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PROMIS SERIES

VOLUME 8

Midlatitude Ground Magnetograms

NASA
National Aeronautics and Space Administration

Goddard Space Flight Center

NSSDC/WDC-A-R&S 90-10

PROMIS SERIES

VOLUME 8

Midlatitude Ground Magnetograms

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Prepared by

D. H. Fairfield
Laboratory for Extraterrestrial Physics, NASA Goddard Space Flight Center, Greenbelt, Maryland
and
C. T. Russell
Institute for Geophysics and Planetary Physics, UCLA, Los Angeles, California

Foreword

This is the eighth in a series of volumes pertaining to the Polar Region Outer Magnetosphere International Study (PROMIS). It contains 24 hour stack plots of 1-minute average, H and D component, ground magnetograms for the period March 10-June 16 1986. Nine midlatitude ground stations have been selected from the UCLA magnetogram data base that has been constructed from all available digitized magnetogram stations. Figure 1 displays the entire collection of stations. The nine stations plotted here and circled in Figure 1 have been selected as an optimal chain of midlatitude stations distributed in longitude. The stations are listed in Table 1 along with their geographic and geomagnetic coordinates. The approximate universal times of local midnight are also listed in Table 1 and marked on the individual station traces for the first day of data, March 10. Note that the availability of digitized data restricts the longitudinal coverage to just under 12 hours of local time. To aid the study of relations between high latitude effects and midlatitude effects the upper and lower envelopes of the AE index Au and Al are shown at the bottom of the plots. Note that these two traces are plotted on different scales.

A primary purpose of printing this book is to allow the users to define universal times and onset longitudes of magnetospheric substorms. It is well known (e.g., Clauer and McPherron, 1974; Rostoker et al. 1980; Nagai, 1982; Barfield et al., 1986) that substorm magnetic field perturbations are largely a result of substorm current wedges; currents flow (1) earthward from the magnetotail along auroral zone field lines in the post midnight sector, (2) through the auroral ionosphere as the auroral electrojet, and (3) back out to the magnetotail in the premidnight sector along field lines associated with the westward traveling surge. This current system produces a positive H perturbation when a midlatitude ground station (or geosynchronous spacecraft) is located between the field-aligned legs of the wedge. The D perturbation is negative if the observation point is located to the east and the downward current leg is the primary cause of the perturbation. The D perturbation is positive if the location is to the west and the upward current is the primary cause. By noting the longitude where the D perturbation reverses sign (which typically corresponds to the maximum in the +H perturbation) one can determine the central meridian of the current wedge. This location is typically within an hour or two of the 2300 local time meridian but it can vary significantly from substorm to substorm. An example of the above is the 0800 UT substorm on March 12 where the D perturbation reversal and maximum +H occurs near Tuscon when this station is located slightly past local midnight.

We note that plots of the form shown in this book can be generated through remote access to the UCLA data base where users can choose the time scale and select stations from the entire data base of over 50 stations. The UCLA data base can be accessed over SPAN by use of the SET HOST command to BRUNET and signing on the GUEST account. The program is initiated with

the command PR MANAL (Russell, 1988). Users must have a graphics terminal to use the program. It is suggested that users obtain a copy of the documentation, inquire about the availability of on-line data and obtain the current password of the GUEST account from C. T. Russell before attempting to use the MANAL program.

REFERENCES

Barfield, J. N., N. A. Saflekos, R. E. Sheehan, R. L. Carovillano, T. A. Potemra, and D. Knecht, Three-dimensional observations of Birkeland currents, *J. Geophys. Res.*, 91, 4393-4403, 1986

Clauer, R. C., and R. L. McPherron, Mapping the local time—universal time development of magnetospheric substorms using mid-latitude magnetic observatories, *J. Geophys. Res.*, 79, 2811-2820, 1974.

Nagai, T., Observed magnetic substorm signatures at synchronous altitude, *J. Geophys. Res.*, 87, 4405-4417, 1982.

Rostoker, G., S. -I. Akasofu, J. Foster, R. A. Greenwald, Y. Kamide, K. Kawasaki, A. T. Y. Lui, R. L. McPherron, and C. T. Russell, Magnetospheric substorms—definition and signatures, *J. Geophys. Res.*, 85, 1663-1668, 1980.

Russell, C. T., MANAL: A program for the display and analysis of ground based magnetograms. Report available from the author, 1988.

Table 1. Magnetic Observations Whose Digital Magnetic Data are Available in the UCLA Data Base

Abrev.	Name	Geographic lat	Geographic long	Geomagnetic lat	Geomagnetic long	UT of Local Midnight
KNY	Kanoya	31.4°	130.9°	20.8°	199.4°	15.3 Hr.
MMB	Memambetsu	43.9	144.2	34.3	209.7	14.4
HON	Honolulu	21.3	202.0	21.7	267.6	10.5
VIC	Victoria	48.5	236.6	54.4	294.7	8.2
TUC	Tucson	32.2	249.2	39.8	311.4	7.4
BD	Boulder	40.1	254.8	49.5	315.7	7.0
OTT	Ottawa	45.4	284.4	57.0	351.5	5.0
SJG	San Juan	18.1	293.8	29.6	03.1	4.4
STJ	Saint Johns	47.6	307.3	59.1	18.9	3.5

