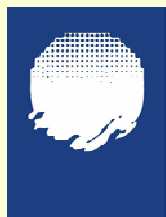


# 2009

**Boletín del  
Observatorio del Ebro  
Observaciones  
geomagnéticas en la  
isla Livingston - Antártida**





Observatori  
de  
l'Ebre

Consejo Superior de Investigaciones Científicas – Universitat Ramon Llull

## BOLETÍN DEL OBSERVATORIO DEL EBRO



**OBSERVACIONES GEOMAGNÉTICAS DE LA ISLA LIVINGSTON  
2009 Y CAMPAÑA 2009-2010**

**LIVINGSTON ISLAND GEOMAGNETIC OBSERVATIONS  
2009 AND 2009-2010 SURVEY**

**S. Marsal, J.M. Torta, J.G. Solé, M. Ibáñez**



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**Por - by**

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OBSERVATORI DE L'EBRE

Roquetes

2010

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## 1. INTRODUCCIÓN

En este Boletín se presentan las observaciones magnéticas registradas en el Observatorio Geomagnético de la Isla Livingston durante el año 2009 y la campaña antártica 2009-2010.

La instalación y operación del observatorio se enmarcaron en el Proyecto ANT95-0994-C03 del Programa Nacional de Investigación en la Antártida. Durante la campaña 1995-1996 se realizó el montaje de las casetas que en la actualidad albergan la estación magnética, ubicada en la Base Antártica Española (BAE) Juan Carlos I de la Isla Livingston (Islas Shetland del Sur). Paralelamente, se procedió a la verificación de la estación magnética así como de los equipos de medida absoluta del campo geomagnético en el *Observatori de l'Ebre*. Una evaluación de la homogeneidad espacial de las variaciones registradas, así como de la particular anomalía magnética cortical en el observatorio pueden encontrarse en TORTA et al. (1999a). Durante la campaña 1996-1997 se instaló el variómetro, del que se tienen registros desde el 7 de Diciembre de 1996, y se procedió a la realización de las primeras medidas absolutas.

En los anteriores Boletines (TORTA et al., 1997a, 1998, 1999b; GAYA-PIQUÉ et al., 2000, 2002; MARSAL et al., 2003, 2004, 2005, 2006, 2007, 2008, 2009) se han ido resumiendo sucesivamente las medidas realizadas desde esa fecha hasta febrero de 2009. Cabe señalar que el observatorio se encuentra atendido sólo durante los meses del verano austral. De esta forma, nuestra actividad en la campaña antártica 2009-2010 quedó comprendida entre el 2 de Diciembre de 2009 y el 7 de Febrero de 2010. Sin embargo, el observatorio se deja en registro continuo automático durante los meses de Marzo a Noviembre, recuperándose los datos de este período al inicio de la campaña siguiente.

Los valores del campo registrados por el observatorio son transmitidos a través del satélite GOES-E hasta el nodo de información geomagnética (GIN) que INTERMAGNET posee en Ottawa. Los datos son recuperados posteriormente por el *Observatori de l'Ebre* y mostrados en su página web: [www.obsebre.es/php/geomagnetisme.php](http://www.obsebre.es/php/geomagnetisme.php)

Se puede obtener más información dirigiéndose a:

**Observatori de l'Ebre**  
**Datos Antárticos**  
**43520 Roquetes (Tarragona)**

**Tel.: 977 50 05 11**  
**Fax: 977 50 46 60**  
**e\_mail: smarsal@obsebre.es**  
**jmtorta@obsebre.es**

## 2. SITUACIÓN GEOGRÁFICA

La instalación del observatorio requirió la edificación de tres casetas térmicamente aisladas y construidas con materiales amagnéticos. La zona de emplazamiento de la estación magnética fue definida después de un estudio realizado por el *Instituto Geográfico Nacional* (CASAS et al., 1992) durante la campaña 1990-1991. Los resultados del levantamiento magnético efectuado mostraron que el lugar más apropiado es la zona de Punta Polaca, situada al Oeste de las instalaciones de la BAE y a unos 350 m de distancia de ellas aproximadamente. Asimismo, el lugar se encuentra suficientemente alejado del conjunto de instalaciones de la BAE para que no existan riesgos de contaminación de los registros magnéticos debido a la influencia de la Base o a efectos antropogénicos. De las tres casetas, una aloja los sensores de un magnetómetro vector cuyo sensor es un magnetómetro de protones (PVM); otra contiene la electrónica, el sistema de control y adquisición de datos; y la tercera alberga el magnetómetro para la realización de medidas absolutas. Durante la campaña 2007-2008 se incorporó una nueva caseta que alberga un nuevo variómetro de tipo fluxgate triaxial.

Las coordenadas del pilar fundamental son las siguientes:

<b>Latitud Geográfica</b>	<b>62°</b>	<b>39'</b>	<b>44" S</b>
<b>Longitud Geográfica</b>	<b>60°</b>	<b>23'</b>	<b>41" W</b>
<b>Latitud Geomagnética*</b>	<b>52°</b>	<b>50'</b>	<b>13" S</b>
<b>Longitud Geomagnética*</b>	<b>8°</b>	<b>57'</b>	<b>42" E</b>
<b>Altitud s.n.m.</b>	<b>19.4 m</b>		

\*Calculado a partir de la 11ª generación del IGRF para la época 2010.0.

A 460 m en dirección Este del pilar fundamental se clavó un jalón como marca de referencia para la determinación de la Declinación. El acimut determinado entre la línea pilar-jalón y el Norte Geográfico es 90° 52' 3.66".

### 3. INSTRUMENTOS Y OPERACIÓN

#### 3.1. VARIÓMETROS

Los dos instrumentos principales de la estación magnética automática son el magnetómetro vector (PVM) y el fluxgate triaxial suspendido (modelo FGE), ubicados en sendas casetas.

El PVM está constituido por un magnetómetro de precesión de protones Geomag sm90r de efecto Overhauser que mide la intensidad total del campo (F). El sensor de este magnetómetro está montado en el centro de dos conjuntos de bobinas de Helmholtz mutuamente perpendiculares orientados respectivamente según las direcciones dadas por la Declinación e Inclinación locales. Al aplicar corriente a esas bobinas y medir la magnitud de los vectores resultantes, pueden obtenerse los cambios en la Declinación, D, y la Inclinación, I; el sistema se conoce como configuración  $\delta D/\delta I$ . La estación fue desarrollada por el Geomagnetism Group del *British Geological Survey* (BGS) en Edimburgo. Los detalles técnicos de la misma pueden encontrarse en RIDDICK et al. (1995), y una descripción resumida de su fundamento y operación en TORTA et al. (1997b) y en MARSAL et al. (2007).

El FGE, construido por el *Danish Meteorological Institute* (DMI) (ver detalles en Danish Meteorological Institute, 2006), incluye tres sensores fluxgate suspendidos dispuestos ortogonalmente sobre un soporte de mármol. En nuestro caso, el conjunto se orienta de acuerdo con los tres ejes magnéticos locales, H, D y Z. La salida analógica de este magnetómetro es digitalizada por medio de dos conversores A/D de 16 bits que se muestrean a 1 y 0.1 Hz. El primero está configurado para un rango dinámico de 3200 nT y una resolución de 0.05 nT, mientras que el segundo posee un rango dinámico de 6400 nT y resolución 0.3 nT.

Tanto el muestreo de ambos variómetros como la sincronización de tiempo se realizan bajo control de hardware basado en un microcontrolador PIC 16F877 y un receptor GPS. Los procesos de adquisición, almacenamiento, monitorización y transmisión de datos se realizan por medio de software desarrollado en lenguaje C en un PC embebido sobre LINUX (TORTA et al., 2009). Estos elementos se encuentran ubicados en una tercera caseta, que asimismo aloja la electrónica que permite suministrar corriente estable a las bobinas  $\delta D/\delta I$  del PVM, así como la fuente de alimentación del conjunto de la estación. Como se ha dicho, los conversores A/D del magnetómetro FGE se muestrean a frecuencias de 1 y 0.1 Hz, mientras que para el PVM se produce un ciclo completo de polarizaciones de las bobinas  $\delta D/\delta I$  una vez por minuto.

#### 3.2. MEDIDAS ABSOLUTAS

Para la realización de medidas absolutas se ha utilizado un DI-flux ELSEC 810A, que consta de un magnetómetro fluxgate cuyo sensor viene montado en un teodolito amagnético Zeiss 015B. La electrónica se encuentra en el exterior de la caseta.

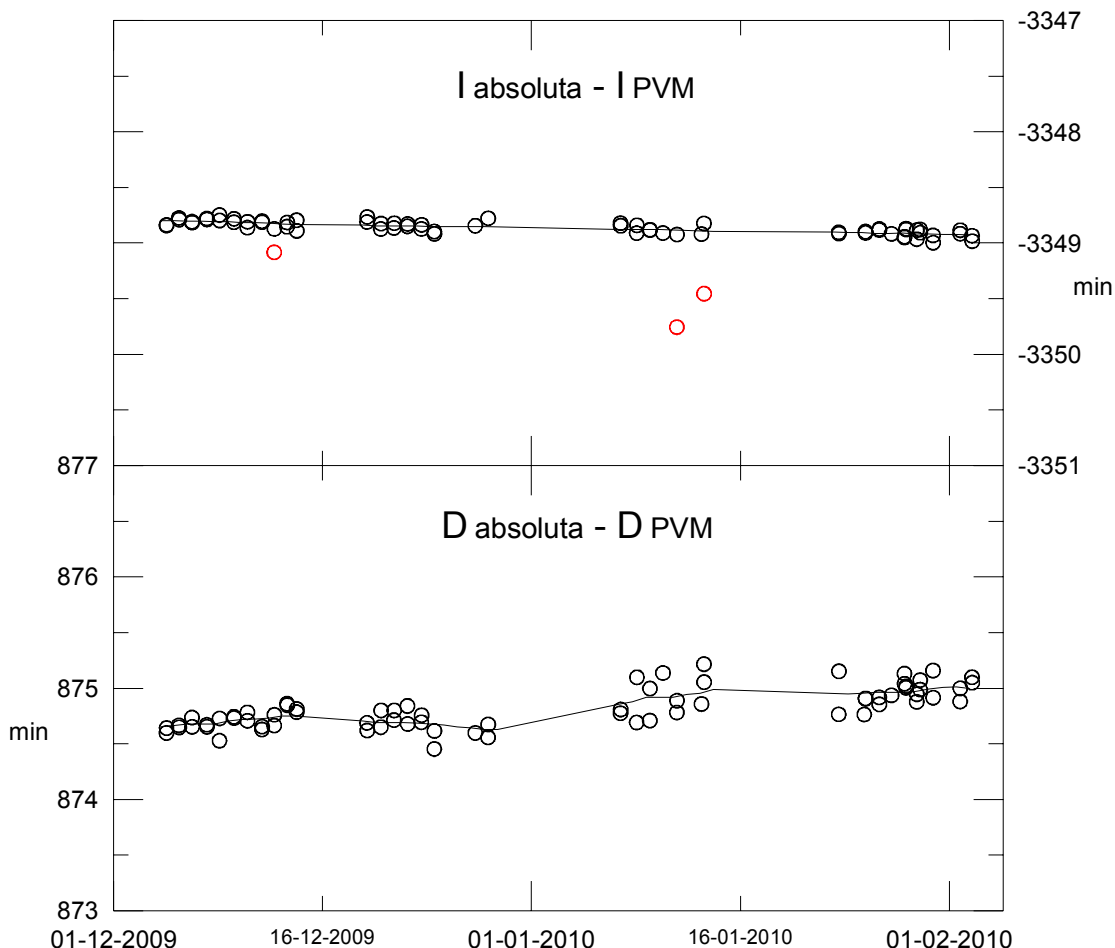


El procedimiento de observación está basado en la determinación de campo nulo para la obtención de D e I. Para eliminar los errores de colimación entre el sensor y el eje óptico del teodolito, así como los debidos al "offset" de campo nulo generados por la electrónica, se realizan observaciones en las cuatro posiciones posibles para cada elemento (ver, p.e., JANKOWSKI Y SUCKSDORFF, 1996, TORTA et al., 1997b, o MARSAL Y TORTA, 2007).

Para la determinación contemporánea de la intensidad total (F) se extraen los valores correspondientes de la secuencia de medidas del PVM cuando éste mide con las bobinas sin polarizar. Para su reducción a la posición del pilar fundamental se han efectuado varias series de medidas en el mismo con el magnetómetro de precesión de protones Gem Systems GSM19 de efecto Overhauser. Durante la campaña 2008-2009 tales medidas han proporcionado una diferencia promedio de -1.3 nT (Fpilar fundamental - Fmagnetómetro vector).

#### 4. PROCESO DE LOS DATOS

El proceso de datos preliminar incluye la detección y eventual eliminación de valores espurios por comparación de los valores de ambos variómetros. Tras la compilación de la serie de medidas absolutas, se ha procedido a la determinación de las líneas de base definitivas.



**Fig. 1. Diferencias observadas entre el DI-flux y el PVM (círculos) y líneas de base adoptadas (líneas continuas) para los dos elementos D e I. Los círculos en rojo corresponden a las diferencias descartadas antes de la adopción de la línea de base. Periodo correspondiente a la campaña 2009-2010.**

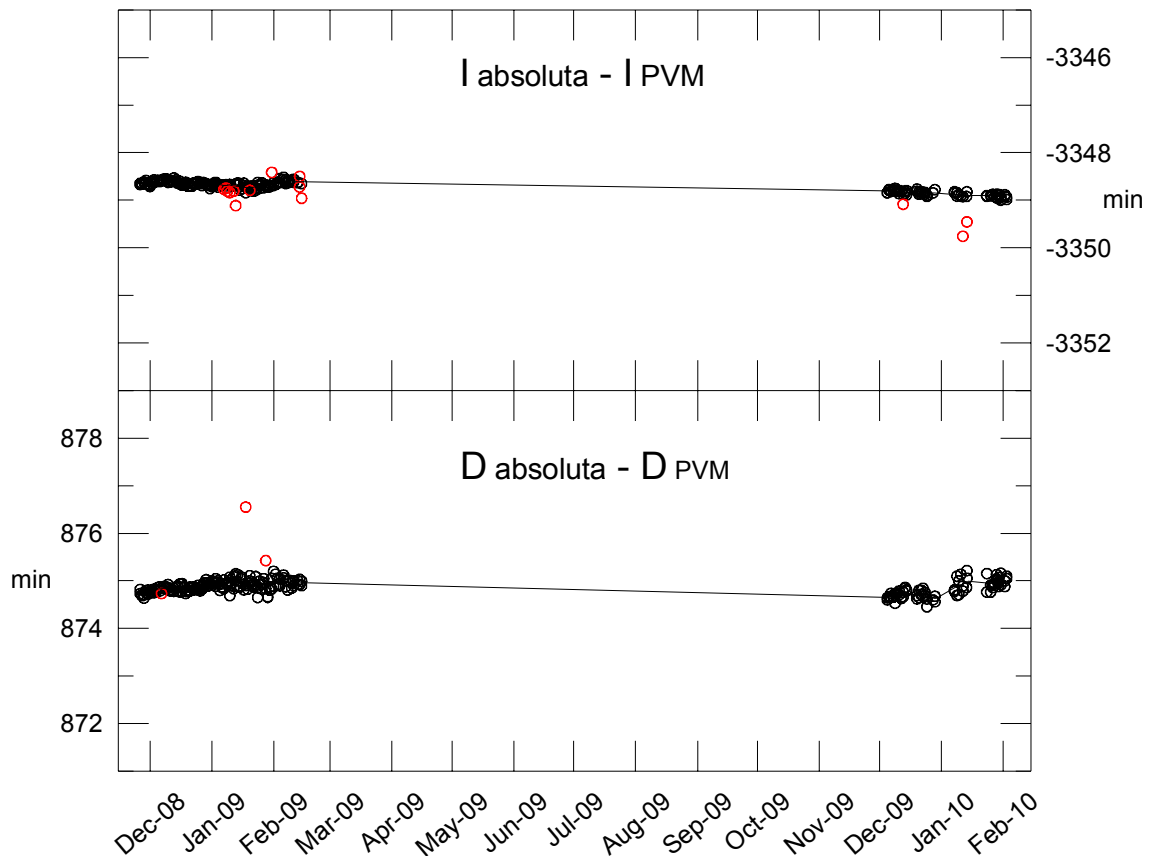
El procedimiento seguido ha sido:

Para cada elemento observado D e I se han abstraído de los valores de las medidas absolutas los valores correspondientes del PVM por un lado y del FGE por otro (diferencias o líneas de base observadas). Sobre estas dos series de diferencias se ha realizado un análisis secuencial que finaliza con la obtención de las líneas de base (diferencias adoptadas). Este proceso incluye el análisis de ciertos observables que determinan la validez de las medidas absolutas individuales, el descarte de los valores de línea de base observada con diferencias excesivas, y una interpolación de los datos no rechazados del tipo que se decida más oportuno según el caso, ya sea una media móvil, un ajuste lineal, cuadrático, etc. Las diferencias observadas y las correspondientes líneas de base adoptadas para el PVM se ilustran en la Fig. 1 para la campaña 2009-2010.

Tras añadir las líneas de base a las medidas de los variómetros (y así trasladarlas a las referencias absolutas) se han producido los valores minuto del PVM y los valores de 1 y 10 segundos del magnetómetro FGE. Sin embargo, los valores del campo magnético para un instante dado no coinciden en ambas series al nivel de precisión que sería deseable, dado que ambos variómetros tienen propiedades distintas. Así, se ha optado por considerar el PVM como instrumento semiabsoluto, es decir, estable a medio y corto plazo (hasta varias semanas o incluso meses), mientras que la mayor resolución, precisión y frecuencia de muestreo del FGE lo hacen apto para la medición precisa de variaciones magnéticas a altas frecuencias; sin embargo, sus medidas (térmicamente sensibles) se encuentran afectadas ligeramente por la onda térmica diurna y en mayor grado por la onda térmica anual (Marsal et al., 2009), pues no se dispone de medios para estabilizar la temperatura de la caseta que lo aloja. De este modo, se reducen los datos del magnetómetro FGE a los datos “semidefinitivos” del PVM, obteniendo así datos definitivos que conjugan las mejores propiedades de ambos instrumentos. Este proceso se realiza trasladando la media móvil de los datos del FGE en una ventana de cien minutos a la correspondiente media móvil del PVM en la misma ventana temporal. En resumen, se utiliza el DI-flux como instrumento absoluto para referenciar los datos del PVM en un primer paso, y a su vez se usan dichos datos “semidefinitivos” del PVM como datos semiabsolutos para reducir los datos del FGE en un segundo paso. De los valores minuto así derivados se obtienen fácilmente los magnetogramas y las tablas de medias que se presentan a continuación.

Teniendo en cuenta la conducta manifestada durante las últimas campañas en las que se han realizado medidas absolutas, las líneas de base que se han adoptado para el período entre ellas obedecen a funciones lineales con las pendientes necesarias para pasar de las diferencias adoptadas al final de una campaña a las del principio de la siguiente (Fig. 2).

Aunque la evolución de las líneas de base durante el periodo sin medidas absolutas es desconocida, cabe resaltar su considerable estabilidad interanual a lo largo de los últimos años. Teniendo en cuenta que una variación de 1 minuto de arco en declinación equivale a una variación de 5.8 nT en la dirección del Este magnético, la deriva invernal de la línea de base de esta componente ha sido inferior a 2 nT. Equivalentemente, una variación de 1 minuto de arco para la inclinación magnética supone un cambio de 8.5 y 5.8 nT en las intensidades horizontal y vertical (H y Z) respectivamente, lo que se traduce en una variación total del orden de 2 nT para H y 1 nT para Z.



**Fig. 2. Equivalente a la figura anterior para el periodo completo de registro desde noviembre de 2008 hasta febrero de 2010.**

## 5. INCIDENCIAS

En este apartado se relacionan las incidencias más importantes que afectan a los datos, ocurridas durante el periodo que abarca este boletín. Los periodos no mencionados disponen de un registro normal.

- 1- Debido al deterioro del sistema de adquisición de energía de la base, en el periodo comprendido entre el día 10 de mayo y el 7 de junio de 2009 el PVM deja de adquirir datos. Esto da lugar a una mayor incertidumbre en los datos finales, puesto que se asume que los registros del FGE son más sensibles a variaciones de temperatura. De todos modos, la amplitud de la onda térmica diurna suele estar comprendida entre 1 y 2 °C en el interior del sensor FGE, lo que da lugar a un error máximo de 0.5 nT en los datos finales de los distintos componentes del campo (suponiendo un coeficiente de temperatura de 0.25 nT/°C dado por el fabricante).
- 2- Por las mismas razones anteriores, a partir del 7 de junio de 2009 se pierde todo registro de la estación hasta el inicio de la campaña 2009-2010, concretamente el 4 de diciembre de 2009.
- 3- Entre los días 24 de diciembre de 2009 y 4 de enero de 2010 se desmantela el magnetómetro FGE para apantallarlo a fin de evitar las interferencias producidas por una estación de radio cercana.
- 4- Entre el 31 de diciembre de 2009 y el 6 de enero de 2010 se produce una avería en el PVM. Sin embargo, entre los días 4 y 6 de enero se dispone de datos de F del magnetómetro de protones. Con ellos se corrigen parcialmente los datos del FGE.
- 5- Entre el 14 y el 23 de enero de 2010 se produce una segunda avería en el PVM, con lo que se obtienen datos definitivos a base de reducir directamente los valores del FGE al

pilar fundamental. Como en la incidencia 1, la cota máxima de error asociada a la penetración de la onda térmica diurna dentro del sensor FGE se estima en 0.5 nT.

Como consecuencia de las incidencias 3 y 4, entre los días 24 y 29 de diciembre de 2009 se obtienen datos definitivos a partir de los valores del PVM reducidos directamente al pilar fundamental, con lo que se pierden los registros de alta frecuencia (1 y 0.1 Hz) proporcionados por el magnetómetro FGE.

## 6. PRESENTACIÓN DE LOS DATOS

Los valores medios anuales para todos los elementos del campo obtenidos hasta la publicación de este Boletín se presentan en la tabla 1. Puesto que las líneas de base adoptadas en la Fig. 2 para el período sin medidas absolutas podrían diferir de las reales, damos en la tabla 2 las medias correspondientes únicamente a los períodos con referencias absolutas. Corresponden básicamente a las medias sobre los meses de Diciembre, Enero y Febrero de cada campaña. Las medias correspondientes a la época 2009.5 no se presentan debido a la falta de datos durante 6 meses (7 de junio a 4 de diciembre de 2009).

Año	D	H	Z	X	Y	I	F
1997.5	14° 55.5'	20522	-30040	19830	5286	-55° 39.7'	36380
1998.5	14° 54.7'	20465	-29976	19776	5266	-55° 40.7'	36295
1999.5	14° 53.5'	20415	-29910	19729	5246	-55° 41.1'	36213
2000.5	14° 52.4'	20369	-29855	19686	5228	-55° 41.8'	36141
2001.5	14° 49.8'	20319	-29786	19642	5201	-55° 42.0'	36057
2002.5	14° 47.1'	20262	-29717	19591	5171	-55° 42.7'	35967
2003.5	14° 45.0'	20210	-29665	19544	5146	-55° 44.1'	35895
2004.5	14° 42.0'	-	-	-	-	-	35813
2005.5	14° 39.5'	20113	-29536	19459	5088	-55° 44.7'	35738
2006.5	14° 36.3'	20072	-29471	19423	5061	-55° 44.5'	35657
2007.5	14° 33.5'	20025	-29414	19382	5034	-55° 45.2'	35583
2008.5	14° 30.4'	19970	-29347	19333	5002	-55° 46.0'	35497
2009.5	-	-	-	-	-	-	-

**Tabla 1. Valores medios anuales para todos los elementos del campo magnético. H, Z, X, Y y F vienen dados en unidades de nT.**

Año	D	H	Z	X	Y	I	F
1997.0	14° 55.7'	20554	-30065	19860	5295	-55° 38.5'	36419
1998.0	14° 54.8'	20504	-29995	19814	5277	-55° 38.6'	36334
1999.0	14° 53.9'	20447	-29934	19759	5257	-55° 39.9'	36250
2000.0	14° 52.7'	20339	-29868	19715	5238	-55° 40.1'	36169
2001.1	14° 50.5'	20345	-29799	19666	5211	-55° 40.6'	36082
2002.0	14° 48.6'	20298	-29738	19624	5188	-55° 41.0'	36005
2003.0	14° 45.9'	20246	-29679	19578	5160	-55° 42.0'	35927
2004.0	14° 43.8'	20194	-29630	19530	5135	-55° 43.4'	35857
2005.0	14° 41.4'	20144	-29564	19486	5109	-55° 43.8'	35775
2006.0	14° 37.8'	20102	-29494	19451	5077	-55° 43.4'	35693
2007.0	14° 35.0'	20048	-29438	19402	5048	-55° 44.6'	35616
2008.0	14° 31.8'	19999	-29372	19359	5018	-55° 45.0'	35534
2009.0	14° 28.9'	19950	-29310	19316	4989	-55° 45.5'	35455
2010.0	14° 26.3'	19895	-29240	19267	4961	-55° 46.1'	35366

**Tabla 2. Valores medios para los períodos con referencias absolutas**

Los datos que se presentan a continuación son:

- i) Índices K, calculados automáticamente mediante el método FMI, según una modificación del programa original (en lenguaje C) creado por P. McFadden (AGSO). Q y D indican los cinco días Internacionales de Calma y Perturbados de cada mes, respectivamente.
- ii) Magnetogramas diarios de la declinación (D), intensidad horizontal (H) e intensidad vertical (Z), mostrados secuencialmente y por meses.
- iii) Magnetogramas diarios de la intensidad total (F), mostrados secuencialmente y por meses.
- iv) Tablas mensuales de los valores medios horarios de D, H, Z y F. Todas las medias han sido calculadas a partir de valores minuto.

Los datos definitivos instantáneos de 1 y 10 segundos, así como las medias minuto, horarias, diarias y mensuales pueden encontrarse en los centros mundiales de datos (WDC) y en la web del *Observatori de l'Ebre*: [www.obsebre.es/php/geomagnetisme.php](http://www.obsebre.es/php/geomagnetisme.php).

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## 1. INTRODUCTION

*In this Bulletin we give details of the magnetic observations recorded at the Livingston Island Geomagnetic Observatory during 2009, including the 2009-2010 austral summer survey.*

*Both the observatory installation and operation were on behalf of the National Program for Antarctic Research Project ANT95-0994-C03. In order that this objective could be achieved, during the 1995-1996 survey, the magnetic observatory instrument accommodation was deployed at the Spanish Antarctic Station Juan Carlos I (Livingston Island in the South Shetland Island group). In parallel with this work both the variometer station and the absolute observing instruments were tested and calibrated at Ebre Observatory, Roquetes, Tarragona, Spain. An assessment of the spatial homogeneity of the recorded variations, as well as of the particular observatory crustal anomaly biases are given in TORTA et al. (1999a). Both the variometer, deployed in a set of  $\delta D/\delta I$  coils and the absolute instruments were installed during December 1996, with continuous recording and the absolute observing program beginning on December 7, 1996.*

*In the previous Bulletins (TORTA et al., 1997a, 1998, 1999b; GAYA-PIQUÉ et al., 2000, 2002; MARSAL et al., 2003, 2004, 2005, 2006, 2007, 2008, 2009) the measurements made between that date and February 2009 were summarized. As this site is only manned during the Austral summer all scientific staff departs at the end of February each survey, but the magnetometers are left recording and we retrieve the data recorded throughout the winter at the beginning of the next survey season. Thus, our activity during the 2009-2010 survey covered the period between December 2, 2009 and February 7, 2010.*

*Data recorded at the Observatory are transmitted via GOES-E satellite to the INTERMAGNET Geomagnetic Information Node (GIN) at Ottawa, being them afterwards retrieved by Ebre Observatory and made available in its website: [www.obsebre.es/php/geomagnetisme.php](http://www.obsebre.es/php/geomagnetisme.php)*

*It is possible to obtain more information applying to:*

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<b>Antarctic Data</b>	<b>Fax:</b>	<b>977 50 46 60</b>
<b>43520 Roquetes (Tarragona)</b>	<b>e_mail:</b>	<b>smarsal@obsebre.es</b> <b>jmtorta@obsebre.es</b>

## 2. POSITION

*The installation of the observatory required the erection of three thermally isolated huts which had been prefabricated using non-magnetic materials. The location of the observatory was determined using the results of a study made by the Instituto Geográfico Nacional (CASAS et al., 1992) during the 1990-1991 field season. The results of this magnetic survey showed the most appropriate site to be around the area named as Punta Polaca, located to the west of the Station settlement and at approximately 350 m from the main base. Located at this position, the site is far enough from the settlement to avoid man-made disturbances. One hut houses the Proton Vector Magnetometer (PVM); the second contains the control electronics and the data acquisition system; and the third accommodates the D/I fluxgate theodolite for the absolute observations. During the 2007-2008 survey a new hut was added up, which houses a tri-axial fluxgate magnetometer.*

*The coordinates of the absolute pillar are:*

<b>Geographic latitude</b>	<b>62°</b>	<b>39'</b>	<b>44" S</b>
<b>Geographic longitude</b>	<b>60°</b>	<b>23'</b>	<b>41" W</b>



<b>Geomagnetic latitude*</b>	<b>52°</b>	<b>50'</b>	<b>13" S</b>
<b>Geomagnetic longitude*</b>	<b>8°</b>	<b>57'</b>	<b>42" E</b>
<b>Height above msl</b>	<b>19.4 m</b>		

\* Computed from the 11th Generation of IGRF for the epoch 2010.0.

At a position 460 m to the west of the absolute pillar a fixed mark was constructed which is used as the reference mark in the determination of declination. The angle viewed from the D/I pillar between the azimuth mark and the geographic north (the azimuth of the mark) is 90° 52' 3.66".

### 3. INSTRUMENTS AND OPERATION

#### 3.1. VARIOMETERS

The two main instruments in the automatic magnetic observatory are a Proton Vector Magnetometer (PVM) and a suspended tri-axial fluxgate (model FGE), located in their respective huts.

The PVM is made up of a Geomag sm90r Overhauser magnetometer used to measure total field intensity ( $F$ ). This magnetometer is deployed at the centre of a pair of dual axis Helmholtz coils which are deployed parallel to the directions given by the local declination and inclination. By applying bias currents through these coils and measuring the resultant vectors, changes in declination,  $D$ , and inclination,  $I$ , may be obtained; this is known as the  $\delta D/\delta I$  configuration. The equipment was developed by the Geomagnetism Group of the British Geological Survey (BGS) in Edinburgh. Its technical details are described by RIDDICK et al. (1995), and a summarized description of its principles and operation by TORTA et al. (1997b) and MARSAL et al. (2007).

The FGE, made by the Danish Meteorological Institute (DMI) (see details in Danish Meteorological Institute, 2006), includes three suspended fluxgate sensors arranged orthogonally on a stable support made of marble. In our case, this trihedron is oriented by the variometer frame in the direction of the local magnetic axes,  $H$ ,  $D$  and  $Z$ . The analog output of this magnetometer is digitized by means of two 16-bit A/D converters, which sample at both 1 and 0.1 Hz frequencies. The first one is set to a dynamic range of 3200 nT and a resolution of 0.05 nT, while the second has a dynamic range of 6400 nT and a resolution of 0.3 nT.

All sampling and timing are carried out under the control of hardware based on a PIC 16F877 microcontroller and a GPS receiver. The data acquisition, storage, monitoring and transmission processes are supervised using control software developed in C-language, which runs on a low power LINUX-based embedded PC. These elements are located in a third hut, which also accommodates the electronics which generates stable currents to the  $\delta D/\delta I$  bias coils of the PVM, as well as the power supply for the whole station. As pointed out above, the A/D converters are sampled at both 1 and 0.1 Hz frequencies, while a complete cycle of polarizations of the PVM  $\delta D/\delta I$  coils is produced every minute.

#### 3.2. ABSOLUTE OBSERVATIONS

For the absolute measurements of declination and inclination an ELSEC 810A D/I-fluxgate theodolite is used. It comprises a single axis fluxgate magnetometer sensor element mounted on a Zeiss 015B nonmagnetic theodolite with the electronics package placed outside the hut.

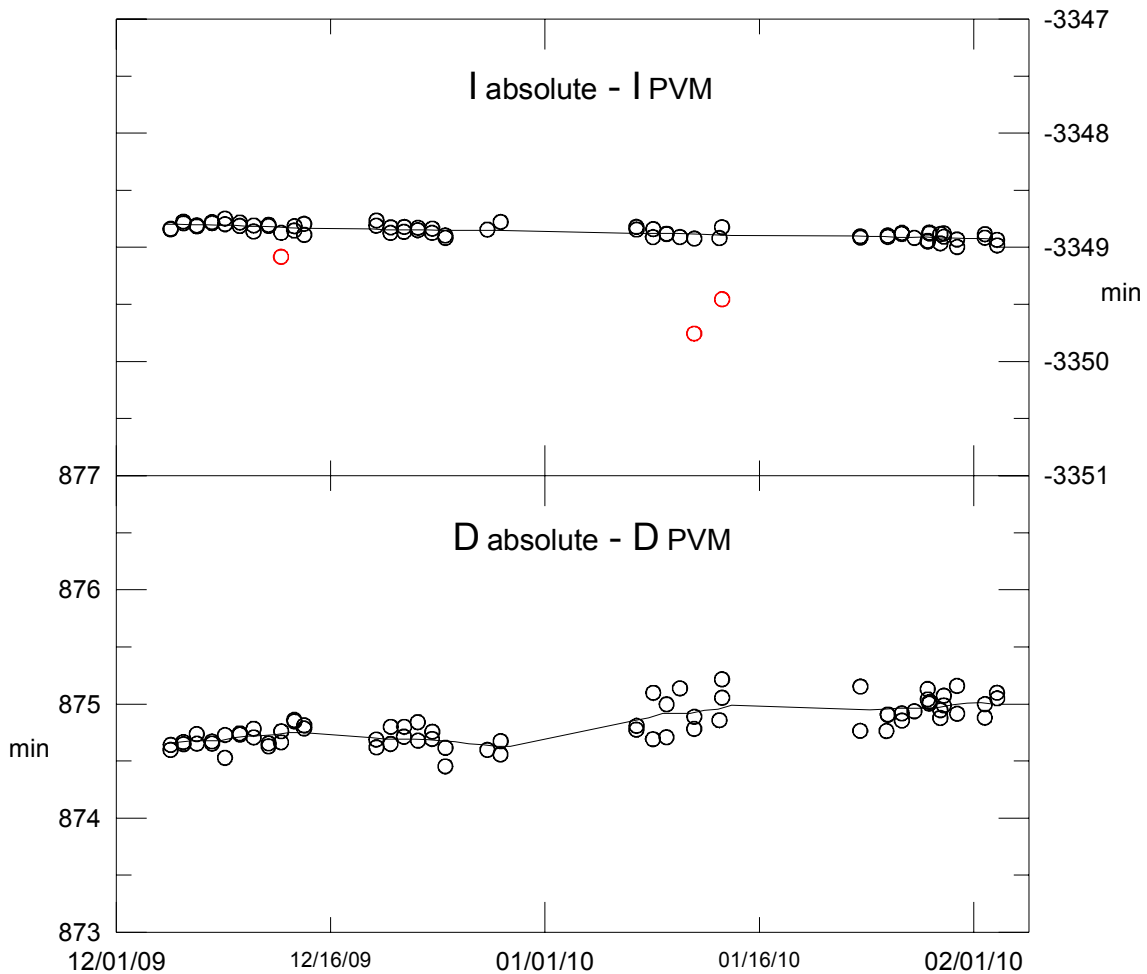
The D/I observation procedure is based on the null-field technique to measure  $D$  and  $I$ . To remove the errors due to the misalignment of the magnetic axis of the fluxgate and the optical axis of the theodolite, as well as those due to the zero-field offset generated by the control

electronics, the observations are made in four positions for each element (see, e.g., JANKOWSKI & SUCKSDORFF, 1996, TORTA et al., 1997b, or MARSAL & TORTA, 2007).

The total field intensity ( $F$ ) values are obtained from the PVM when it measures without polarizing the coils. For their reduction to the D/I pillar, several series of simultaneous measurements have been made using a Gem Systems GSM19 Overhauser proton precession magnetometer on it. These measurements gave a mean difference of  $-1.3$  nT (Fabsolute pillar - Fvector magnetometer) for the 2009-2010 survey.

#### 4. DATA PROCESSING

The preliminary data processing included the detection and elimination of any spikes in the data by comparing the values obtained with both variometers. After the compilation of the absolute measurements series, the definitive baselines were determined



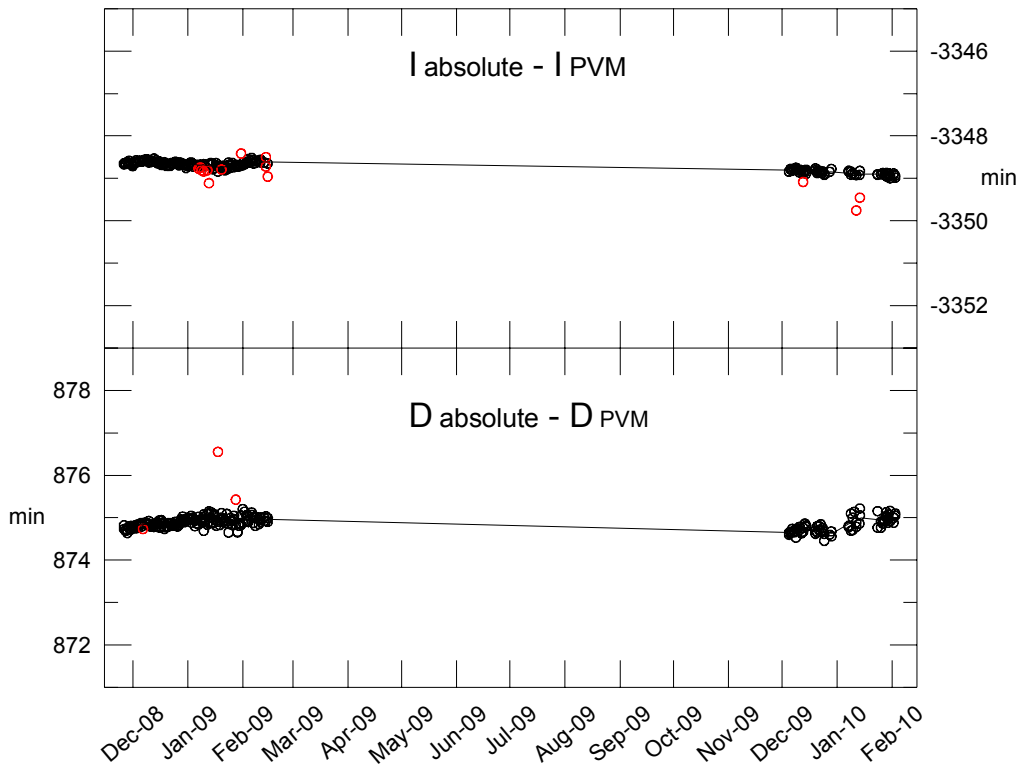
**Fig. 1.** Observed differences between the D/I-fluxgate and the PVM (circles) and adopted baselines (lines) for the two elements I and D. Red circles correspond to differences removed before the adoption of the baseline. Period corresponding to the 2009-2010 survey.

Following procedure was adopted to allocate the baselines:

For each observed element D and I, the absolute measurements were subtracted from the corresponding values of the PVM on the one hand, and from the FGE values on the other hand

(observed differences or observed baselines). To these two series of differences a sequential analysis was applied towards the determination of the adopted differences or adopted baselines. This process included an analysis of a series of observable quantities that determine the validity of the individual absolute measurements, the rejection of the observed baseline values with excessive differences, and the most suitable interpolation of the accepted data as the case may be: a running average, a linear or square fitting, etc. The observed differences and the corresponding adopted baselines for the PVM are plotted in Figure 1 for the 2009-2010 survey.