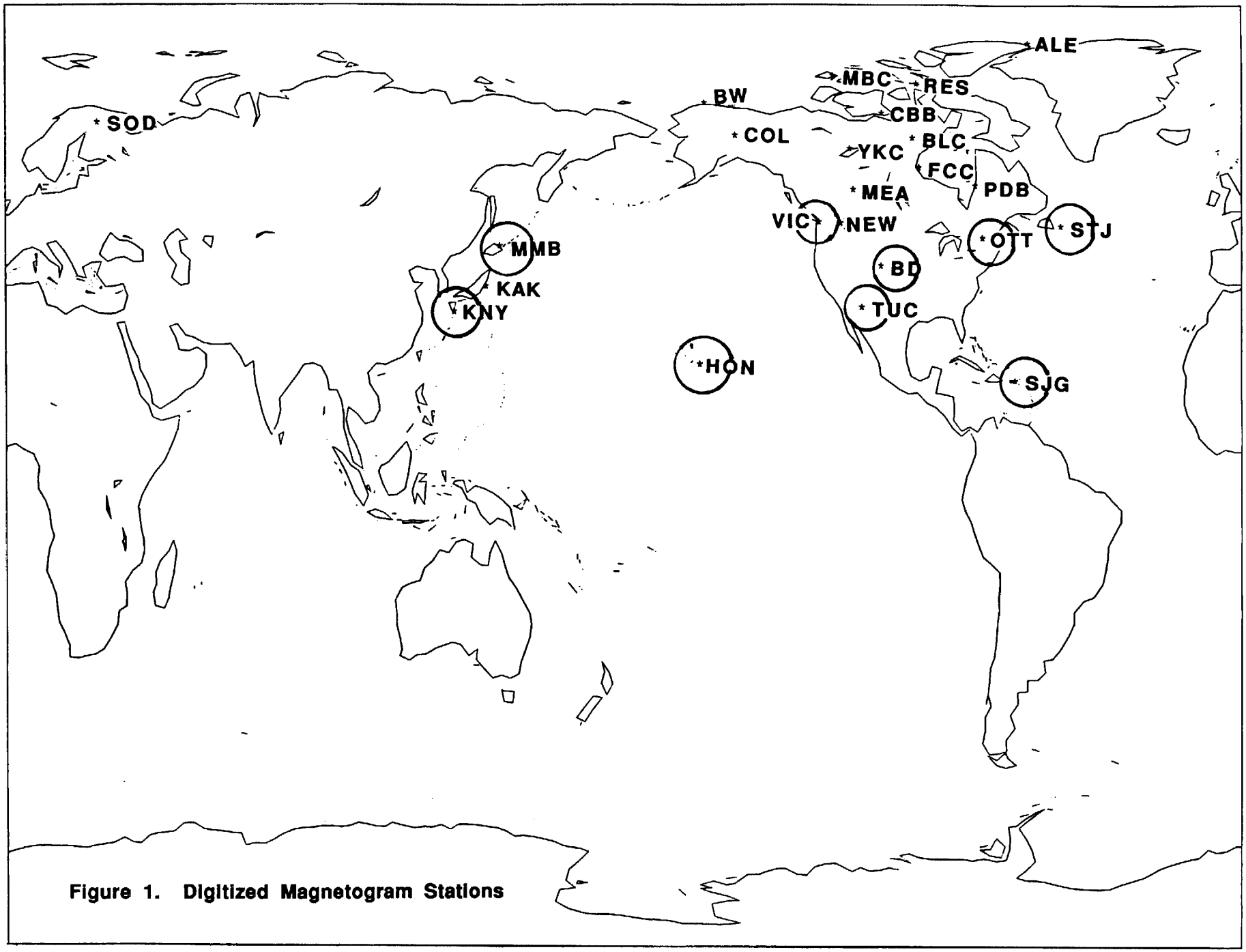

Figure 1. Digitized Magnetogram Stations

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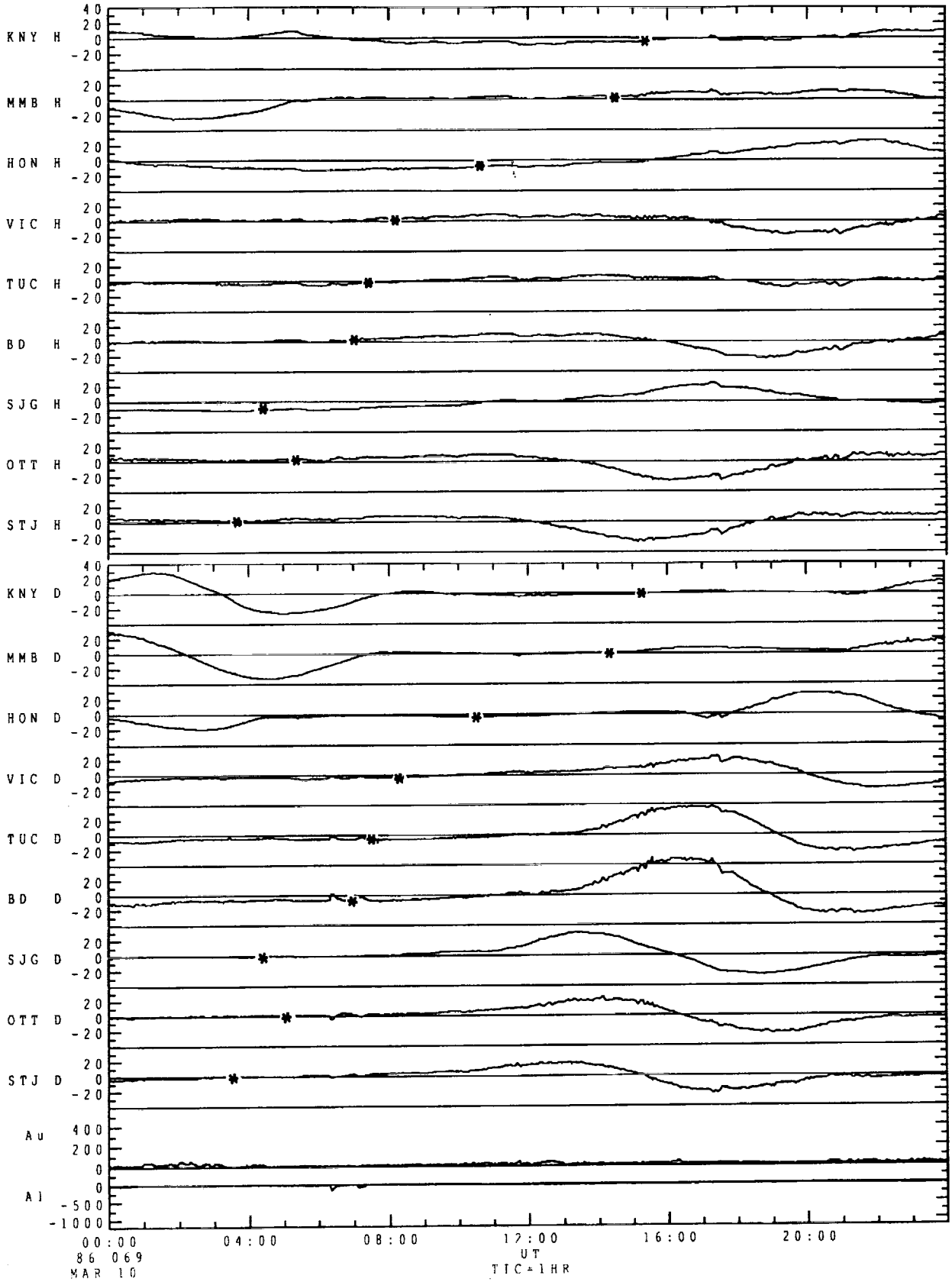

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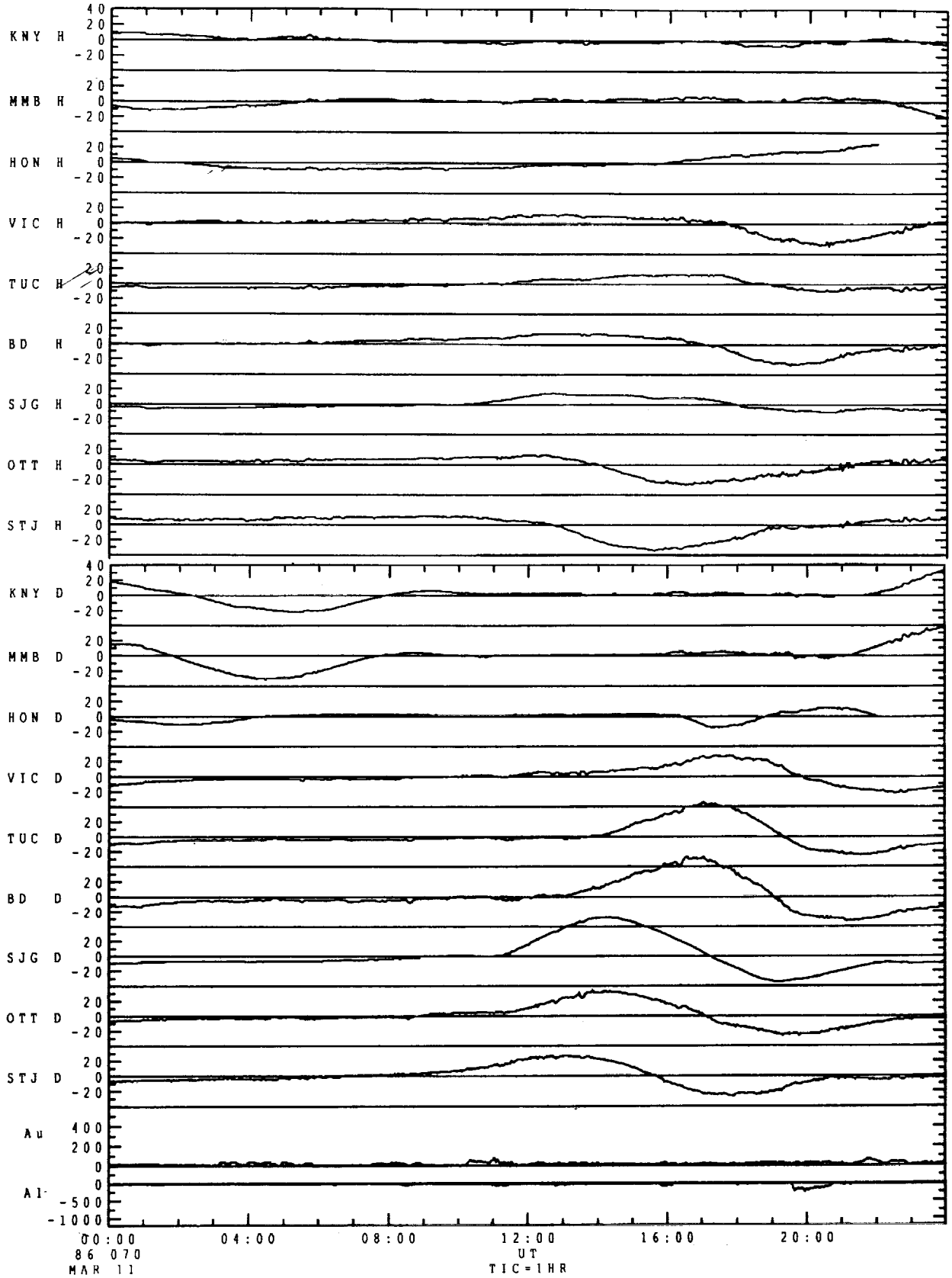

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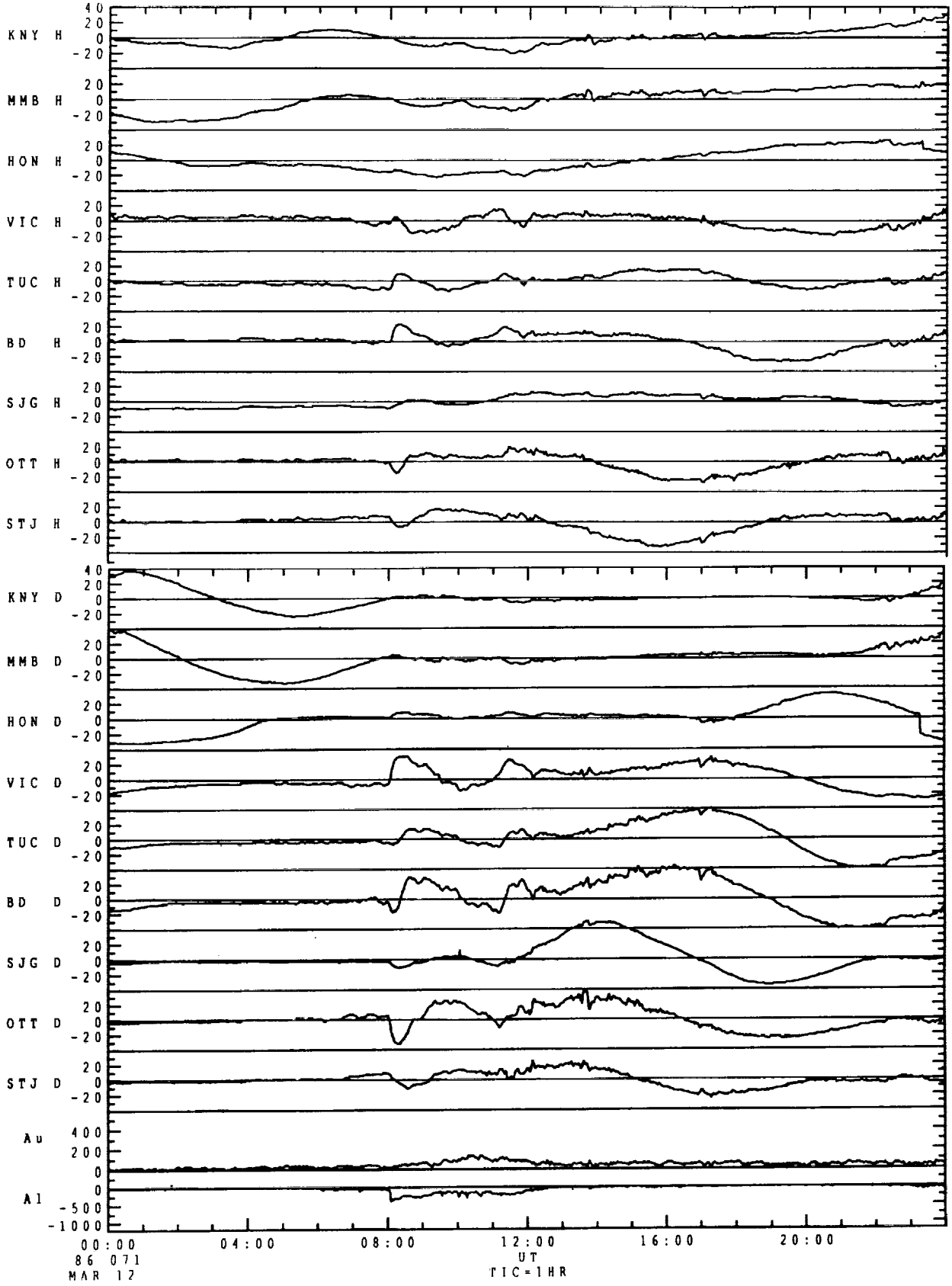

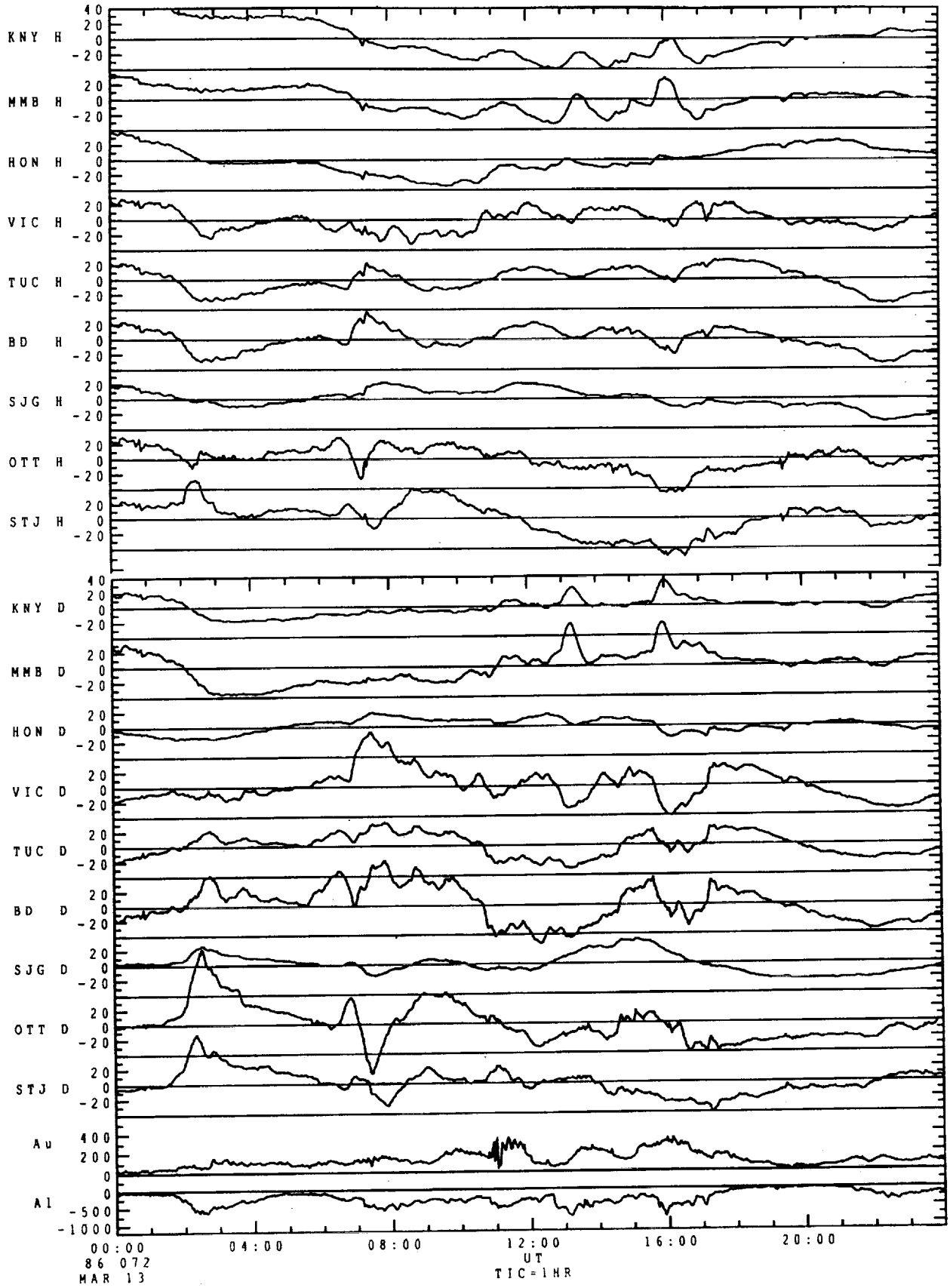
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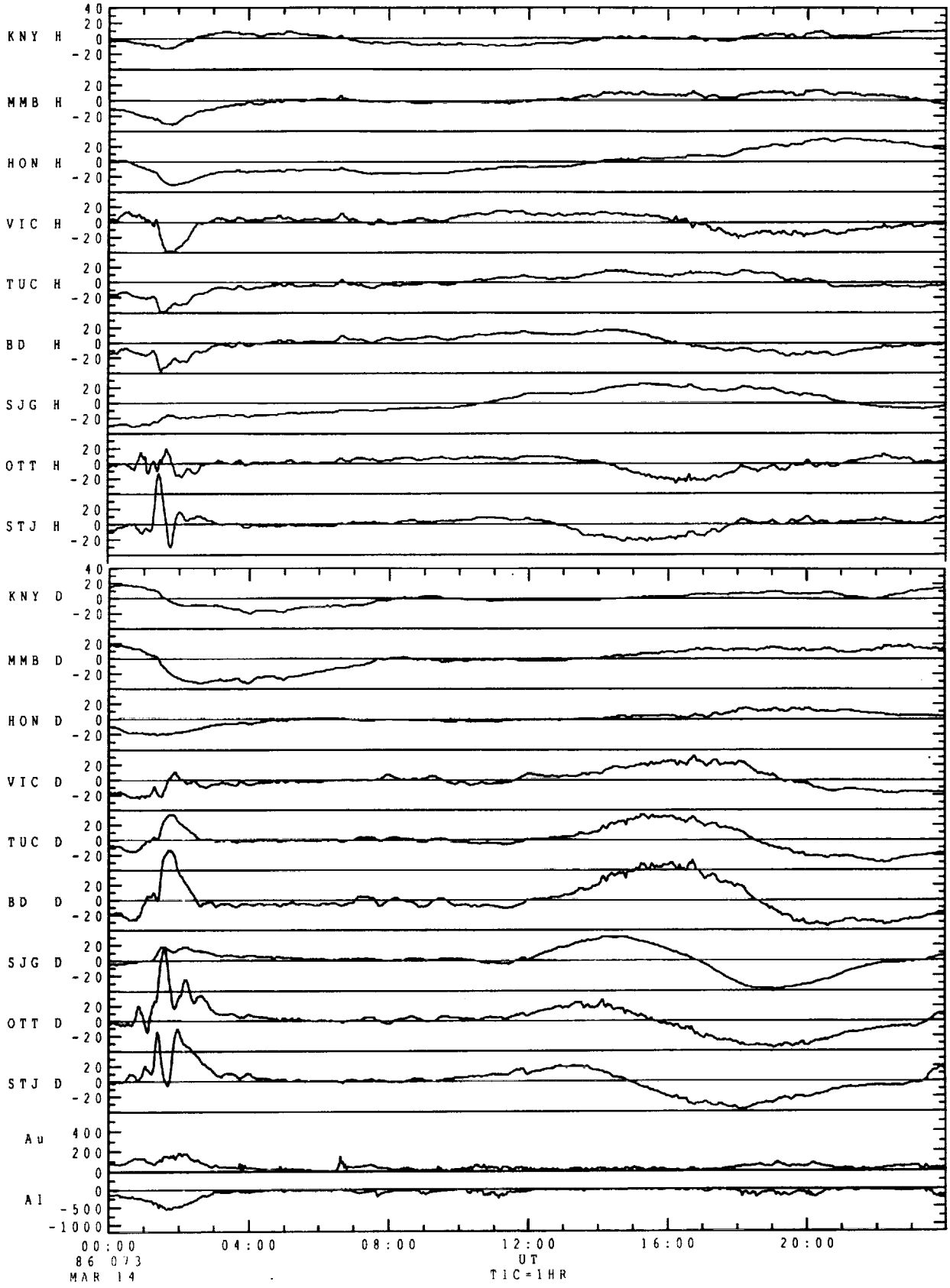
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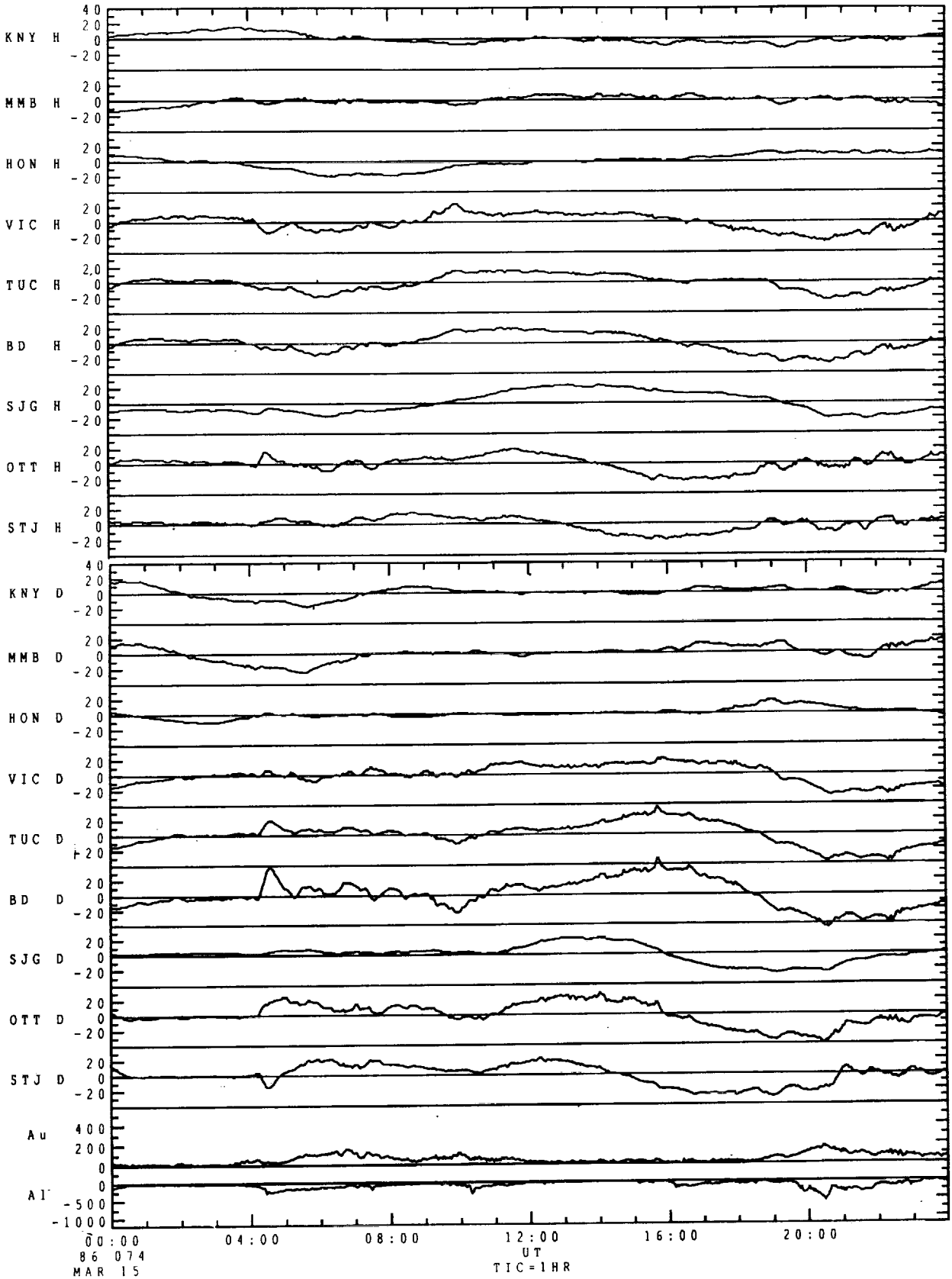