By adding the baselines to the vector magnetometer values (and thus translating the vector data to the absolute references) both the definitive minute values of the PVM and the 1- and 10-second values of the FGE magnetometer were produced. However, the magnetic field values of both data series for a given moment did not coincide at the desirable level of accuracy, as both instruments have different properties. Thus, we considered the PVM as a semi-absolute instrument, i.e., stable in the short and medium term (up to several weeks or even months), while the higher resolution, accuracy and sampling frequency of the FGE make it suitable for the precise measurement of the high-frequency magnetic field variations; nonetheless, its measurements (thermally sensitive) are slightly affected by the diurnal thermal wave and, to a larger extent, by the annual thermal wave (Marsal et al., 2009), since no means of temperature stabilization are available in the FGE hut. In this way, the FGE magnetometer data are reduced to the 'semi-definitive' data obtained from the PVM, giving rise to definitive data that combine the best properties of both instruments. This process consists of translating the running average of the FGE in a time window of one-hundred minutes to the corresponding running average of the PVM in the same time window. In summary, the D/I-fluxgate is used as the absolute instrument to reference the PVM data in a first step, and in turn such PVM 'semi-definitive' data are used to reduce the FGE data in a second step. The magnetograms and the tables of means which are presented below were obtained from these values.



**Fig. 2.** As the previous figures but for the complete recording period from November 2008 to February 2010.

Taking into account the behaviour exhibited during the last surveys in which absolute measurements were made, the baselines adopted for the period in between are linear functions with the necessary slopes to pass from the adopted differences at the end of the penultimate survey to those at the beginning of the last one (Figure 2).

Although the baselines evolution during the period without absolute control is unknown, its present year-to-year stability should be noted. Taking into account that a change of one minute of arc in declination means a variation of 5.8 nT in the East magnetic direction, the drift of the baseline of this component for the last winter season was less than 2 nT. Equivalently, a variation of one minute of arc in the magnetic inclination entails a change of 8.5 and 5.8 nT in the horizontal and vertical intensities (H and Z) respectively, which means a total variation of about 2 nT for H and 1 nT for Z.

## 5. INCIDENCES

In this section we list the most important incidences on the data occurring on the time span to which this bulletin corresponds. The remaining periods have normal recording.

- 1- Due to problems affecting the energy acquisition system in the Base, PVM data were not available in the period between May 10th and June 7<sup>th</sup>, 2009. This gives rise to additional uncertainty in the final data, since the available FGE data are assumed to be more sensitive to temperature variations. However, the amplitude of the diurnal thermal wave in the FGE sensor is within 1 and 2 °C, which gives rise to a maximum error of 0.5 nT in the final components of the magnetic field (assuming a thermal coefficient of 0.25 nT/°C given by the manufacturer).
- 2- For the same stated above reason, all geomagnetic records are lost from June 7th 2009 until December 4th 2009, at the beginning of the last summer survey.
- 3- Between December 24th 2009 and January 4th 2010 the FGE magnetometer was dismantled in order to shield it against the interferences produced by a nearby broadcasting station.
- 4- Between December 31st 2009 and January 6th 2010 a failure of the PVM was produced. However, between January 4th and 6th Proton F values were available, which permitted partial correction of the FGE measurements.
- 5- Between January 14th and 23rd 2010 a second failure of the PVM was produced. During this period, definitive values are directly obtained by reducing FGE values to the fundamental pillar. Similar to the case of incidence 1, an upper limit for the error associated to the penetration of the diurnal thermal wave into the FGE sensor is estimated at 0.5 nT.

As a consequence of incidences 3 and 4, between December 24th and 29th 2009 definitive data are directly obtained by reducing the PVM data to the fundamental pillar. This causes a loss of the higher sampling rate (1 and 0.1 Hz) data provided by the FGE magnetometer.

## 6. PRESENTATION OF DATA

The annual mean values for all magnetic elements obtained until the publication of this Bulletin are presented in table 1. Since the adopted baselines of figure 2 for the period without absolute measurements might differ from the actual ones, we give in table 2 the means corresponding to only the periods with absolute references, basically corresponding to the means over December, January and February of each Survey. The means corresponding to the 2009.5 epoch are not presented because of the lack of data during 6 months (June 7th – December 4th, 2009).

Year	D	H	Z	X	Y	I	F
1997.5	14° 55.5'	20522	-30040	19830	5286	-55° 39.7'	36380
1998.5	14° 54.7'	20465	-29976	19776	5266	-55° 40.7'	36295
1999.5	14° 53.5'	20415	-29910	19729	5246	-55° 41.1'	36213
2000.5	14° 52.4'	20369	-29855	19686	5228	-55° 41.8'	36141
2001.5	14° 49.8'	20319	-29786	19642	5201	-55° 42.0'	36057
2002.5	14° 47.1'	20262	-29717	19591	5171	-55° 42.7'	35967
2003.5	14° 45.0'	20210	-29665	19544	5146	-55° 44.1'	35895
2004.5	14° 42.0'	-	-	-	-	-	35813
2005.5	14° 39.5'	20113	-29536	19459	5088	-55° 44.7'	35738
2006.5	14° 36.3'	20072	-29471	19423	5061	-55° 44.5'	35657
2007.5	14° 33.5'	20025	-29414	19382	5034	-55° 45.2'	35583
2008.5	14° 30.4'	19970	-29347	19333	5002	-55° 46.0'	35497
2009.5	-	-	-	-	-	-	-

**Table 1. Annual mean values for all magnetic elements. H, Z, X, Y and F are given in nT units.**

Year	D	H	Z	X	Y	I	F
1997.0	14° 55.7'	20554	-30065	19860	5295	-55° 38.5'	36419
1998.0	14° 54.8'	20504	-29995	19814	5277	-55° 38.6'	36334
1999.0	14° 53.9'	20447	-29934	19759	5257	-55° 39.9'	36250
2000.0	14° 52.7'	20339	-29868	19715	5238	-55° 40.1'	36169
2001.1	14° 50.5'	20345	-29799	19666	5211	-55° 40.6'	36082
2002.0	14° 48.6'	20298	-29738	19624	5188	-55° 41.0'	36005
2003.0	14° 45.9'	20246	-29679	19578	5160	-55° 42.0'	35927
2004.0	14° 43.8'	20194	-29630	19530	5135	-55° 43.4'	35857
2005.0	14° 41.4'	20144	-29564	19486	5109	-55° 43.8'	35775
2006.0	14° 37.8'	20102	-29494	19451	5077	-55° 43.4'	35693
2007.0	14° 35.0'	20048	-29438	19402	5048	-55° 44.6'	35616
2008.0	14° 31.8'	19999	-29372	19359	5018	-55° 45.0'	35534
2009.0	14° 28.9'	19950	-29310	19316	4989	-55° 45.5'	35455
2010.0	14° 26.3'	19895	-29240	19267	4961	-55° 46.1'	35366

**Table 2. Mean values for periods with absolute references.**

The data presented following in this bulletin are:

i) Computer-produced *K* indices by means of the FMI method, according to a modification of the original C-language program created by P. McFadden (AGSO). *Q* and *D* refer to the five International Quiet and Disturbed days in each month, respectively.

ii) Month-at-a-glance daily magnetograms of declination (*D*), horizontal intensity (*H*) and vertical intensity, (*Z*).

iii) Month-at-a-glance daily magnetograms of total intensity (*F*).

iv) Monthly tables of hourly mean values of *D*, *H*, *Z* and *F*. All means have been calculated from minute values.

Definitive 1- and 10-second spot values, as well as 1-minute, hourly, daily and monthly mean values are available in the World Data Centres (WDC) and in the Ebre Observatory website: [www.obsebre.es/php/geomagnetisme.php](http://www.obsebre.es/php/geomagnetisme.php).

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K INDICES & DAILY K SUMS AT LIVINGSTON ISLAND (K=9 LIMIT: 450 nT) FOR 2009 & JANUARY 2010

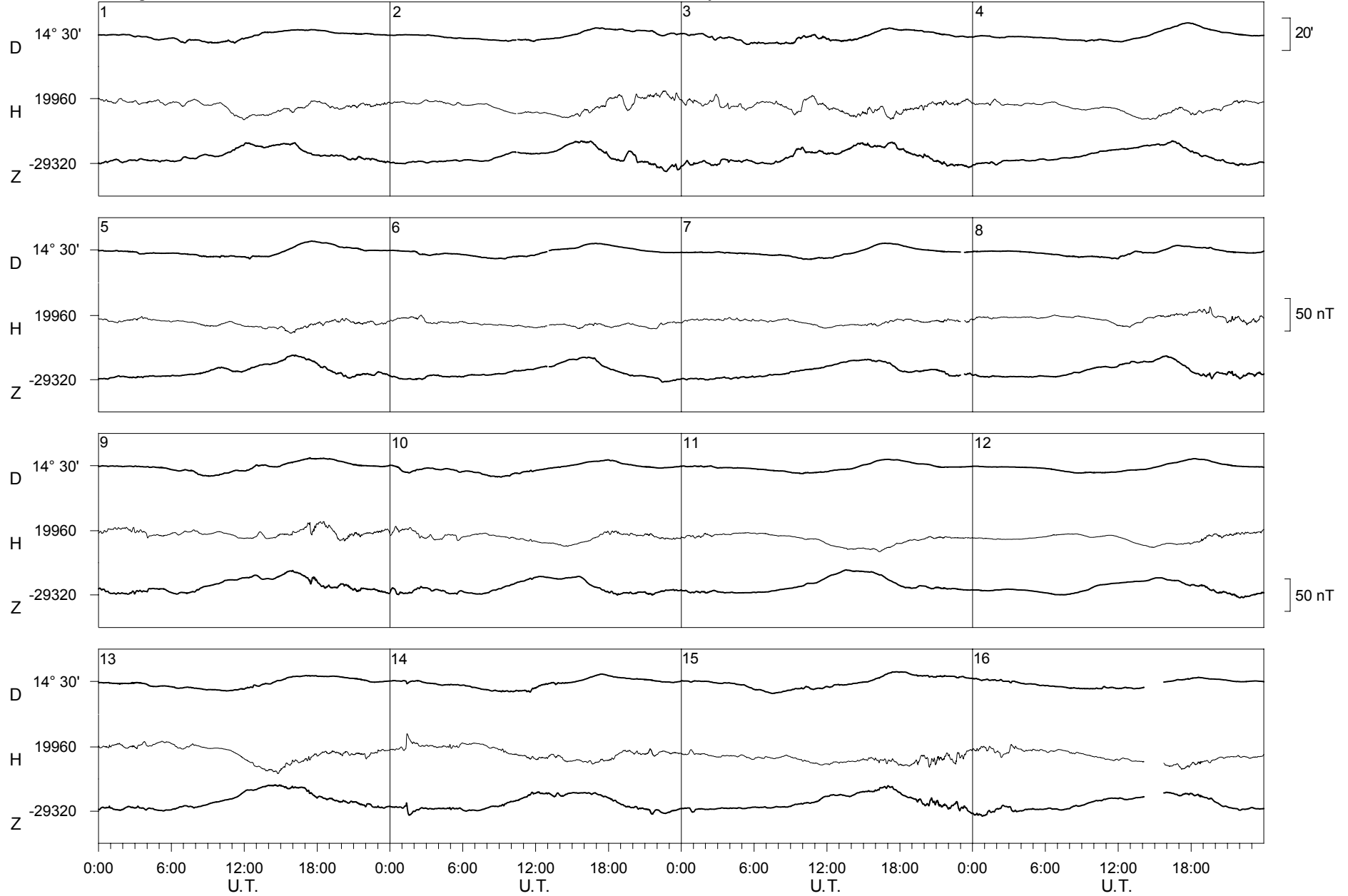
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3	----- -	----- -	Q----- -	Q----- -	Q----- -	----- -	-
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6	D----- -	----- -	----- -	Q----- -	2221 1111 11	1011 1111 7	-
7	----- -	----- -	----- -	----- -	1011 23-- -	Q1011 0121 7	-
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31	----- -	----- -	----- -	----- -	----- -	3111 1122 12	-
Mean K sum	-	-	-	-	10.1	11.1	-

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FEB2009	40	109	53	13	3	0	0	0	0	0	6
MAR2009	64	108	57	15	3	1	0	0	0	0	0
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MAY2009	125	76	35	5	1	1	0	0	0	0	5
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DEC2009	27	81	53	5	0	0	0	0	0	0	82
2009 TOTAL	395	580	324	74	8	3	0	0	0	0	1536
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Livingston Island

January

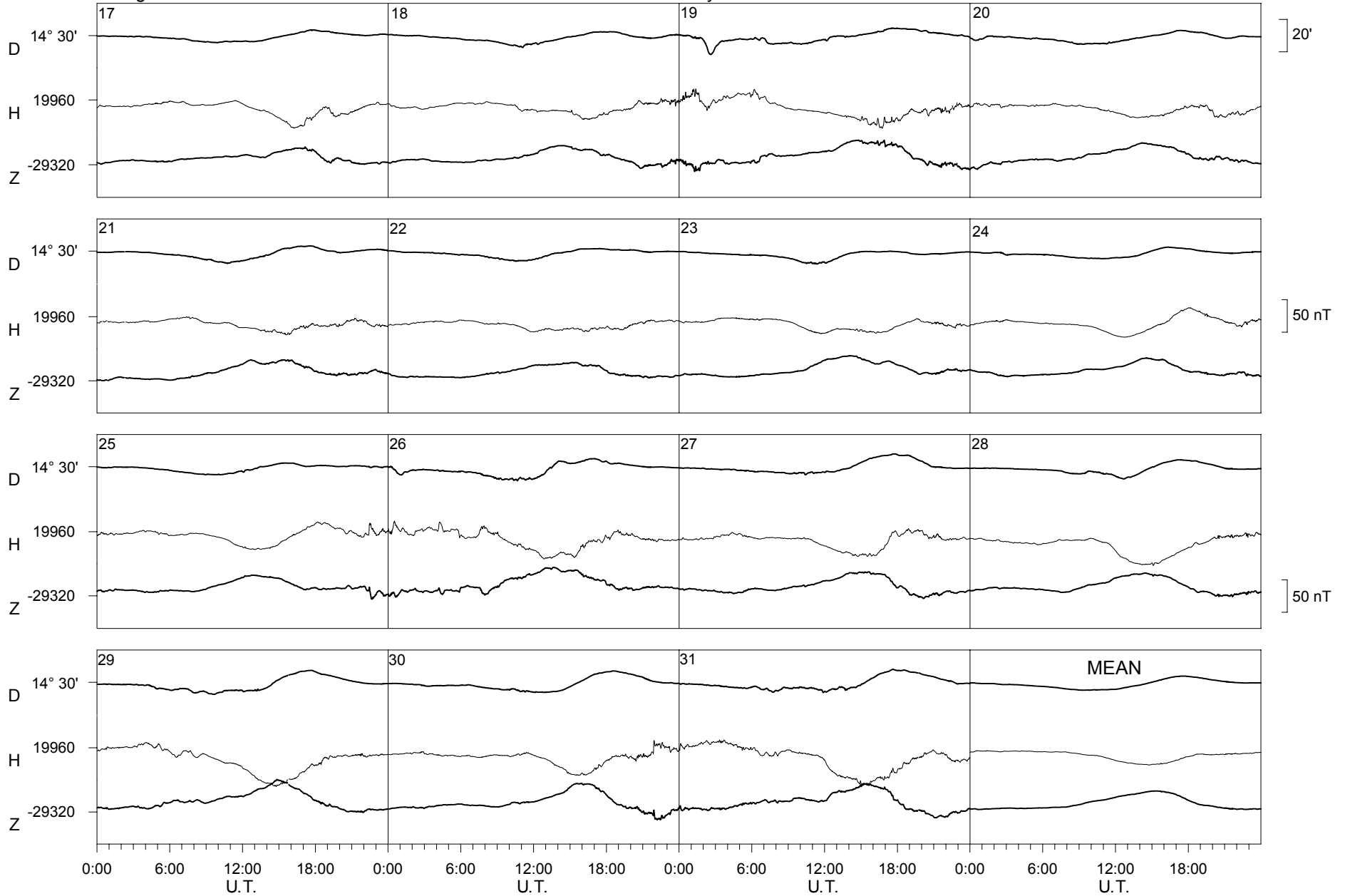
2009



Livingston Island

January

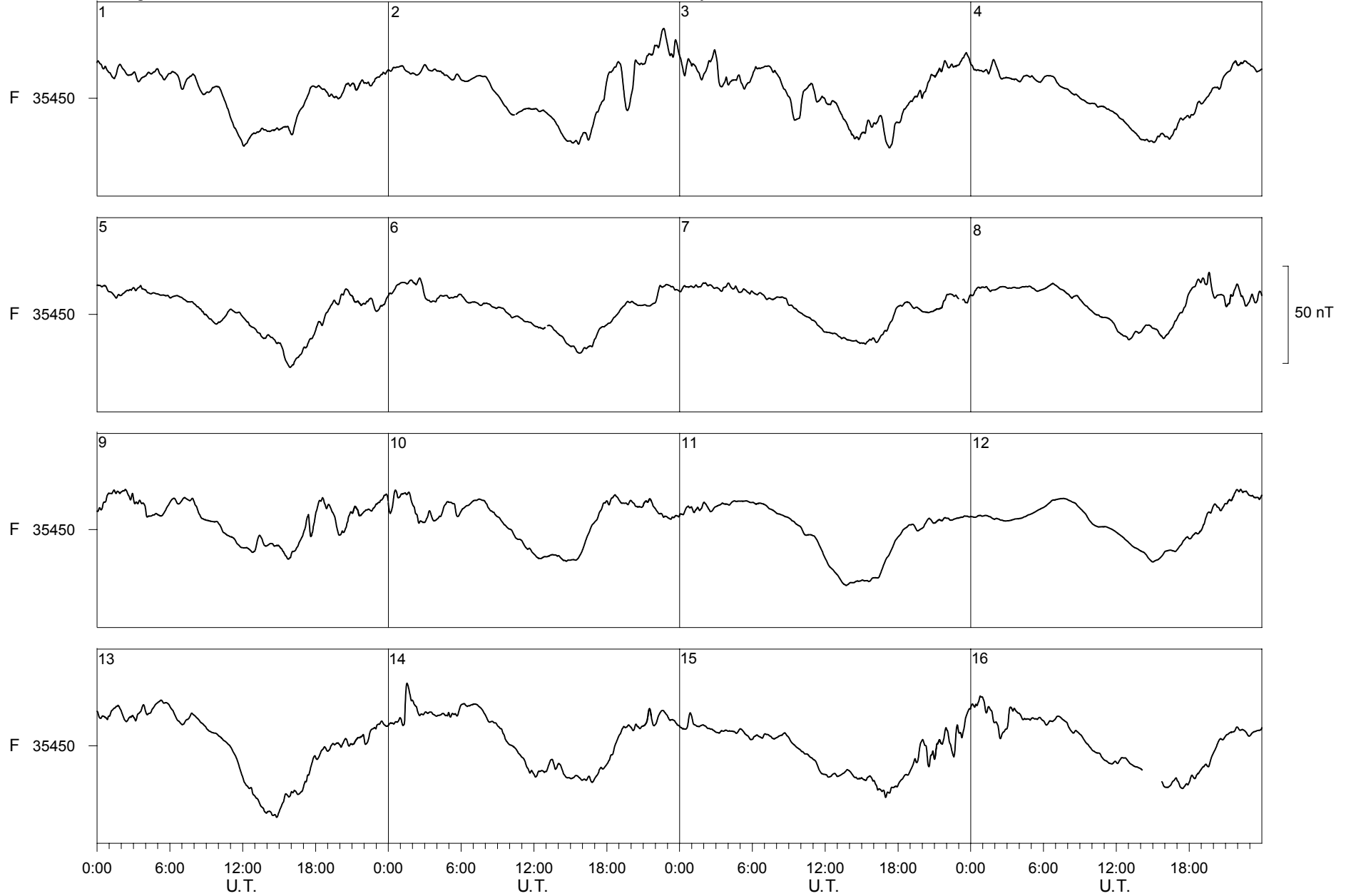
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Livingston Island

January

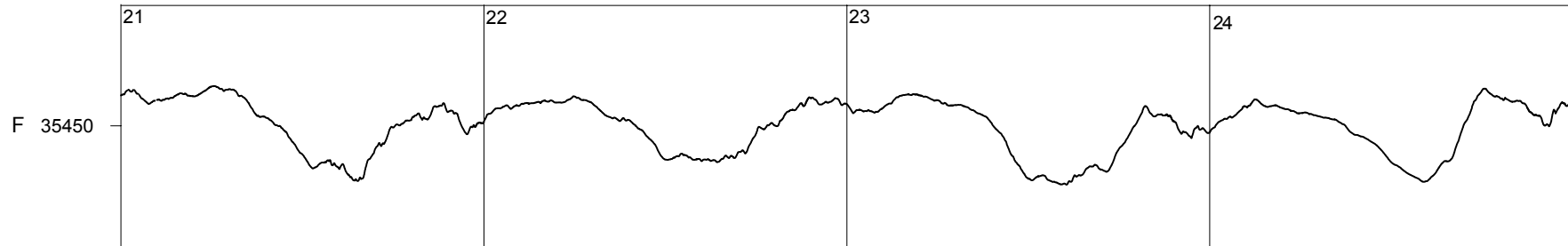
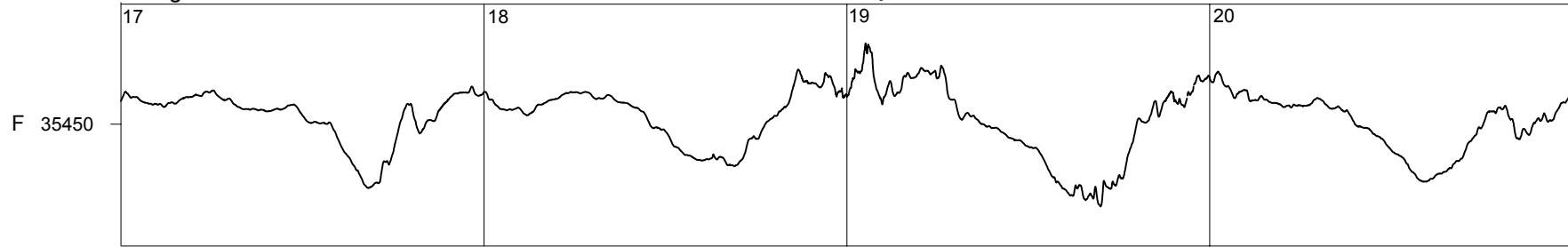
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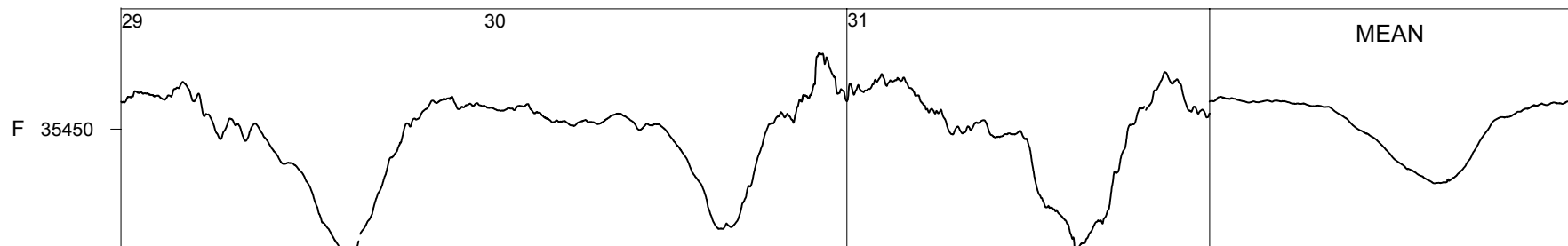
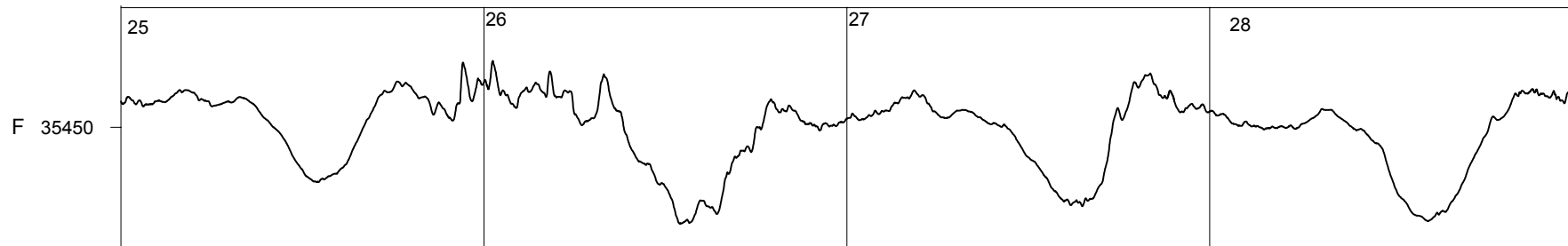
Livingston Island

January

2009



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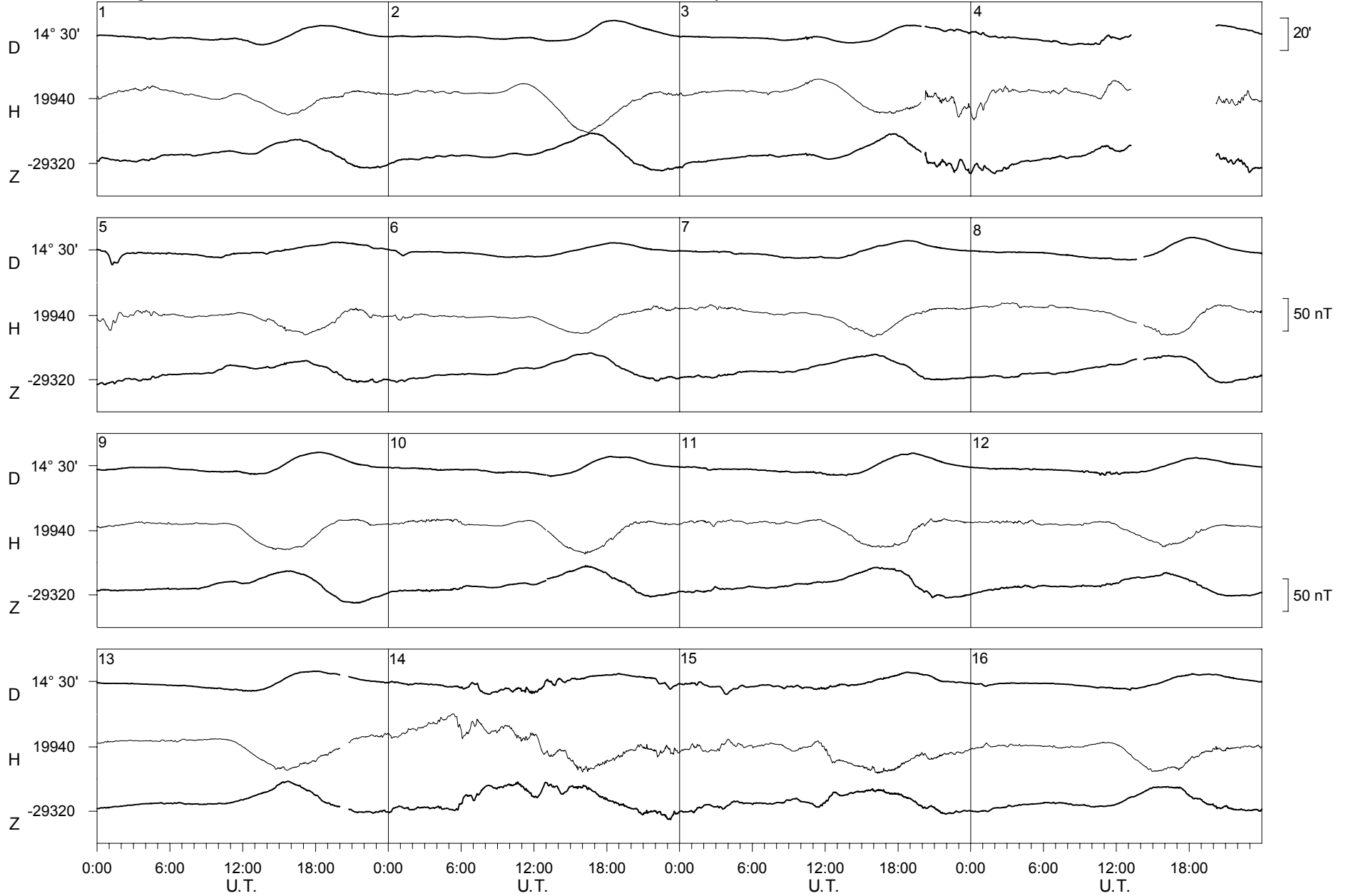


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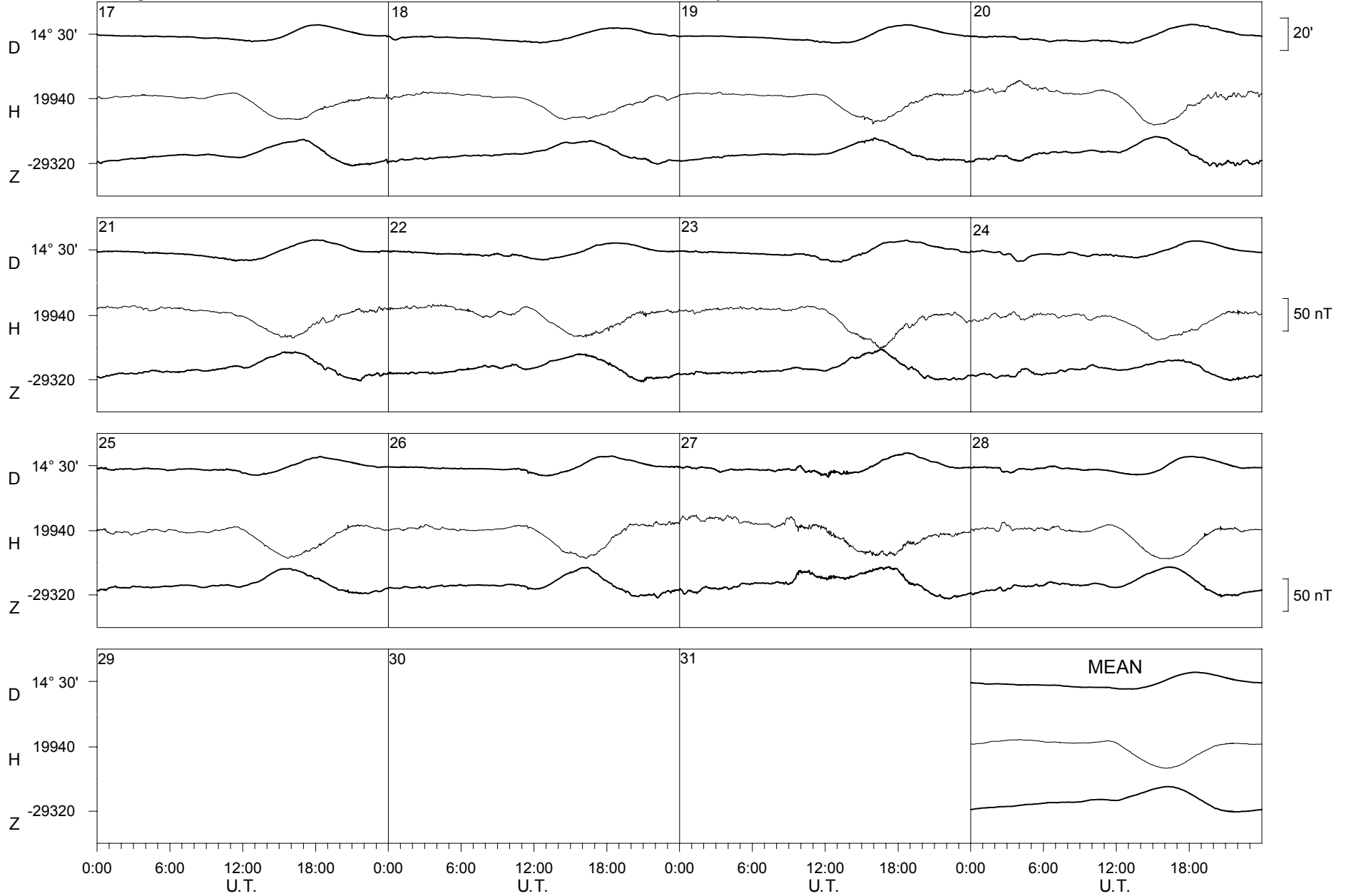
Livingston Island

February

2009



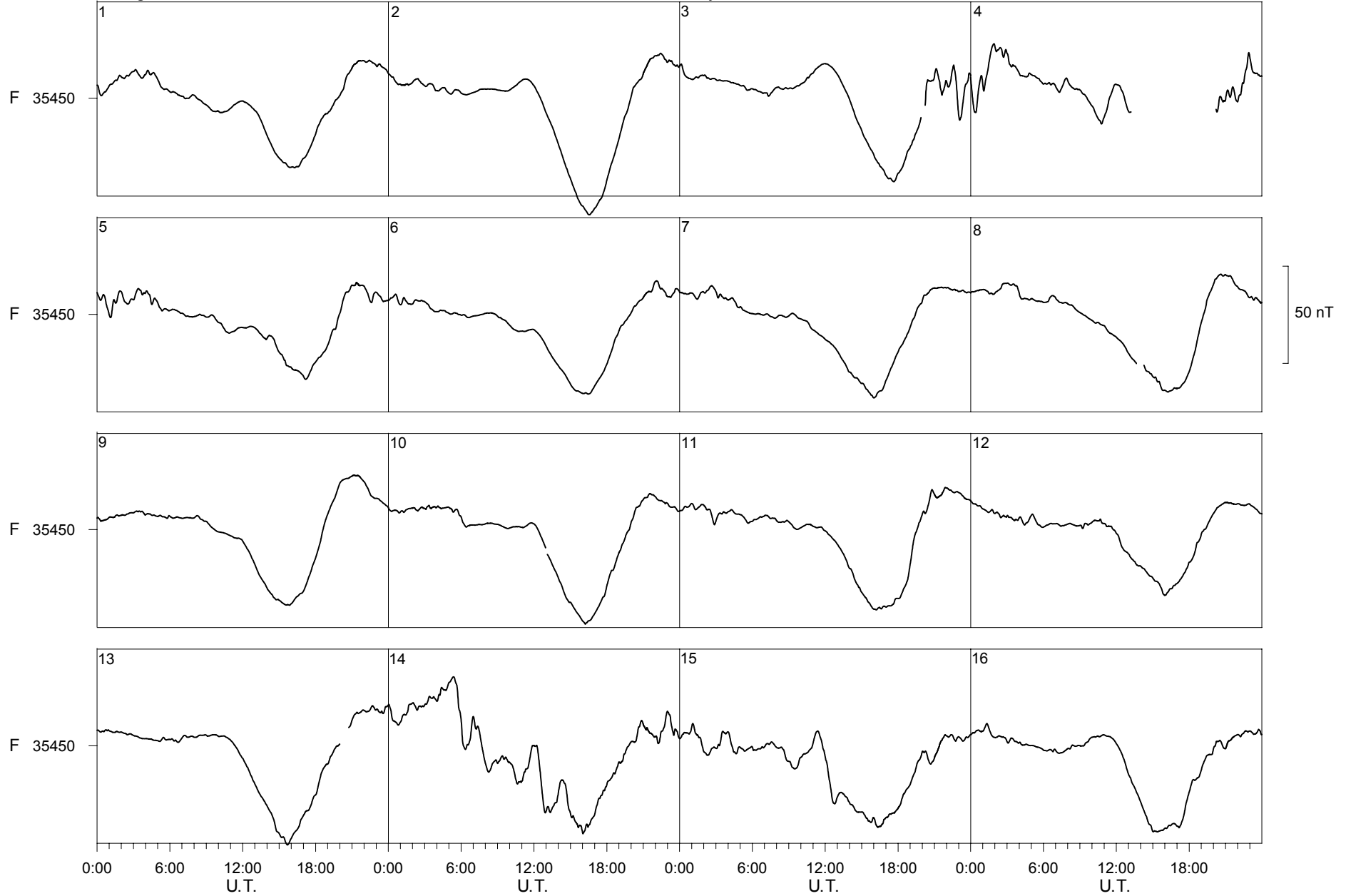
Livingston Island February 2009



Livingston Island

February

2009

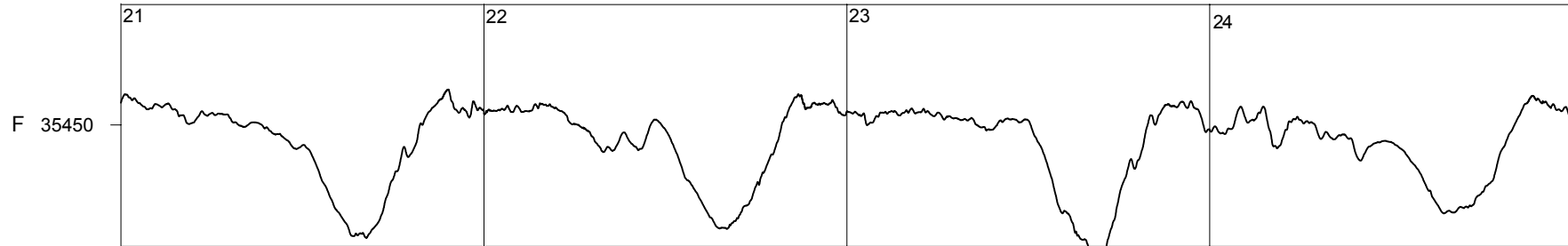
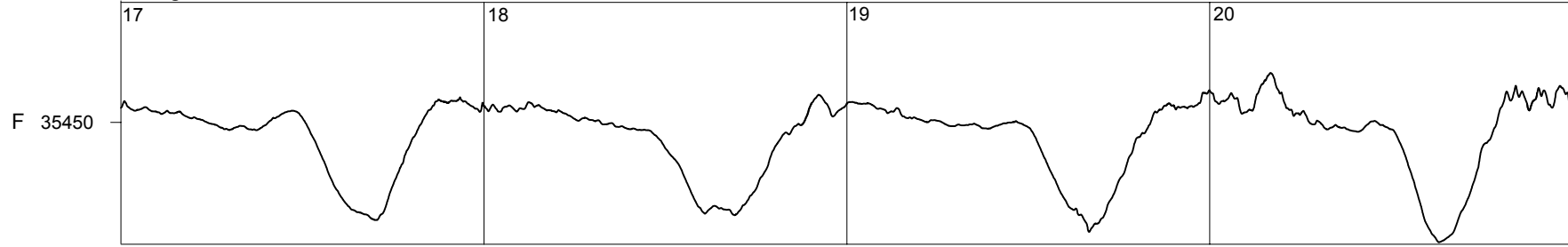




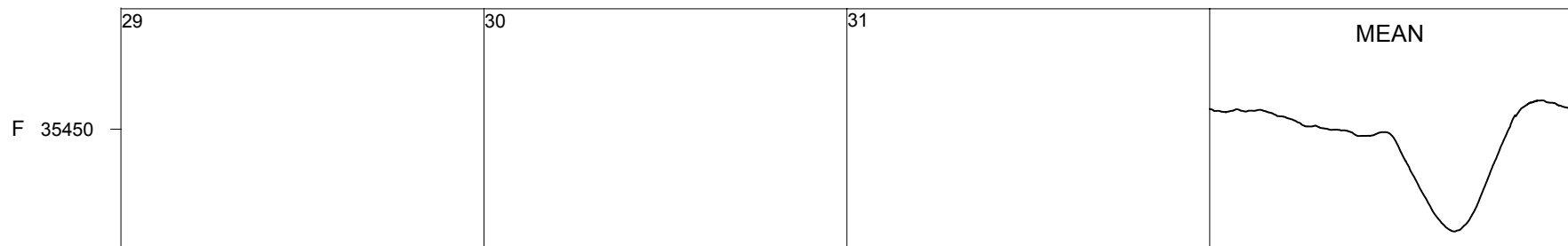
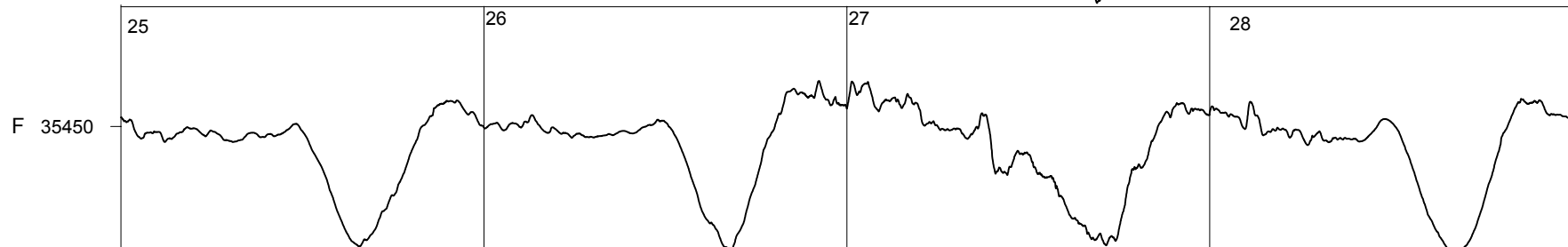
Livingston Island