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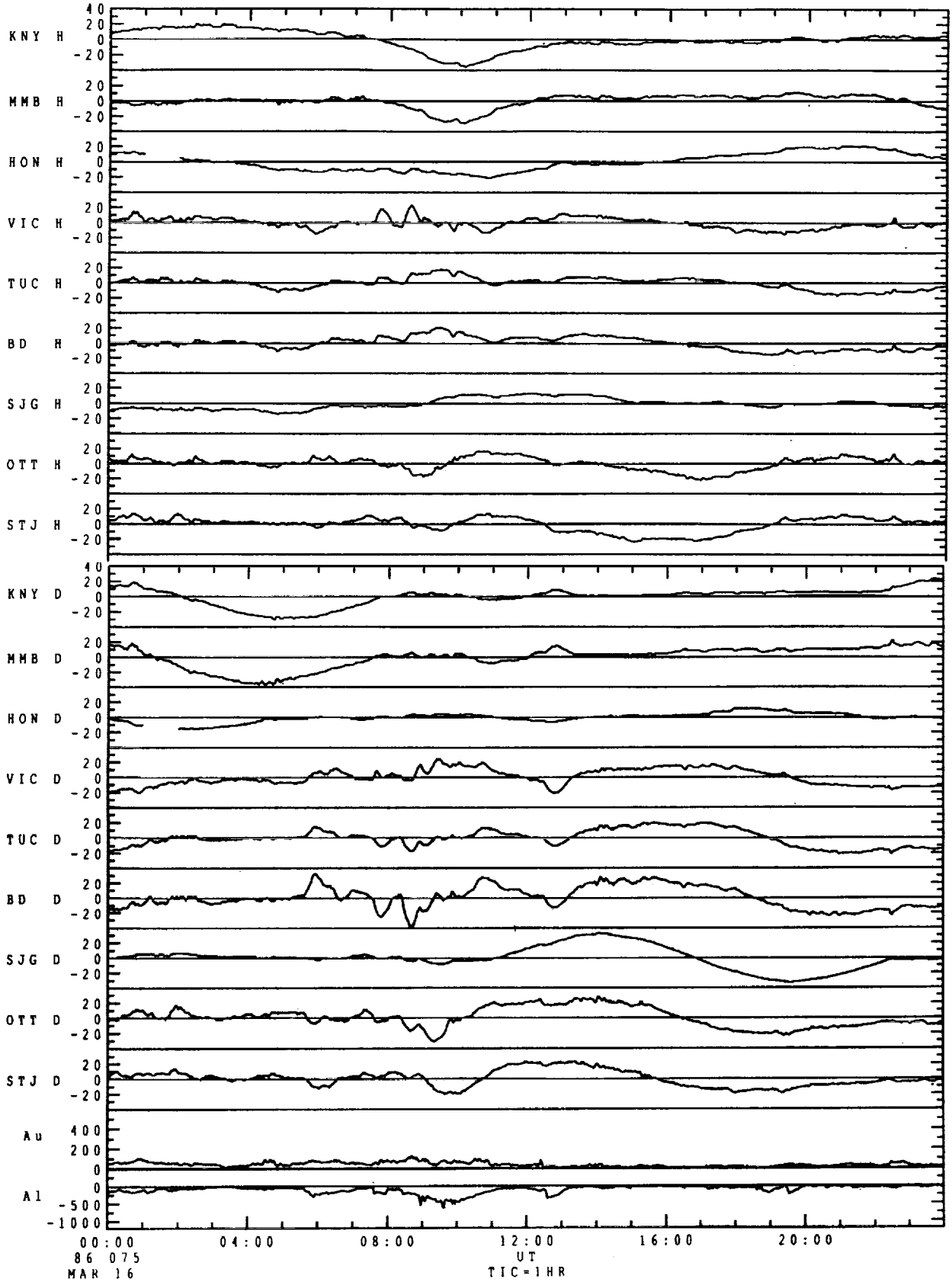

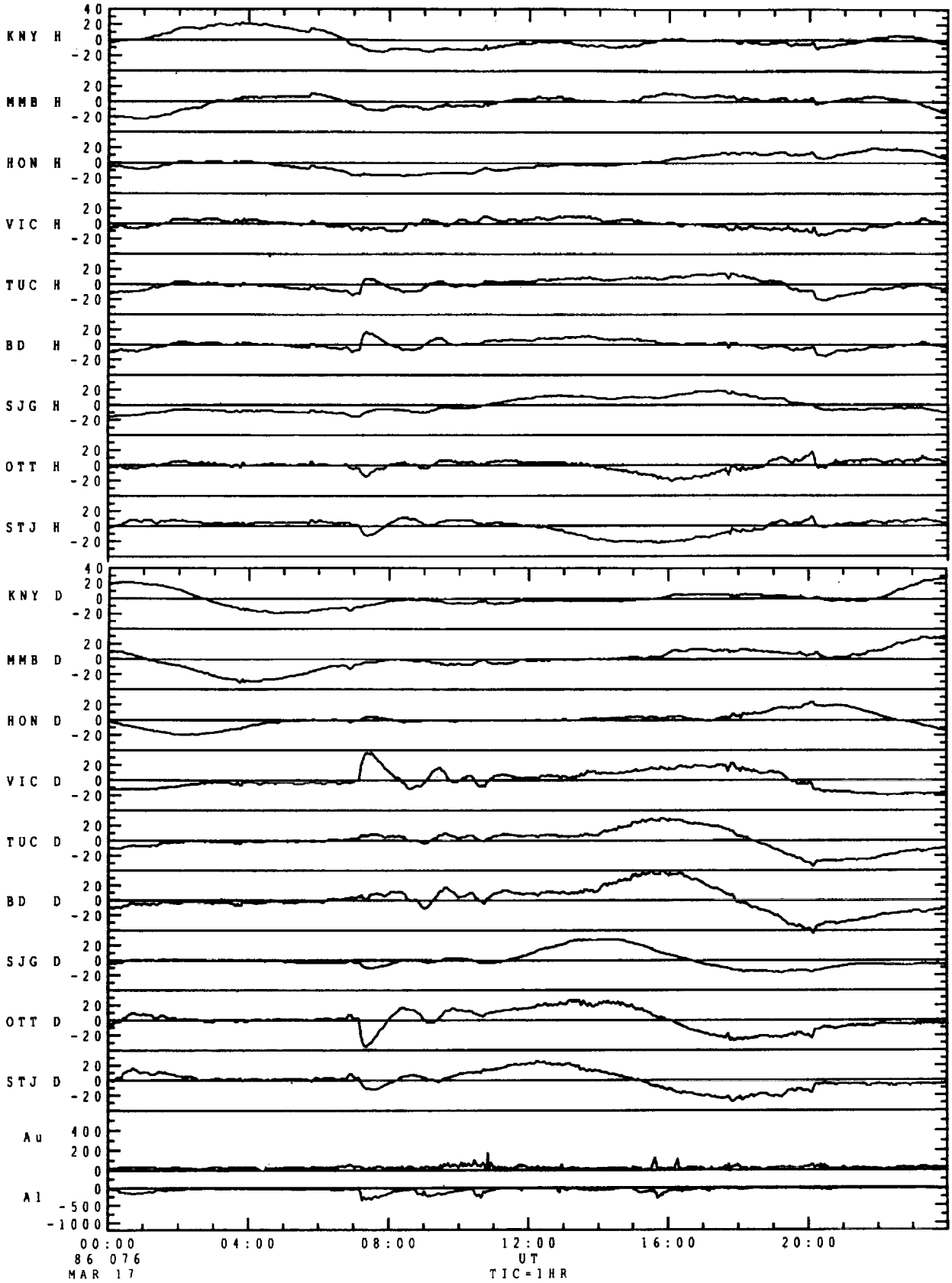
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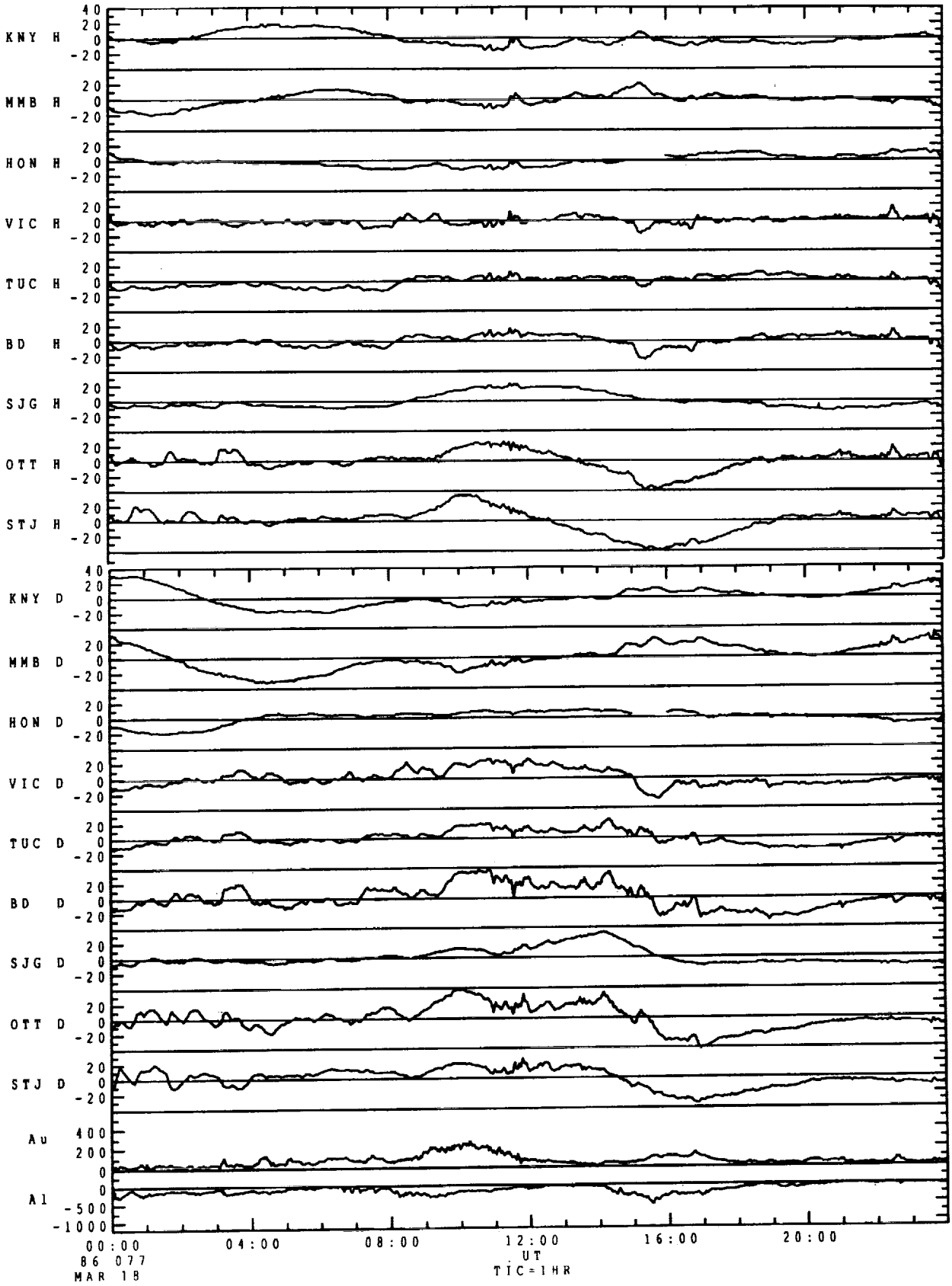