February

2009



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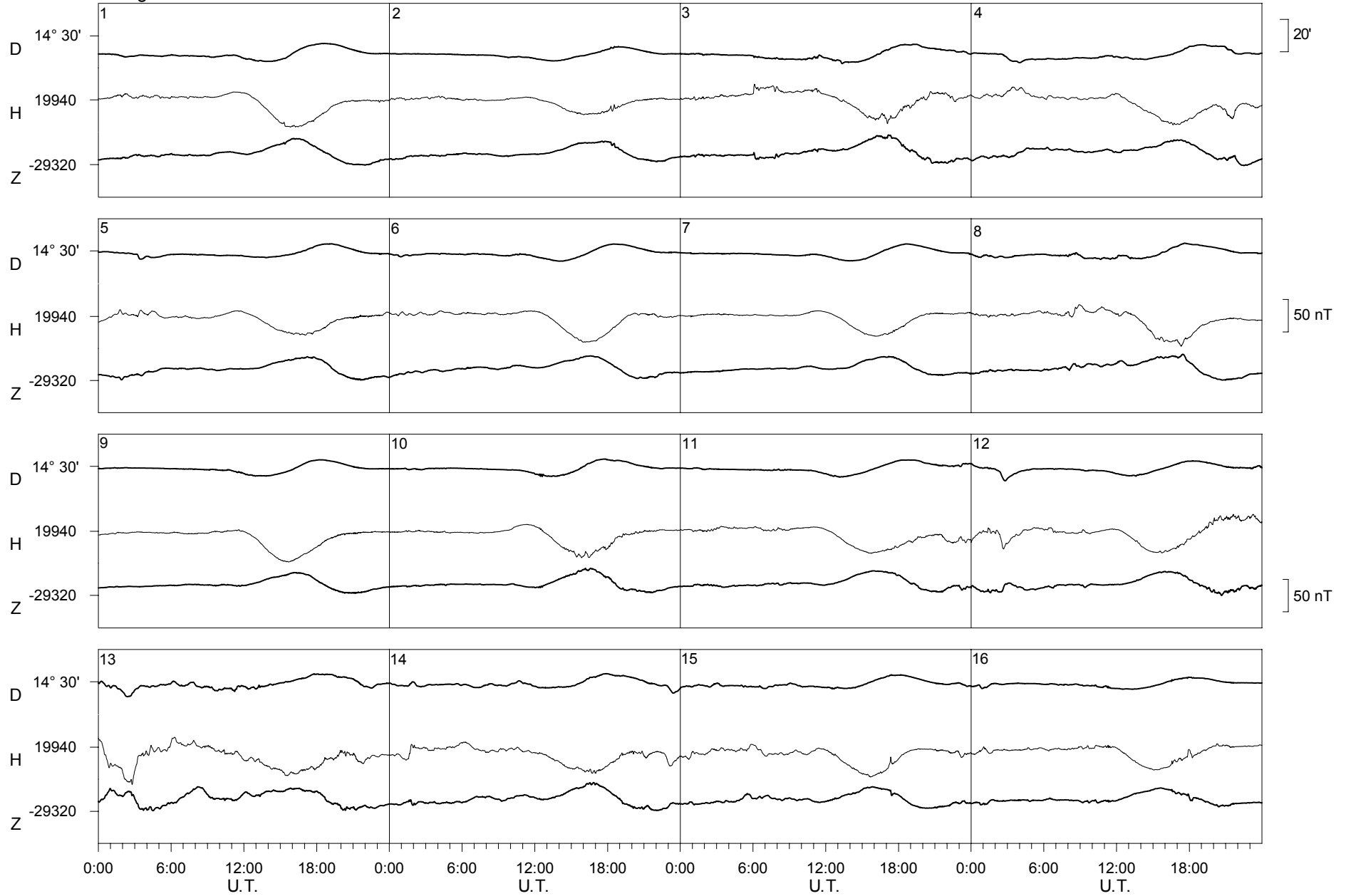
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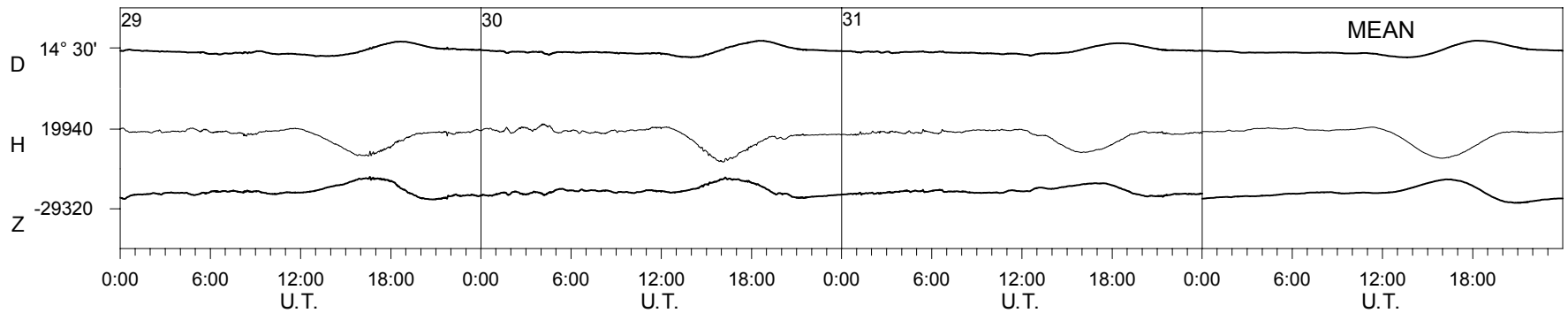
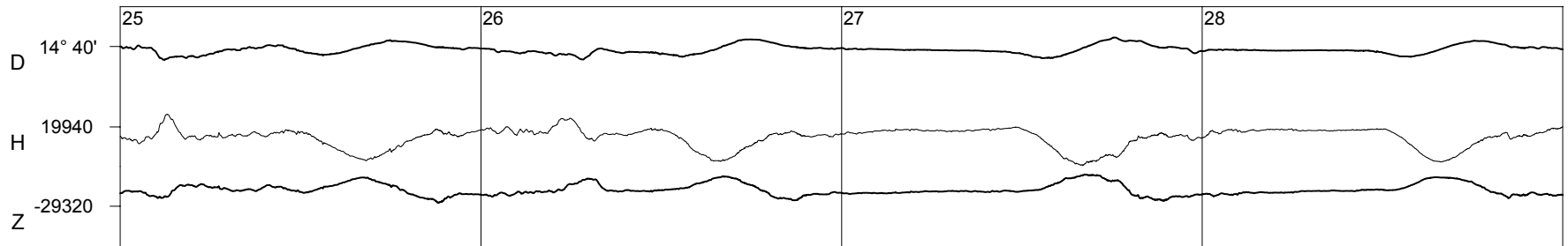
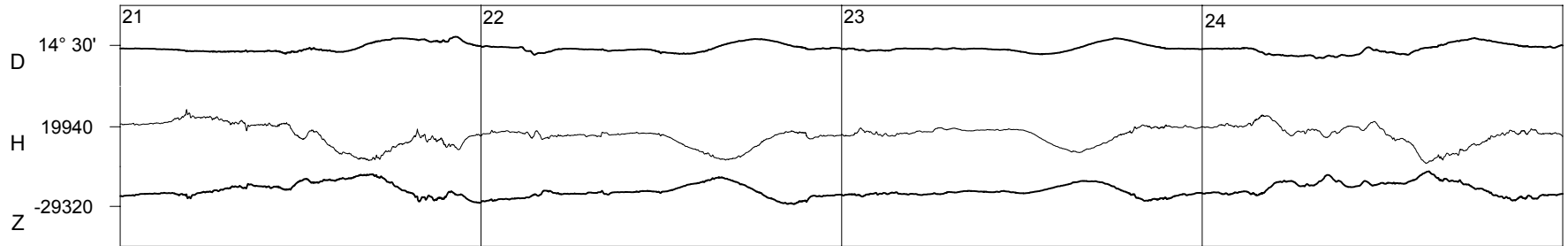
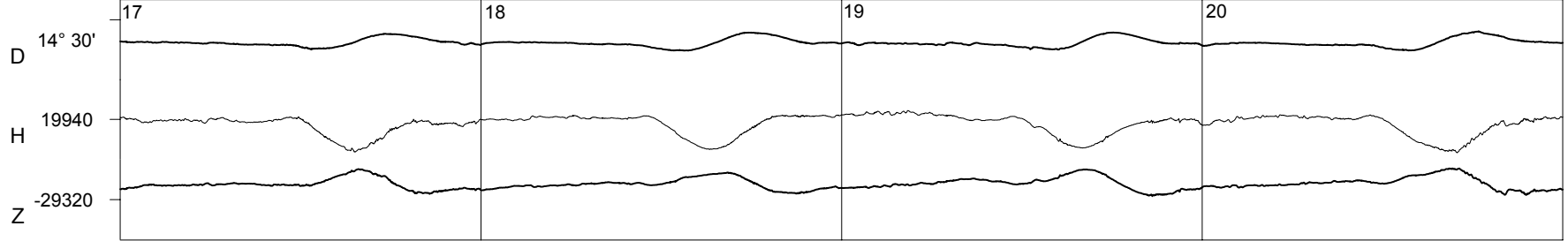
Livingston Island

March

2009



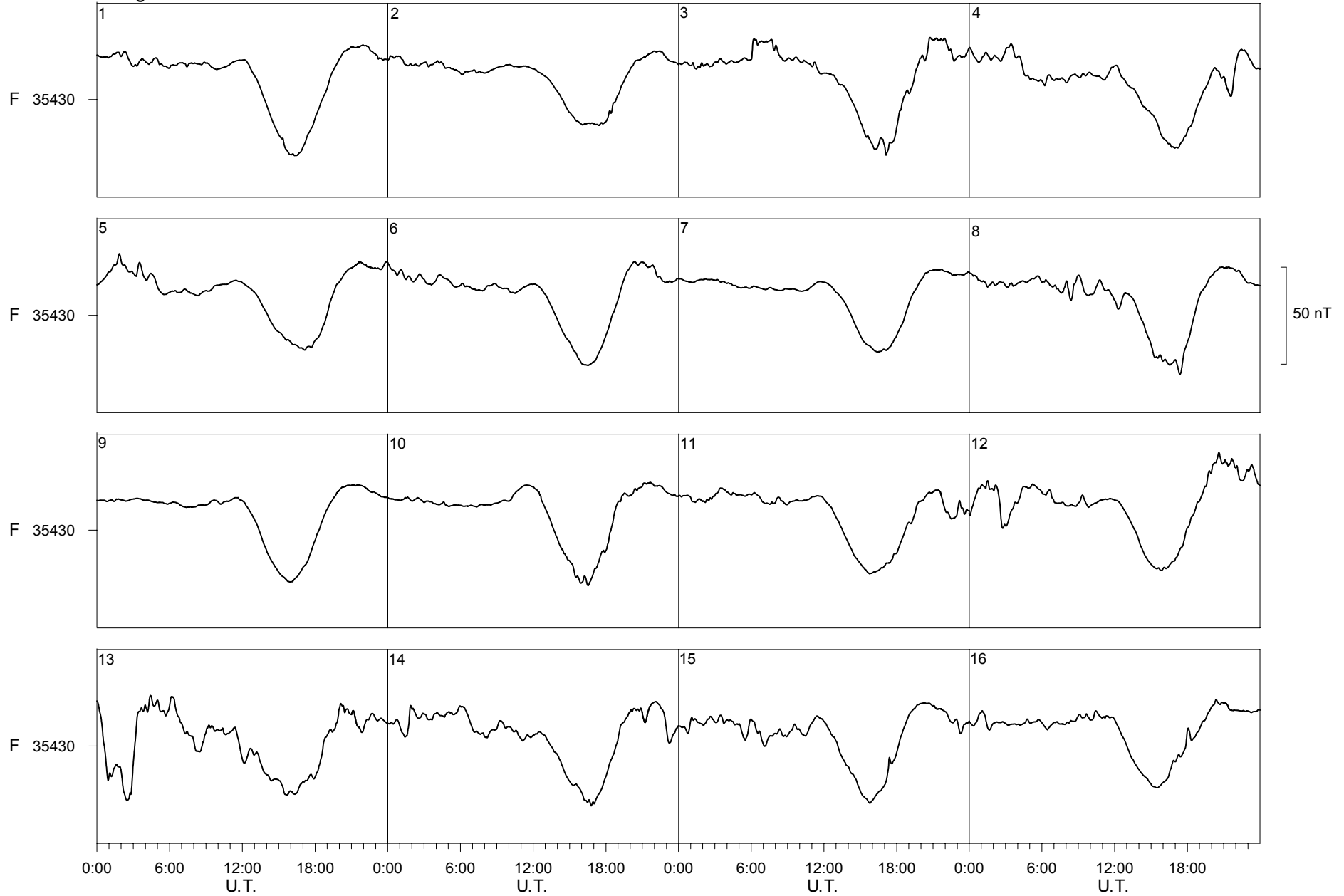
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Livingston Island

March

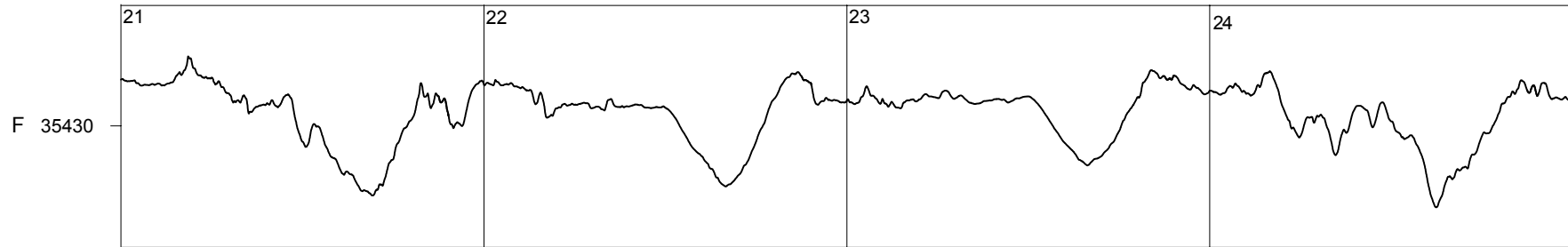
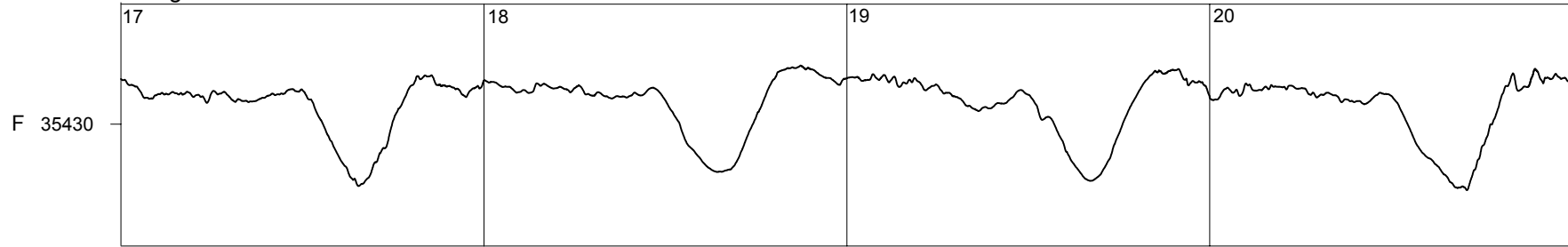
2009



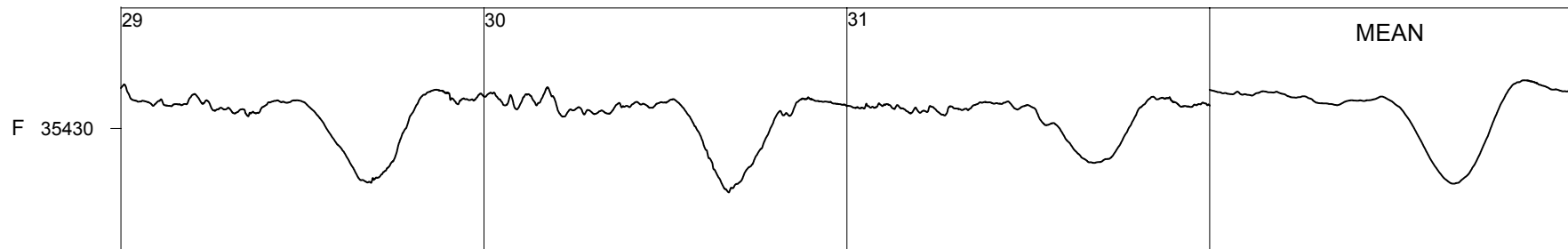
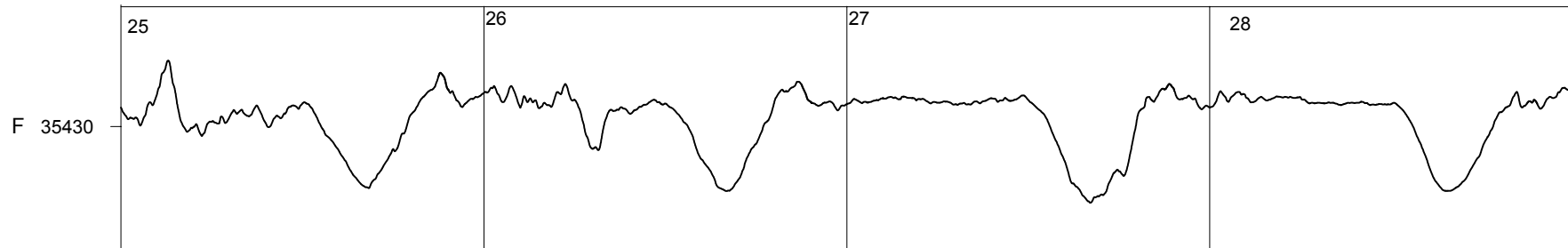
Livingston Island

March

2009



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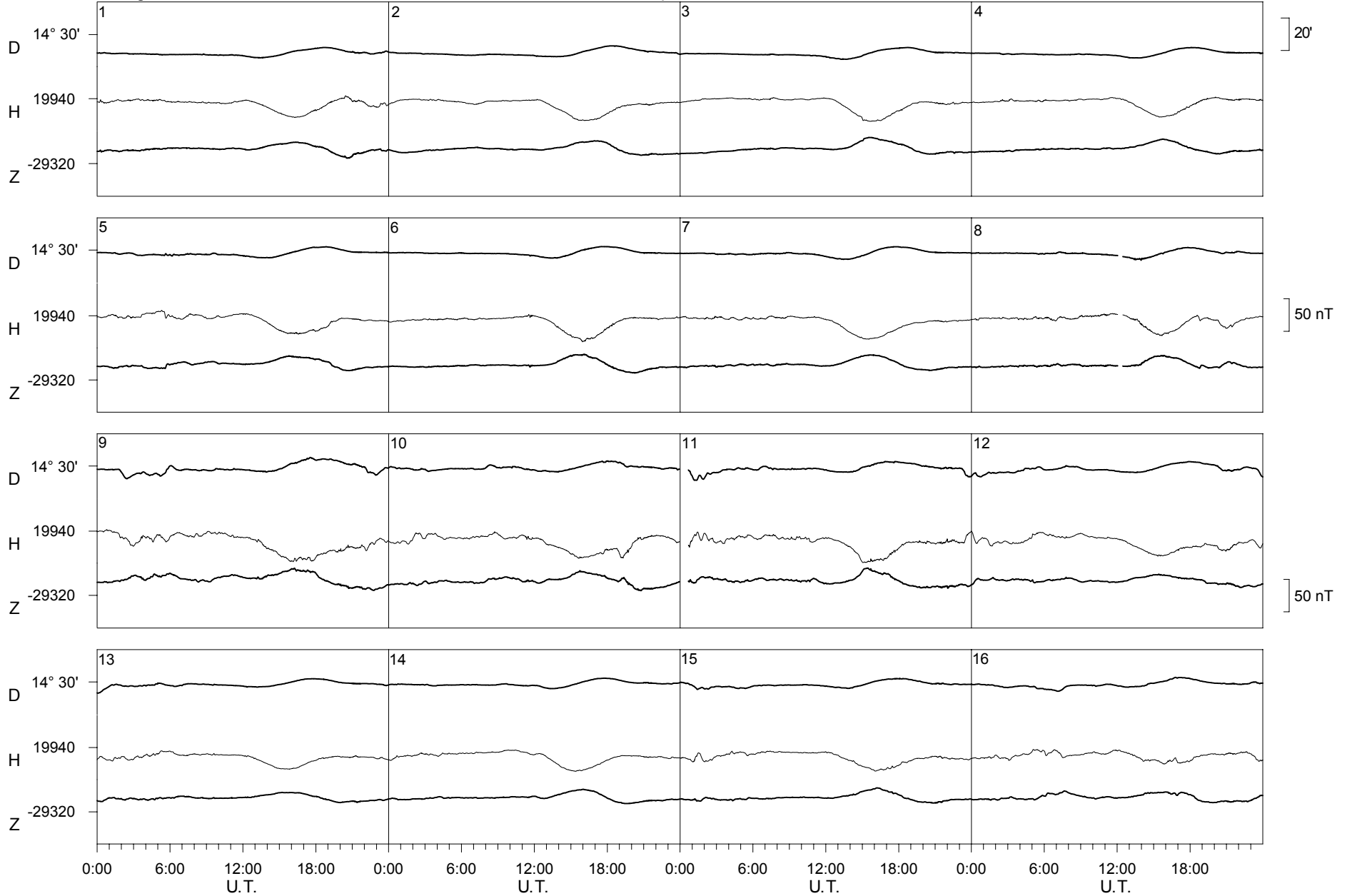


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Livingston Island

April

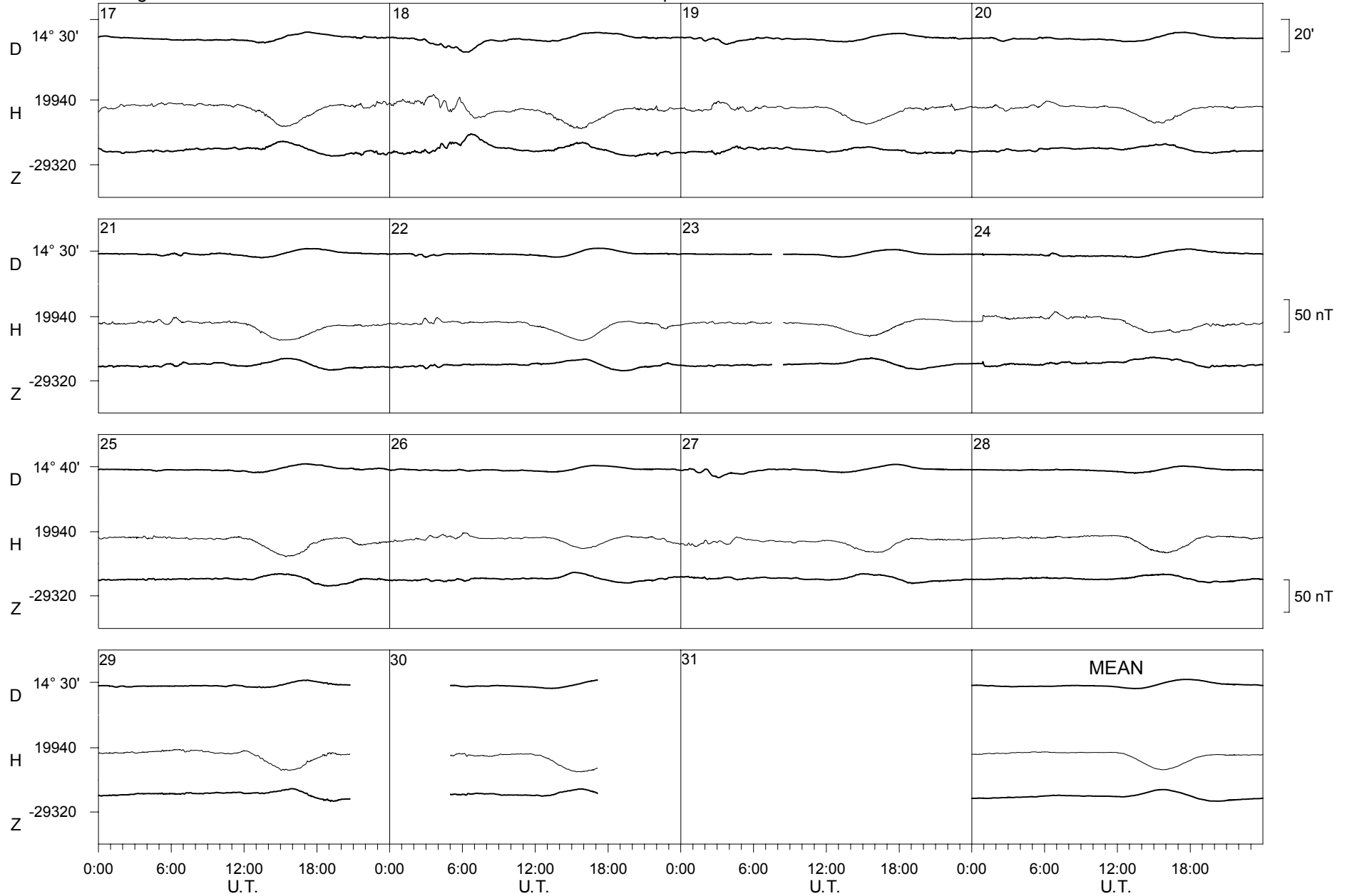
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Livingston Island

April

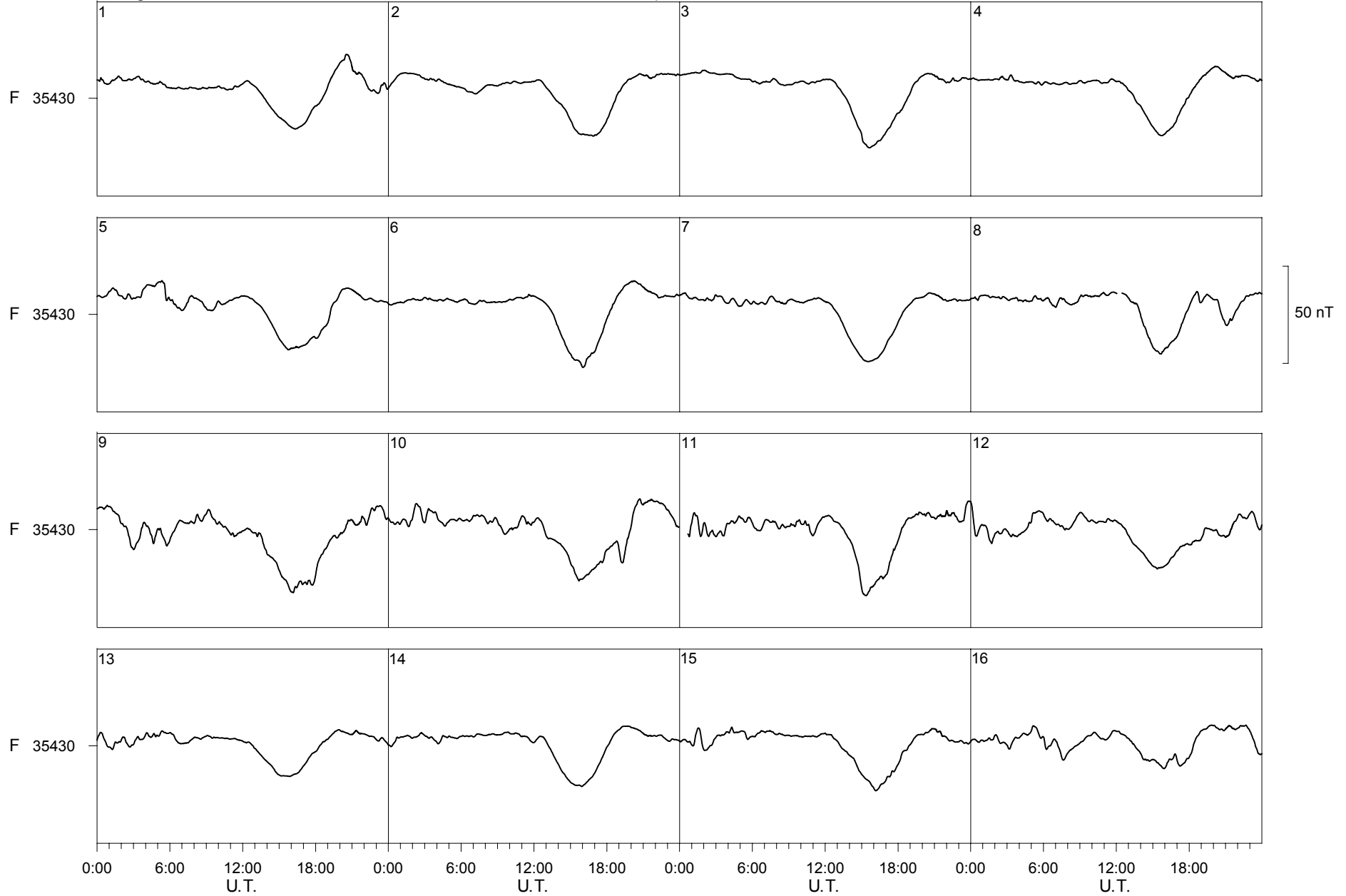
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Livingston Island

April

2009

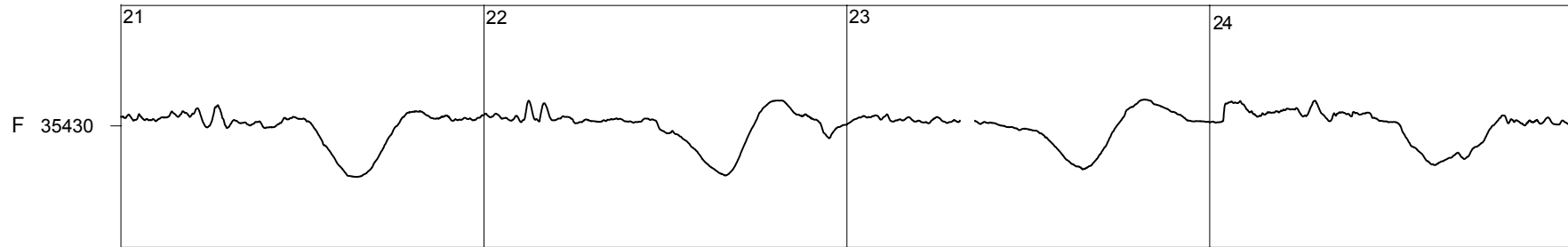
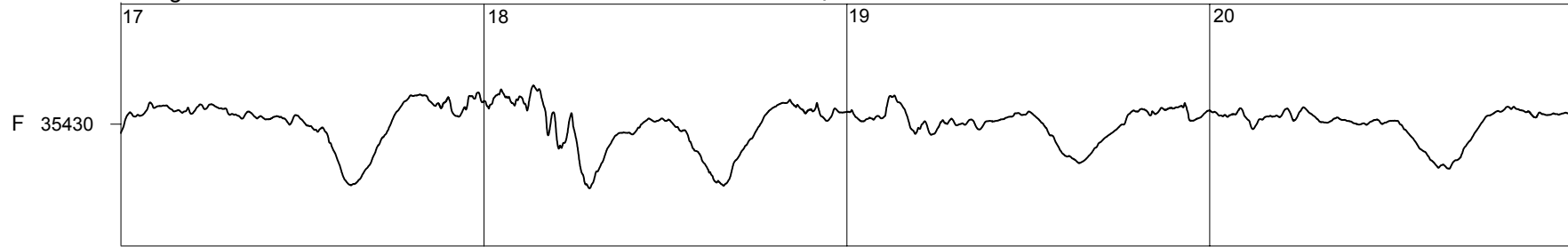




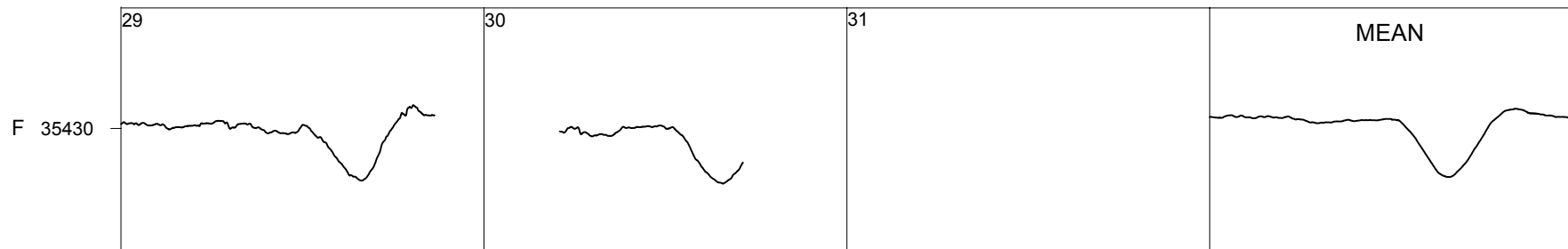
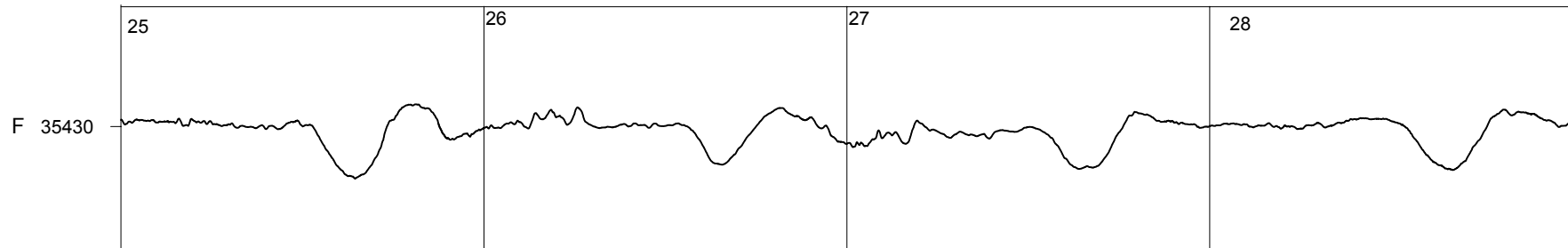
Livingston Island

April

2009



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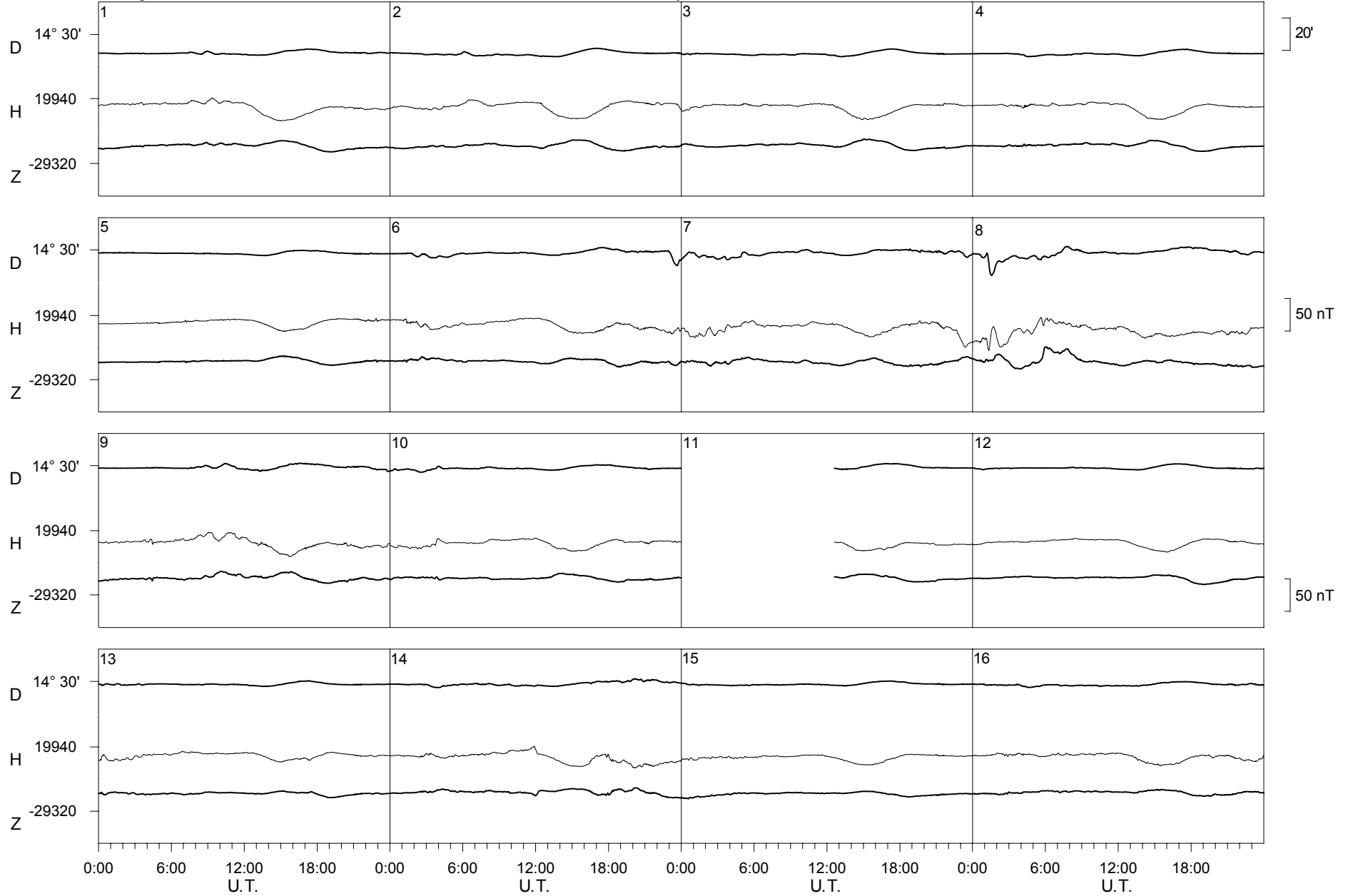
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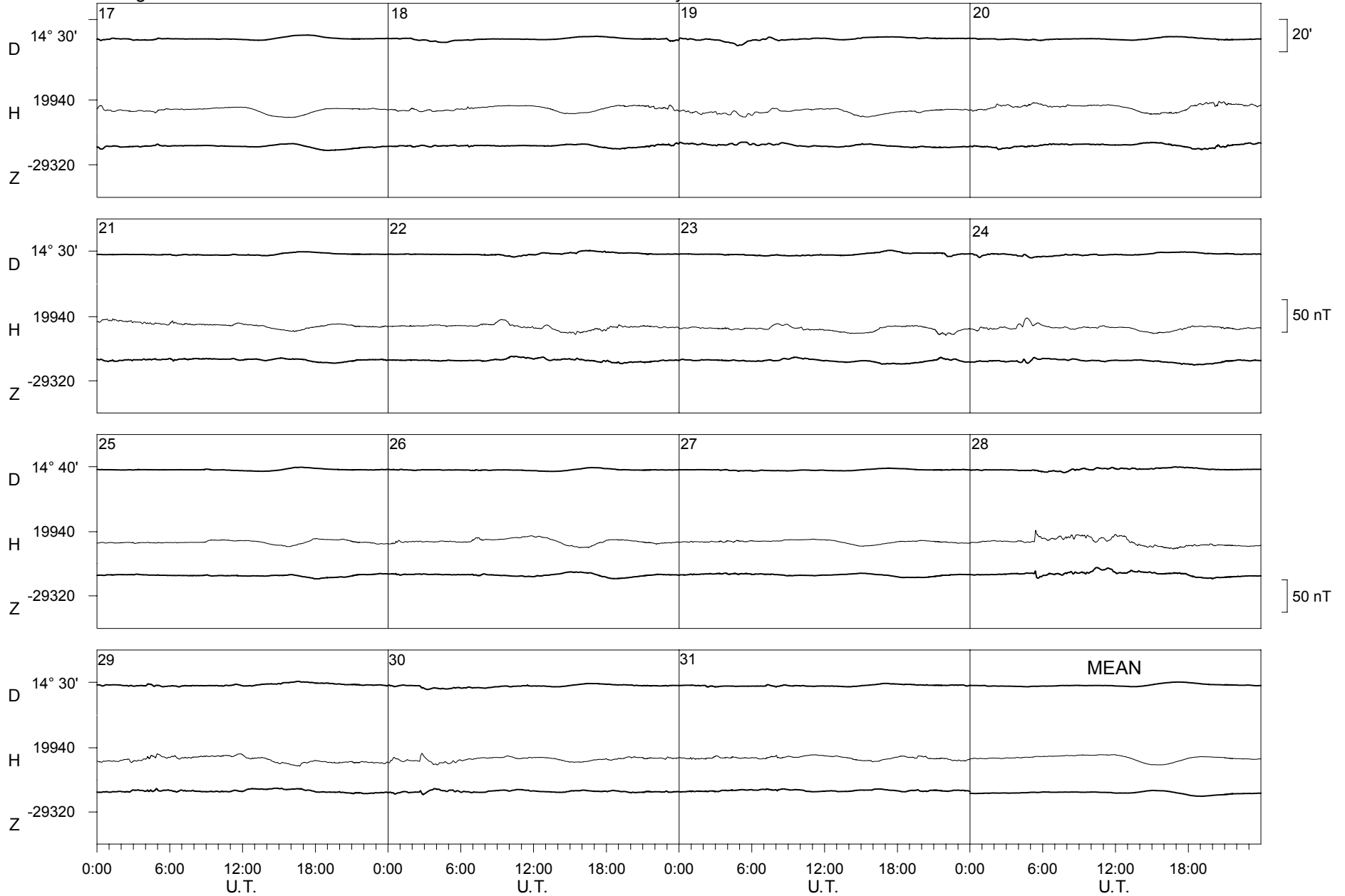
Livingston Island

May

2009



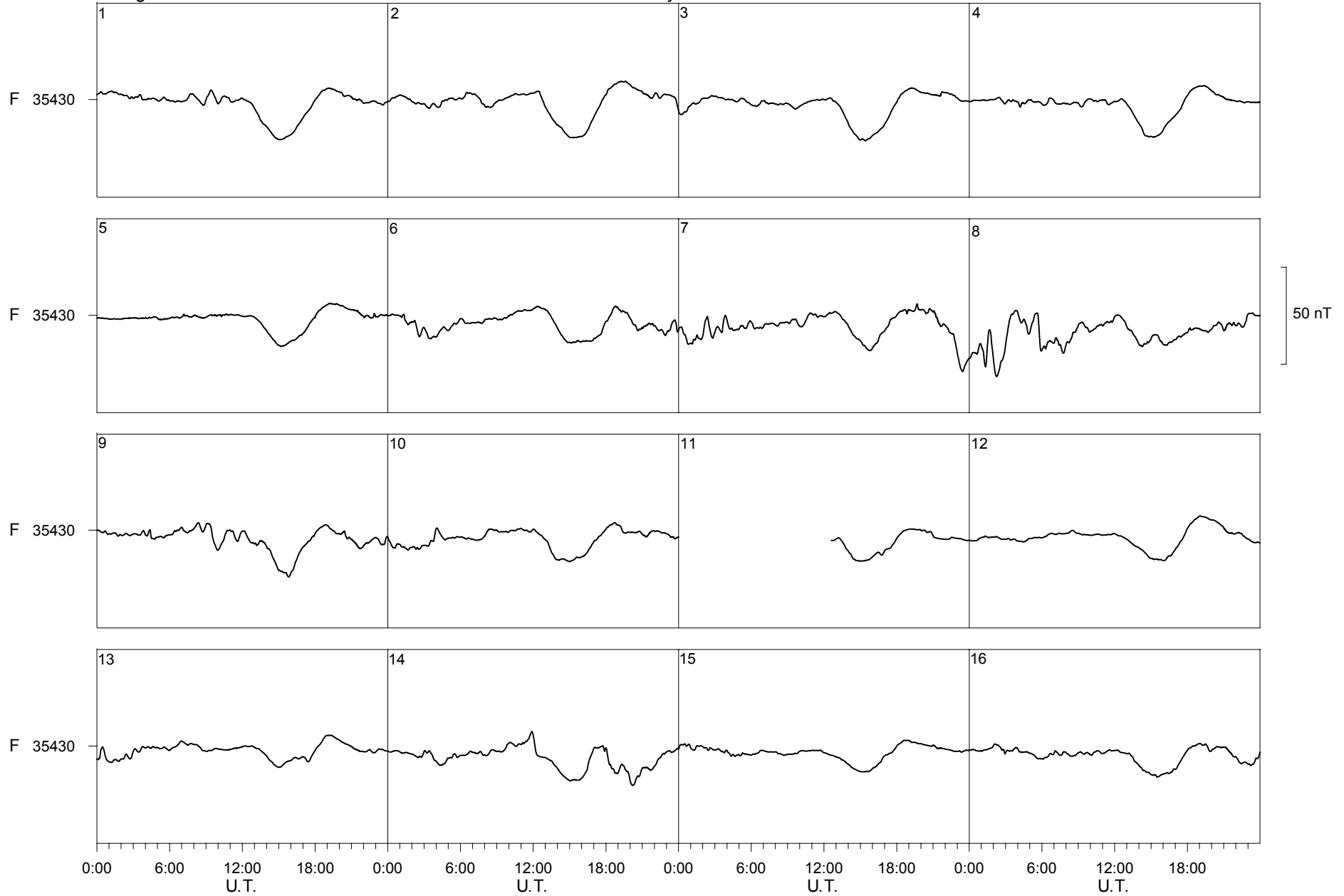
Livingston Island May 2009



Livingston Island

May

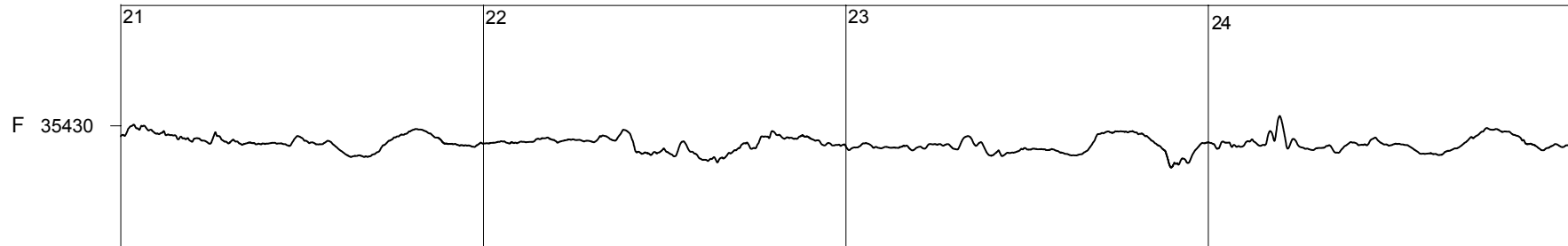
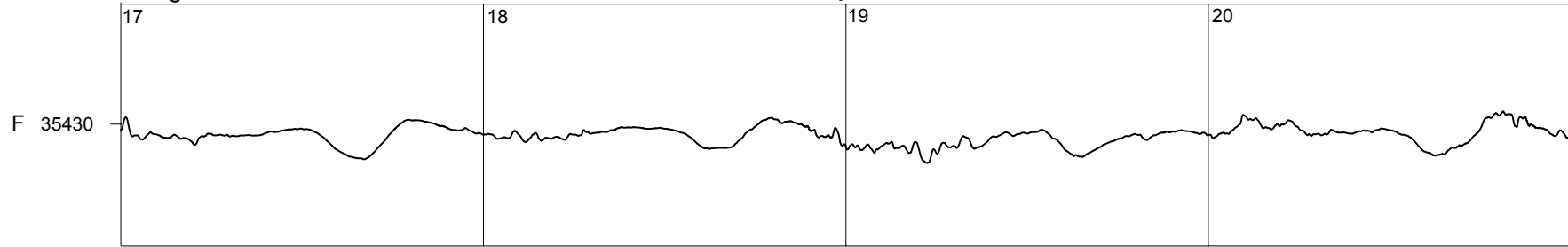
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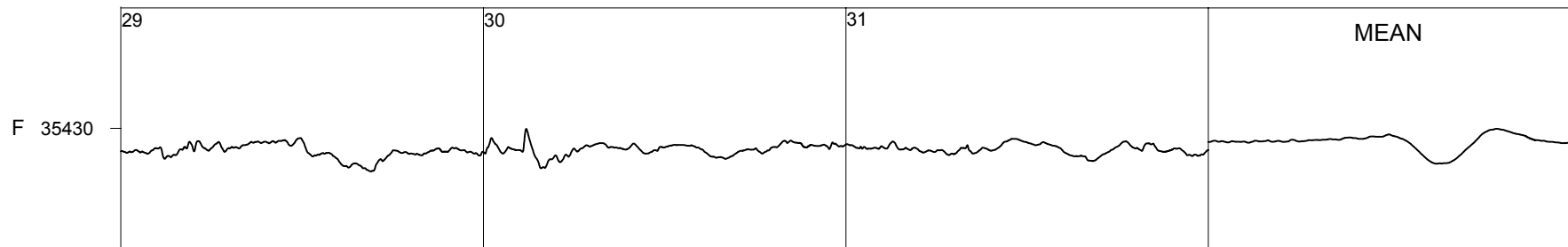
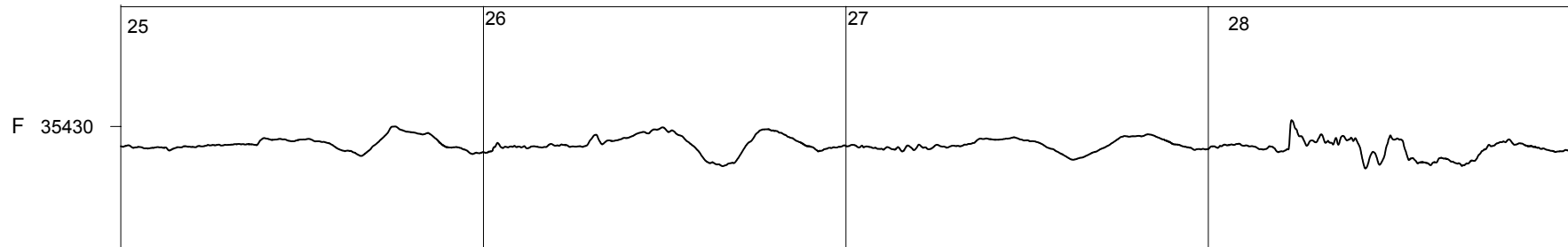
Livingston Island

May

2009



50 nT



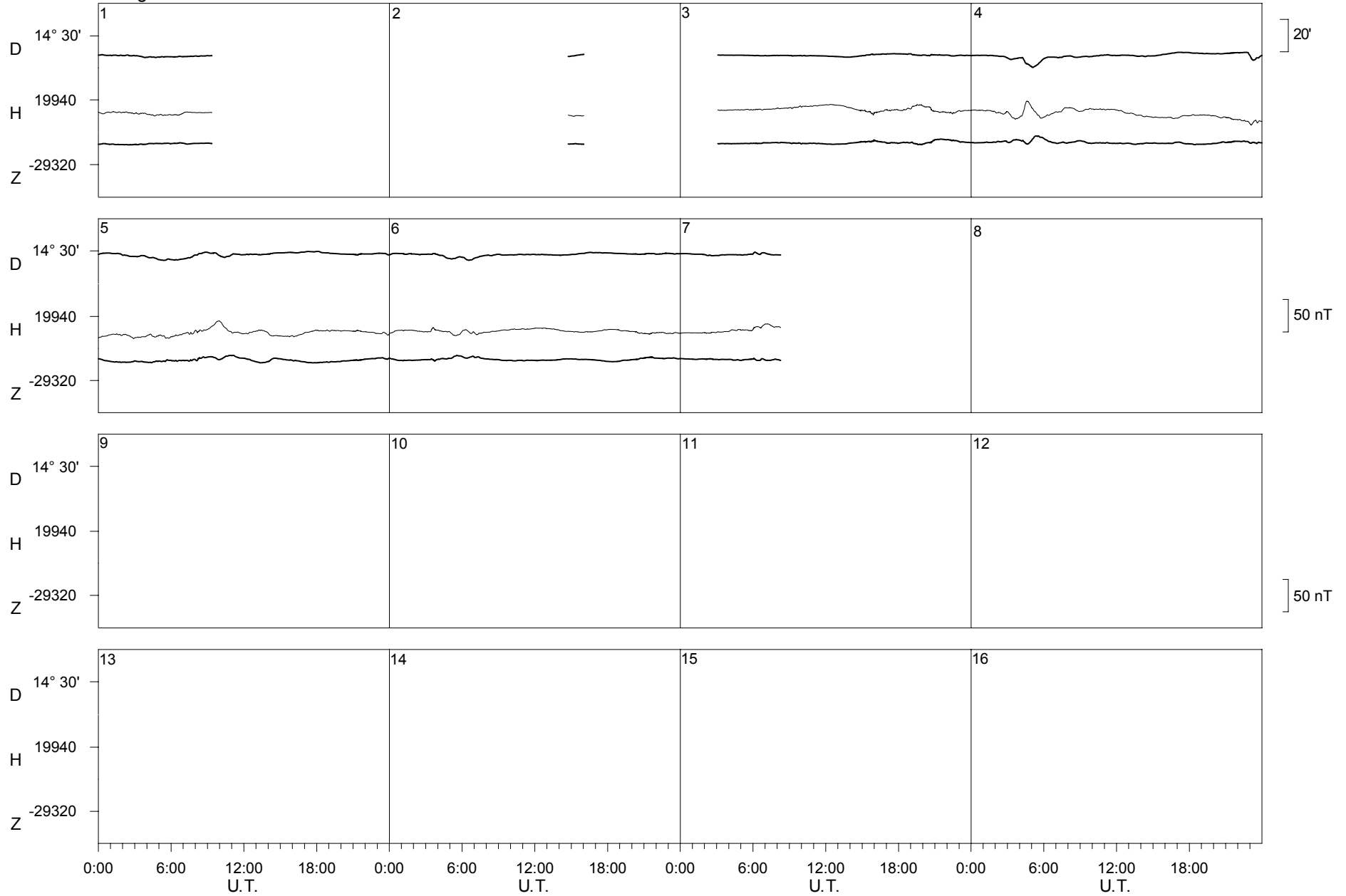
0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00

U.T. U.T. U.T. U.T.

Livingston Island

June

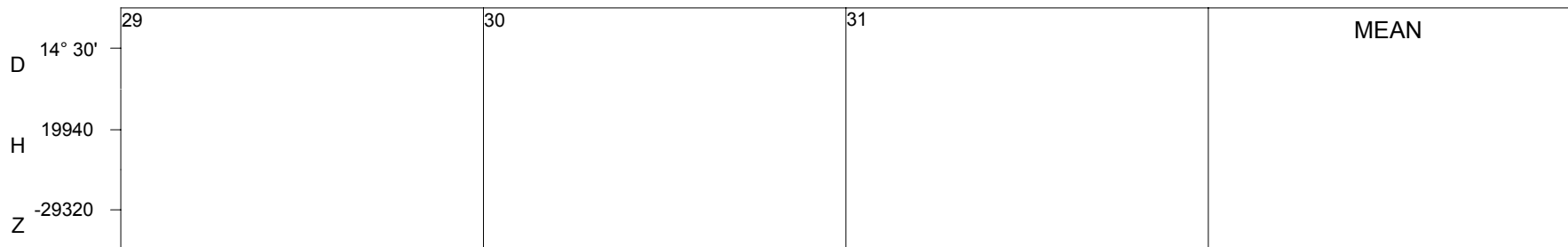
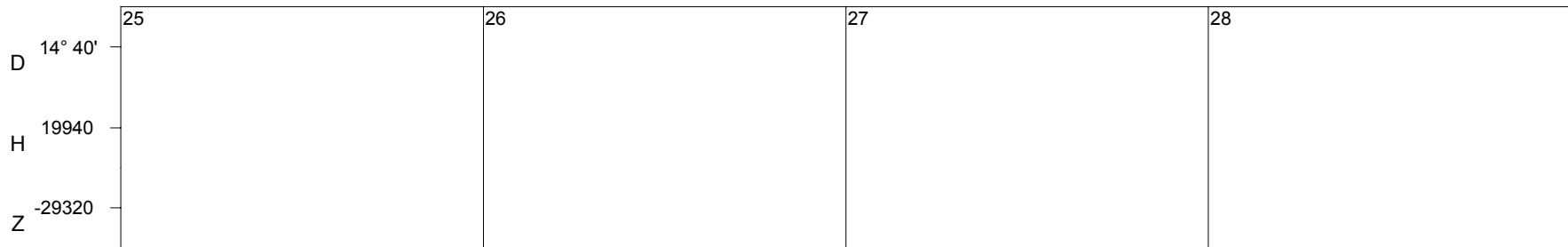
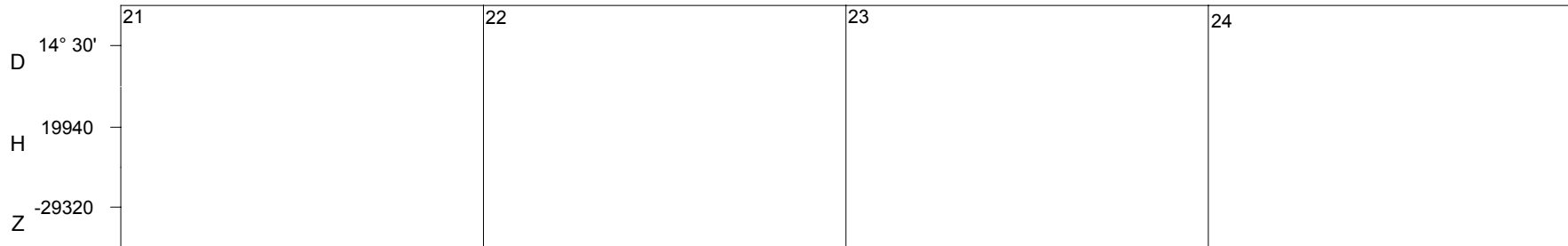
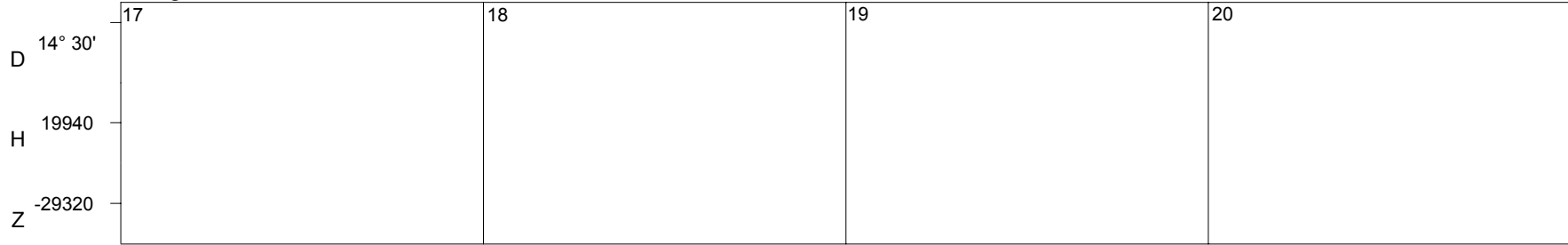
2009



Livingston Island

June

2009

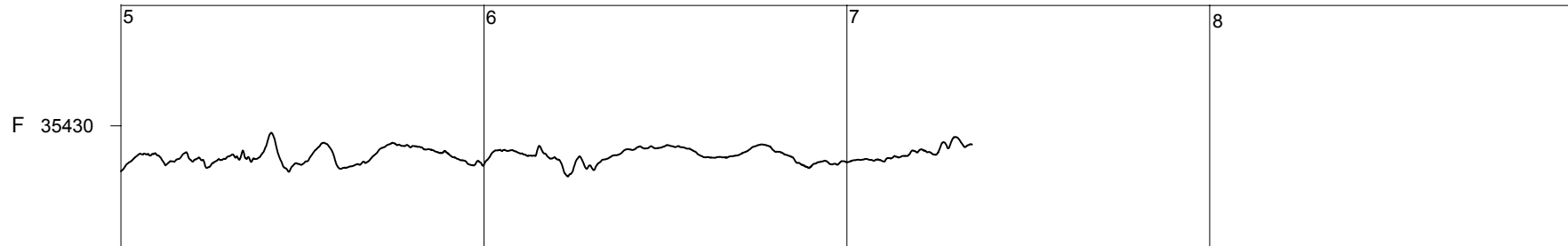
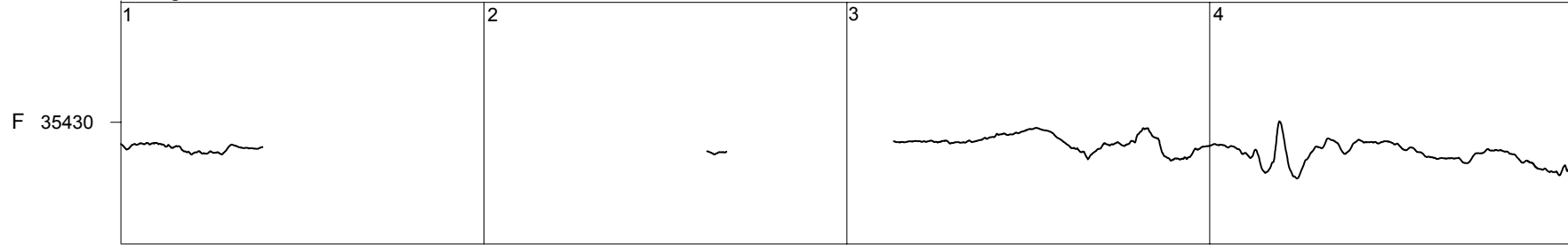


0:00 U.T. 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 U.T.

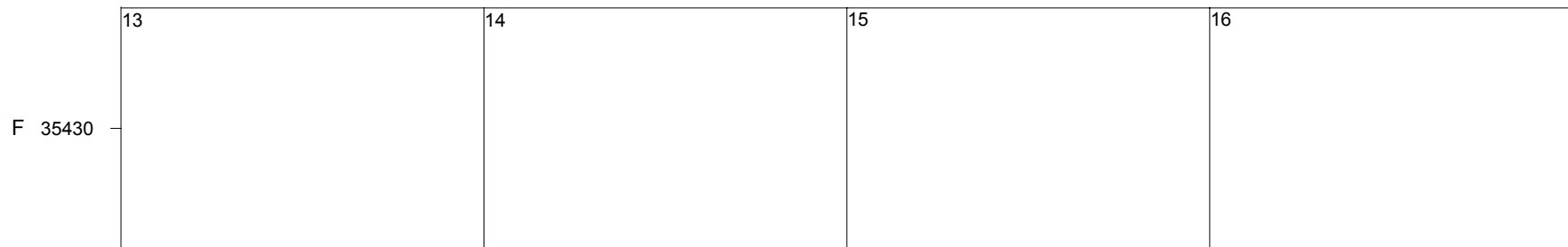
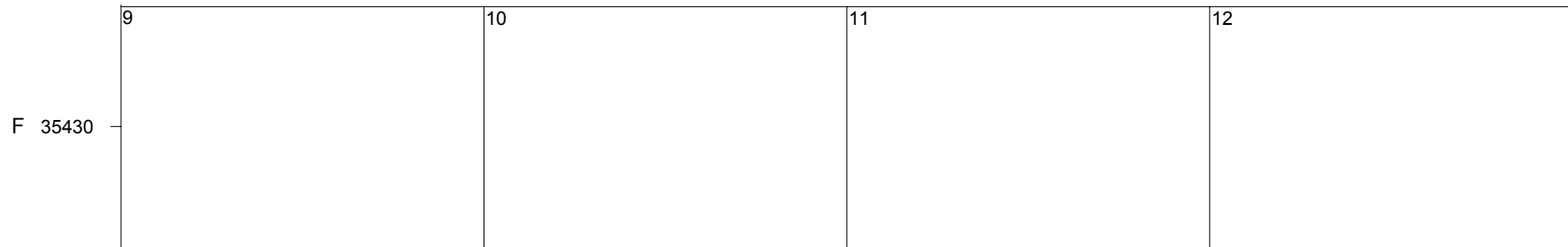
Livingston Island

June

2009



50 nT



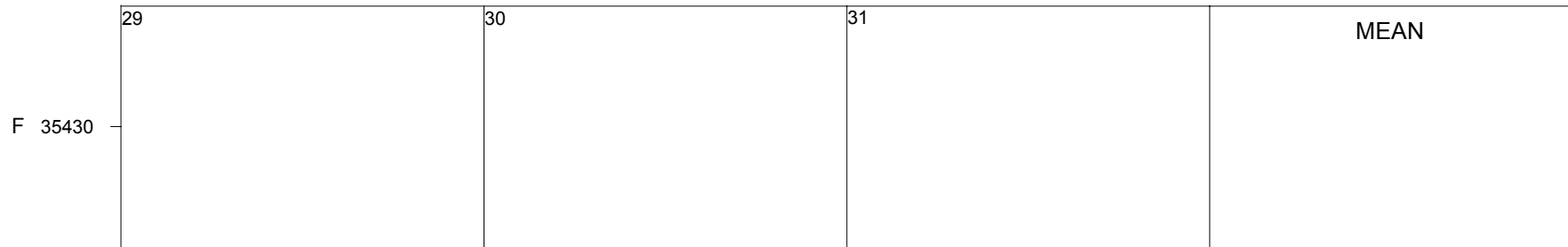
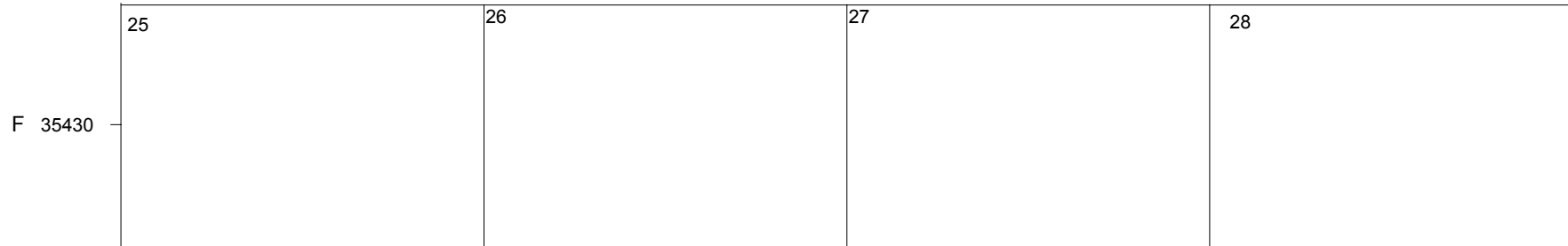
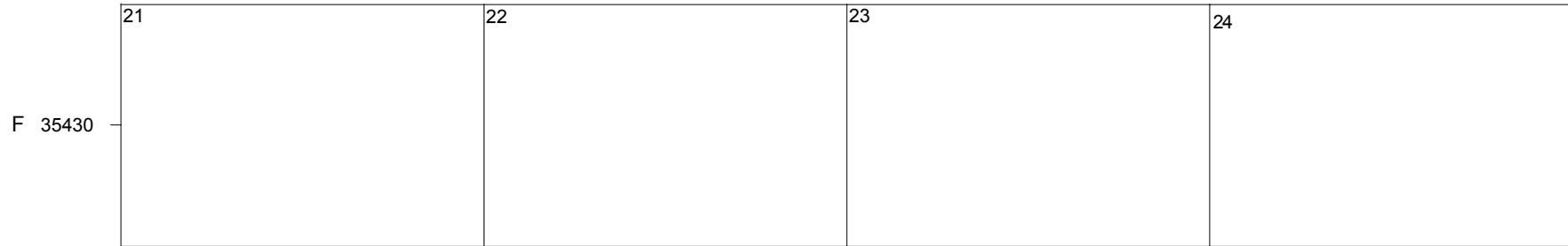
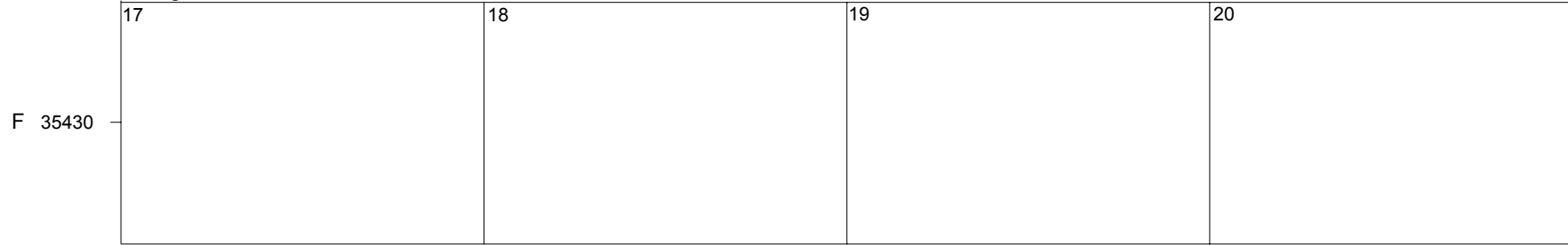
0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00  
U.T. U.T. U.T. U.T.



Livingston Island

June

2009



50 nT

0:00 U.T. 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 U.T.

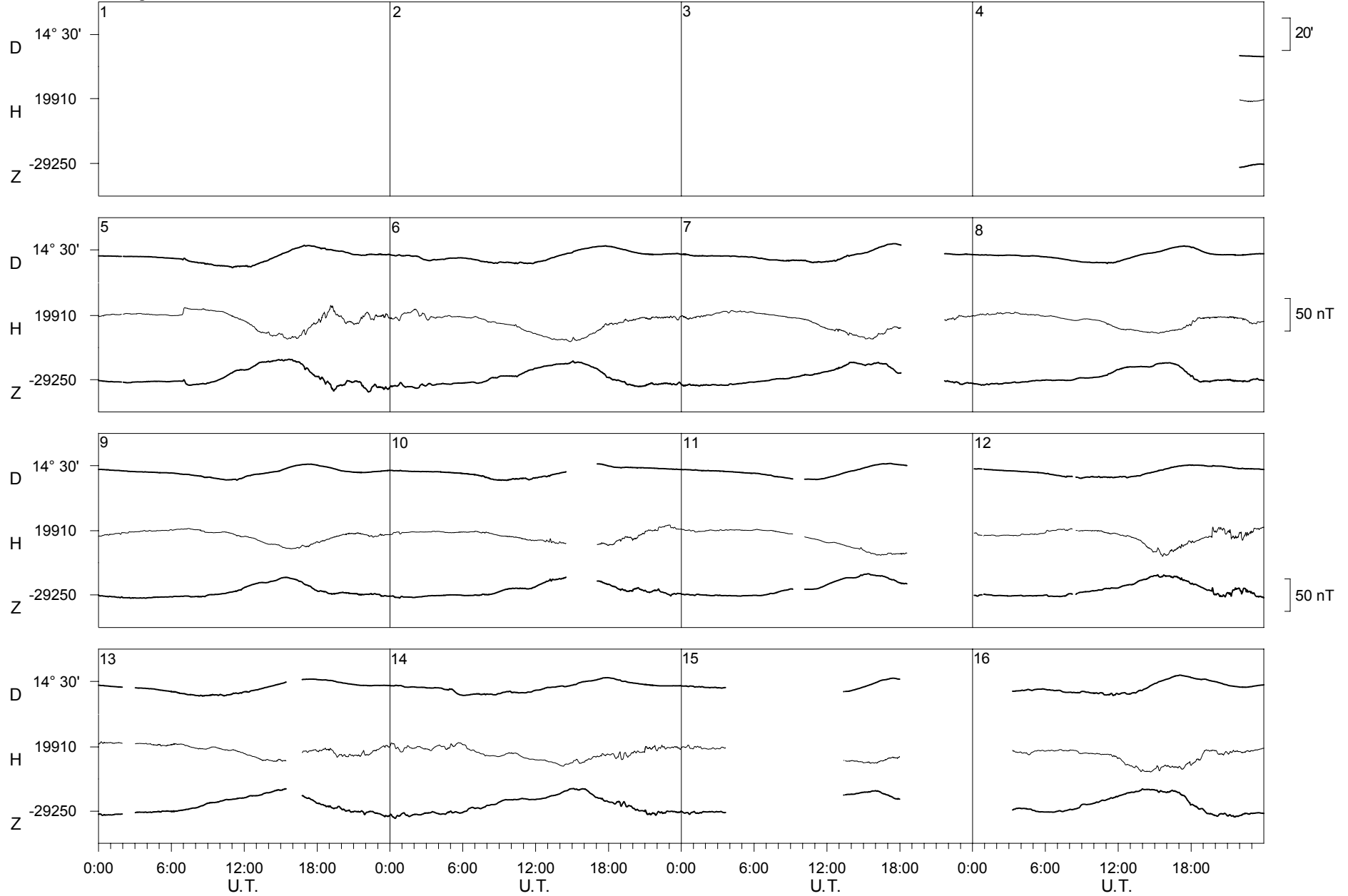
***DEBIDO AL DETERIORO DEL SISTEMA DE ADQUISICIÓN DE ENERGÍA DE LA BASE, NO HAY REGISTRO DESDE EL 7 DE JUNIO HASTA EL 4 DE DICIEMBRE, AL INICIO DE LA CAMPAÑA 2009-2010.***

***DUE TO PROBLEMS AFFECTING THE ENERGY ACQUISITION SYSTEM IN THE BASE, THERE ARE NO RECORDS FROM JUNE 7<sup>th</sup> 2009 UNTIL DECEMBER 4<sup>th</sup> 2009, AT THE BEGINNING OF THE 2009-2010 SUMMER SURVEY.***