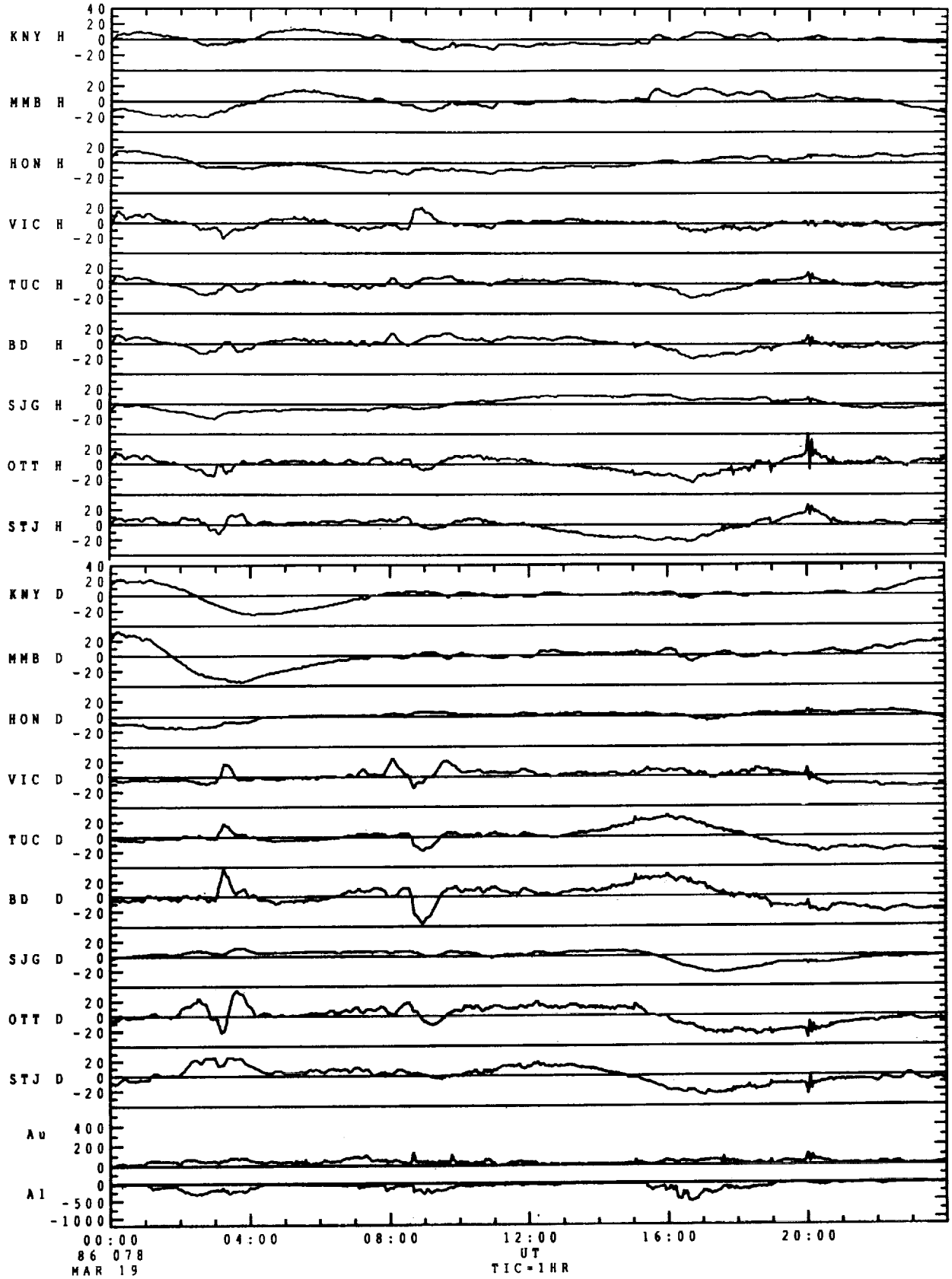
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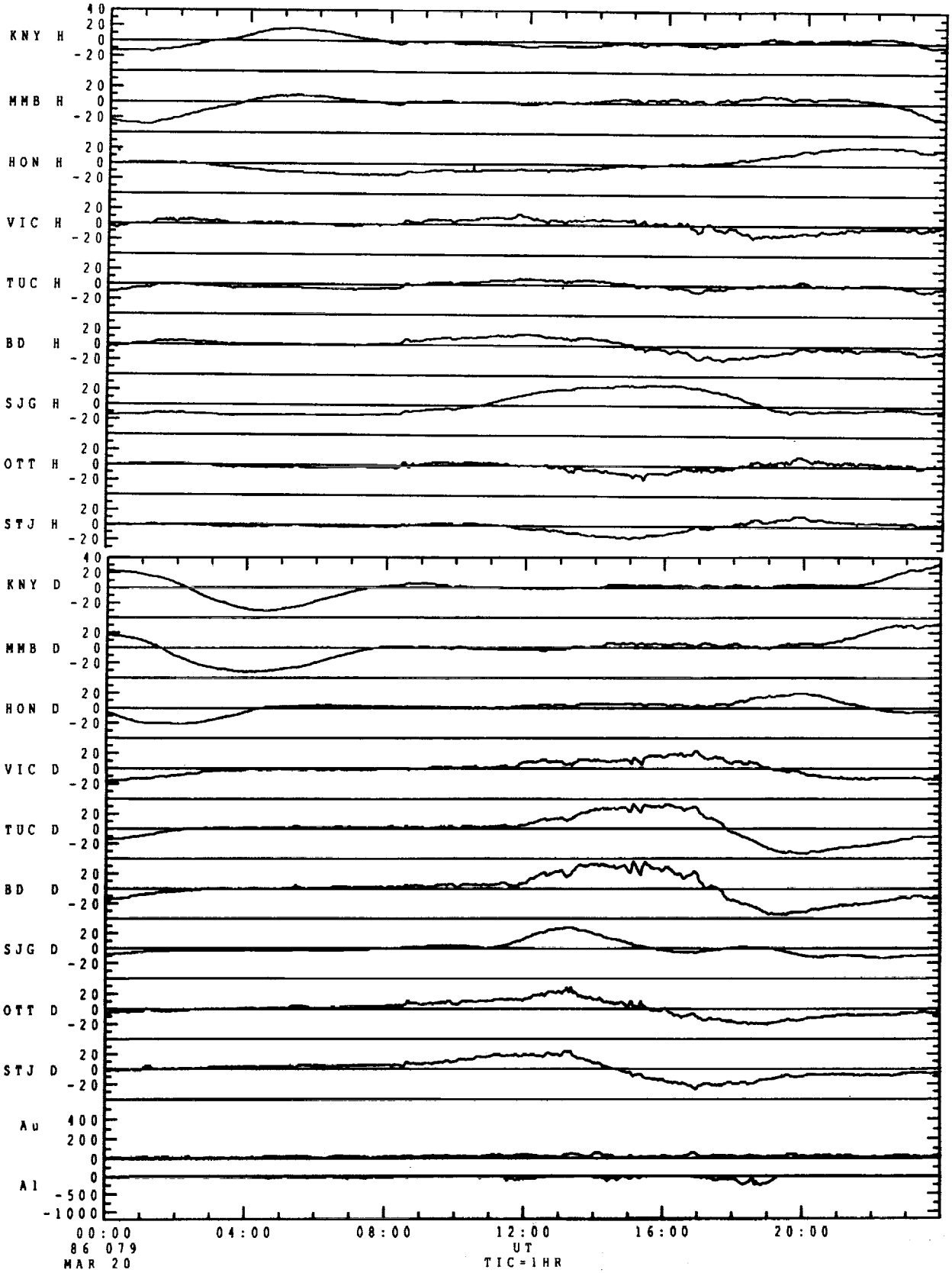
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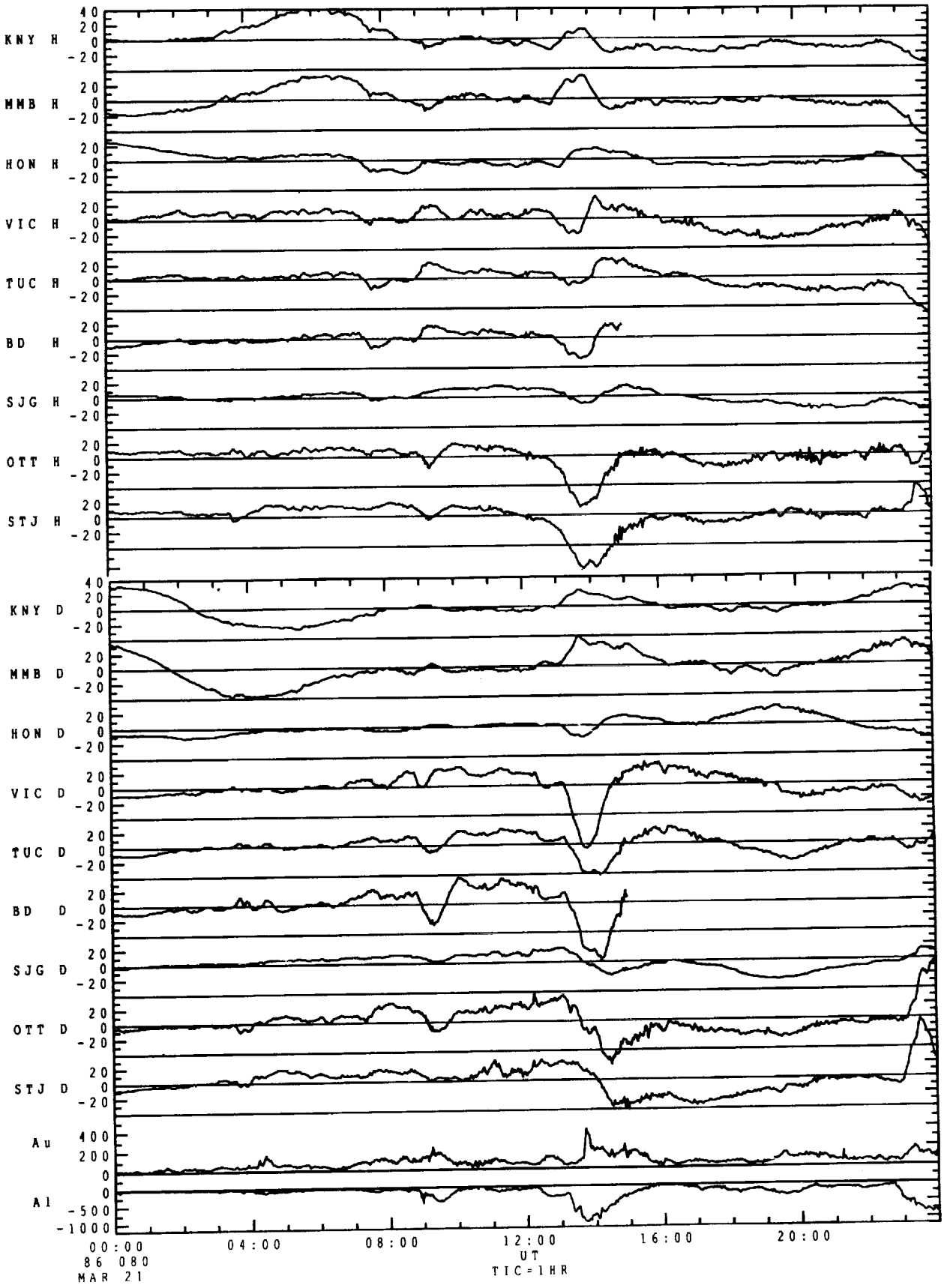