Livingston Island

December

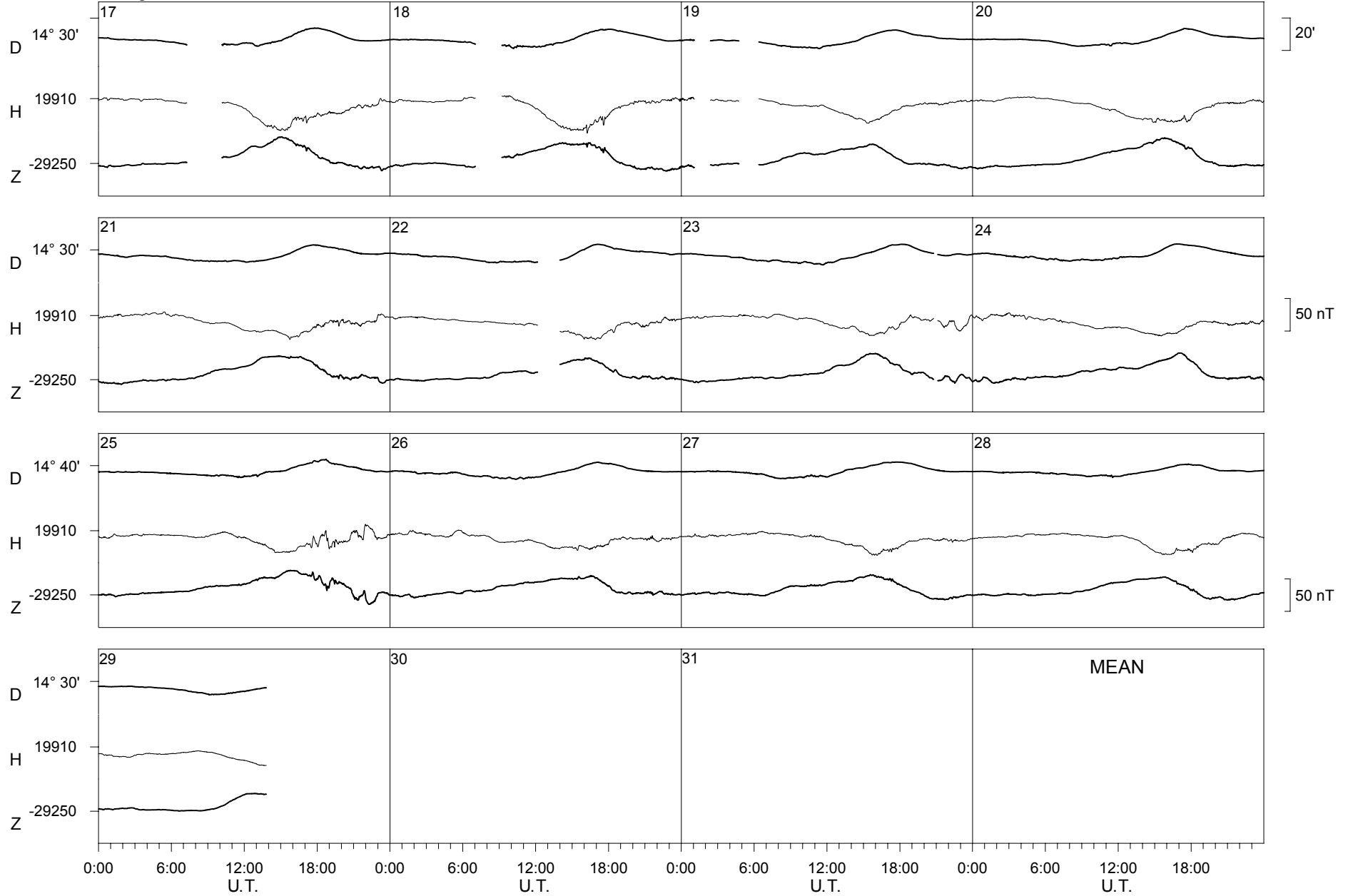
2009



Livingston Island

December

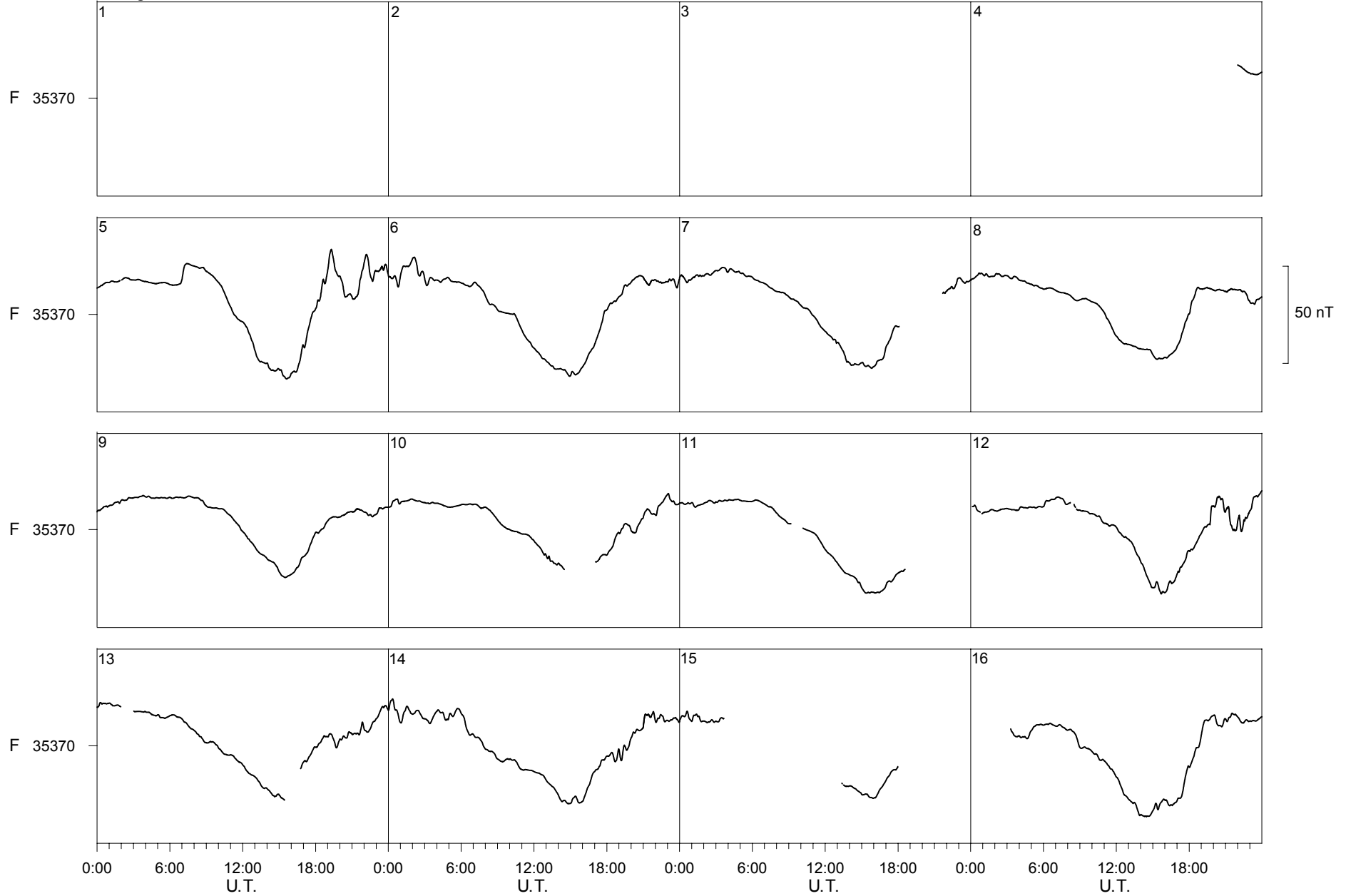
2009



Livingston Island

December

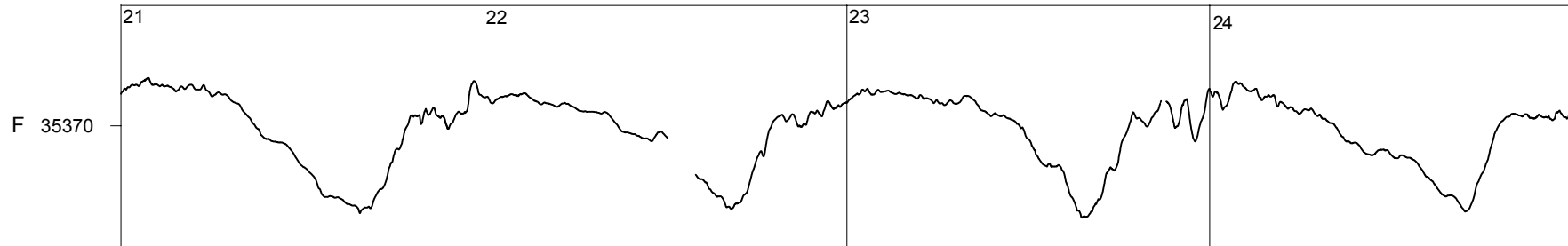
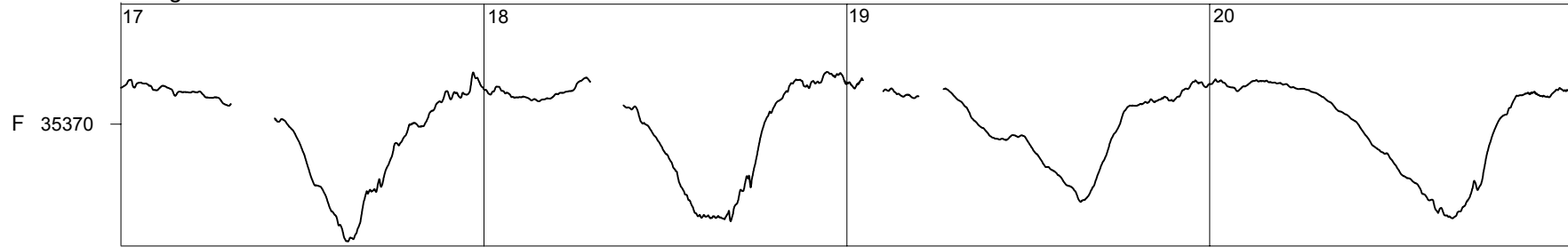
2009



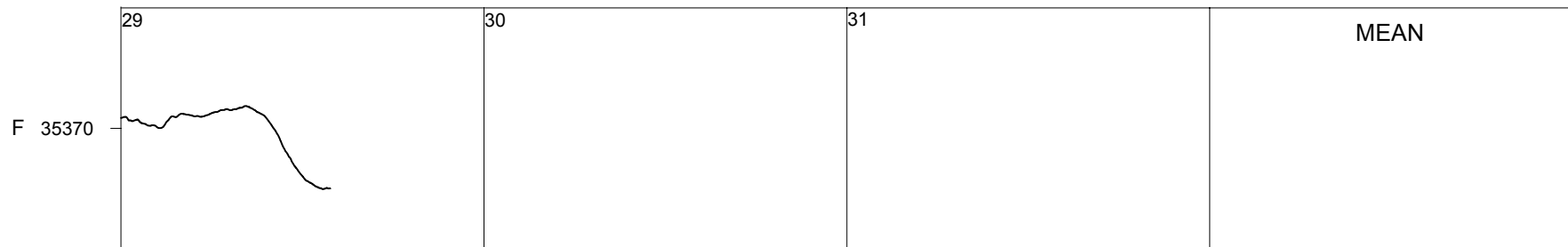
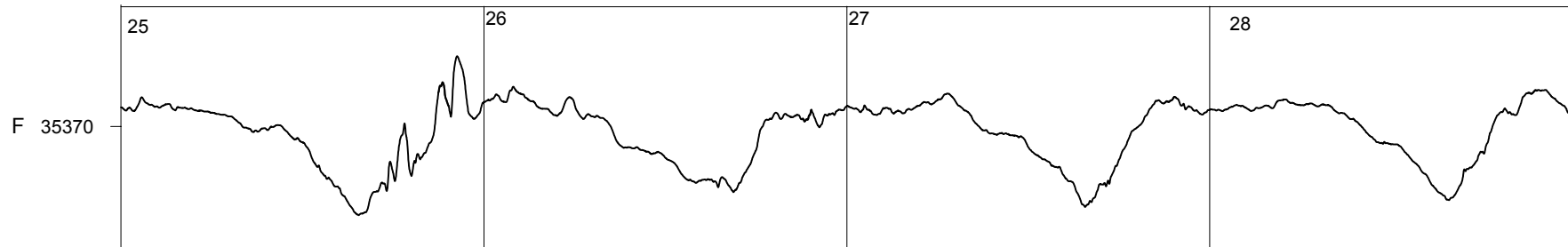
Livingston Island

December

2009



50 nT



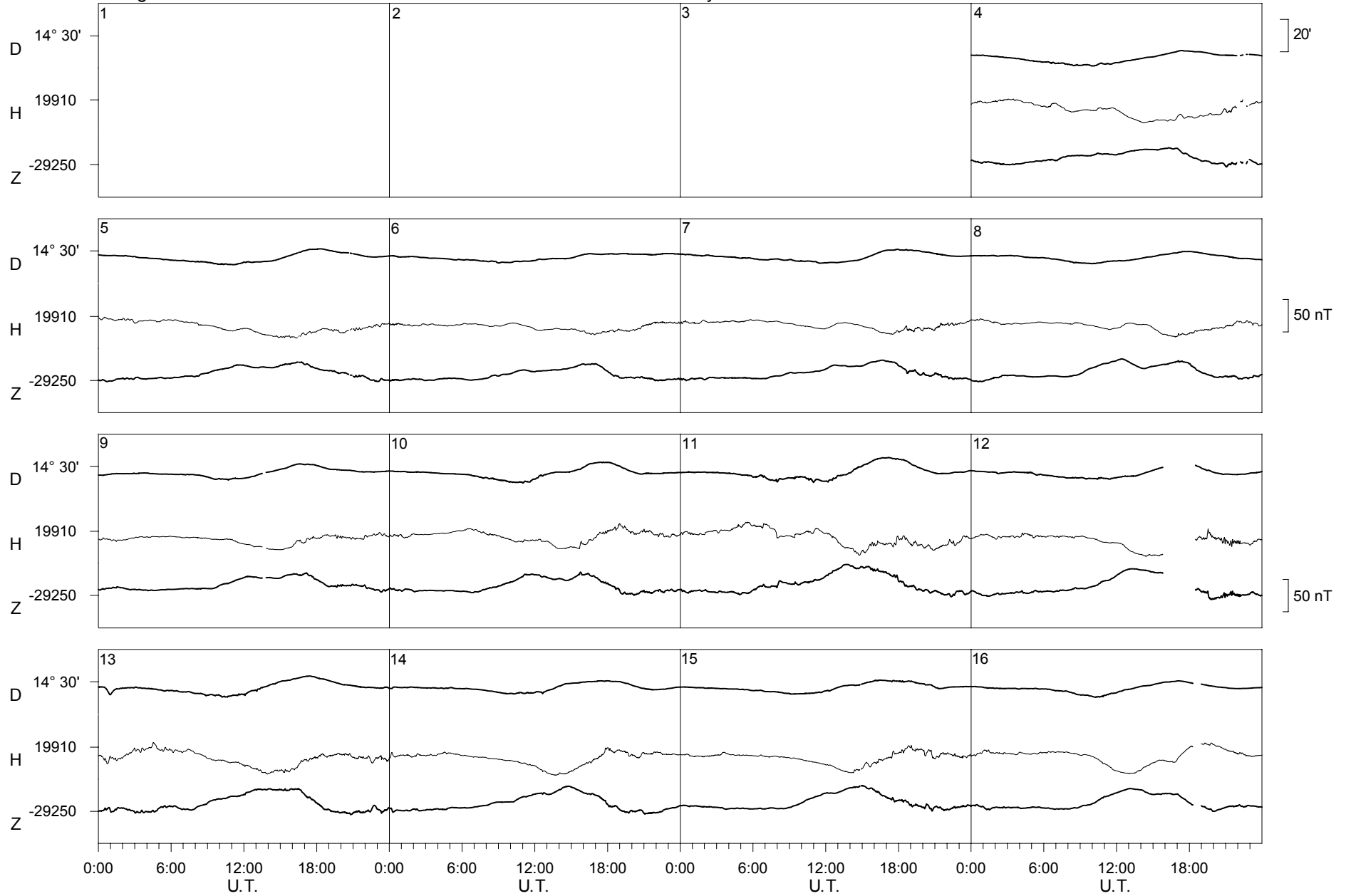
MEAN

0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00  
U.T. U.T. U.T. U.T.

Livingston Island

January

2010

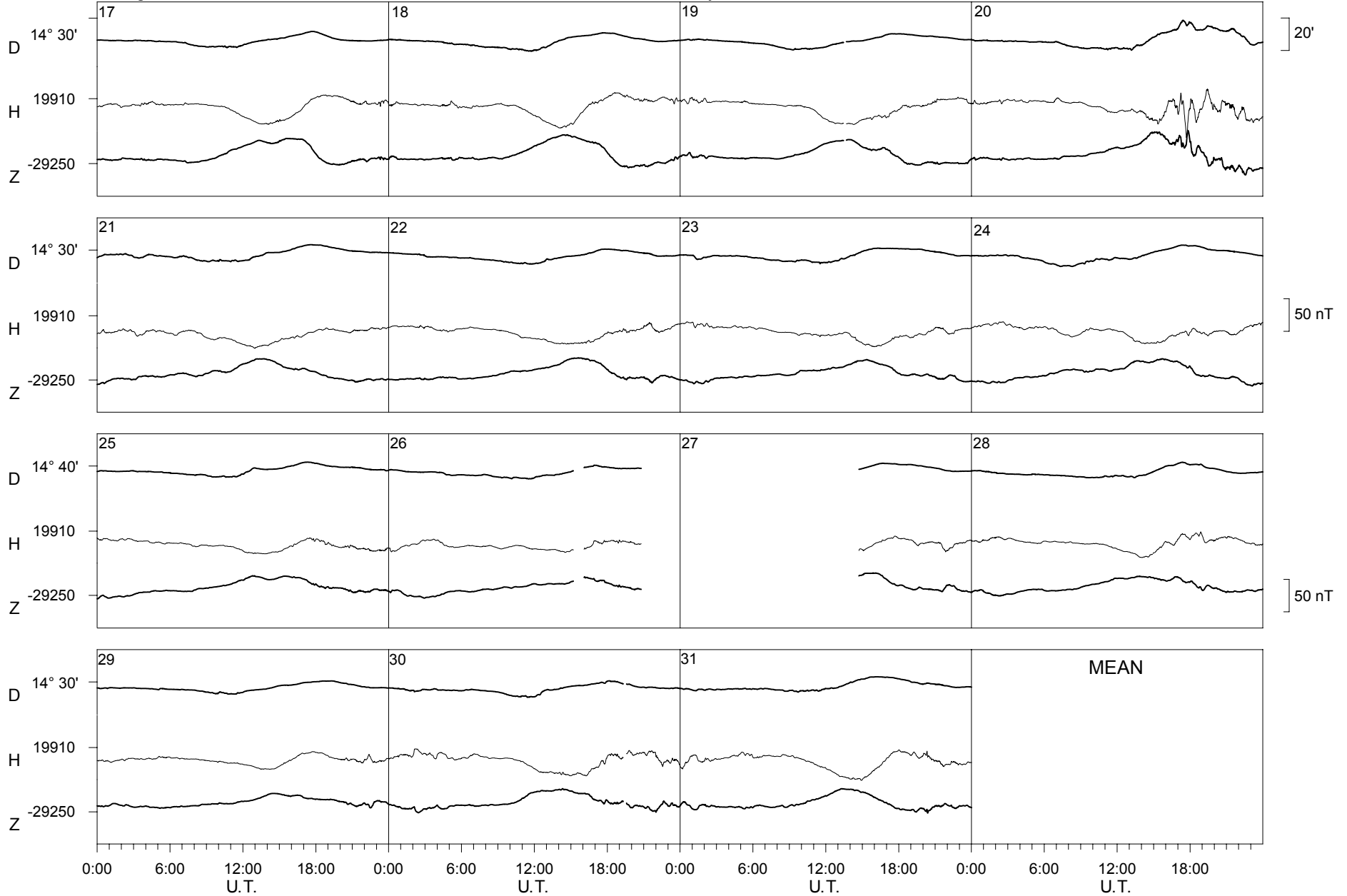




Livingston Island

January

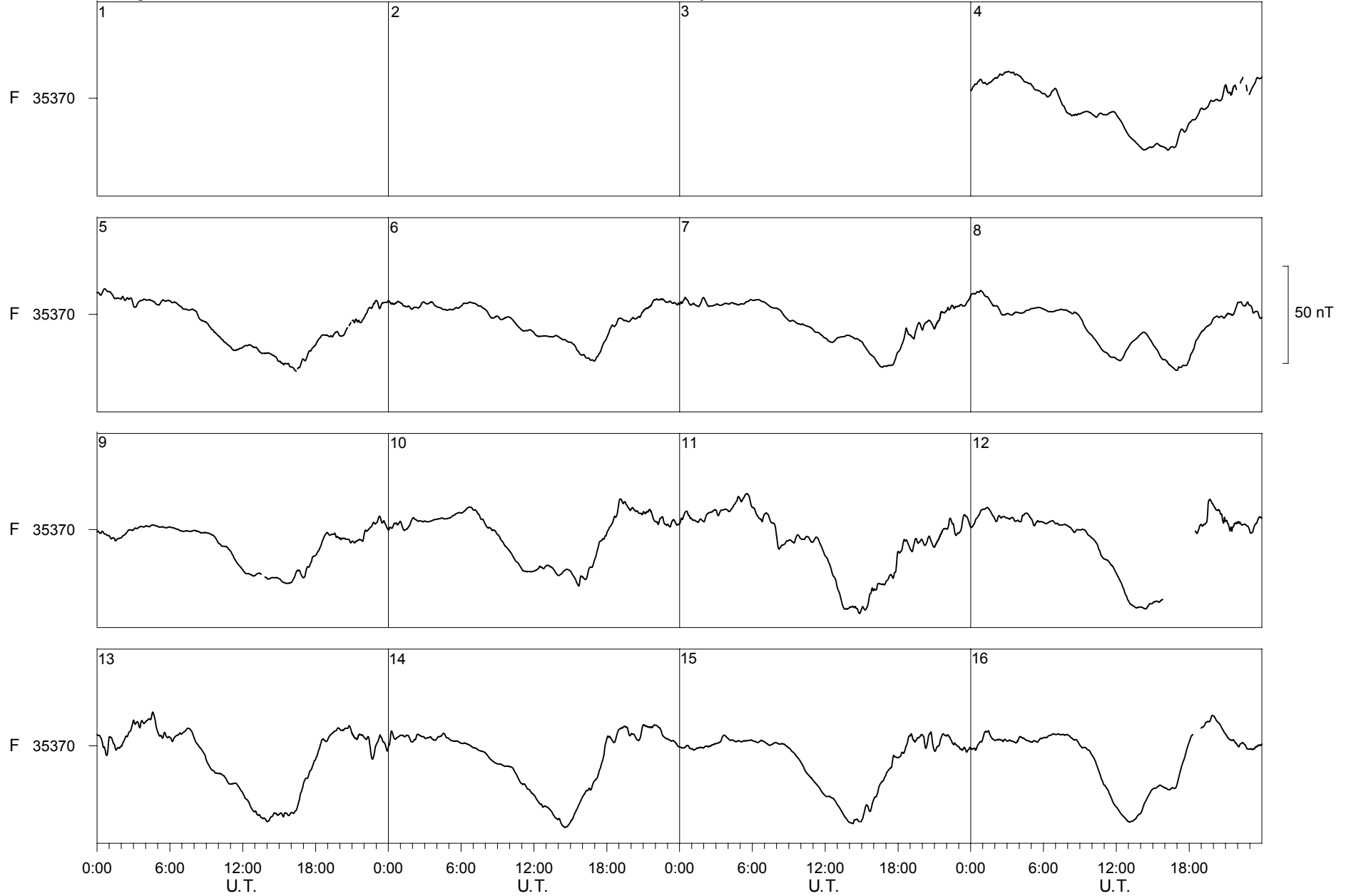
2010



Livingston Island

January

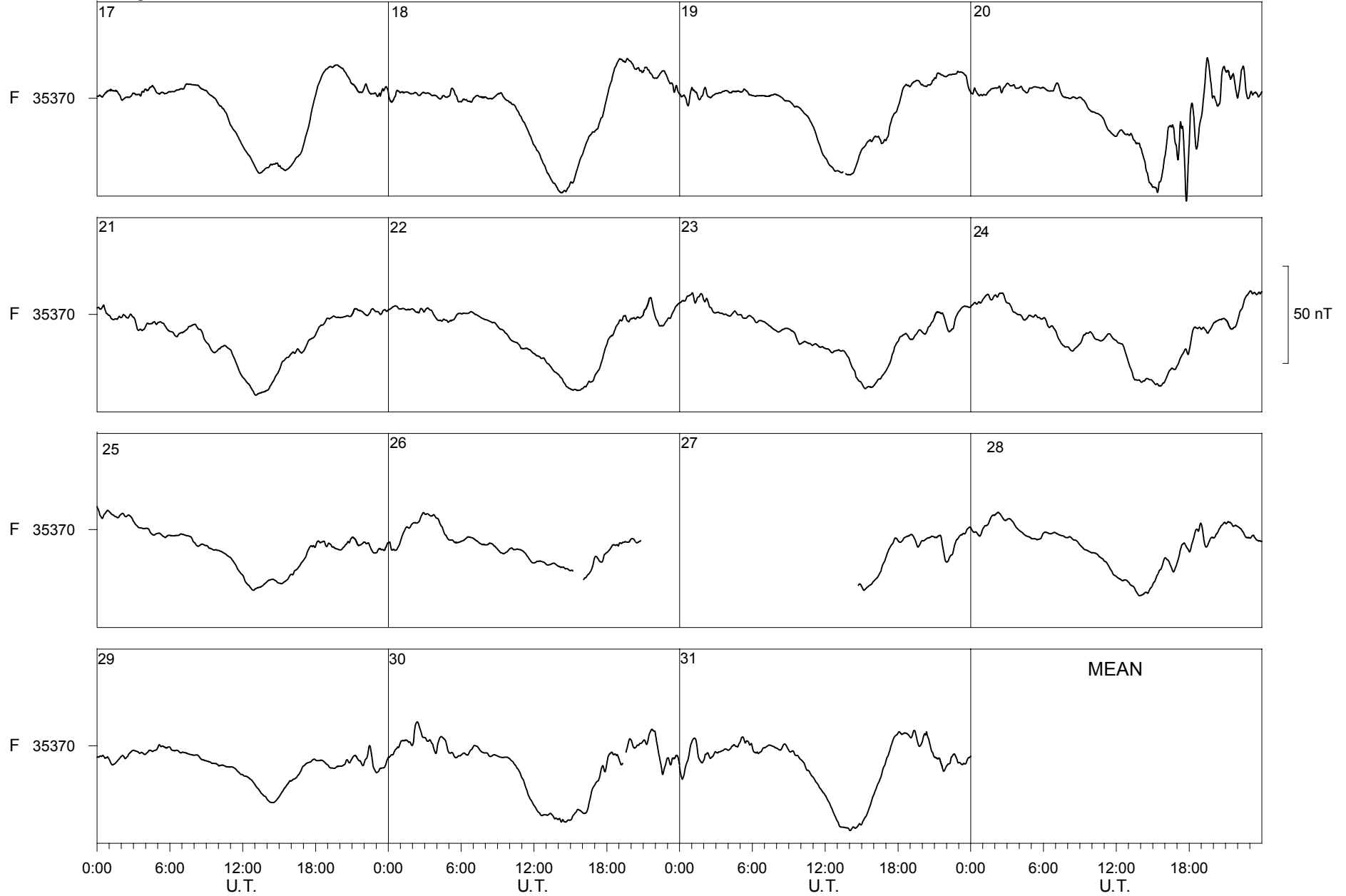
2010



Livingston Island

January

2010



LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 JANUARY 2009

DECLINATION EAST

HOUR (UT)		0	1	2	3	4	5	6	D = 14 DEGREES PLUS TABULAR QUANTITIES (UNITS 0.1 MINUTES)											18	19	20	21	22	23	MEAN
DAY									7	8	9	10	11	12	13	14	15	16	17							
1	D	297	299	296	288	275	273	268	262	260	250	257	262	285	307	315	324	328	328	324	311	307	304	303	297	293
2		297	298	296	294	284	278	275	272	266	261	---	264	270	276	288	307	332	338	332	326	324	319	298	305	295
3	D	301	303	281	280	272	246	248	247	246	265	290	282	266	263	274	299	328	335	329	324	315	302	291	286	286
4		290	288	283	287	285	281	278	269	265	263	267	260	260	277	294	322	345	368	358	333	316	306	297	293	295
5		295	294	290	280	280	280	279	273	263	259	261	259	256	260	270	299	332	351	345	329	315	305	297	297	290
6		296	292	278	270	277	275	267	256	248	250	260	264	280	---	307	317	337	336	324	313	301	291	285	284	288
7		285	286	285	285	281	278	273	268	267	254	244	250	255	273	288	313	338	337	322	306	298	291	288	---	286
8		291	292	293	292	287	281	274	265	259	260	257	250	265	287	283	293	320	323	316	311	297	287	283	285	285
9		297	297	296	294	290	284	270	270	243	238	253	269	280	302	294	312	330	343	343	334	316	302	298	296	294
10		292	261	277	282	278	268	264	251	235	235	253	265	276	287	296	309	323	331	327	309	297	290	286	292	283
11	Q	295	296	293	287	286	283	277	270	265	254	256	260	270	277	292	313	334	336	326	312	304	291	291	293	290
12	Q	295	292	292	291	289	286	278	266	256	257	257	259	267	274	281	298	316	332	340	330	311	300	294	292	290
13		292	287	288	289	271	271	261	262	253	248	243	250	265	279	296	319	331	334	331	331	322	313	298	299	289
14		303	299	299	287	279	278	270	254	243	239	241	246	275	288	291	302	324	341	328	319	314	307	298	296	289
15		301	301	295	289	284	267	246	230	239	254	259	259	273	280	290	302	330	356	353	336	331	332	329	323	294
16		312	309	304	296	285	278	271	265	258	255	259	260	259	257	---	---	304	313	322	317	311	301	299	301	288
17		298	297	296	295	292	287	282	276	265	260	263	265	265	269	286	301	316	331	329	320	311	304	303	308	292
18		305	300	300	293	289	284	275	272	267	253	238	243	256	270	286	298	314	323	323	309	293	286	292	305	286
19	D	302	287	218	258	274	279	281	257	253	253	253	270	287	297	299	311	325	344	343	337	325	315	305	299	290
20		277	293	293	291	284	283	278	269	255	250	252	256	268	282	293	304	318	331	323	314	294	287	297	294	287
21		---	295	---	294	290	282	277	269	255	243	230	236	249	266	288	315	327	330	313	298	293	302	309	309	286
22	Q	300	294	293	290	286	281	278	273	261	250	242	244	258	281	293	306	314	315	309	307	305	295	298	299	286
23	Q	296	292	287	284	280	277	275	272	263	248	229	227	240	271	291	298	297	299	294	283	281	284	289	294	277
24	Q	293	289	289	280	281	280	277	270	262	258	255	256	261	268	289	312	323	318	309	298	292	288	291	295	285
25		295	297	297	295	289	282	272	263	254	252	254	266	278	297	310	321	315	303	307	303	302	305	300	298	290
26	D	281	265	280	280	274	270	268	257	238	223	223	224	241	299	329	325	344	339	321	315	305	298	298	294	283
27		292	290	287	283	281	275	270	268	262	259	261	264	269	283	308	341	363	374	370	350	315	297	291	290	298
28		290	291	290	288	284	282	279	272	258	263	265	253	231	243	279	310	332	341	334	319	301	287	285	286	286
29		288	287	286	284	275	259	255	254	240	230	244	250	247	255	292	334	359	371	353	336	317	301	292	291	287
30		292	290	285	277	279	281	282	273	262	255	253	244	239	241	256	291	329	357	367	358	341	315	299	295	290
31	D	290	287	281	276	268	265	266	250	259	265	266	254	251	264	271	306	347	372	372	360	342	323	303	292	293
MEAN		295	292	288	286	282	276	271	264	256	252	253	255	263	277	291	310	328	337	332	321	310	301	296	296	289
MEAN Q		296	292	291	286	285	281	277	270	261	253	248	249	259	274	289	306	317	320	316	306	299	292	293	295	286
MEAN D		294	288	271	276	273	266	266	255	251	251	258	258	266	286	298	313	334	344	338	329	319	308	300	294	289

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 JANUARY 2009

HORIZONTAL INTENSITY

HOUR (UT)		H = 19500 nT PLUS TABULAR QUANTITIES (UNITS nT)																								
DAY		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	D	457	456	455	454	456	453	453	455	453	451	447	432	433	434	438	443	445	453	453	446	447	450	450	452	449
2		454	453	454	456	454	452	450	452	448	441	---	439	438	435	432	436	442	450	462	450	461	464	468	462	450
3	D	456	453	457	450	449	446	454	454	448	440	461	452	444	438	434	441	442	433	441	446	451	454	452	457	448
4		452	454	452	450	452	452	454	449	444	443	446	446	439	431	429	433	441	443	438	442	445	453	456	454	446
5		454	450	453	456	454	452	451	450	446	444	449	447	443	441	441	437	439	445	448	452	453	448	449	448	448
6		454	457	456	448	450	449	448	447	446	445	444	442	442	---	446	442	446	445	443	447	444	440	447	449	447
7		452	454	454	454	454	453	452	451	454	451	447	443	443	445	446	446	447	452	454	451	451	452	452	---	450
8		457	456	457	457	458	456	459	458	458	457	454	449	444	448	456	459	461	462	466	465	457	455	450	454	456
9		459	463	462	458	452	453	456	459	456	457	456	450	449	453	450	454	460	465	470	455	450	454	457	460	457
10		460	462	453	449	451	450	452	455	453	450	448	445	442	440	437	440	446	455	457	455	453	453	448	448	450
11	Q	451	451	453	454	456	456	456	453	452	450	447	444	437	433	432	432	430	437	443	446	449	450	449	449	446
12	Q	448	447	447	447	448	450	452	454	455	451	451	452	447	440	436	438	440	440	443	451	452	454	456	458	448
13		460	463	460	463	463	467	460	461	460	458	456	448	436	427	422	431	438	444	450	451	449	449	448	455	451
14		457	466	463	461	461	461	465	464	458	453	448	444	442	446	440	439	436	438	444	453	450	450	452	450	452
15		450	449	446	446	446	444	443	443	445	442	437	433	435	437	438	441	439	437	432	439	438	443	442	450	441
16		457	456	449	459	455	455	453	454	450	447	443	440	441	438	---	---	431	428	435	438	443	445	444	445	446
17		450	450	450	452	454	456	457	454	452	452	456	458	450	444	438	427	418	430	445	439	439	445	452	454	447
18		451	448	448	448	451	454	455	454	456	453	450	445	443	444	443	437	431	436	442	445	453	455	457	457	448
19	D	463	467	453	461	466	469	468	458	450	446	444	442	439	435	432	427	423	427	434	443	442	445	446	451	447
20		453	452	451	452	451	452	453	452	451	450	447	443	438	433	434	436	440	447	450	449	436	438	440	447	446
21		---	451	---	452	452	454	457	459	454	450	450	446	443	439	437	434	441	446	446	447	451	455	448	446	448
22	Q	448	449	451	452	452	453	454	451	449	449	447	440	438	440	440	441	439	442	442	442	449	453	453	454	447
23	Q	452	452	453	457	458	456	456	456	454	449	441	435	438	441	440	437	436	441	449	455	451	449	446	447	448
24	Q	449	452	453	453	452	450	449	448	448	446	442	434	429	431	438	447	456	469	471	463	457	450	448	454	450
25		456	456	457	460	460	457	455	456	457	453	449	440	434	433	437	447	457	467	473	467	461	455	461	459	455
26	D	465	459	460	464	465	461	451	459	460	449	440	434	425	421	426	426	443	447	455	456	452	448	447	447	448
27		448	448	450	454	457	453	450	451	450	449	449	442	434	428	424	424	429	452	458	461	454	451	448	449	446
28		449	447	446	443	442	441	443	447	447	448	447	439	422	412	409	412	421	431	439	444	451	453	455	456	439
29		458	460	461	464	464	459	449	453	448	445	437	434	423	409	403	406	416	429	438	446	447	449	447	449	442
30		450	451	452	450	448	447	447	445	448	448	448	451	445	437	426	418	420	432	444	447	445	451	463	458	445
31	D	462	464	468	469	464	459	453	450	453	454	451	446	427	415	410	404	412	419	432	443	452	451	442	441	443
MEAN		454	455	454	455	455	454	453	453	452	449	447	443	438	435	434	435	438	443	448	449	449	450	451	452	448
MEAN Q		450	450	451	453	453	453	453	453	452	449	445	441	438	437	437	439	440	446	449	451	452	451	450	452	448
MEAN D		461	460	459	460	460	458	456	455	453	448	449	441	434	429	428	428	433	436	443	447	449	450	447	449	447

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 JANUARY 2009

VERTICAL INTENSITY

		Z = -29000 nT PLUS TABULAR QUANTITIES (UNITS nT)																									
HOUR (UT)		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN	
DAY																											
1	D	-318	-315	-316	-314	-315	-316	-315	-311	-308	-308	-305	-295	-290	-294	-292	-290	-294	-305	-308	-308	-312	-312	-313	-317	-307	
2		-319	-319	-317	-318	-316	-315	-315	-316	-313	-306	---	-304	-304	-301	-292	-286	-288	-300	-313	-308	-314	-320	-328	-325	-310	
3	D	-321	-318	-321	-316	-316	-316	-319	-319	-313	-301	-302	-302	-305	-300	-291	-292	-293	-291	-301	-307	-312	-319	-322	-324	-309	
4		-320	-319	-317	-315	-315	-314	-314	-312	-310	-306	-302	-299	-297	-295	-292	-291	-287	-296	-305	-310	-316	-320	-321	-319	-308	
5		-318	-316	-316	-316	-315	-314	-314	-312	-310	-304	-303	-307	-303	-297	-294	-286	-284	-290	-300	-309	-315	-312	-312	-310	-307	
6		-316	-319	-319	-313	-315	-315	-313	-313	-312	-310	-306	-304	-301	---	-291	-287	-286	-297	-305	-311	-314	-316	-322	-320	-309	
7		-319	-319	-319	-317	-317	-316	-315	-312	-311	-307	-304	-301	-297	-292	-290	-289	-292	-299	-307	-307	-305	-308	-314	---	-307	
8		-314	-315	-315	-315	-316	-315	-315	-313	-309	-305	-300	-300	-296	-293	-292	-286	-287	-299	-311	-313	-310	-312	-313	-311	-306	
9		-313	-318	-317	-315	-311	-313	-317	-316	-309	-304	-298	-296	-292	-294	-294	-286	-287	-296	-306	-307	-307	-312	-312	-316	-306	
10		-315	-317	-310	-312	-315	-317	-317	-318	-314	-308	-301	-296	-292	-294	-294	-293	-304	-312	-318	-317	-317	-318	-314	-313	-309	
11	Q	-315	-316	-315	-316	-317	-317	-316	-314	-311	-308	-303	-298	-289	-283	-283	-285	-290	-301	-308	-308	-309	-310	-311	-312	-306	
12	Q	-313	-313	-312	-312	-313	-316	-318	-320	-317	-312	-305	-303	-301	-299	-297	-294	-297	-303	-305	-310	-316	-320	-323	-318	-310	
13		-315	-317	-314	-315	-317	-319	-315	-313	-312	-307	-303	-296	-287	-283	-280	-283	-283	-292	-299	-303	-306	-309	-312	-314	-304	
14		-314	-319	-317	-316	-316	-316	-319	-318	-313	-309	-303	-295	-292	-294	-294	-292	-292	-296	-304	-312	-315	-320	-322	-319	-309	
15		-317	-317	-317	-316	-315	-315	-314	-314	-313	-310	-307	-301	-296	-296	-292	-289	-285	-285	-297	-303	-307	-310	-312	-318	-306	
16		-326	-322	-314	-319	-318	-317	-316	-317	-313	-308	-303	-300	-301	-300	---	---	-293	-294	-295	-301	-310	-316	-317	-316	-309	
17		-317	-315	-313	-313	-314	-315	-313	-311	-309	-309	-307	-307	-305	-308	-303	-298	-295	-296	-308	-313	-313	-318	-318	-317	-310	
18		-315	-312	-312	-313	-315	-316	-316	-314	-313	-311	-309	-305	-299	-292	-291	-295	-296	-303	-307	-313	-320	-321	-320	-315	-309	
19	D	-317	-324	-317	-314	-317	-316	-312	-305	-306	-305	-302	-300	-298	-289	-283	-285	-286	-289	-296	-309	-316	-320	-319	-325	-306	
20		-325	-318	-317	-315	-313	-312	-312	-313	-311	-306	-303	-300	-296	-291	-287	-290	-293	-300	-308	-311	-309	-312	-314	-317	-307	
21		---	-316	---	-317	-317	-318	-318	-315	-311	-308	-303	-297	-290	-292	-292	-288	-293	-300	-307	-310	-310	-309	-306	-306	-306	
22	Q	-312	-314	-314	-314	-314	-315	-314	-312	-308	-307	-303	-299	-295	-295	-293	-292	-296	-299	-308	-311	-312	-314	-313	-313	-307	
23	Q	-310	-310	-311	-313	-314	-313	-311	-309	-308	-306	-302	-293	-286	-283	-282	-289	-293	-291	-298	-306	-308	-307	-303	-304	-302	
24	Q	-305	-307	-311	-312	-312	-311	-310	-309	-307	-303	-302	-301	-297	-291	-285	-287	-293	-302	-306	-308	-311	-309	-308	-312	-304	
25		-312	-311	-311	-313	-314	-312	-312	-313	-312	-306	-301	-295	-289	-289	-292	-297	-305	-309	-309	-309	-307	-307	-315	-316	-307	
26	D	-318	-312	-312	-313	-313	-312	-306	-310	-311	-299	-293	-289	-282	-277	-281	-282	-291	-296	-305	-309	-310	-307	-306	-308	-302	
27		-310	-310	-312	-314	-315	-312	-309	-311	-310	-306	-304	-300	-296	-289	-284	-284	-286	-297	-309	-319	-321	-317	-314	-313	-306	
28		-311	-308	-308	-308	-309	-310	-312	-314	-311	-305	-302	-297	-290	-287	-286	-288	-292	-302	-311	-314	-319	-319	-316	-314	-306	
29		-314	-315	-312	-313	-313	-308	-303	-304	-304	-303	-298	-296	-292	-284	-275	-274	-284	-296	-306	-311	-318	-320	-317	-316	-303	
30		-314	-313	-313	-312	-309	-308	-309	-310	-312	-311	-306	-305	-302	-296	-289	-277	-277	-286	-302	-312	-315	-322	-329	-319	-306	
31	D	-315	-315	-316	-315	-312	-307	-305	-303	-304	-300	-300	-303	-295	-288	-284	-278	-282	-293	-311	-317	-322	-328	-323	-318	-306	
MEAN		-316	-315	-315	-314	-314	-314	-313	-313	-310	-306	-303	-300	-295	-292	-289	-288	-290	-297	-306	-310	-313	-315	-316	-315	-307	
MEAN Q		-311	-312	-313	-313	-314	-314	-314	-313	-310	-307	-303	-298	-294	-290	-288	-289	-294	-299	-305	-309	-311	-312	-311	-312	-306	
MEAN D		-318	-317	-316	-314	-315	-313	-312	-310	-309	-303	-300	-298	-294	-290	-286	-285	-289	-295	-304	-310	-314	-317	-317	-318	-306	

## LIVINGSTON ISLAND MAGNETIC OBSERVATORY

JANUARY 2009

## TOTAL INTENSITY

F = 35000 nT PLUS TABULAR QUANTITIES (UNITS nT)																						MEAN				
HOUR (UT)		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
DAY																										
1	D	466	463	463	461	463	462	461	459	455	455	449	433	429	433	434	435	439	453	455	451	455	457	458	462	452
2		465	464	463	465	463	461	459	461	456	447	---	444	444	440	430	428	432	447	465	454	465	472	481	475	455
3	D	467	464	469	460	459	458	465	465	457	443	454	450	448	440	431	435	437	430	443	451	457	465	467	470	454
4		465	465	462	460	461	459	461	456	452	448	446	444	439	433	428	430	431	439	444	451	457	466	468	465	451
5		464	460	462	463	461	460	459	457	453	447	449	451	445	440	437	428	427	436	447	455	461	456	456	455	451
6		463	467	466	457	459	459	457	456	454	452	449	446	443	---	437	432	433	442	448	455	455	455	463	464	452
7		464	465	465	464	464	462	461	458	458	453	449	444	440	438	436	436	438	447	455	453	451	454	460	---	453
8		462	463	464	464	464	463	465	463	459	455	450	447	440	440	443	441	443	453	465	467	459	459	458	459	456
9		463	469	468	464	457	459	465	466	458	454	449	443	440	444	442	438	442	452	463	456	452	459	460	466	455
10		465	468	456	456	460	461	462	465	460	453	447	441	436	437	435	435	448	460	466	464	462	464	458	456	455
11	Q	460	461	461	463	464	464	463	461	457	454	448	442	430	423	423	424	428	440	450	451	454	455	455	457	449
12	Q	457	457	455	455	457	460	464	466	464	457	452	450	446	441	436	435	439	443	447	456	462	466	469	467	454
13		465	469	464	467	469	472	465	464	463	457	453	443	429	420	415	422	426	437	447	450	451	453	456	461	451
14		462	471	468	467	466	467	471	470	463	456	448	439	436	440	436	434	433	437	447	459	459	463	466	463	455
15		461	461	459	457	457	456	455	455	455	450	445	439	435	436	434	433	428	428	434	444	446	452	453	462	447
16		472	468	458	467	464	464	462	464	458	452	446	442	443	440	---	---	431	430	435	441	452	457	457	457	452
17		462	459	458	459	461	463	462	458	456	456	456	457	451	450	442	432	425	433	450	452	451	459	463	463	453
18		460	456	455	457	460	463	463	461	461	458	454	448	443	437	435	436	433	441	448	455	466	467	468	463	454
19	D	468	476	463	465	470	471	467	455	452	449	446	443	439	430	423	422	420	425	435	451	456	461	461	469	451
20		469	463	462	460	458	458	458	459	456	452	448	443	437	430	427	430	436	445	454	456	447	450	453	459	450
21		---	461	---	462	463	464	466	464	459	453	449	442	434	435	433	428	436	445	451	454	455	457	451	450	451
22	Q	455	458	459	460	460	461	461	457	453	452	448	440	437	437	436	436	438	442	449	452	457	460	459	460	451
23	Q	457	456	458	462	463	461	459	458	456	452	443	432	429	428	426	430	433	435	445	455	455	452	447	448	447
24	Q	451	454	458	459	458	456	455	454	452	447	444	439	433	429	428	435	445	459	464	461	460	455	453	459	450
25		461	460	460	463	465	461	459	461	461	454	447	437	429	429	433	443	455	464	468	464	459	456	466	466	455
26	D	471	463	463	466	466	463	453	460	462	446	436	429	418	411	418	419	435	442	454	458	456	451	450	452	448
27		454	455	457	461	463	459	454	457	455	452	450	442	435	426	420	419	424	446	459	469	466	461	458	458	450
28		456	452	451	450	450	450	453	457	455	450	446	439	423	415	412	416	424	438	450	455	464	464	463	462	446
29		463	465	463	466	466	458	449	452	449	447	438	435	425	411	400	401	415	432	446	454	460	462	459	460	445
30		459	458	459	457	454	453	453	453	455	455	451	452	446	436	424	410	411	426	445	455	457	466	479	467	449
31	D	466	467	470	470	465	458	453	449	452	449	448	448	430	417	411	403	411	424	446	457	467	471	461	457	448
MEAN		462	463	461	461	462	461	460	459	457	452	448	443	437	432	429	428	432	441	451	455	457	460	460	461	451
MEAN Q		456	457	458	460	460	460	460	459	456	452	447	441	435	432	430	432	436	444	451	455	457	458	457	458	451
MEAN D		468	467	466	464	465	462	460	458	456	448	446	440	433	426	423	423	429	435	446	453	458	461	459	462	450

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 FEBRUARY 2009

DECLINATION EAST

D = 14 DEGREES PLUS TABULAR QUANTITIES (UNITS 0.1 MINUTES)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	295	291	287	282	274	274	280	279	272	267	272	273	257	239	251	281	318	344	354	350	334	316	298	288	291
2 Q	288	289	288	290	289	286	286	283	275	272	278	280	269	261	265	280	316	366	385	376	352	330	310	293	300
3	288	286	283	282	281	280	278	273	265	269	279	285	268	253	250	260	285	324	352	355	---	330	328	319	292
4 D	311	292	283	282	274	268	259	248	239	241	248	284	279	---	---	---	---	---	---	---	---	347	332	314	---
5	291	229	276	282	280	279	277	274	267	256	261	278	281	282	288	299	312	325	333	346	343	334	320	308	293
6	294	276	289	289	286	283	282	275	266	257	257	260	259	267	283	299	316	332	342	337	321	306	300	294	290
7	294	289	289	289	280	277	275	267	256	251	252	255	251	256	278	304	324	340	355	350	328	313	303	296	290
8 Q	293	289	286	286	286	284	279	271	264	254	250	247	241	---	---	287	329	363	374	358	330	307	292	283	291
9	274	278	286	288	288	288	281	275	269	263	262	263	252	251	270	309	351	373	380	363	334	310	297	289	296
10 Q	287	284	283	278	274	275	275	272	261	258	260	257	247	238	247	269	308	341	354	351	338	315	302	294	286
11	291	288	278	278	278	278	273	268	263	259	260	255	244	243	251	275	315	348	368	372	351	325	306	294	290
12	287	282	281	281	279	277	275	272	267	263	253	252	254	258	267	287	310	334	346	340	327	312	304	295	288
13	289	287	287	284	281	278	275	272	265	259	253	248	242	249	277	317	350	360	358	347	---	315	303	295	291
14 D	295	284	285	281	273	267	268	258	229	250	249	242	256	295	305	316	327	337	342	341	330	322	291	269	288
15 D	285	288	270	249	250	269	273	274	265	269	261	255	266	279	279	293	314	330	351	350	335	305	297	292	287
16	285	276	287	289	289	288	287	284	278	271	263	260	255	256	270	289	315	334	342	343	338	322	311	301	293
17 Q	295	292	290	289	288	287	285	284	278	277	274	267	260	260	269	292	327	353	356	341	322	305	294	291	295
18	274	281	285	285	282	280	278	275	269	263	259	255	251	257	271	291	313	331	338	337	327	307	299	290	287
19 Q	289	289	289	288	285	283	281	277	271	267	265	255	250	250	259	287	323	347	356	350	334	315	301	291	292
20	286	285	286	282	270	269	259	263	260	258	262	259	250	253	277	305	336	353	358	346	328	311	296	292	289
21	290	291	290	287	282	279	277	273	265	256	246	237	237	248	277	307	335	356	358	341	318	295	289	291	289
22	291	289	285	280	276	275	272	268	270	267	268	254	242	248	262	280	307	332	342	339	325	305	293	291	286
23	291	288	287	285	283	279	276	272	269	273	270	250	233	233	262	290	330	348	356	349	331	314	304	288	290
24 D	292	290	280	256	243	271	274	273	280	265	270	269	261	255	264	286	309	339	354	347	327	307	294	287	287
25	283	276	280	280	281	275	276	280	276	273	275	267	248	245	260	286	312	340	351	340	327	311	298	291	289
26	291	291	290	285	283	282	281	281	279	276	279	264	244	243	262	288	327	353	355	339	322	304	294	293	292
27 D	290	286	284	266	275	276	274	270	275	281	269	255	253	253	259	282	322	355	373	361	333	311	289	287	291
28	289	289	275	265	279	281	292	285	280	274	275	267	254	245	249	272	316	350	354	343	323	300	286	287	289
MEAN	290	284	284	281	278	278	277	273	267	264	263	260	254	255	267	290	320	345	355	348	332	314	301	293	290
MEAN Q	290	288	287	286	284	283	281	277	270	266	265	261	253	251	261	283	321	354	365	355	335	314	300	290	293
MEAN D	294	288	281	267	263	270	270	265	258	261	259	261	263	272	277	294	318	340	355	349	335	318	301	290	288



LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 FEBRUARY 2009

HORIZONTAL INTENSITY  
 H = 19500 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN	
DAY																										
1	443	450	453	454	458	454	450	447	444	440	441	447	442	434	424	417	419	428	439	442	447	451	449	448	443	
2 Q	447	448	452	451	450	450	448	449	449	451	460	462	451	433	413	395	390	399	414	428	439	447	449	447	438	
3	446	449	451	452	453	452	450	450	451	456	464	470	465	454	438	425	419	419	423	429	---	441	433	423	444	
4 D	420	442	454	453	452	452	451	452	451	447	443	461	461	---	---	---	---	---	---	---	---	---	435	442	438	---
5	430	432	440	446	444	441	441	438	439	440	441	444	442	435	431	420	415	413	420	430	446	449	441	439	436	
6	438	437	442	440	439	439	437	438	438	437	436	438	434	425	417	413	415	424	436	443	446	451	451	450	436	
7	451	451	454	452	451	447	445	443	442	444	444	441	437	429	419	412	411	422	436	443	448	451	451	451	441	
8 Q	453	454	457	459	454	453	454	453	451	449	447	443	436	---	---	415	411	415	432	449	456	453	448	446	444	
9	446	448	450	453	452	451	450	450	451	450	451	447	433	420	413	411	414	424	440	452	456	457	451	450	443	
10 Q	451	453	455	456	457	456	450	449	448	448	453	455	449	433	418	409	407	415	429	444	452	454	451	450	443	
11	453	454	451	454	455	452	453	453	452	452	455	456	449	440	427	418	415	417	423	443	453	456	456	454	445	
12	453	453	454	453	453	452	450	449	449	451	454	452	444	436	427	420	419	424	434	443	448	448	447	446	444	
13	447	449	450	449	449	449	449	451	451	452	452	446	434	421	410	406	410	416	425	434	---	454	457	458	440	
14 D	456	464	469	476	483	484	464	475	463	470	460	455	444	429	431	411	406	413	421	431	439	437	433	434	448	
15 D	436	440	434	442	445	441	441	445	441	435	440	445	423	418	411	407	402	405	414	425	424	426	430	433	429	
16	438	442	442	442	442	442	441	439	440	441	445	446	438	422	408	403	408	411	424	433	436	438	440	440	433	
17 Q	441	443	443	445	445	444	442	441	441	444	447	447	438	424	413	409	408	415	424	430	435	438	441	441	435	
18	442	445	448	449	449	447	446	445	443	442	442	438	429	417	409	411	411	415	421	429	433	441	443	441	435	
19 Q	447	448	448	448	447	446	445	445	444	444	446	446	438	424	414	409	405	414	425	435	444	447	446	450	438	
20	451	454	451	463	463	456	453	450	448	448	452	450	440	423	405	400	406	420	431	442	445	444	446	449	441	
21	453	452	454	453	449	452	452	449	448	446	445	441	434	423	413	408	409	421	431	435	443	448	447	450	440	
22	451	452	453	455	455	452	448	441	440	444	445	452	442	428	417	409	410	415	424	433	443	443	446	446	439	
23	447	446	449	450	451	451	451	450	449	450	454	451	442	425	411	403	393	403	422	430	438	442	442	434	437	
24 D	432	438	439	442	436	441	442	438	441	437	437	438	432	424	412	403	408	413	419	429	439	445	444	444	432	
25	441	437	436	437	441	440	440	437	438	439	442	445	436	423	409	400	402	410	419	432	443	448	446	442	433	
26	442	443	445	446	443	441	441	441	442	443	447	446	437	423	408	403	400	410	428	442	449	448	451	452	436	
27 D	459	460	459	459	459	453	450	448	452	453	446	447	435	425	411	406	404	404	416	421	430	434	433	437	438	
28	442	444	446	444	443	443	443	443	440	439	444	448	441	425	408	398	398	404	418	434	442	443	440	442	434	
MEAN	445	447	449	451	451	449	447	447	446	446	448	449	440	428	416	409	408	414	426	436	443	445	445	444	439	
MEAN Q	448	449	451	452	451	450	448	447	447	447	451	451	442	429	416	407	404	412	425	437	445	448	447	447	440	
MEAN D	441	449	451	454	455	454	450	452	450	448	445	449	439	425	416	407	405	409	417	427	434	435	437	437	438	

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 FEBRUARY 2009

VERTICAL INTENSITY

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	-313	-315	-316	-315	-313	-308	-306	-307	-307	-304	-301	-302	-305	-301	-291	-286	-283	-288	-297	-305	-316	-325	-326	-324	-306
2 Q	-318	-313	-313	-310	-309	-308	-307	-309	-310	-307	-305	-306	-303	-297	-289	-282	-274	-276	-290	-306	-320	-328	-330	-327	-306
3	-322	-317	-316	-313	-311	-309	-308	-308	-309	-307	-306	-309	-313	-309	-301	-293	-283	-275	-282	-296	---	-320	-325	-324	-307
4 D	-327	-330	-330	-322	-317	-315	-312	-310	-310	-306	-297	-296	-299	---	---	---	---	---	---	---	---	-317	-321	-328	---
5	-326	-323	-319	-320	-318	-313	-312	-311	-310	-308	-301	-299	-301	-302	-300	-295	-292	-293	-299	-307	-318	-323	-322	-321	-310
6	-322	-320	-318	-315	-313	-312	-311	-312	-312	-309	-304	-302	-301	-294	-289	-282	-279	-283	-293	-304	-312	-318	-319	-317	-306
7	-316	-315	-316	-313	-311	-307	-307	-307	-308	-307	-303	-298	-294	-289	-285	-283	-282	-290	-297	-309	-319	-320	-318	-317	-305
8 Q	-316	-315	-315	-316	-311	-310	-310	-310	-307	-303	-300	-297	-295	---	---	-285	-283	-285	-294	-312	-323	-323	-319	-316	-306
9	-313	-313	-313	-313	-311	-311	-311	-311	-310	-305	-300	-300	-301	-295	-288	-284	-286	-293	-306	-321	-331	-332	-326	-321	-308
10 Q	-315	-313	-313	-313	-312	-311	-307	-307	-309	-306	-303	-303	-301	-293	-287	-281	-277	-283	-293	-302	-315	-322	-320	-317	-304
11	-315	-315	-313	-310	-311	-308	-308	-309	-307	-304	-303	-300	-299	-295	-288	-281	-278	-280	-286	-305	-318	-322	-324	-321	-304
12	-317	-313	-310	-308	-307	-307	-307	-307	-307	-306	-306	-303	-298	-294	-293	-290	-288	-293	-301	-311	-319	-321	-321	-319	-306
13	-315	-313	-311	-309	-308	-308	-308	-309	-309	-309	-308	-305	-299	-293	-285	-275	-280	-289	-302	-311	---	-321	-322	-320	-305
14 D	-317	-316	-315	-315	-315	-316	-298	-293	-282	-281	-279	-289	-290	-280	-289	-282	-285	-297	-305	-312	-319	-321	-324	-327	-302
15 D	-321	-317	-311	-314	-307	-308	-308	-308	-306	-302	-307	-311	-297	-295	-291	-288	-288	-292	-297	-307	-314	-321	-322	-320	-306
16	-320	-319	-315	-312	-310	-308	-307	-307	-310	-311	-313	-311	-305	-297	-288	-283	-283	-287	-300	-308	-314	-316	-318	-318	-307
17 Q	-317	-315	-313	-312	-310	-308	-307	-307	-307	-306	-309	-310	-307	-300	-293	-288	-285	-287	-299	-312	-320	-322	-320	-317	-307
18	-316	-314	-312	-312	-310	-309	-308	-307	-307	-306	-305	-304	-300	-295	-288	-288	-286	-289	-298	-308	-312	-316	-319	-315	-305
19 Q	-315	-313	-311	-310	-308	-307	-306	-306	-306	-305	-306	-306	-303	-297	-289	-284	-283	-290	-299	-308	-313	-314	-314	-316	-305
20	-314	-313	-308	-313	-313	-305	-303	-302	-303	-301	-301	-302	-301	-292	-282	-279	-285	-296	-309	-319	-321	-319	-318	-319	-305
21	-315	-312	-310	-310	-306	-307	-308	-306	-305	-305	-302	-299	-300	-292	-284	-278	-278	-286	-298	-306	-316	-319	-313	-311	-303
22	-310	-310	-309	-310	-309	-306	-304	-301	-299	-301	-298	-303	-299	-291	-287	-282	-283	-289	-298	-310	-320	-318	-317	-314	-303
23	-311	-309	-310	-309	-309	-309	-307	-307	-305	-302	-303	-305	-303	-294	-286	-279	-275	-284	-298	-306	-316	-319	-319	-317	-303
24 D	-313	-312	-315	-314	-305	-311	-310	-307	-304	-301	-300	-303	-305	-302	-297	-293	-290	-291	-296	-308	-316	-320	-317	-315	-306
25	-312	-308	-309	-308	-308	-307	-306	-305	-308	-306	-305	-307	-304	-297	-286	-280	-283	-290	-298	-308	-314	-317	-316	-313	-304
26	-309	-308	-308	-308	-306	-305	-305	-305	-305	-305	-305	-309	-310	-301	-290	-282	-280	-292	-305	-314	-321	-320	-319	-314	-305
27 D	-315	-314	-309	-310	-308	-303	-302	-302	-301	-294	-285	-292	-293	-294	-290	-284	-279	-279	-293	-304	-315	-323	-324	-320	-301
28	-317	-313	-312	-307	-307	-306	-302	-303	-305	-305	-303	-307	-306	-298	-288	-281	-277	-284	-297	-311	-320	-320	-317	-314	-304
MEAN	-316	-315	-313	-312	-310	-309	-307	-306	-306	-304	-302	-303	-301	-295	-289	-284	-282	-287	-297	-309	-317	-321	-320	-319	-305
MEAN Q	-316	-314	-313	-312	-310	-309	-308	-308	-308	-306	-305	-304	-302	-296	-289	-284	-280	-284	-295	-308	-318	-322	-321	-318	-305
MEAN D	-318	-318	-316	-315	-310	-310	-306	-304	-301	-297	-293	-298	-297	-293	-292	-287	-286	-290	-298	-308	-315	-320	-322	-322	-305

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 FEBRUARY 2009

TOTAL INTENSITY  
 F = 35000 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	454	459	462	462	463	456	452	451	449	444	443	447	447	438	425	417	416	424	439	447	459	468	469	466	448
2 Q	460	457	459	456	454	453	452	454	455	454	457	459	450	435	418	401	392	399	418	440	457	468	471	468	445
3	463	461	460	459	458	455	454	453	455	456	460	466	466	456	441	427	416	409	417	432	---	458	458	452	450
4 D	452	467	474	467	462	460	457	456	456	451	441	450	452	---	---	---	---	---	---	---	---	452	460	464	---
5	457	456	457	461	459	453	452	449	449	448	443	442	443	440	436	426	421	420	429	442	459	465	460	458	447
6	458	456	457	454	452	450	449	450	450	447	442	442	439	428	419	411	410	418	433	446	455	462	464	461	444
7	461	460	463	459	456	452	450	449	449	449	446	440	435	426	418	411	411	423	437	451	461	464	463	462	446
8 Q	462	461	464	465	458	457	458	456	454	449	445	441	435	---	---	415	411	415	432	456	469	468	462	458	448
9	455	457	458	459	458	457	456	456	456	451	448	446	439	426	416	412	415	426	447	465	476	477	469	464	449
10 Q	460	460	461	461	461	460	453	452	453	451	451	452	448	432	418	408	403	413	430	445	460	467	465	461	447
11	461	462	458	458	459	455	456	456	454	451	452	451	446	437	424	413	410	412	420	448	464	468	470	467	448
12	463	460	457	456	455	454	453	452	452	452	454	451	442	434	428	421	419	427	439	453	462	463	463	460	449
13	458	457	456	454	453	453	453	455	455	455	455	449	437	425	412	402	408	419	435	447	---	467	469	468	445
14 D	464	468	470	474	478	479	454	455	440	443	435	441	436	419	427	411	410	424	435	446	456	457	458	460	447
15 D	456	455	447	454	450	448	448	451	447	440	447	453	429	424	418	413	410	415	425	439	444	451	454	454	441
16	457	458	454	453	451	449	448	447	450	452	455	454	445	429	414	406	409	415	432	444	451	453	456	457	443
17 Q	456	456	454	454	452	451	448	448	447	449	453	454	446	433	420	414	411	416	432	445	456	459	459	456	445
18	456	456	456	457	455	453	451	450	449	448	447	443	436	424	414	415	413	418	429	442	447	455	458	455	443
19 Q	458	457	455	454	452	451	449	449	449	448	450	449	443	430	418	411	408	419	432	445	454	457	456	460	444
20	460	460	455	465	465	454	452	449	448	447	449	449	442	425	407	402	410	427	444	458	462	459	460	462	446
21	461	458	458	456	452	454	454	451	450	449	446	441	438	425	413	405	406	419	435	443	456	462	456	457	444
22	456	456	456	458	457	453	449	442	441	444	443	451	442	427	417	409	410	418	431	445	460	458	459	456	443
23	455	452	455	455	456	455	454	452	451	449	452	452	445	428	413	404	394	408	430	441	454	458	459	452	443
24 D	448	450	453	454	443	451	451	446	445	441	440	443	441	434	423	415	415	419	426	442	454	461	458	456	442
25	452	446	447	446	449	447	446	444	447	446	447	450	442	429	413	402	405	417	428	444	455	460	458	453	441
26	451	450	451	452	448	447	446	446	447	448	449	452	447	433	415	405	402	418	439	454	464	463	463	459	444
27 D	464	464	459	460	459	451	449	448	449	444	432	439	433	428	417	410	404	403	422	434	448	457	458	456	441
28	457	454	454	450	449	448	445	445	445	445	446	452	447	431	414	402	399	408	427	447	459	460	456	454	441
MEAN	458	458	458	458	456	454	451	450	450	448	447	449	443	431	419	411	409	417	431	446	457	461	461	459	445
MEAN Q	459	458	458	458	456	454	452	452	451	450	451	451	444	432	419	410	405	412	429	446	459	464	463	461	446
MEAN D	457	461	461	462	458	458	452	451	447	444	439	445	438	427	421	412	410	415	427	440	450	456	458	458	445

LIVINGSTON ISLAND MAGNETIC OBSERVATORY

DECLINATION EAST

MARCH 2009

D = 14 DEGREES PLUS TABULAR QUANTITIES (UNITS 0.1 MINUTES)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	287	282	272	279	276	276	278	276	274	270	277	274	254	244	245	267	311	340	351	346	325	304	291	290	287
2 Q	288	288	288	287	287	284	282	281	279	270	269	265	253	246	253	271	285	305	327	328	314	298	288	289	284
3	288	287	285	283	281	279	268	260	256	255	257	270	254	238	239	257	293	325	344	343	325	315	307	297	284
4	292	289	282	245	248	255	257	256	262	263	266	274	266	258	257	269	285	314	340	341	335	306	291	289	281
5	295	290	285	263	262	272	280	279	277	274	272	272	265	261	265	275	291	317	340	340	320	299	286	283	286
6 Q	275	272	278	283	283	281	280	281	278	271	278	274	258	243	241	261	291	324	341	336	319	301	291	291	285
7 Q	287	285	284	283	284	284	281	278	275	271	276	275	259	243	242	259	292	321	340	335	318	300	289	286	285
8 D	269	269	263	266	275	279	275	272	279	258	254	254	270	255	259	280	314	342	339	328	316	298	288	287	283
9 Q	287	290	290	289	288	286	284	283	280	279	276	265	246	241	248	267	298	330	339	328	308	291	285	285	286
10	284	284	282	287	287	288	286	284	281	279	276	265	246	239	250	278	318	342	337	328	307	294	288	289	287
11	287	287	283	282	280	279	278	276	278	278	275	263	244	237	251	272	298	323	338	335	317	306	302	312	287
12	299	288	246	248	275	284	284	284	282	275	274	264	248	244	257	280	302	325	332	322	307	293	291	295	283
13 D	285	262	221	267	271	282	288	286	269	256	256	263	263	270	285	298	315	337	346	337	325	293	269	287	285
14 D	282	281	276	281	283	284	277	269	282	277	296	284	265	265	268	285	320	342	341	333	316	292	277	244	288
15 D	270	277	276	279	276	271	267	270	281	282	271	268	262	260	267	292	319	339	338	321	300	287	288	279	285
16	271	276	286	289	289	287	285	282	283	276	271	264	256	255	265	283	306	322	324	318	303	295	293	292	286
17	289	289	287	287	286	283	285	280	276	276	274	272	258	257	266	286	313	327	327	316	303	291	284	279	287
18 Q	284	289	287	287	286	285	282	279	279	277	273	261	250	248	258	283	312	333	333	323	304	287	284	285	286
19	284	280	284	282	281	279	276	284	278	280	275	267	261	257	255	274	307	331	333	319	299	284	282	281	285
20	274	281	285	285	284	281	277	275	274	274	275	270	255	249	255	281	312	331	337	323	305	293	289	286	285
21	285	285	282	280	273	271	269	270	271	271	269	268	282	277	270	280	307	325	335	331	324	322	333	304	291
22	295	292	288	264	269	283	282	280	276	277	280	275	264	259	266	287	310	325	331	321	302	288	284	287	287
23	283	276	276	280	285	283	284	285	283	283	280	274	262	258	265	283	305	325	333	318	300	287	284	283	286
24	284	284	285	279	256	251	248	244	245	249	264	279	266	258	280	294	314	328	331	319	307	296	293	294	281
25 D	293	296	261	246	249	253	273	284	292	298	304	288	269	260	267	286	306	322	326	319	304	295	289	292	286
26	287	275	269	275	265	260	246	272	281	270	272	268	260	253	264	284	311	333	332	317	301	292	292	289	282
27	288	287	286	284	283	283	282	280	280	278	275	269	255	244	252	275	305	331	335	328	309	296	293	275	286
28	281	284	283	282	280	279	280	281	281	280	279	275	262	250	257	277	302	320	327	317	301	294	294	291	286
29	288	286	283	281	278	276	270	274	277	280	270	270	264	260	263	274	294	316	330	323	306	296	293	291	285
30	287	281	281	279	272	279	277	279	277	274	272	273	267	256	258	277	302	322	334	324	304	292	288	285	285
31	283	280	279	277	280	280	279	276	276	273	270	271	265	272	274	283	301	316	323	316	302	290	288	286	285
MEAN	285	283	278	277	277	277	276	276	276	273	273	270	260	253	259	278	304	327	335	327	311	296	290	287	285
MEAN Q	284	285	286	286	286	284	282	280	278	274	274	268	253	244	248	268	296	323	336	330	313	295	287	287	285
MEAN D	280	277	259	268	271	274	276	276	281	274	276	271	266	262	269	288	315	336	338	328	312	293	282	278	285

## LIVINGSTON ISLAND MAGNETIC OBSERVATORY

MARCH 2009

## HORIZONTAL INTENSITY

H = 19500 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	442	446	446	445	446	444	445	444	444	445	449	452	447	433	414	401	400	407	418	432	438	439	439	439	436
2 Q	442	441	443	444	444	442	441	440	439	441	443	444	440	435	426	420	418	420	427	434	439	441	442	441	437
3	442	442	444	446	447	449	458	459	453	453	454	453	446	438	427	415	413	412	428	437	447	450	443	445	442
4	444	447	448	457	453	445	444	443	443	442	443	447	445	433	423	412	404	406	416	427	429	418	433	430	435
5	435	444	443	445	446	439	439	439	438	439	444	448	443	433	422	416	413	414	421	433	438	440	441	444	436
6 Q	444	444	444	443	447	444	445	444	445	443	446	448	446	435	419	406	401	408	422	438	444	443	440	440	437
7 Q	441	442	443	443	443	442	442	442	441	442	446	448	444	433	421	412	411	416	427	438	444	445	444	445	437
8 D	443	441	442	442	445	447	445	443	448	450	451	448	444	440	424	406	402	401	417	429	435	437	436	434	435
9 Q	435	437	438	439	438	437	438	436	437	439	440	441	435	419	402	394	399	410	422	432	436	438	439	439	430
10	439	440	440	439	439	438	438	438	438	441	447	450	442	428	413	404	404	412	424	434	438	440	442	442	434
11	442	441	442	446	445	445	445	442	443	444	446	445	438	425	414	407	409	413	421	428	433	432	424	427	433
12	434	440	427	430	441	445	443	438	437	439	440	443	439	426	412	408	411	421	434	448	459	462	460	460	437
13 D	432	410	390	424	435	436	449	445	441	437	432	429	421	416	407	399	401	407	416	425	430	420	424	427	423
14 D	428	428	439	436	438	442	444	435	433	436	437	433	430	422	411	407	402	405	417	430	431	429	429	417	428
15 D	425	430	434	436	435	438	436	429	429	433	430	437	430	417	404	396	400	415	429	436	437	435	432	428	427
16	432	434	436	435	436	438	436	437	438	439	441	440	432	418	408	406	413	423	429	437	443	441	441	442	432
17	441	438	438	439	439	438	441	438	437	437	440	442	435	420	409	402	407	419	430	437	437	435	434	437	432
18 Q	440	440	439	443	443	443	443	442	442	441	443	442	430	417	407	403	409	423	435	443	445	444	445	444	435
19	446	447	448	448	449	447	446	444	440	439	440	443	435	428	414	406	406	415	427	434	437	440	439	438	436
20	435	438	441	442	444	445	444	443	442	441	442	444	435	422	411	405	401	407	421	433	434	438	441	442	433
21	443	443	445	448	454	452	450	445	443	443	442	435	430	425	410	404	400	406	417	426	426	420	417	429	431
22	432	434	433	431	427	429	430	429	431	431	432	431	427	417	410	403	400	406	418	428	433	430	428	429	425
23	430	435	431	430	432	434	437	437	435	436	436	437	433	423	414	409	413	420	429	437	440	440	440	439	431
24	440	442	441	447	451	435	433	435	430	438	438	443	429	423	404	400	405	412	420	428	433	434	433	431	430
25 D	425	423	436	446	428	427	428	429	430	430	433	434	431	420	411	403	400	406	415	425	431	434	429	434	425
26	437	436	434	433	436	448	440	425	431	430	433	437	433	422	407	399	400	412	422	431	433	429	429	429	428
27	432	433	435	436	437	435	435	435	435	437	437	439	434	422	406	395	396	403	407	423	428	430	429	425	426
28	431	434	435	435	437	437	436	436	435	436	436	437	434	423	408	398	400	410	422	428	429	429	433	438	428
29	438	436	437	437	439	438	436	435	433	436	438	440	437	429	420	410	408	414	424	432	435	436	435	438	432
30	440	438	439	440	443	437	437	436	436	437	439	441	441	433	419	404	402	413	423	430	430	432	433	433	432
31	433	434	436	436	435	436	436	436	438	439	439	439	436	431	422	413	412	417	426	434	436	435	434	435	432
MEAN	437	437	438	440	441	440	441	439	438	439	441	442	436	426	414	405	405	412	423	432	436	436	436	436	432
MEAN Q	440	441	442	442	443	442	442	441	441	441	443	445	439	428	415	407	408	415	427	437	442	442	442	442	435
MEAN D	431	427	428	437	436	438	441	436	436	437	437	436	431	423	411	402	401	407	419	429	433	431	430	428	428

## LIVINGSTON ISLAND MAGNETIC OBSERVATORY

MARCH 2009

## VERTICAL INTENSITY

HOUR (UT) DAY	Z = -29000 nT						PLUS TABULAR QUANTITIES (UNITS nT)																	MEAN	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		23
1	-311	-310	-308	-306	-306	-305	-305	-305	-306	-304	-300	-302	-303	-298	-291	-285	-280	-288	-299	-309	-317	-320	-318	-313	-304
2 Q	-311	-308	-306	-306	-305	-304	-303	-303	-305	-307	-305	-304	-303	-300	-294	-288	-286	-284	-289	-302	-310	-313	-314	-309	-302
3	-307	-305	-305	-306	-305	-305	-309	-308	-304	-303	-299	-296	-298	-296	-291	-282	-277	-278	-292	-303	-313	-316	-314	-311	-301
4	-310	-308	-307	-306	-297	-295	-296	-296	-298	-300	-299	-298	-299	-297	-293	-290	-283	-283	-291	-303	-310	-310	-320	-315	-300
5	-312	-315	-313	-310	-306	-301	-301	-302	-301	-303	-303	-302	-302	-299	-293	-289	-286	-284	-290	-304	-314	-318	-316	-314	-303
6 Q	-312	-308	-306	-304	-305	-302	-301	-299	-301	-301	-297	-299	-300	-295	-290	-286	-282	-286	-297	-309	-316	-315	-310	-307	-301
7 Q	-307	-306	-306	-305	-303	-302	-302	-302	-301	-301	-298	-301	-302	-301	-295	-288	-284	-284	-291	-302	-310	-311	-309	-308	-301
8 D	-308	-305	-305	-303	-304	-304	-303	-300	-298	-296	-296	-295	-292	-295	-289	-284	-283	-284	-299	-312	-318	-318	-314	-309	-301
9 Q	-308	-307	-306	-306	-306	-305	-304	-303	-304	-304	-304	-305	-303	-298	-292	-288	-285	-291	-302	-311	-316	-316	-312	-308	-303
10	-306	-306	-305	-304	-303	-303	-303	-303	-303	-304	-304	-307	-306	-299	-291	-284	-280	-287	-300	-311	-312	-315	-312	-307	-302
11	-306	-304	-304	-307	-305	-304	-304	-302	-302	-301	-301	-303	-302	-297	-289	-284	-283	-286	-295	-305	-313	-313	-306	-309	-301
12	-310	-314	-310	-304	-310	-310	-307	-304	-303	-305	-304	-304	-302	-298	-290	-285	-284	-289	-300	-309	-316	-313	-307	-308	-304
13 D	-297	-292	-293	-313	-316	-311	-303	-291	-285	-299	-301	-300	-294	-293	-289	-287	-285	-289	-296	-308	-316	-314	-314	-311	-300
14 D	-309	-306	-307	-307	-307	-306	-303	-298	-299	-302	-297	-296	-301	-299	-292	-284	-278	-281	-294	-308	-315	-315	-317	-308	-301
15 D	-308	-308	-307	-305	-304	-297	-299	-298	-301	-302	-302	-305	-302	-296	-291	-283	-284	-291	-302	-312	-315	-313	-308	-306	-302
16	-307	-305	-304	-303	-303	-303	-301	-302	-303	-305	-305	-304	-300	-293	-289	-285	-288	-293	-301	-306	-311	-309	-307	-306	-301
17	-306	-303	-302	-302	-302	-301	-301	-300	-300	-301	-301	-302	-302	-297	-290	-284	-285	-291	-302	-310	-311	-309	-306	-307	-301
18 Q	-307	-305	-303	-303	-303	-302	-301	-300	-299	-299	-300	-301	-298	-293	-290	-288	-287	-293	-302	-309	-311	-311	-307	-305	-301
19	-305	-304	-303	-302	-301	-300	-298	-296	-294	-295	-297	-300	-298	-296	-291	-285	-283	-289	-300	-309	-314	-313	-309	-307	-299
20	-303	-304	-303	-302	-302	-301	-300	-299	-298	-297	-296	-299	-298	-292	-289	-285	-282	-285	-296	-307	-309	-311	-309	-308	-299
21	-307	-305	-304	-304	-306	-303	-300	-296	-295	-295	-297	-295	-288	-288	-286	-283	-281	-286	-296	-306	-309	-308	-305	-314	-298
22	-313	-311	-310	-307	-302	-304	-304	-303	-303	-302	-301	-301	-300	-295	-290	-285	-286	-293	-303	-312	-316	-313	-307	-306	-303
23	-305	-306	-304	-303	-305	-305	-304	-302	-301	-302	-301	-303	-303	-299	-295	-290	-288	-291	-299	-307	-312	-310	-306	-304	-302
24	-303	-304	-302	-304	-297	-289	-293	-292	-284	-293	-292	-292	-291	-290	-282	-282	-287	-292	-298	-305	-311	-309	-308	-305	-296
25 D	-302	-303	-308	-302	-294	-294	-297	-300	-300	-297	-296	-300	-302	-297	-292	-286	-285	-291	-297	-306	-311	-312	-305	-305	-299
26	-306	-305	-304	-302	-302	-297	-290	-288	-300	-301	-301	-301	-299	-297	-291	-286	-284	-290	-298	-308	-311	-308	-305	-303	-299
27	-304	-303	-304	-303	-302	-302	-302	-301	-301	-302	-301	-301	-300	-297	-289	-284	-281	-285	-291	-306	-310	-311	-308	-306	-300
28	-306	-305	-304	-303	-303	-303	-302	-301	-301	-301	-300	-299	-300	-296	-289	-284	-285	-288	-295	-303	-307	-305	-305	-306	-300
29	-305	-302	-301	-300	-301	-301	-298	-298	-299	-300	-301	-300	-299	-295	-291	-285	-282	-283	-291	-302	-308	-306	-303	-303	-298
30	-303	-301	-300	-300	-300	-296	-297	-297	-298	-299	-299	-297	-299	-298	-293	-287	-283	-285	-291	-300	-303	-306	-304	-303	-298
31	-302	-301	-301	-299	-298	-298	-297	-298	-299	-300	-300	-298	-297	-294	-294	-291	-289	-289	-294	-301	-304	-303	-301	-302	-298
MEAN	-307	-305	-305	-304	-303	-302	-301	-300	-300	-301	-300	-300	-299	-296	-291	-286	-284	-287	-296	-307	-312	-312	-309	-308	-301
MEAN Q	-309	-307	-306	-305	-304	-303	-302	-301	-302	-302	-301	-302	-301	-297	-292	-288	-285	-288	-296	-307	-312	-313	-310	-308	-302
MEAN D	-305	-303	-304	-306	-305	-302	-301	-298	-297	-299	-298	-299	-298	-296	-291	-285	-283	-287	-298	-309	-315	-314	-312	-308	-301

## LIVINGSTON ISLAND MAGNETIC OBSERVATORY

MARCH 2009

## TOTAL INTENSITY

F = 35000 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	452	453	452	449	450	448	448	448	448	447	447	450	448	435	419	407	402	413	428	444	455	457	456	451	442
2 Q	452	449	448	448	448	445	444	444	445	447	447	447	444	438	429	420	418	417	425	439	449	453	454	450	442
3	448	447	448	450	449	451	459	459	452	451	449	446	443	437	427	412	407	407	428	442	456	461	454	453	443
4	452	452	452	456	446	440	440	440	442	443	442	443	443	435	426	417	407	408	421	436	444	437	454	448	439
5	448	456	454	453	449	442	442	442	441	444	446	448	444	437	426	419	414	414	422	441	451	456	455	455	442
6 Q	453	450	449	447	450	446	445	443	445	444	442	445	444	435	421	411	405	412	429	448	457	456	449	448	441
7 Q	448	448	448	447	446	444	444	444	443	443	443	447	445	438	427	416	412	415	427	442	451	453	451	451	441
8 D	450	446	446	445	447	449	446	444	444	444	444	442	437	438	423	409	406	407	428	445	453	454	450	446	439
9 Q	445	445	445	446	445	444	444	442	443	444	444	446	441	428	414	405	406	417	433	446	452	453	450	448	439
10	446	446	446	444	443	443	442	443	443	445	449	453	448	434	419	408	404	415	432	447	450	454	452	448	440
11	448	445	446	450	449	448	448	444	445	445	446	447	442	430	418	409	410	415	426	439	448	448	437	441	438
12	446	453	443	439	450	452	449	444	443	445	444	446	443	432	418	410	412	422	438	453	466	465	458	459	443
13 D	435	418	407	443	452	448	449	437	430	439	437	435	425	422	413	408	408	413	425	440	449	442	444	443	432
14 D	442	440	446	445	446	448	447	437	437	441	437	434	436	430	419	410	402	407	424	442	449	448	449	436	435
15 D	439	443	443	443	442	438	438	434	436	439	437	444	438	425	414	403	406	420	437	449	452	449	444	440	436
16	443	443	442	441	442	443	440	442	443	445	446	445	437	423	414	409	416	426	436	444	452	450	448	448	438
17	447	442	442	443	442	441	443	440	439	441	442	444	440	428	416	407	410	422	438	448	449	446	443	445	437
18 Q	447	445	443	445	445	444	444	442	441	442	443	443	435	422	414	411	413	426	440	451	453	453	450	448	439
19	449	449	449	447	448	445	443	440	436	437	439	443	437	431	420	410	408	418	434	445	451	452	448	446	439
20	441	444	445	444	445	445	443	442	441	440	439	442	437	425	416	410	404	411	427	443	446	449	449	449	437
21	449	447	447	449	455	450	447	441	438	439	440	434	426	423	413	407	403	410	425	438	441	437	432	446	435
22	448	447	446	442	435	439	439	437	439	438	438	438	434	424	417	408	408	417	431	445	451	446	440	440	435
23	440	443	439	439	441	442	443	442	439	441	440	442	440	431	423	416	416	423	434	445	451	450	446	444	438
24	444	446	444	449	445	430	431	432	423	434	434	436	428	424	406	404	411	419	429	439	446	445	444	441	433
25 D	434	435	446	446	429	429	432	435	436	433	434	438	438	428	419	409	407	415	425	438	445	448	440	442	433
26	445	443	441	440	440	444	433	423	436	437	438	440	437	429	416	406	406	418	429	442	447	442	440	438	434
27	440	440	442	442	441	440	440	439	440	441	441	442	438	429	414	403	401	408	415	437	443	445	442	438	433
28	441	442	442	441	442	442	440	440	439	440	439	439	438	429	414	404	406	415	427	437	441	439	441	445	434
29	445	441	440	440	442	441	438	437	437	439	441	441	439	431	422	412	409	413	425	439	445	444	441	443	435
30	444	441	441	442	443	436	438	437	438	439	440	440	441	436	424	410	406	414	424	435	438	442	441	440	435
31	439	439	440	438	437	438	437	438	440	441	440	439	437	432	426	419	416	419	428	439	443	441	439	440	435
MEAN	445	445	444	445	445	443	443	440	440	441	442	443	439	430	419	410	408	415	429	443	449	449	447	445	437
MEAN Q	449	448	447	447	447	445	444	443	443	444	444	446	442	432	421	412	411	417	431	445	453	454	451	449	440
MEAN D	440	436	438	445	443	442	443	437	437	439	438	439	435	428	418	408	406	412	428	443	450	448	446	441	435