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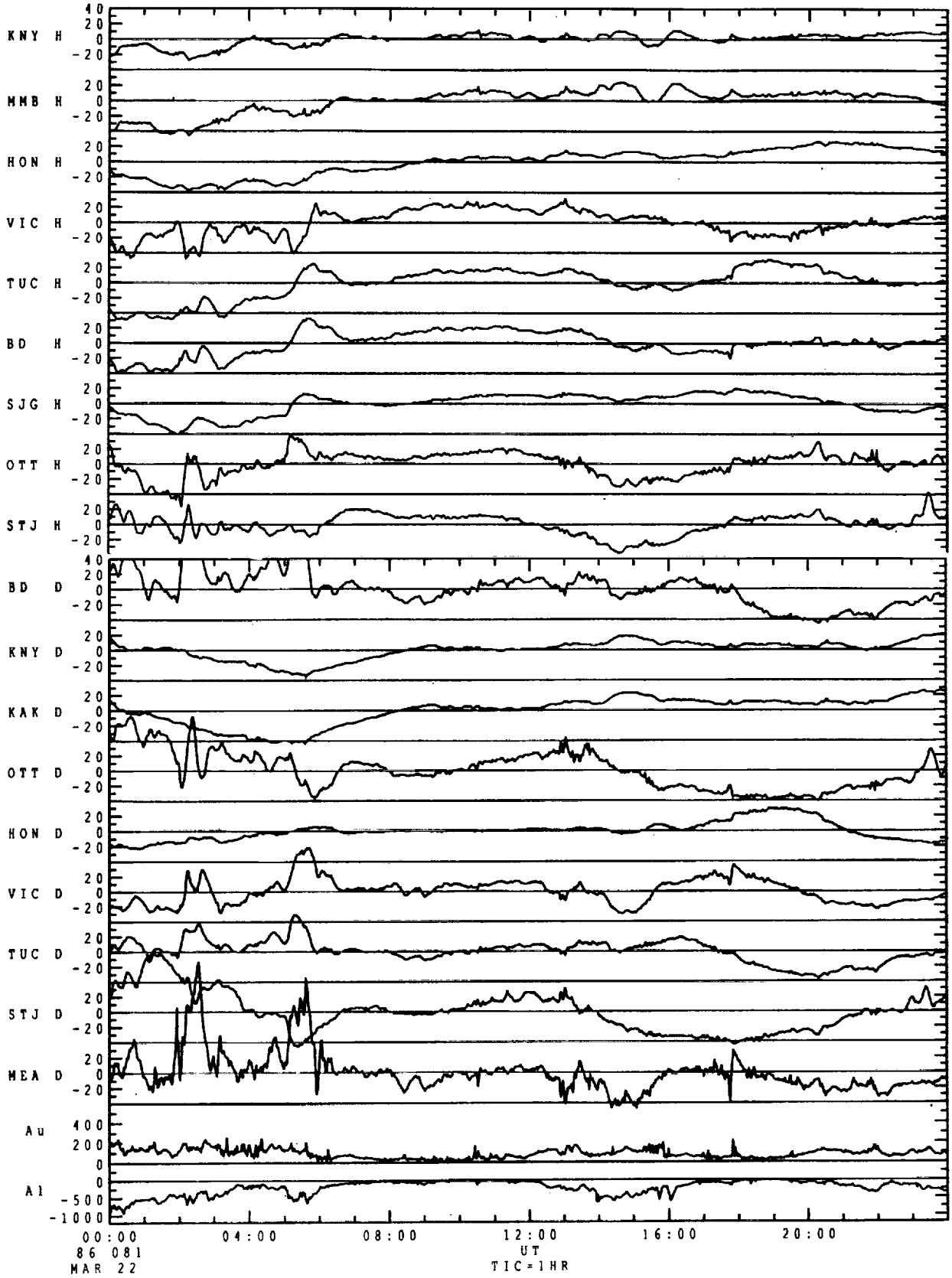
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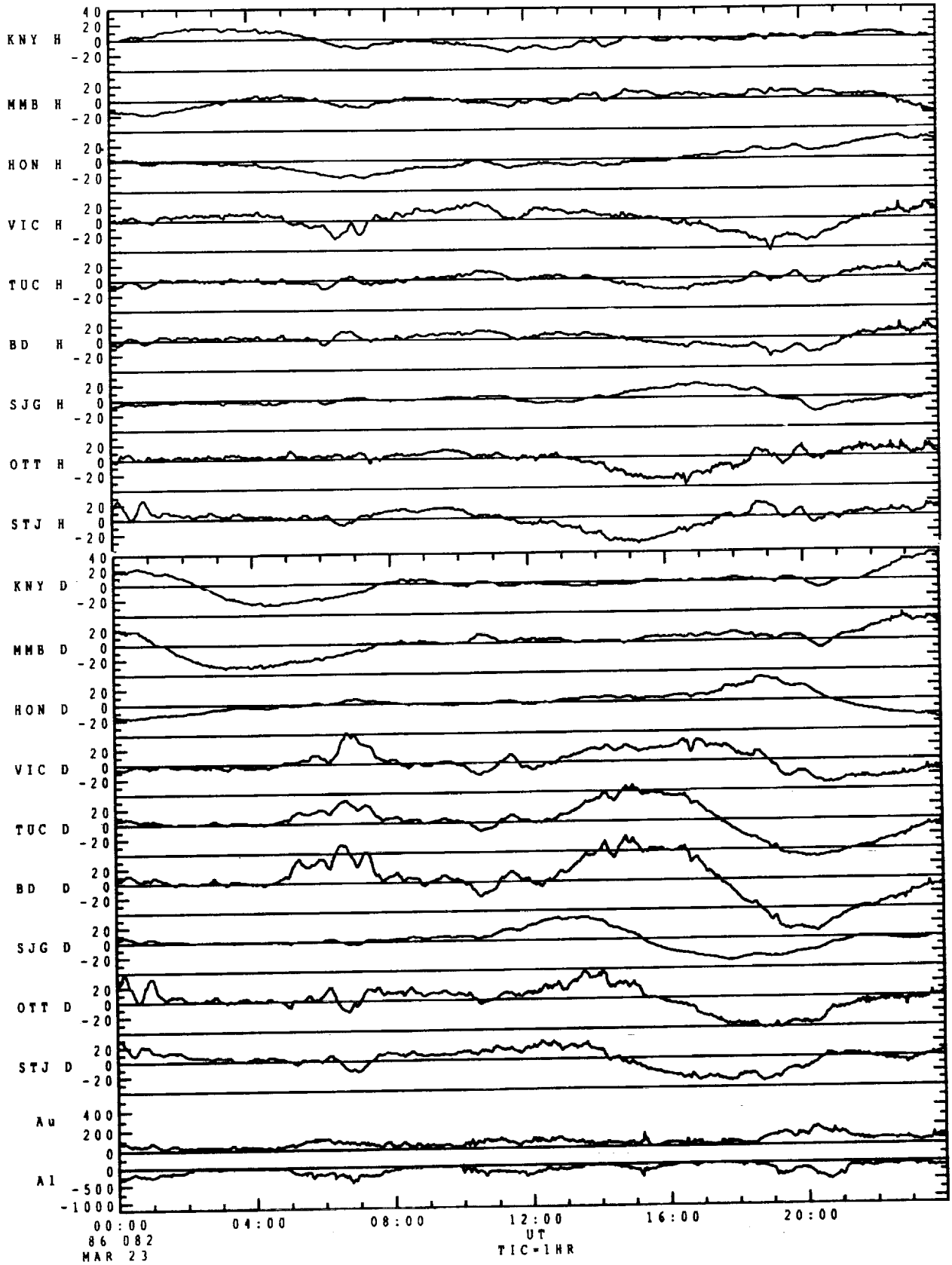
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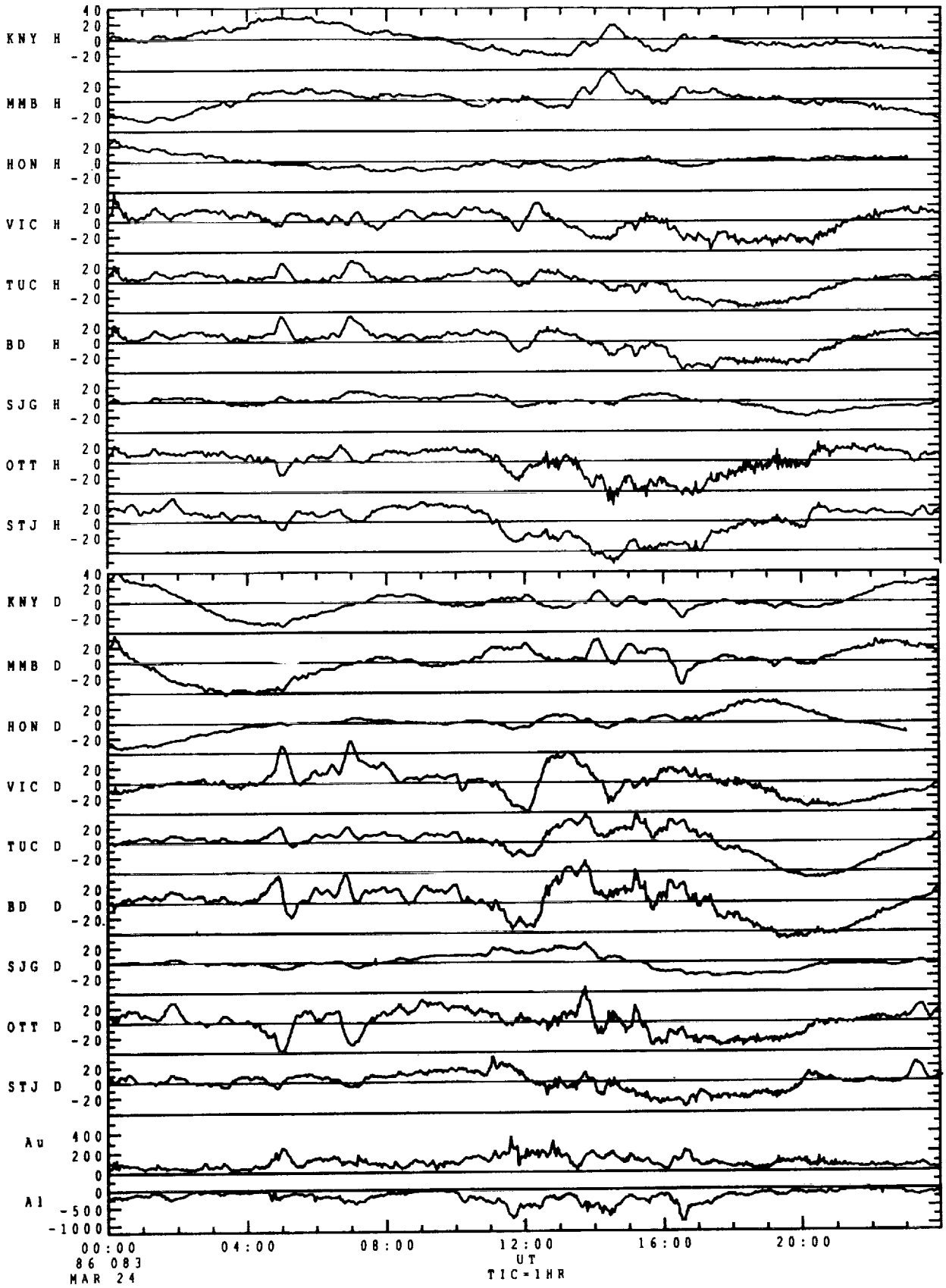