## LIVINGSTON ISLAND MAGNETIC OBSERVATORY

## DECLINATION EAST

APRIL 2009

D = 14 DEGREES PLUS TABULAR QUANTITIES (UNITS 0.1 MINUTES)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	285	282	282	280	278	276	276	277	277	273	273	272	263	257	265	282	300	309	318	313	297	288	283	290	283
2 Q	287	284	283	280	279	275	272	274	277	276	274	271	266	264	266	282	302	320	329	320	305	295	290	285	286
3	281	281	281	281	278	277	275	276	274	274	271	267	256	248	257	282	302	313	318	311	296	289	288	286	282
4 Q	284	284	281	279	280	278	276	275	277	278	275	272	263	256	262	280	301	315	318	308	294	288	287	286	283
5	285	280	281	270	272	271	270	275	274	276	272	270	261	254	257	275	295	313	319	313	296	287	286	286	281
6	284	285	284	281	280	281	280	280	279	278	275	269	260	252	263	288	309	320	319	306	289	283	282	281	284
7 Q	280	281	279	275	276	274	277	279	281	280	277	269	254	245	255	279	306	319	317	305	290	285	284	283	281
8	282	282	282	282	281	278	279	284	280	278	275	270	---	247	253	276	297	313	312	297	285	286	286	281	281
9 D	279	277	235	255	249	259	284	278	274	275	278	279	274	267	271	297	324	344	340	336	315	304	263	273	285
10 D	290	284	278	272	279	283	283	281	299	291	292	279	270	266	272	289	309	324	327	306	296	293	285	285	289
11 D	---	224	252	271	281	283	284	287	280	281	283	281	268	263	273	300	320	325	319	309	296	287	286	257	283
12 D	243	255	260	262	280	287	277	291	295	278	276	273	264	261	271	293	312	322	323	311	286	274	288	271	281
13	249	281	275	275	282	285	276	287	286	283	281	277	271	270	277	291	308	319	316	304	293	290	289	283	285
14	285	285	283	279	280	281	282	282	281	286	281	277	272	260	269	289	309	321	318	303	294	293	289	291	287
15	291	264	264	271	265	265	278	279	280	281	282	277	270	263	271	291	310	318	318	307	292	289	286	285	283
16	285	281	270	270	274	263	252	257	279	280	278	283	271	271	284	299	318	325	312	298	291	288	287	295	284
17	296	290	287	284	281	278	274	274	274	274	274	274	268	259	272	296	312	320	310	300	293	290	290	288	286
18 D	287	284	277	254	238	222	205	249	271	271	280	275	269	268	281	303	317	318	313	301	289	287	287	288	276
19	289	282	278	259	262	275	285	286	281	279	279	274	267	264	271	288	304	312	311	299	290	287	285	283	283
20	285	286	271	280	281	284	286	280	279	277	278	274	266	266	276	295	314	320	311	296	288	285	285	284	285
21	284	284	283	281	280	275	280	284	279	284	284	276	267	262	271	290	308	315	310	298	290	287	284	283	285
22	283	284	274	272	280	283	284	283	283	281	280	277	272	265	271	292	313	317	307	292	285	284	285	283	285
23 Q	283	282	281	281	281	281	280	---	---	281	280	277	268	265	275	292	305	309	302	288	281	280	281	281	283
24	281	280	280	279	278	277	280	271	270	270	270	270	268	264	272	289	302	311	309	299	292	288	286	284	282
25	283	283	282	281	277	279	280	280	280	278	277	273	268	267	280	298	312	314	306	294	288	283	287	286	285
26	282	283	280	279	276	279	276	279	280	275	276	275	272	269	275	291	305	305	300	291	284	284	285	282	283
27	282	272	259	244	258	263	276	283	283	283	279	275	268	266	274	287	301	313	307	292	285	283	282	282	279
28	281	280	279	278	280	280	280	281	281	278	275	272	267	262	268	281	295	303	298	290	283	280	281	279	281
29	279	274	273	276	276	277	277	278	279	278	276	280	271	270	275	291	308	309	297	287	---	---	---	---	---
30 Q	---	---	---	---	---	278	274	277	278	278	275	272	266	263	273	288	305	---	---	---	---	---	---	---	---
MEAN	281	278	275	273	275	275	275	278	280	279	278	274	267	262	270	289	307	317	314	303	291	287	285	283	283
MEAN Q	284	283	281	279	279	277	276	277	279	278	276	272	263	259	266	284	304	316	316	305	293	287	285	284	---
MEAN D	274	265	260	263	265	267	267	277	284	279	282	277	269	265	274	296	316	327	325	312	297	289	282	275	283



LIVINGSTON ISLAND MAGNETIC OBSERVATORY

APRIL 2009

HORIZONTAL INTENSITY

H = 19500 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	435	437	437	439	438	437	435	435	434	434	433	435	437	431	422	415	412	418	426	437	441	436	429	431	432
2 Q	435	439	439	438	437	436	433	433	436	437	437	438	437	428	419	409	407	412	422	429	432	431	434	434	431
3	436	438	440	440	441	440	439	440	439	439	439	440	439	429	416	406	407	417	426	434	435	432	433	434	432
4 Q	434	435	436	438	437	436	437	437	438	439	439	441	439	430	420	413	415	424	433	440	441	438	439	438	434
5	438	440	438	440	444	444	437	440	440	437	439	442	442	435	423	415	413	416	420	431	436	434	433	432	434
6	431	433	434	434	435	435	435	435	435	436	438	440	437	429	415	406	404	414	427	435	437	436	436	437	431
7 Q	437	436	436	437	435	436	436	438	437	438	437	437	432	421	410	405	408	416	425	429	431	432	432	433	430
8	435	436	436	436	435	437	435	437	436	439	441	442	---	433	420	412	416	427	437	435	428	426	435	438	433
9 D	440	437	425	426	429	429	435	433	434	437	436	431	429	421	410	398	396	396	404	409	413	415	418	426	422
10 D	422	423	433	435	430	429	429	431	435	430	431	430	427	417	411	401	401	406	411	406	426	431	432	426	423
11 D	---	432	428	424	429	432	429	433	429	429	427	427	428	420	406	393	396	406	420	423	422	422	424	429	422
12 D	428	423	423	421	425	436	434	430	433	433	430	429	425	416	408	402	406	414	416	419	413	416	423	421	422
13	423	422	423	425	428	433	430	428	429	429	428	428	426	419	411	407	409	417	423	426	425	426	425	423	423
14	423	427	429	429	429	430	431	432	432	434	435	431	429	419	408	404	408	416	424	427	427	425	425	424	425
15	423	424	421	428	432	430	431	433	433	432	432	432	431	423	416	408	405	409	417	422	425	425	422	422	424
16	423	425	424	425	430	435	432	428	428	431	431	433	433	427	420	418	419	417	424	429	429	431	432	423	427
17	427	429	432	432	432	435	434	432	433	432	432	431	427	420	407	400	407	417	427	432	431	431	430	435	427
18 D	435	437	437	445	432	432	423	414	421	422	425	425	422	415	405	397	403	412	422	426	426	426	424	427	423
19	425	424	429	436	427	425	428	429	428	428	428	429	425	416	407	404	410	418	425	427	427	429	428	428	424
20	428	429	427	427	429	432	437	431	431	429	429	429	426	418	409	405	411	420	427	429	430	428	429	430	426
21	430	429	429	431	433	431	435	432	431	431	432	431	427	416	406	404	407	415	422	426	426	426	427	428	425
22	429	428	431	433	433	432	431	431	432	431	431	428	424	418	411	404	407	419	429	432	431	430	424	426	426
23 Q	429	431	431	431	430	430	430	---	---	430	429	428	425	420	414	411	414	423	431	436	436	435	433	433	428
24	433	441	439	437	438	439	441	441	439	439	439	437	433	424	417	417	418	419	423	428	427	428	429	429	431
25	430	431	431	431	431	431	430	429	429	429	429	431	428	419	409	403	406	419	427	430	429	421	422	424	425
26	425	427	428	432	433	431	435	430	429	430	430	431	431	429	423	416	415	422	429	433	431	431	428	422	428
27	420	420	424	423	428	428	426	426	425	424	425	425	426	422	414	409	409	418	427	429	428	428	428	427	423
28	429	430	430	431	430	430	431	432	432	433	433	434	432	426	415	409	409	417	428	432	433	432	431	430	428
29	431	432	433	432	434	435	437	435	435	432	431	432	432	423	412	405	408	419	427	431	---	---	---	---	---
30 Q	---	---	---	---	---	429	429	427	427	429	430	430	427	418	408	403	405	---	---	---	---	---	---	---	---
MEAN	430	431	431	432	433	433	433	432	432	433	433	433	430	423	413	407	408	416	424	428	429	429	429	429	427
MEAN Q	434	435	436	436	435	434	433	434	434	435	435	435	432	423	414	408	410	418	428	433	435	434	435	435	---
MEAN D	431	431	429	430	429	432	430	428	430	430	430	429	426	418	408	398	400	407	415	417	420	422	424	426	422

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 APRIL 2009

VERTICAL INTENSITY

HOUR (UT) DAY	Z = -29000 nT PLUS TABULAR QUANTITIES (UNITS nT)																	18	19	20	21	22	23	MEAN	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16								17
1	-300	-300	-299	-299	-297	-297	-296	-296	-296	-297	-297	-296	-298	-295	-291	-289	-287	-290	-295	-304	-310	-304	-300	-299	-297
2 Q	-301	-303	-301	-299	-298	-297	-296	-295	-297	-297	-298	-298	-298	-296	-294	-288	-286	-286	-294	-302	-306	-306	-305	-305	-298
3	-304	-304	-302	-301	-300	-298	-297	-297	-296	-296	-297	-297	-298	-296	-289	-280	-283	-287	-292	-300	-305	-303	-302	-302	-297
4 Q	-302	-301	-301	-300	-299	-298	-297	-297	-297	-297	-297	-296	-296	-293	-289	-283	-285	-292	-298	-302	-304	-301	-300	-299	-297
5	-299	-300	-298	-299	-301	-300	-294	-294	-294	-292	-294	-295	-295	-294	-290	-284	-284	-286	-289	-298	-305	-303	-300	-299	-295
6	-299	-299	-300	-299	-299	-298	-297	-297	-297	-297	-297	-298	-297	-294	-286	-281	-283	-291	-301	-307	-308	-303	-300	-300	-297
7 Q	-300	-298	-298	-298	-297	-296	-296	-297	-295	-296	-296	-298	-297	-293	-286	-282	-283	-290	-298	-303	-304	-302	-300	-300	-296
8	-300	-300	-299	-298	-298	-298	-297	-297	-296	-298	-298	-298	---	-297	-289	-283	-285	-290	-298	-300	-298	-293	-299	-300	-296
9 D	-300	-298	-294	-292	-291	-289	-290	-296	-297	-296	-291	-290	-293	-293	-288	-283	-281	-283	-294	-302	-306	-308	-310	-307	-295
10 D	-303	-302	-302	-300	-298	-299	-300	-300	-295	-293	-295	-298	-300	-295	-294	-285	-286	-289	-296	-298	-310	-310	-307	-302	-298
11 D	---	-296	-293	-296	-299	-298	-294	-296	-296	-297	-297	-298	-302	-299	-292	-280	-285	-292	-302	-307	-307	-307	-306	-304	-298
12 D	-297	-295	-296	-296	-296	-299	-297	-294	-295	-298	-298	-299	-298	-293	-291	-288	-291	-294	-295	-300	-302	-303	-306	-305	-297
13	-302	-299	-300	-300	-301	-299	-297	-297	-299	-299	-299	-298	-297	-295	-292	-290	-291	-294	-299	-304	-305	-304	-303	-301	-299
14	-300	-301	-300	-299	-298	-298	-298	-298	-298	-298	-297	-297	-298	-296	-291	-287	-287	-293	-303	-307	-305	-303	-302	-301	-298
15	-301	-302	-299	-301	-301	-300	-300	-299	-298	-298	-298	-298	-298	-296	-292	-286	-285	-290	-298	-303	-306	-304	-301	-301	-298
16	-301	-301	-300	-299	-300	-298	-293	-290	-293	-297	-299	-298	-298	-296	-291	-290	-291	-291	-299	-305	-304	-304	-304	-298	-297
17	-298	-300	-301	-299	-298	-299	-298	-296	-295	-295	-295	-295	-294	-295	-287	-285	-290	-297	-303	-306	-303	-302	-299	-303	-297
18 D	-301	-302	-299	-299	-291	-287	-276	-280	-291	-294	-297	-298	-298	-297	-292	-287	-290	-296	-301	-305	-305	-303	-301	-301	-295
19	-301	-300	-301	-300	-293	-294	-295	-294	-294	-295	-297	-299	-300	-297	-293	-293	-295	-297	-299	-302	-301	-301	-300	-299	-297
20	-299	-299	-298	-297	-298	-297	-295	-294	-295	-294	-294	-295	-296	-293	-291	-289	-290	-295	-299	-301	-301	-299	-298	-298	-296
21	-298	-297	-297	-298	-297	-295	-295	-293	-294	-293	-293	-296	-296	-293	-289	-285	-288	-295	-301	-303	-300	-300	-299	-298	-296
22	-299	-298	-298	-297	-296	-296	-295	-295	-295	-294	-295	-295	-293	-293	-289	-288	-288	-296	-302	-304	-300	-298	-295	-295	-295
23 Q	-297	-297	-297	-296	-296	-295	-295	---	---	-294	-294	-293	-293	-292	-288	-285	-287	-293	-299	-302	-300	-297	-294	-293	-294
24	-293	-297	-296	-294	-295	-295	-293	-292	-293	-293	-292	-291	-291	-287	-284	-285	-287	-289	-295	-298	-297	-297	-296	-295	-293
25	-295	-295	-295	-295	-294	-294	-294	-294	-293	-294	-293	-294	-294	-290	-287	-287	-290	-297	-303	-304	-301	-295	-294	-295	-294
26	-296	-296	-295	-296	-297	-295	-295	-293	-293	-294	-294	-293	-293	-293	-288	-284	-289	-294	-298	-300	-298	-296	-293	-291	-294
27	-291	-292	-293	-292	-293	-293	-292	-292	-292	-293	-294	-295	-295	-293	-288	-287	-288	-291	-298	-300	-298	-297	-296	-295	-293
28	-294	-294	-294	-293	-293	-292	-292	-292	-293	-294	-295	-294	-293	-291	-288	-287	-288	-292	-296	-299	-298	-297	-295	-294	-293
29	-295	-294	-293	-292	-292	-292	-292	-291	-291	-290	-290	-290	-291	-291	-289	-285	-287	-295	-300	-302	---	---	---	---	---
30 Q	---	---	---	---	---	-293	-292	-291	-292	-294	-294	-294	-295	-293	-288	-285	-287	---	---	---	---	---	---	---	---
MEAN	-299	-299	-298	-297	-297	-296	-295	-294	-295	-295	-295	-296	-296	-294	-289	-286	-287	-292	-298	-302	-303	-301	-300	-299	-296
MEAN Q	-300	-300	-299	-298	-297	-296	-295	-295	-295	-296	-296	-296	-296	-293	-289	-285	-286	-290	-297	-302	-303	-301	-300	-299	---
MEAN D	-300	-299	-297	-296	-295	-294	-291	-293	-295	-296	-295	-297	-298	-296	-291	-285	-286	-291	-298	-302	-306	-306	-306	-304	-297

LIVINGSTON ISLAND MAGNETIC OBSERVATORY

APRIL 2009

TOTAL INTENSITY

F = 35000 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	439	440	439	440	438	437	435	435	435	435	435	436	438	432	424	418	415	421	430	443	450	443	435	435	435
2 Q	439	443	442	440	439	436	434	434	437	437	438	438	438	432	424	414	411	414	426	437	441	441	442	442	434
3	442	443	443	442	441	440	438	439	437	438	438	439	439	432	419	406	409	417	427	438	442	440	439	440	435
4 Q	440	439	440	440	438	438	438	437	438	438	439	439	437	430	421	412	415	426	436	443	445	441	441	440	435
5	440	442	439	440	445	443	435	436	437	433	436	438	439	434	424	414	413	416	421	434	443	440	438	437	434
6	436	437	438	438	437	437	437	436	436	437	438	439	438	430	416	407	407	419	434	444	446	442	439	439	434
7 Q	440	438	438	438	436	436	436	438	436	437	437	438	434	424	413	406	409	420	431	438	440	439	437	437	432
8	439	439	439	438	437	438	437	437	436	439	440	441	---	435	421	411	415	426	438	439	433	428	437	441	434
9 D	441	439	428	427	428	426	431	434	436	437	431	428	430	425	415	404	401	403	416	426	431	434	437	440	427
10 D	434	434	439	439	434	435	435	437	434	430	432	434	433	425	420	407	407	414	422	420	442	444	443	435	430
11 D	---	433	429	429	434	435	431	434	431	433	432	433	436	430	416	398	405	416	432	437	437	437	437	439	429
12 D	433	428	429	427	430	439	435	432	434	436	434	435	432	423	415	411	415	421	424	429	428	431	437	435	429
13	434	431	432	433	435	437	434	432	434	435	434	433	431	425	419	415	416	424	431	436	437	437	435	433	431
14	432	435	435	434	434	434	435	436	436	436	436	434	434	427	416	410	412	422	434	440	438	435	435	433	431
15	432	434	430	436	437	436	436	437	436	435	435	435	435	428	421	412	409	416	426	434	437	436	433	432	431
16	433	433	433	432	436	437	431	427	429	434	435	435	436	430	423	421	423	421	432	439	439	439	440	430	432
17	432	435	437	436	435	437	437	434	434	432	433	432	429	426	412	406	415	426	437	442	440	438	435	441	432
18 D	439	441	439	443	429	426	412	410	423	426	430	432	430	424	415	406	412	423	432	438	438	436	433	435	428
19	434	432	436	439	428	428	431	430	430	431	432	434	433	425	417	415	421	426	432	436	435	437	435	434	430
20	434	434	432	432	434	434	435	431	432	431	431	431	430	423	416	412	417	426	433	436	436	434	434	434	430
21	433	433	433	435	435	432	435	431	431	430	431	433	431	422	413	409	413	423	432	436	434	433	433	433	429
22	434	433	434	435	434	433	432	432	433	432	432	430	427	423	416	411	413	426	437	440	436	434	428	429	430
23 Q	432	434	433	432	432	432	432	---	---	431	430	429	428	423	417	413	416	426	435	440	439	436	433	432	430
24	432	440	437	435	436	437	436	435	435	435	432	432	430	421	415	416	418	420	428	433	431	432	432	431	430
25	432	433	432	432	431	432	431	430	430	430	430	432	430	421	413	409	414	427	437	439	436	426	426	428	428
26	430	431	431	433	435	433	435	430	430	431	430	430	431	429	422	415	418	426	433	437	435	433	429	424	430
27	423	423	427	425	429	429	426	427	426	426	428	429	429	425	417	413	414	422	432	435	433	432	431	430	426
28	430	431	430	431	430	430	430	431	431	433	433	433	431	426	418	413	414	422	431	436	436	435	432	431	429
29	432	432	431	430	431	432	433	431	431	429	428	429	429	424	416	410	413	425	435	438	---	---	---	---	---
30 Q	---	---	---	---	---	429	429	427	428	430	431	431	430	423	414	408	411	---	---	---	---	---	---	---	---
MEAN	435	435	435	435	435	434	433	432	433	433	433	434	433	427	418	411	413	421	431	437	438	436	435	435	431
MEAN Q	438	439	438	437	436	434	434	434	434	435	435	435	433	427	418	411	412	421	432	440	441	439	438	438	---
MEAN D	436	435	433	433	431	432	429	429	432	432	432	432	432	425	416	405	408	415	425	430	435	436	438	437	429

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
MAY 2009

DECLINATION EAST

D = 14 DEGREES PLUS TABULAR QUANTITIES (UNITS 0.1 MINUTES)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	284	281	282	282	281	282	284	287	284	284	280	278	274	273	282	297	304	308	301	290	287	287	284	287	286
2	286	283	279	277	276	277	282	269	274	275	272	273	266	264	272	292	309	311	299	289	285	283	283	285	282
3	279	281	281	278	277	272	275	275	276	277	280	278	270	265	273	290	302	309	298	287	282	280	279	280	281
4	281	282	282	279	267	269	274	273	278	283	279	279	274	269	278	292	302	307	298	288	284	283	281	282	282
5 Q	282	282	282	282	280	280	280	279	278	278	275	275	271	266	274	290	296	295	292	284	279	277	277	277	281
6 D	278	278	267	256	258	273	277	281	283	280	282	281	273	268	276	285	300	312	303	291	290	289	292	236	280
7 D	270	266	255	248	254	276	268	283	287	289	295	285	276	267	273	289	300	299	300	294	290	284	291	269	280
8 D	269	204	233	258	252	254	263	303	301	283	285	282	278	278	287	294	306	316	312	303	297	290	275	287	280
9	284	284	285	285	287	286	284	285	295	289	305	285	275	270	282	302	312	310	304	293	291	293	284	273	289
10	273	277	264	278	285	284	281	284	288	282	282	282	276	273	282	295	301	304	300	291	285	280	283	283	284
11	---	---	---	---	---	---	---	---	---	---	---	---	---	279	284	298	310	311	306	294	287	287	286	286	---
12 Q	280	281	284	284	286	286	285	286	287	286	284	282	277	275	283	299	309	308	299	288	284	283	281	283	287
13	282	281	278	281	284	284	282	280	281	283	280	280	275	270	275	287	298	300	290	283	280	280	281	282	282
14 D	282	281	281	269	270	279	283	283	281	278	273	274	274	270	277	287	292	299	301	300	310	308	297	293	285
15	284	279	279	276	275	277	279	279	279	282	283	281	277	274	281	293	300	300	293	286	284	283	282	282	283
16	282	278	277	278	267	271	279	275	274	275	273	273	273	273	279	290	295	298	294	286	281	280	282	280	280
17 Q	276	282	279	274	275	282	281	280	280	280	280	278	275	273	281	293	302	303	294	285	281	280	281	283	282
18	283	283	274	269	260	269	273	277	280	280	279	278	277	277	283	291	295	295	290	284	280	280	280	271	280
19	281	275	277	268	251	256	274	284	273	277	280	284	281	276	281	289	292	292	290	286	285	283	283	283	279
20	282	281	278	279	275	274	276	279	280	282	281	278	275	273	279	288	294	293	288	282	277	276	277	279	280
21	279	279	280	279	278	278	276	278	277	276	275	278	276	274	277	288	294	295	291	285	283	282	281	281	281
22	281	282	282	281	281	280	280	279	277	275	267	276	284	286	285	293	303	298	293	289	288	283	282	282	284
23	282	281	282	280	279	277	274	273	274	272	274	277	276	274	279	286	294	303	291	288	288	287	273	283	281
24	274	279	283	277	271	264	268	275	278	276	278	278	278	277	281	290	292	294	293	287	283	283	282	282	280
25 Q	282	280	280	282	281	281	281	281	281	282	280	277	274	272	275	285	295	293	288	283	281	281	280	282	281
26	281	281	279	281	280	280	279	278	279	280	279	276	273	271	275	283	292	291	285	281	279	280	280	280	280
27 Q	281	281	281	280	277	275	275	276	275	276	279	278	276	275	277	283	288	290	287	283	280	280	281	281	280
28 D	279	280	280	279	277	275	270	269	279	285	288	290	288	287	286	290	295	296	292	285	282	282	283	283	283
29	282	284	279	278	283	276	276	278	279	279	279	284	278	286	290	296	303	300	295	291	286	285	283	282	285
30	278	281	275	261	261	265	267	266	268	275	275	278	277	273	275	284	291	290	286	284	280	279	278	280	276
31	281	280	276	275	276	276	276	279	279	278	277	276	276	274	275	282	289	291	287	285	282	282	282	281	280
MEAN	280	278	277	275	273	275	277	279	280	280	280	279	276	274	279	290	299	300	295	288	285	283	282	280	282
MEAN Q	280	281	281	280	280	281	281	280	280	280	280	278	275	272	278	290	298	298	292	285	281	280	280	281	282
MEAN D	276	262	263	262	262	271	272	284	286	283	285	282	278	274	280	289	299	304	302	295	294	291	288	274	281

LIVINGSTON ISLAND MAGNETIC OBSERVATORY

MAY 2009

HORIZONTAL INTENSITY  
H = 19500 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	430	432	431	432	432	433	432	435	434	437	435	434	429	417	408	407	412	419	425	427	427	425	424	424	427
2	427	427	425	424	426	429	436	435	430	432	434	434	430	418	411	409	413	424	433	436	434	432	432	431	428
3	423	428	430	430	430	431	429	430	430	429	431	432	429	421	411	409	413	420	427	431	430	431	431	429	426
4	430	430	430	429	429	430	430	430	431	433	434	432	430	421	411	408	413	421	429	431	429	428	427	427	427
5 Q	427	427	428	428	429	429	430	431	432	433	434	434	433	428	420	417	419	424	431	434	434	434	432	433	429
6 D	433	431	426	420	422	425	427	427	430	431	434	435	435	428	418	413	414	418	426	426	420	421	416	416	425
7 D	414	409	415	419	423	430	425	424	424	425	427	428	426	422	414	408	413	420	426	428	429	424	416	396	420
8 D	401	407	396	415	415	427	432	428	424	422	419	420	421	412	407	411	408	411	414	413	414	414	414	421	415
9	422	422	423	424	423	423	425	426	432	431	433	431	424	419	410	402	408	415	420	419	418	414	416	416	421
10	416	414	414	419	423	421	421	421	426	425	427	427	425	416	411	409	413	420	425	423	422	422	424	423	420
11	---	---	---	---	---	---	---	---	---	---	---	---	---	419	411	410	412	415	421	421	420	418	418	419	---
12 Q	419	422	422	423	423	424	425	426	427	426	426	426	424	418	412	408	410	417	424	427	426	423	422	420	422
13	422	419	422	426	428	428	430	432	430	430	429	430	430	426	419	419	421	422	428	431	429	426	426	427	426
14 D	427	426	425	428	424	426	427	428	430	431	434	437	428	422	413	410	417	427	418	416	410	412	414	417	423
15	421	422	423	424	423	424	425	426	425	426	427	427	424	419	414	412	416	422	428	428	427	426	426	426	423
16	426	427	428	428	428	426	427	428	428	429	429	430	428	422	415	412	413	419	426	426	426	424	420	420	424
17 Q	427	424	423	423	422	425	426	426	426	427	428	429	427	421	415	413	414	419	425	427	427	426	426	426	424
18	424	424	424	424	424	425	427	428	430	431	431	431	429	425	420	419	421	425	430	431	431	430	427	427	427
19	423	420	421	419	420	416	420	424	424	424	425	426	426	424	417	414	417	420	422	422	423	425	425	425	422
20	424	426	432	430	431	434	431	430	431	431	432	432	430	425	420	419	420	423	431	435	435	434	432	432	429
21	434	435	433	431	430	428	430	428	428	428	427	429	428	426	422	419	418	423	425	428	428	425	425	425	427
22	425	426	426	427	426	426	426	427	428	434	426	424	423	423	416	415	418	420	423	425	425	425	424	423	424
23	422	423	422	422	421	421	422	423	428	423	421	420	419	416	414	415	421	425	425	426	423	415	414	420	421
24	420	422	423	422	432	429	424	423	421	423	424	424	423	421	416	415	417	421	425	425	424	422	421	422	423
25 Q	423	423	423	423	423	423	423	423	424	427	427	426	426	424	420	418	420	426	428	427	427	424	423	421	424
26	423	424	425	424	425	424	424	429	428	428	431	433	432	428	421	417	416	423	427	427	425	423	422	423	425
27 Q	424	424	424	424	425	425	425	425	426	427	428	428	427	423	419	418	420	423	425	425	426	424	423	422	424
28 D	423	425	425	425	424	431	429	430	433	433	428	429	433	422	418	417	414	416	419	420	419	419	418	418	424
29	419	419	420	420	426	426	425	424	426	427	427	428	425	424	419	416	413	418	419	417	418	417	417	416	421
30	421	420	423	419	416	418	421	424	424	426	424	424	425	423	420	418	419	422	422	424	425	424	423	424	422
31	424	423	424	425	425	424	423	425	425	426	428	428	427	425	422	420	420	424	426	425	425	423	421	420	424
MEAN	423	423	423	424	425	426	427	427	428	428	429	429	427	422	416	413	416	421	425	426	425	423	423	422	424
MEAN Q	424	424	424	424	424	425	426	426	427	428	428	428	427	423	417	415	416	422	427	428	428	426	425	424	425
MEAN D	420	420	417	421	422	428	428	428	428	428	429	430	429	421	414	412	413	418	421	420	418	418	416	414	421

LIVINGSTON ISLAND MAGNETIC OBSERVATORY

MAY 2009

VERTICAL INTENSITY

Z = -29000 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	-297	-296	-294	-293	-292	-291	-291	-291	-290	-290	-290	-290	-292	-290	-286	-285	-288	-294	-300	-301	-298	-296	-295	-295	-293
2	-296	-296	-294	-293	-293	-294	-291	-291	-289	-292	-293	-293	-295	-291	-287	-284	-286	-294	-299	-300	-297	-294	-294	-294	-293
3	-290	-293	-294	-294	-292	-292	-290	-291	-290	-289	-290	-292	-294	-292	-286	-283	-285	-291	-298	-299	-297	-296	-295	-293	-292
4	-292	-293	-293	-292	-292	-292	-291	-291	-290	-289	-290	-290	-292	-290	-286	-285	-291	-295	-300	-300	-297	-295	-294	-293	-292
5 Q	-293	-293	-293	-293	-293	-292	-292	-292	-291	-291	-291	-291	-291	-290	-285	-284	-287	-291	-296	-297	-295	-293	-291	-291	-291
6 D	-291	-290	-288	-287	-289	-290	-291	-290	-291	-290	-292	-292	-295	-293	-288	-288	-288	-290	-297	-298	-293	-293	-293	-295	-291
7 D	-292	-292	-295	-294	-290	-287	-289	-291	-292	-293	-292	-294	-296	-297	-292	-288	-290	-296	-298	-298	-297	-294	-290	-286	-293
8 D	-290	-289	-285	-300	-298	-288	-274	-276	-284	-292	-293	-296	-298	-293	-291	-292	-291	-293	-295	-295	-297	-298	-299	-300	-292
9	-298	-296	-295	-295	-294	-294	-295	-295	-293	-289	-286	-289	-292	-293	-290	-285	-290	-296	-301	-300	-298	-294	-295	-295	-294
10	-294	-293	-293	-293	-295	-294	-294	-293	-295	-295	-295	-295	-294	-290	-288	-290	-292	-296	-299	-298	-297	-296	-296	-294	-294
11	---	---	---	---	---	---	---	---	---	---	---	---	---	-293	-289	-288	-291	-293	-298	-300	-299	-296	-296	-295	---
12 Q	-294	-294	-293	-292	-291	-293	-293	-294	-294	-293	-293	-293	-293	-293	-291	-290	-291	-295	-302	-303	-300	-296	-295	-293	-294
13	-293	-291	-292	-294	-294	-293	-293	-294	-292	-291	-291	-292	-293	-293	-290	-290	-291	-291	-296	-298	-296	-293	-293	-293	-293
14 D	-292	-292	-290	-290	-287	-289	-290	-290	-289	-290	-291	-293	-290	-289	-286	-286	-290	-294	-289	-288	-286	-292	-296	-299	-290
15	-300	-298	-296	-294	-293	-292	-292	-293	-292	-291	-292	-292	-292	-292	-290	-289	-292	-294	-297	-297	-295	-294	-293	-293	-293
16	-293	-293	-293	-292	-291	-289	-289	-290	-289	-290	-290	-290	-290	-291	-288	-287	-288	-292	-296	-296	-295	-293	-290	-290	-291
17 Q	-293	-291	-292	-291	-290	-290	-290	-290	-290	-291	-291	-291	-292	-292	-289	-288	-288	-292	-296	-297	-296	-294	-293	-292	-292
18	-291	-290	-291	-291	-291	-290	-290	-290	-290	-291	-290	-290	-290	-290	-289	-288	-289	-292	-294	-294	-293	-291	-289	-288	-291
19	-287	-288	-289	-289	-288	-286	-288	-288	-287	-289	-291	-291	-292	-292	-289	-288	-289	-291	-292	-292	-292	-293	-293	-292	-290
20	-291	-292	-294	-293	-291	-290	-288	-288	-288	-288	-288	-289	-289	-288	-286	-286	-289	-291	-295	-295	-292	-290	-288	-287	-290
21	-288	-289	-288	-287	-287	-287	-287	-286	-286	-286	-286	-287	-287	-287	-287	-285	-286	-289	-291	-292	-290	-288	-287	-287	-287
22	-288	-288	-288	-288	-289	-288	-289	-288	-288	-286	-283	-284	-284	-287	-286	-287	-288	-290	-291	-292	-291	-290	-289	-288	-288
23	-287	-288	-287	-288	-288	-289	-289	-288	-287	-284	-286	-288	-289	-291	-290	-289	-292	-293	-293	-292	-289	-286	-287	-290	-289
24	-290	-289	-289	-290	-290	-286	-286	-287	-287	-289	-289	-289	-288	-288	-288	-290	-291	-293	-295	-294	-292	-289	-288	-288	-289
25 Q	-288	-287	-287	-287	-288	-288	-288	-289	-288	-289	-289	-289	-289	-289	-288	-288	-289	-292	-293	-291	-290	-288	-287	-286	-289
26	-286	-287	-286	-287	-287	-287	-287	-288	-287	-288	-289	-290	-289	-287	-285	-283	-284	-289	-293	-292	-290	-288	-287	-287	-288
27 Q	-287	-287	-286	-285	-286	-286	-286	-287	-288	-288	-288	-288	-288	-287	-286	-285	-287	-289	-291	-291	-291	-289	-287	-287	-288
28 D	-287	-287	-287	-286	-285	-288	-287	-286	-284	-284	-279	-279	-285	-282	-283	-285	-285	-285	-290	-292	-292	-291	-290	-289	-286
29	-289	-289	-288	-287	-287	-287	-287	-287	-288	-288	-288	-287	-285	-284	-284	-284	-284	-287	-289	-289	-290	-291	-291	-290	-288
30	-290	-289	-290	-287	-286	-287	-289	-289	-288	-286	-286	-286	-288	-289	-289	-287	-287	-288	-287	-289	-290	-289	-289	-289	-288
31	-288	-288	-288	-287	-286	-286	-286	-285	-285	-286	-287	-288	-287	-288	-287	-286	-285	-286	-288	-287	-287	-287	-287	-287	-287
MEAN	-291	-291	-291	-291	-290	-289	-289	-289	-289	-289	-289	-290	-291	-290	-288	-287	-288	-292	-295	-295	-294	-292	-291	-291	-291
MEAN Q	-291	-290	-290	-290	-290	-290	-290	-290	-290	-290	-290	-290	-290	-290	-288	-287	-288	-292	-296	-296	-294	-292	-291	-290	-291
MEAN D	-290	-290	-289	-291	-290	-289	-286	-287	-288	-290	-289	-291	-293	-291	-288	-288	-289	-292	-294	-294	-293	-293	-294	-294	-290

## LIVINGSTON ISLAND MAGNETIC OBSERVATORY

MAY 2009

## TOTAL INTENSITY

F = 35000 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	433	434	432	431	430	430	429	431	429	432	430	430	429	420	412	410	416	425	433	435	432	430	429	428	428
2	431	431	428	427	428	430	432	431	427	430	432	433	432	421	414	411	415	427	436	439	436	432	432	431	429
3	424	428	431	431	430	429	427	428	428	426	428	430	430	424	413	410	414	423	433	435	433	433	433	429	427
4	429	430	430	429	428	429	429	428	428	428	429	429	429	423	413	412	418	426	435	436	433	430	429	429	427
5 Q	428	428	428	429	429	428	429	430	429	430	430	430	430	426	418	415	418	425	433	436	434	432	429	430	428
6 D	430	428	423	420	422	425	427	426	428	428	431	433	434	429	419	416	417	421	431	432	424	425	422	424	426
7 D	420	418	423	425	423	425	424	426	426	427	427	430	431	429	420	414	418	427	432	433	432	427	420	405	424
8 D	411	413	404	428	426	425	415	415	419	425	424	426	429	420	415	419	416	419	423	422	425	425	426	430	421
9	429	428	428	428	427	427	429	430	431	428	426	427	426	423	416	408	415	424	431	430	427	422	424	424	425
10	423	421	421	424	427	426	426	425	430	429	430	430	428	420	415	415	419	427	433	430	429	428	429	427	425
11	---	---	---	---	---	---	---	---	---	---	---	---	---	424	416	415	418	422	429	430	429	426	426	425	---
12 Q	425	426	426	425	424	426	427	428	429	428	428	428	427	423	418	415	417	425	434	436	434	429	427	424	426
13	425	422	424	428	429	429	430	431	429	428	428	429	430	428	422	421	424	424	432	435	431	428	427	428	428
14 D	427	426	425	426	421	425	426	426	427	428	431	433	426	422	415	413	420	429	420	418	413	419	424	428	424
15	430	429	429	428	426	426	427	427	426	426	428	428	426	423	418	417	421	427	432	432	430	429	428	427	427
16	428	428	429	428	427	425	425	426	425	426	427	427	427	424	417	415	417	423	430	430	429	427	422	422	425
17 Q	428	425	425	425	423	425	425	425	425	426	427	428	427	424	419	416	417	424	430	432	431	429	428	427	425
18	425	425	425	425	424	425	426	426	427	429	428	428	428	425	421	420	421	427	431	431	431	428	425	424	426
19	421	420	421	421	420	416	421	422	421	423	426	426	427	426	420	417	419	423	425	425	425	427	427	426	423
20	425	427	432	430	429	430	426	426	427	426	427	428	427	424	418	418	421	424	432	434	432	429	427	426	427
21	428	429	427	426	425	424	425	423	423	423	423	424	423	423	420	418	418	422	426	428	427	423	422	422	424
22	423	423	423	424	424	424	424	424	425	427	419	419	419	421	417	416	419	422	424	426	425	425	423	422	423
23	421	422	421	421	421	422	422	422	424	419	419	420	420	420	419	418	424	427	428	427	423	416	416	422	421
24	422	422	423	423	429	423	421	421	420	423	423	423	422	421	419	419	421	425	428	428	425	422	421	422	423
25 Q	422	421	421	421	422	422	422	423	423	424	425	424	424	423	421	419	421	426	429	427	426	422	421	419	423
26	420	422	422	422	422	422	422	425	424	425	427	429	428	424	418	414	415	423	428	428	425	422	420	422	423
27 Q	422	422	421	421	421	421	422	422	424	425	425	425	424	421	418	417	420	423	426	426	426	423	422	421	422
28 D	422	422	422	421	421	426	424	425	424	424	417	418	425	417	415	416	415	416	421	424	423	422	420	420	421
29	420	420	421	419	422	423	423	422	424	424	425	424	420	420	416	415	413	418	420	419	421	421	421	420	420
30	423	421	423	419	417	418	422	423	422	422	421	421	423	423	421	418	419	421	421	423	424	423	423	423	421
31	423	422	422	423	421	420	420	421	421	421	424	425	424	423	420	418	417	421	424	422	422	421	420	419	421
MEAN	425	424	424	425	425	425	425	425	426	426	426	427	426	423	417	416	418	424	429	429	428	426	425	424	424
MEAN Q	425	424	424	424	424	424	425	425	426	427	427	427	426	423	419	416	418	424	430	431	430	427	425	424	425
MEAN D	422	422	420	424	423	425	423	423	425	426	426	428	429	423	417	416	417	422	425	426	424	423	422	421	423











***DEBIDO AL DETERIORO DEL SISTEMA DE ADQUISICIÓN DE ENERGÍA DE LA BASE, NO HAY REGISTRO DESDE EL 7 DE JUNIO HASTA EL 4 DE DICIEMBRE, AL INICIO DE LA CAMPAÑA 2009-2010.***

***DUE TO PROBLEMS AFFECTING THE ENERGY ACQUISITION SYSTEM IN THE BASE, THERE ARE NO RECORDS FROM JUNE 7<sup>th</sup> 2009 UNTIL DECEMBER 4<sup>th</sup> 2009, AT THE BEGINNING OF THE 2009-2010 SUMMER SURVEY.***

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 DECEMBER 2009

DECLINATION EAST

D = 14 DEGREES PLUS TABULAR QUANTITIES (UNITS 0.1 MINUTES)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1 Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3 Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4 Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	267	264	---
5 D	263	261	260	259	256	251	246	233	219	208	200	198	201	224	255	287	316	324	309	297	283	269	272	272	257
6	267	264	252	238	244	250	246	232	222	224	220	218	231	254	276	298	314	323	316	298	280	273	274	276	262
7	270	264	263	263	261	257	249	239	234	236	229	226	233	256	274	291	320	336	---	---	---	---	273	273	---
8	270	268	267	267	263	261	254	244	232	224	222	222	240	263	279	293	313	322	305	279	271	270	270	276	266
9	275	270	265	261	259	256	251	243	233	224	214	218	239	251	262	283	303	307	295	279	264	258	261	267	260
10	269	265	264	262	259	255	248	237	217	211	219	219	231	245	---	---	---	306	292	289	287	285	281	278	---
11 Q	275	271	268	265	260	254	249	237	226	---	---	218	234	256	274	295	309	310	---	---	---	---	---	---	---
12	---	275	270	266	261	256	246	235	---	229	230	228	230	236	254	271	290	301	303	298	296	286	281	279	264
13	273	267	---	258	253	242	231	219	212	216	216	228	240	257	276	---	---	313	309	300	286	277	274	275	259
14 D	274	266	263	260	253	231	217	221	220	233	231	235	252	265	271	288	303	318	315	297	286	277	273	273	263
15	271	266	262	---	---	---	---	---	---	---	---	---	---	---	253	278	305	317	---	---	---	---	---	---	---
16 D	---	---	---	---	246	251	246	237	232	233	226	220	225	235	266	300	326	333	316	306	288	270	265	274	---
17	277	269	267	265	264	256	247	---	---	---	---	240	243	237	253	277	312	335	331	309	280	262	260	263	---
18	267	267	266	265	261	255	250	---	---	---	223	224	226	241	256	285	312	328	326	312	297	280	264	260	268
19	264	---	---	263	---	---	---	239	228	221	219	220	233	244	263	292	314	325	312	295	286	275	271	269	---
20	268	270	268	269	267	262	255	242	229	230	236	238	245	244	261	283	310	332	323	301	288	283	277	275	269
21	272	264	258	265	263	259	248	238	233	231	231	233	228	235	250	272	305	328	323	311	297	280	274	277	266
22	277	273	266	260	259	254	243	232	223	227	227	228	---	---	248	285	321	330	311	298	291	287	279	274	268
23	276	272	266	262	254	244	235	234	229	222	222	214	227	247	262	283	308	330	331	305	---	---	272	271	263
24	277	276	267	259	256	250	243	236	237	239	239	---	---	---	---	297	330	332	324	309	293	279	266	261	271
25 D	262	260	260	260	258	254	250	246	242	238	240	231	237	250	263	274	298	318	332	311	296	282	268	263	266
26 D	266	263	253	252	251	256	240	235	229	223	221	225	234	251	267	286	311	316	307	287	271	265	262	262	260
27	263	264	265	264	260	254	247	230	222	227	235	234	242	268	283	297	313	320	317	301	280	267	263	264	266
28	264	262	257	258	260	256	252	248	242	235	239	235	240	253	264	277	295	307	303	286	270	269	265	267	263
29	269	268	269	265	263	257	250	239	228	220	224	234	245	---	---	---	---	---	---	---	---	---	---	---	---
30 Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MEAN	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MEAN Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MEAN D	---	---	---	255	253	248	239	234	228	227	224	222	230	245	264	287	311	322	316	300	285	273	268	269	262

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
DECEMBER 2009

HORIZONTAL INTENSITY

HOUR (UT)		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN	
DAY		H = 19500 nT PLUS TABULAR QUANTITIES (UNITS nT)																									
1	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	407	407
5	D	410	412	413	413	411	411	411	421	419	417	414	406	396	384	380	376	379	392	408	416	401	402	409	409	405	
6		406	415	414	406	408	408	407	405	400	397	393	385	379	374	372	373	380	392	398	402	405	406	407	407	397	
7		407	408	412	415	417	416	413	411	408	406	402	394	388	385	379	375	382	391	---	---	---	---	406	409	---	
8		411	412	414	414	412	410	409	405	403	404	402	394	389	387	384	384	387	392	403	407	408	407	403	399	402	
9		403	405	407	409	410	410	412	413	410	407	407	402	399	392	388	383	384	388	394	400	405	405	402	403	402	
10		406	408	408	409	408	407	408	408	405	401	399	396	395	392	---	---	---	389	391	399	401	410	416	414	---	
11	Q	411	409	410	411	411	411	411	410	407	---	---	394	391	387	382	376	373	374	---	---	---	---	---	---	---	
12		---	403	403	403	404	405	410	412	---	410	409	406	402	397	384	376	379	389	395	403	411	403	404	413	401	
13		416	416	---	415	414	412	414	411	407	409	405	403	397	391	389	---	---	404	405	400	396	398	401	410	405	
14	D	410	408	409	408	410	414	408	400	396	398	398	391	389	385	382	387	391	397	397	396	402	408	409	409	400	
15		409	409	407	---	---	---	---	---	---	---	---	---	---	---	388	385	388	393	---	---	---	---	---	---	---	
16	D	---	---	---	---	400	404	404	405	403	400	399	396	386	377	372	378	379	380	389	404	400	402	403	406	---	
17		410	410	409	409	409	407	405	---	---	---	---	399	388	373	365	365	379	381	386	388	392	398	399	407	---	
18		406	407	406	405	406	407	411	---	---	---	408	401	389	374	364	362	368	378	393	400	405	405	407	409	396	
19		410	---	---	407	---	---	---	406	401	399	399	399	393	386	379	375	381	391	398	401	403	402	405	406	---	
20		407	406	409	412	412	411	409	407	403	402	397	393	386	380	378	377	375	378	389	397	403	403	405	407	398	
21		408	410	410	412	413	412	410	407	401	398	398	392	386	386	386	379	380	388	396	401	400	397	401	410	399	
22		407	408	407	405	404	403	401	400	400	398	397	397	---	---	385	380	375	379	390	398	396	397	403	404	397	
23		406	407	408	409	409	410	408	409	410	405	406	401	394	391	389	381	383	391	403	406	---	---	395	398	401	
24		406	409	411	411	408	405	404	400	398	394	390	---	---	---	380	383	390	398	400	398	396	398	398	399	397	
25	D	399	402	402	403	404	403	403	401	400	404	407	401	395	389	379	377	383	391	398	390	397	405	410	400	398	
26	D	405	406	406	403	401	408	404	402	397	392	393	395	390	383	384	384	383	387	396	399	398	397	396	399	396	
27		401	401	402	402	404	405	407	406	405	402	402	400	395	390	387	377	377	381	390	395	397	396	395	395	396	
28		399	400	400	402	404	404	404	405	404	402	400	401	401	396	384	375	376	380	384	389	394	402	405	402	396	
29		398	395	395	398	399	399	400	402	403	400	395	391	387	---	---	---	---	---	---	---	---	---	---	---	---	
30	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
31		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
MEAN		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
MEAN Q		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
MEAN D		---	---	---	406	405	408	405	406	403	402	402	398	391	384	380	381	383	389	398	401	400	403	405	405	399	

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 DECEMBER 2009

VERTICAL INTENSITY

		Z = -29000 nT PLUS TABULAR QUANTITIES (UNITS nT)																								
HOUR (UT)		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																										
1	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5	D	-252	-253	-254	-253	-253	-253	-252	-257	-257	-253	-245	-236	-232	-223	-220	-219	-224	-239	-250	-261	-255	-256	-263	-263	-247
6		-259	-261	-260	-257	-257	-256	-254	-254	-248	-244	-243	-236	-230	-227	-225	-223	-229	-239	-250	-256	-260	-257	-256	-256	-247
7		-258	-259	-258	-258	-257	-254	-253	-250	-248	-245	-242	-239	-235	-228	-224	-226	-225	-235	---	---	---	---	-254	-256	---
8		-257	-257	-256	-254	-253	-251	-251	-251	-249	-247	-245	-239	-232	-230	-230	-225	-225	-236	-250	-252	-251	-251	-252	-250	-246
9		-252	-253	-255	-255	-254	-253	-253	-252	-252	-250	-247	-243	-235	-231	-228	-224	-229	-238	-245	-248	-247	-249	-249	-251	-246
10		-253	-254	-253	-251	-251	-250	-251	-250	-248	-242	-240	-240	-233	-227	---	---	---	-231	-238	-243	-241	-245	-246	-249	---
11	Q	-250	-250	-251	-251	-252	-251	-251	-248	-243	---	---	-238	-230	-224	-222	-218	-221	-227	---	---	---	---	---	---	---
12		---	-250	-251	-251	-252	-251	-252	-251	---	-245	-242	-240	-236	-231	-224	-221	-222	-228	-235	-243	-250	-244	-244	-251	-242
13		-256	-255	---	-252	-251	-250	-250	-246	-242	-237	-233	-230	-227	-224	-219	---	---	-232	-240	-244	-249	-251	-252	-256	-242
14	D	-258	-256	-255	-252	-254	-252	-247	-245	-240	-233	-232	-232	-230	-226	-219	-216	-222	-232	-237	-241	-248	-254	-252	-251	-241
15		-253	-252	-251	---	---	---	---	---	---	---	---	---	---	---	-222	-220	-221	-229	---	---	---	---	---	---	---
16	D	---	---	---	---	-247	-251	-251	-249	-246	-239	-235	-230	-224	-219	-216	-219	-220	-229	-244	-253	-255	-258	-255	-253	---
17		-254	-254	-253	-251	-251	-250	-249	---	---	---	---	-236	-226	-223	-214	-211	-221	-231	-242	-249	-252	-256	-256	-257	---
18		-253	-252	-250	-249	-250	-252	-255	---	---	---	-238	-232	-228	-221	-219	-220	-221	-228	-243	-252	-258	-258	-260	-258	-243
19		-254	---	---	-251	---	---	---	-248	-242	-236	-235	-235	-232	-228	-225	-222	-227	-239	-249	-250	-251	-252	-255	-256	---
20		-257	-255	-254	-254	-253	-252	-251	-250	-246	-241	-236	-232	-228	-226	-219	-212	-214	-223	-236	-247	-253	-254	-252	-253	-242
21		-254	-256	-254	-252	-251	-250	-250	-248	-244	-237	-234	-232	-227	-216	-214	-215	-216	-222	-236	-245	-248	-245	-247	-253	-239
22		-249	-250	-251	-250	-249	-249	-248	-247	-244	-239	-237	-238	---	---	-223	-219	-218	-226	-237	-246	-247	-247	-247	-248	-241
23		-251	-253	-252	-251	-249	-247	-247	-247	-246	-243	-241	-239	-231	-227	-220	-211	-214	-225	-236	-239	---	---	-250	-246	-240
24		-251	-251	-252	-249	-248	-246	-246	-244	-240	-237	-234	---	---	---	---	-221	-214	-213	-229	-244	-247	-248	-246	-248	-
239																										
25	D	-250	-251	-249	-248	-247	-246	-245	-244	-239	-237	-236	-235	-230	-224	-223	-214	-215	-221	-231	-230	-239	-252	-260	-247	-238
26	D	-251	-251	-253	-249	-247	-247	-244	-244	-241	-236	-234	-231	-229	-226	-225	-225	-222	-230	-243	-247	-248	-247	-247	-249	-240
27		-249	-248	-247	-246	-248	-249	-251	-247	-240	-236	-236	-235	-231	-229	-225	-220	-224	-229	-239	-246	-255	-257	-254	-251	-241
28		-250	-251	-250	-249	-250	-250	-249	-248	-246	-243	-237	-232	-230	-226	-225	-223	-228	-237	-247	-255	-255	-257	-253	-248	-243
29		-247	-247	-245	-248	-248	-248	-249	-249	-249	-246	-239	-229	-223	---	---	---	---	---	---	---	---	---	---	---	---
30	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
31		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MEAN		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MEAN Q		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MEAN D		---	---	---	-250	-249	-249	-248	-248	-244	-240	-236	-232	-229	-224	-221	-219	-221	-230	-241	-246	-249	-253	-255	-253	-241



LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 DECEMBER 2009

TOTAL INTENSITY

		F = 35000 nT PLUS TABULAR QUANTITIES (UNITS nT)																									
HOUR (UT)		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN	
DAY																											
1	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5	D	385	387	388	388	386	386	385	395	394	390	381	369	360	347	342	339	344	364	382	396	382	384	394	393	377	
6		388	395	394	387	388	387	385	384	375	371	368	357	349	344	341	340	349	364	376	383	389	387	387	387	374	
7		388	390	391	393	392	390	387	384	381	377	373	365	358	350	344	344	347	360	---	---	---	---	384	387	---	
8		390	390	390	389	387	384	383	381	378	378	375	365	356	354	352	348	350	362	379	383	382	383	381	377	375	
9		381	383	386	387	386	386	386	387	385	381	379	373	365	358	353	346	351	361	370	376	378	380	378	381	375	
10		384	385	385	384	383	382	383	382	379	372	369	367	360	354	---	---	---	356	362	371	371	379	383	385	---	
11	Q	383	383	384	385	385	385	384	381	376	---	---	365	357	349	345	338	338	344	---	---	---	---	---	---	---	
12		---	379	380	380	381	381	385	385	---	379	376	372	367	360	347	340	342	353	362	374	384	374	375	386	372	
13		391	391	---	388	386	385	385	381	375	371	366	363	357	350	346	---	---	365	373	373	375	377	380	388	374	
14	D	389	387	386	384	386	387	380	373	367	363	361	358	355	349	342	342	349	361	365	368	377	385	384	383	370	
15		385	384	383	---	---	---	---	---	---	---	---	---	---	---	348	344	347	356	---	---	---	---	---	---	---	
16	D	---	---	---	---	375	380	381	380	376	369	364	359	348	339	334	340	341	349	366	383	382	385	383	383	---	
17		386	387	385	384	383	382	380	---	---	---	---	366	350	340	328	326	342	351	363	370	375	381	382	387	---	
18		384	383	381	380	381	383	388	---	---	---	372	363	353	339	332	332	335	347	368	379	387	386	389	390	369	
19		386	---	---	382	---	---	---	379	371	366	364	365	358	351	346	340	348	363	375	378	380	380	385	387	---	
20		387	385	386	388	387	385	384	381	376	372	364	358	351	346	339	333	334	343	360	374	381	382	382	384	369	
21		386	388	387	386	386	385	383	380	373	366	363	358	351	342	340	336	338	348	363	373	376	372	375	385	368	
22		381	382	383	380	379	379	376	376	373	367	365	366	---	---	347	341	337	346	361	373	372	373	377	378	369	
23		382	384	384	383	382	381	380	381	380	375	374	369	359	354	347	334	338	352	368	372	---	---	375	374	370	
24		382	384	385	382	380	377	376	373	368	363	359	---	---	---	342	338	342	359	373	375	374	374	374	375	367	
25	D	377	380	378	378	377	376	375	373	369	369	370	365	359	350	343	335	339	348	361	355	366	383	392	375	366	
26	D	381	382	383	379	376	380	375	374	368	361	360	359	355	348	348	348	345	354	370	374	374	374	373	376	367	
27		377	376	377	376	378	380	382	378	372	367	367	365	359	355	349	340	343	350	363	372	379	381	378	376	368	
28		377	378	377	378	380	380	379	379	376	373	367	363	362	356	348	341	346	355	366	376	379	384	383	377	370	
29		374	372	371	375	376	375	377	378	378	375	366	355	348	---	---	---	---	---	---	---	---	---	---	---	---	
30	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
31		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
MEAN		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
MEAN Q		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
MEAN D		---	---	---	381	380	382	379	379	375	370	367	362	355	347	342	341	344	355	369	375	376	382	385	382	369	

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 JANUARY 2010

DECLINATION EAST

D = 14 DEGREES PLUS TABULAR QUANTITIES (UNITS 0.1 MINUTES)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2 Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4	279	275	269	262	251	241	235	229	219	218	222	228	240	252	265	277	294	307	302	294	282	279	---	281	261
5	273	271	268	260	254	248	242	237	233	224	218	221	231	234	242	265	---	308	310	297	---	275	264	266	259
6	267	265	262	256	253	247	245	240	235	229	234	238	247	252	254	267	281	280	282	283	280	278	282	283	260
7 Q	279	272	271	265	260	256	248	248	246	241	237	228	228	233	242	264	293	306	306	302	291	278	269	268	264
8 Q	270	271	270	271	263	259	253	243	230	224	226	236	240	248	261	273	284	295	293	281	272	262	254	249	260
9 Q	247	254	255	257	255	252	250	249	242	225	220	225	233	---	272	291	312	311	294	280	276	268	266	268	261
10	269	266	264	261	255	252	247	234	223	210	202	208	239	260	265	278	311	324	315	283	257	256	257	260	258
11 D	263	263	262	259	253	244	238	218	222	231	224	212	219	248	283	319	348	349	335	298	270	256	260	267	264
12	270	265	259	264	262	250	242	233	229	226	225	225	236	242	263	---	---	---	---	276	255	250	252	261	---
13 D	256	249	262	262	255	246	241	235	224	218	209	219	237	262	288	307	323	332	317	296	280	270	264	263	263
14	263	265	263	261	260	259	256	251	240	229	229	230	236	257	284	293	300	304	302	291	268	253	253	263	263
15	267	263	260	257	255	250	245	239	231	225	228	235	251	273	279	296	308	305	302	294	280	260	267	270	264
16	269	262	259	258	257	256	251	243	228	216	208	225	244	261	276	290	300	302	---	278	267	259	258	262	258
17 Q	264	262	261	262	259	256	253	241	227	224	224	225	245	261	270	281	297	314	302	276	264	260	260	264	261
18	267	263	260	257	251	241	236	226	221	216	209	200	211	242	272	287	294	306	305	288	274	262	257	261	254
19	266	268	265	259	256	250	244	234	216	208	212	217	234	---	259	268	285	302	301	293	288	283	275	268	258
20 D	262	261	259	258	255	254	252	242	223	214	215	213	213	222	257	300	322	367	341	342	327	324	276	243	268
21 D	267	274	271	256	269	263	257	257	237	233	235	234	245	269	286	294	316	332	329	314	300	293	287	285	275
22	282	277	273	259	259	255	252	245	239	229	221	217	224	246	259	267	281	302	304	297	287	276	264	266	262
23	269	252	261	265	265	259	251	240	233	233	234	224	229	249	276	302	311	311	308	305	296	285	271	266	267
24	265	266	268	266	252	240	217	204	207	226	243	246	249	252	276	297	313	329	325	307	298	293	283	270	266
25	269	267	268	266	264	260	254	248	246	235	234	238	269	282	281	292	310	322	309	297	292	289	279	275	273
26	275	266	262	263	255	244	244	243	239	229	227	223	237	245	256	---	296	298	288	285	---	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	294	313	313	308	304	293	280	268	268	---
28	270	263	254	250	247	248	244	241	235	230	230	237	237	236	250	282	305	317	309	290	276	260	256	260	259
29	261	263	263	261	257	256	253	251	244	232	231	229	246	254	267	279	287	298	304	303	289	276	266	264	264
30 D	261	252	247	254	250	247	250	249	242	228	212	210	229	252	266	276	283	294	303	---	271	266	262	261	256
31	257	251	253	254	257	257	257	255	247	244	246	250	261	280	307	325	330	325	312	294	289	281	269	269	274
MEAN	267	264	262	260	256	251	247	240	232	226	224	226	238	252	269	287	304	313	308	294	282	273	266	266	---
MEAN Q	264	264	264	263	259	255	251	245	236	228	227	228	236	248	261	277	296	306	299	284	275	267	262	262	---
MEAN D	262	260	260	258	257	251	248	240	230	225	219	218	229	251	276	300	319	335	325	309	290	282	270	264	266

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 JANUARY 2010

HORIZONTAL INTENSITY

		H = 19500 nT PLUS TABULAR QUANTITIES (UNITS nT)																								
HOUR (UT)		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																										
1		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4		406	407	409	410	407	402	402	399	392	394	396	397	389	380	376	379	379	384	384	387	390	395	---	405	394
5		407	405	405	402	403	404	404	401	397	395	389	389	390	383	379	379	---	385	390	388	---	391	394	397	394
6		398	397	397	397	396	397	398	398	395	397	399	394	389	390	390	389	384	385	388	388	391	398	401	400	394
7	Q	401	401	401	402	402	404	404	402	400	397	394	391	395	400	397	393	386	384	389	390	391	396	398	401	397
8	Q	405	403	399	399	399	401	400	400	399	397	394	391	396	399	396	386	380	382	387	390	392	397	402	398	395
9	Q	398	396	398	401	401	402	401	400	400	398	397	393	388	---	382	383	393	398	402	402	400	399	404	405	397
10		403	402	405	405	407	410	413	409	404	400	394	396	395	389	384	386	394	406	414	414	408	408	404	403	402
11	D	407	405	410	411	415	421	418	415	402	404	408	411	403	387	378	384	391	392	398	390	385	386	392	399	400
12		402	403	401	402	405	402	402	402	401	401	396	392	388	377	373	---	---	---	---	402	398	393	392	394	---
13	D	392	392	400	406	411	406	404	404	398	390	388	385	379	372	372	373	382	392	396	398	398	394	391	392	392
14		396	397	397	397	400	399	396	394	392	390	387	383	375	368	370	377	387	398	405	401	396	400	400	399	392
15		398	396	396	399	398	397	396	395	394	392	389	385	380	373	373	382	389	397	406	407	400	398	398	395	393
16		399	403	401	399	400	400	402	402	400	397	390	378	371	371	380	388	387	401	---	415	410	403	399	396	396
17	Q	400	401	399	401	403	401	401	402	402	399	397	388	379	372	373	378	389	406	414	414	410	403	403	405	397
18		402	402	401	400	400	400	397	398	400	401	398	390	379	370	367	379	399	407	417	415	409	407	411	408	398
19		407	407	406	406	405	404	402	401	399	399	396	385	374	---	373	379	383	388	398	399	402	408	410	408	397
20	D	403	404	406	407	406	407	405	407	404	401	397	390	391	391	383	379	402	388	392	409	398	394	385	378	397
21	D	384	385	387	381	387	385	382	387	382	374	375	370	363	363	368	374	377	383	389	388	385	387	389	391	381
22		394	394	393	391	387	388	391	390	389	386	381	376	374	369	367	367	370	377	384	387	389	394	387	394	384
23		399	396	394	392	393	392	390	387	384	382	382	380	380	383	374	365	364	373	378	380	385	390	385	390	384
24		394	397	399	394	390	392	391	382	379	387	388	389	384	372	368	369	378	383	386	382	386	382	390	397	386
25		398	396	397	395	393	392	391	389	387	387	387	383	377	375	377	383	391	397	394	388	386	384	380	381	388
26		381	387	392	396	390	385	387	386	386	384	387	384	382	381	378	---	387	393	394	394	---	---	---	---	---
27		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	384	394	400	398	391	392	387	387	393	---
28		394	398	399	397	393	392	394	393	392	390	390	386	379	374	371	384	392	402	404	395	399	400	393	389	392
29		389	389	392	392	393	395	394	392	391	389	387	385	382	377	377	386	396	402	401	394	391	389	391	390	390
30	D	395	398	403	397	399	392	395	397	394	393	391	383	373	371	369	369	371	385	398	---	400	402	389	389	390
31		386	392	391	393	397	400	395	397	397	395	389	381	373	364	361	367	383	400	402	397	395	385	385	385	388
MEAN		398	398	399	399	399	399	398	397	395	393	391	387	382	378	376	379	385	392	397	397	395	395	395	396	---
MEAN Q		401	400	400	401	402	402	401	401	400	398	395	391	389	389	387	385	387	393	398	399	398	399	402	403	---
MEAN D		397	397	401	401	404	402	401	402	396	392	392	388	382	377	374	376	385	388	394	397	393	393	389	390	392

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 JANUARY 2010

VERTICAL INTENSITY

		Z = -29000 nT PLUS TABULAR QUANTITIES (UNITS nT)																								
HOUR (UT)		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																										
1		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4		-245	-246	-249	-249	-247	-245	-243	-240	-236	-236	-233	-234	-232	-228	-226	-226	-225	-231	-240	-245	-248	-250	---	-247	-239
5		-250	-249	-247	-247	-247	-246	-245	-243	-241	-235	-231	-226	-228	-229	-229	-225	---	-227	-233	-236	---	-243	-248	-249	-238
6		-249	-248	-248	-249	-247	-247	-249	-248	-244	-241	-236	-235	-235	-234	-232	-227	-225	-229	-241	-246	-245	-247	-249	-248	-242
7	Q	-248	-247	-246	-246	-246	-246	-247	-245	-241	-238	-237	-235	-228	-227	-228	-224	-219	-222	-232	-238	-241	-242	-246	-247	-238
8	Q	-251	-248	-244	-242	-243	-244	-243	-244	-242	-235	-227	-222	-218	-226	-230	-226	-223	-221	-231	-241	-244	-244	-246	-243	-237
9	Q	-240	-238	-240	-241	-242	-241	-240	-240	-238	-232	-226	-221	---	-223	-220	-218	-220	-231	-236	-235	-235	-240	-242	-234	
10		-241	-242	-243	-243	-243	-243	-245	-243	-238	-233	-226	-218	-220	-224	-226	-220	-218	-228	-237	-247	-247	-245	-243	-242	-236
11	D	-244	-243	-244	-245	-246	-246	-237	-237	-230	-232	-229	-225	-214	-204	-206	-207	-212	-219	-232	-239	-244	-247	-248	-246	-232
12		-246	-250	-248	-246	-246	-244	-244	-243	-240	-239	-232	-225	-214	-209	-212	---	---	---	---	-249	-253	-248	-250	-248	---
13	D	-248	-247	-248	-251	-250	-243	-244	-247	-241	-233	-229	-226	-220	-216	-216	-217	-217	-230	-244	-250	-253	-251	-247	-248	-238
14		-248	-249	-248	-247	-247	-244	-244	-242	-238	-236	-232	-226	-222	-221	-213	-216	-223	-230	-243	-250	-250	-253	-249	-244	-238
15		-241	-242	-243	-245	-246	-246	-246	-245	-245	-241	-232	-225	-222	-217	-212	-213	-223	-232	-235	-241	-244	-245	-245	-242	-236
16		-241	-246	-244	-244	-245	-244	-246	-246	-245	-241	-233	-225	-218	-215	-221	-223	-223	-230	---	-246	-247	-242	-242	-242	-237
17	Q	-244	-244	-242	-243	-244	-244	-245	-248	-246	-242	-235	-226	-220	-215	-218	-212	-212	-223	-243	-251	-249	-244	-243	-242	-236
18		-241	-243	-243	-243	-242	-242	-242	-243	-241	-241	-236	-228	-219	-211	-206	-210	-216	-223	-243	-254	-254	-252	-248	-243	-236
19		-236	-239	-239	-241	-242	-242	-241	-242	-241	-237	-232	-223	-216	---	-217	-227	-227	-234	-247	-251	-248	-249	-249	-248	-237
20	D	-242	-242	-243	-243	-242	-243	-242	-240	-238	-237	-233	-227	-225	-221	-208	-204	-216	-214	-229	-244	-247	-257	-260	-259	-236
21	D	-254	-248	-248	-246	-244	-244	-241	-241	-243	-237	-237	-231	-222	-217	-221	-230	-233	-235	-241	-247	-250	-252	-249	-249	-240
22		-249	-248	-248	-248	-246	-247	-248	-246	-244	-240	-236	-235	-232	-229	-221	-216	-219	-226	-240	-247	-247	-250	-244	-247	-240
23		-251	-254	-250	-247	-246	-245	-243	-242	-242	-240	-235	-235	-232	-229	-222	-220	-225	-233	-242	-242	-243	-247	-245	-252	-240
24		-252	-254	-253	-248	-246	-245	-241	-236	-234	-236	-234	-235	-231	-222	-222	-219	-220	-227	-239	-244	-247	-246	-254	-257	-239
25		-253	-252	-251	-246	-244	-243	-243	-244	-240	-238	-235	-229	-222	-223	-225	-221	-223	-230	-237	-238	-241	-244	-243	-242	-238
26		-243	-249	-252	-252	-248	-243	-244	-242	-241	-238	-237	-235	-233	-232	-232	---	-224	-228	-234	-237	---	---	---	---	---
27		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	-216	-219	-231	-237	-240	-241	-241	-237	-244	---
28		-243	-247	-250	-247	-242	-241	-243	-242	-240	-235	-231	-226	-224	-222	-222	-225	-225	-227	-234	-238	-242	-244	-243	-242	-237
29		-241	-238	-241	-242	-243	-244	-242	-241	-240	-238	-237	-236	-233	-228	-222	-224	-225	-229	-231	-232	-236	-240	-239	-235	-236
30	D	-241	-245	-248	-244	-244	-240	-240	-241	-240	-238	-235	-224	-218	-217	-216	-220	-225	-233	-236	---	-241	-246	-240	-240	-235
31		-239	-243	-241	-243	-242	-244	-241	-243	-242	-239	-234	-229	-221	-215	-217	-223	-232	-241	-247	-247	-246	-240	-242	-241	-237
MEAN		-245	-246	-246	-246	-245	-244	-243	-243	-241	-238	-233	-228	-224	-221	-220	-220	-222	-228	-238	-243	-245	-246	-246	-245	---
MEAN Q		-245	-244	-243	-243	-244	-244	-244	-244	-242	-238	-233	-227	-222	-223	-225	-220	-218	-221	-234	-241	-242	-241	-244	-243	---
MEAN D		-246	-245	-246	-246	-245	-243	-241	-241	-238	-236	-233	-227	-220	-215	-214	-216	-221	-226	-237	-244	-247	-250	-249	-248	-236

LIVINGSTON ISLAND MAGNETIC OBSERVATORY  
 JANUARY 2010

TOTAL INTENSITY

F = 35000 nT PLUS TABULAR QUANTITIES (UNITS nT)

HOUR (UT)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
DAY																									
1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2 Q	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4	377	378	382	383	379	374	372	368	362	363	361	362	357	348	344	346	345	353	360	366	370	374	---	378	366
5	382	379	378	376	377	377	376	373	368	362	356	352	354	351	349	345	---	350	358	360	---	367	373	376	364
6	376	374	374	376	373	373	376	374	370	368	365	362	359	359	357	352	348	352	364	367	369	374	377	376	367
7 Q	377	376	375	375	375	376	377	374	370	366	364	360	357	359	358	352	345	345	357	362	365	368	374	376	366
8 Q	381	378	372	370	372	373	372	372	371	363	355	349	349	357	359	350	344	344	354	364	369	371	375	371	364
9 Q	368	365	368	371	372	371	370	369	369	367	361	354	347	---	345	343	347	352	363	367	365	364	371	374	362
10	372	372	375	374	376	378	380	377	370	363	354	349	350	350	348	345	348	363	374	383	379	378	374	373	367
11 D	377	375	378	379	383	386	377	375	362	365	365	363	350	332	329	333	341	347	362	363	364	367	371	374	363
12	375	379	376	375	377	374	374	373	370	368	361	352	341	331	331	---	---	---	---	378	378	372	372	373	---
13 D	371	371	375	382	383	375	375	378	369	358	354	349	341	334	334	335	340	356	370	377	379	375	370	372	363
14	374	375	374	374	375	372	371	368	363	360	356	348	341	336	330	337	348	360	374	378	375	380	377	372	363
15	369	369	370	373	373	373	372	371	371	366	356	348	343	335	331	337	349	361	368	374	373	372	372	368	362
16	370	376	373	372	373	373	375	376	373	368	358	344	335	333	342	349	348	361	---	382	381	373	370	369	364
17 Q	372	373	370	373	375	373	374	377	376	371	363	351	341	333	336	334	340	358	380	386	383	375	374	373	365
18	371	373	372	372	371	372	369	371	370	371	365	353	340	328	323	333	349	359	381	389	385	383	382	376	365
19	370	372	372	373	373	373	371	371	370	366	361	347	335	---	335	347	349	358	374	378	377	382	382	380	365
20 D	373	373	375	376	374	376	374	373	370	367	362	353	352	349	334	327	351	341	356	378	374	380	377	372	364
21 D	372	368	369	364	365	364	360	363	361	352	353	345	334	330	336	346	351	356	364	368	369	372	371	371	359
22	373	373	372	371	367	368	371	369	366	361	355	352	348	342	335	331	335	345	360	368	368	374	365	372	360
23	378	379	374	370	370	369	367	364	362	359	355	354	351	350	340	333	337	349	359	360	363	370	365	374	360
24	376	379	380	373	369	369	365	356	353	359	357	359	353	339	336	334	341	349	361	362	367	364	376	381	361
25	378	377	377	371	369	367	367	366	362	360	358	351	342	341	344	344	350	359	363	361	362	364	361	360	361
26	361	370	375	377	370	364	365	363	362	359	360	356	353	352	350	---	348	355	361	364	---	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	341	348	362	365	364	366	363	359	369	---
28	368	374	377	373	367	365	368	367	365	360	357	350	344	339	338	348	352	360	367	365	370	373	368	365	362
29	364	362	365	367	367	370	368	366	364	361	360	357	353	346	342	348	355	362	362	359	361	363	363	359	360
30 D	367	372	378	371	372	365	367	368	365	364	359	346	336	334	332	335	341	355	365	---	371	375	363	363	360
31	360	368	365	367	370	372	367	370	369	366	358	349	338	328	328	336	353	370	376	374	372	361	363	362	360
MEAN	372	373	374	373	373	372	371	370	367	364	359	352	346	341	339	341	346	355	366	370	371	372	371	371	---
MEAN Q	374	373	371	372	373	373	373	373	371	367	361	354	348	349	349	345	344	350	364	370	370	370	373	373	---
MEAN D	372	372	375	374	376	373	371	371	366	361	359	351	342	336	333	335	345	351	363	371	371	374	370	370	362

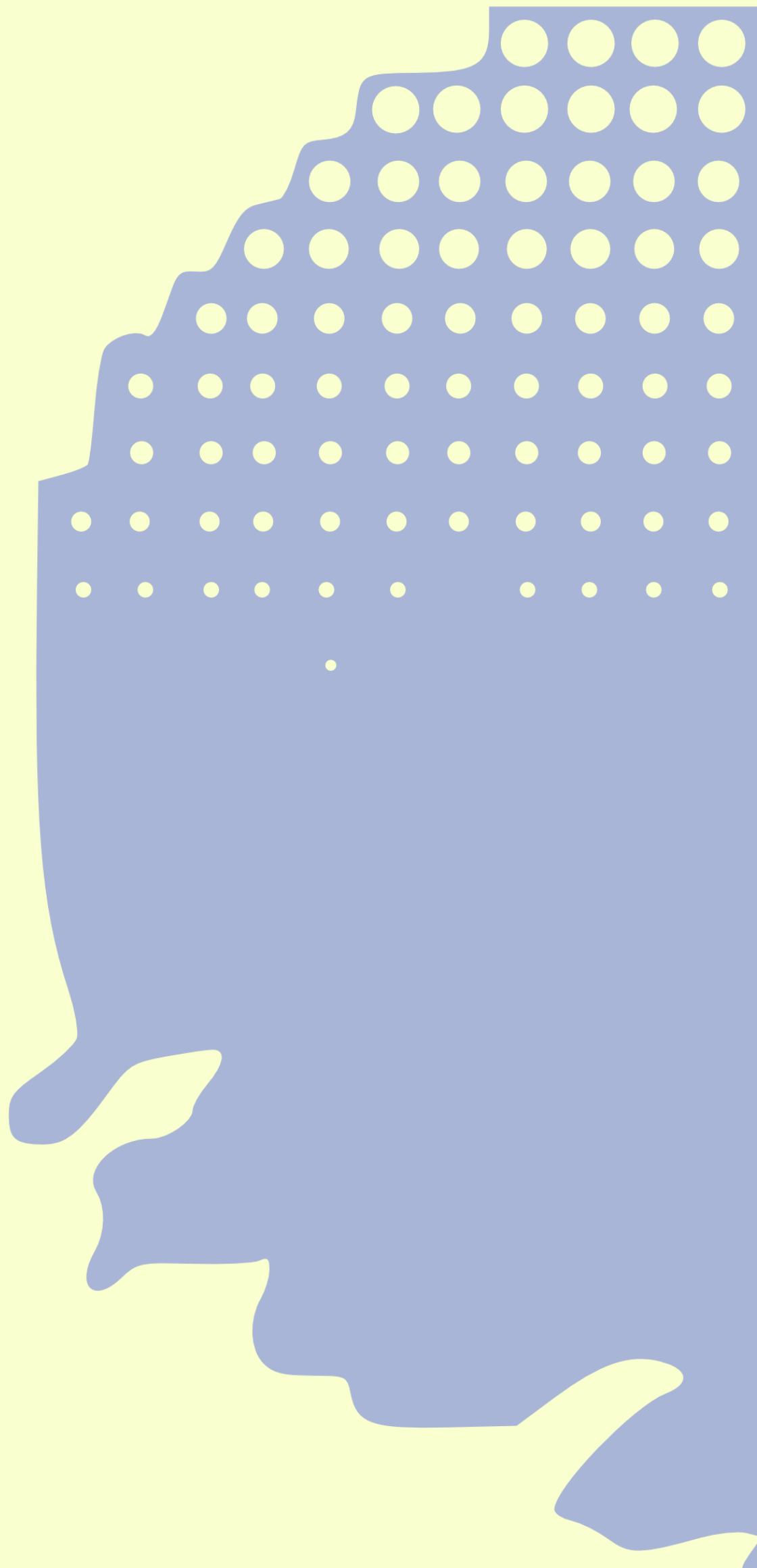












**Universitat Ramon Llull**