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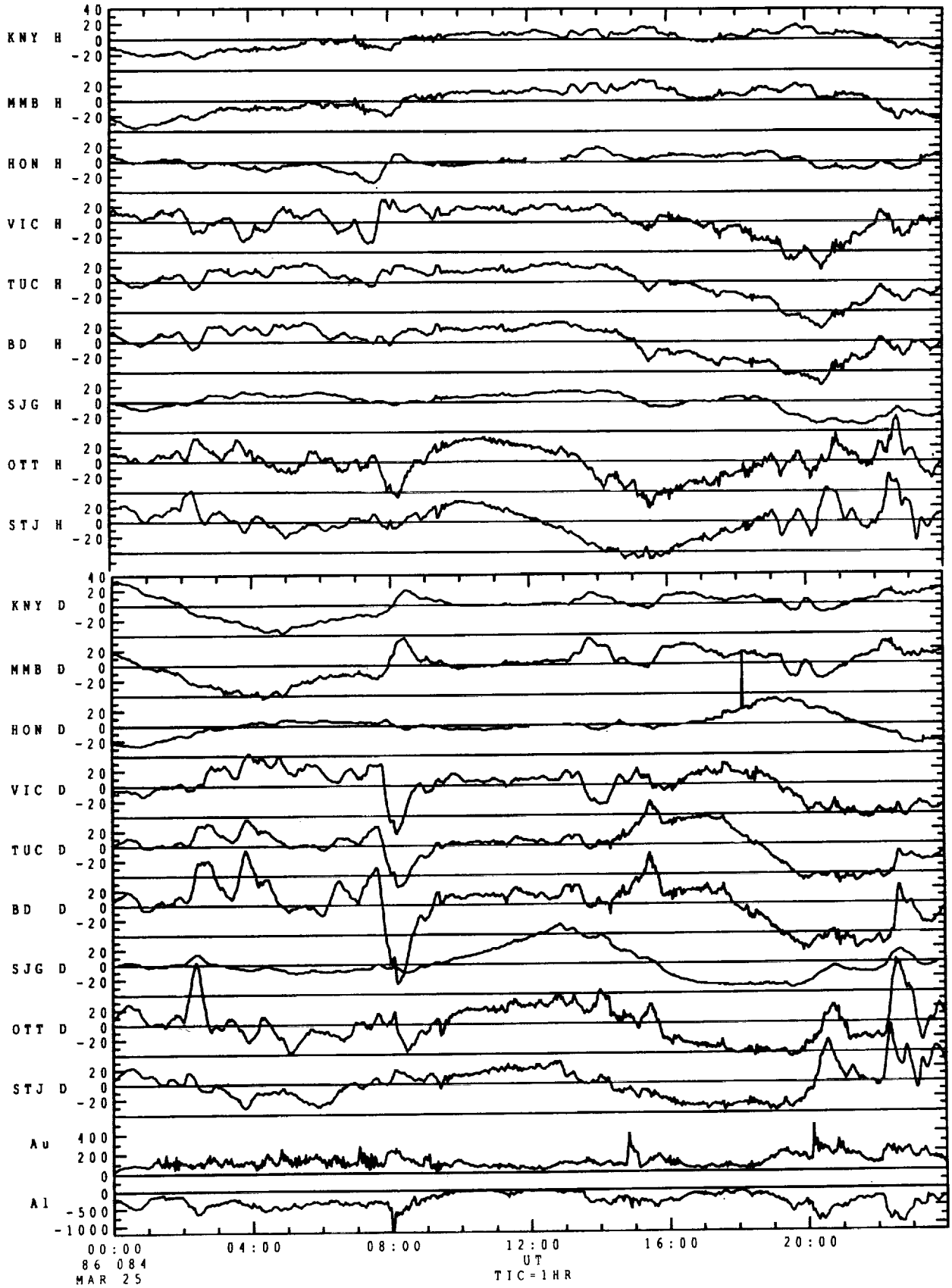
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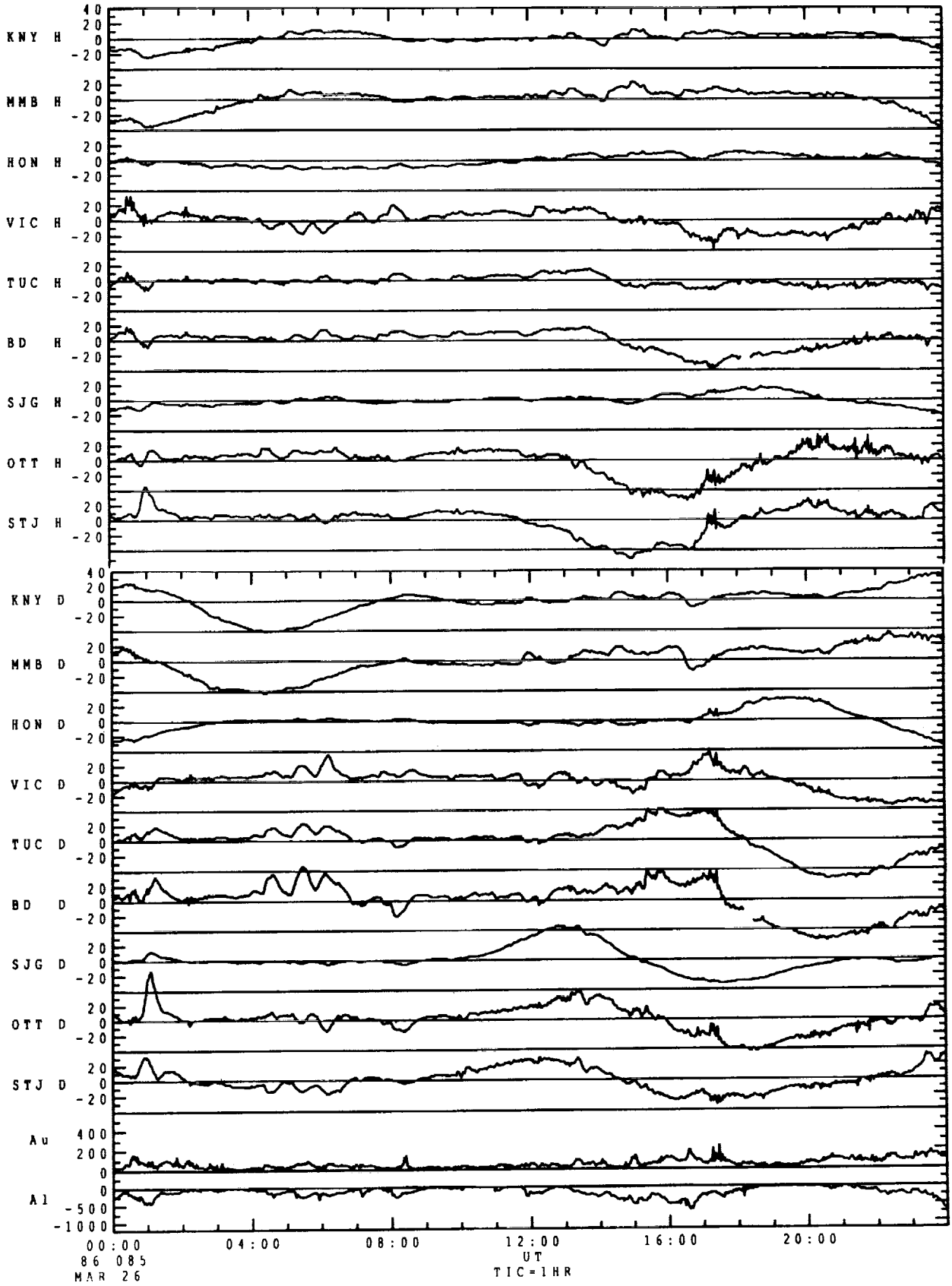
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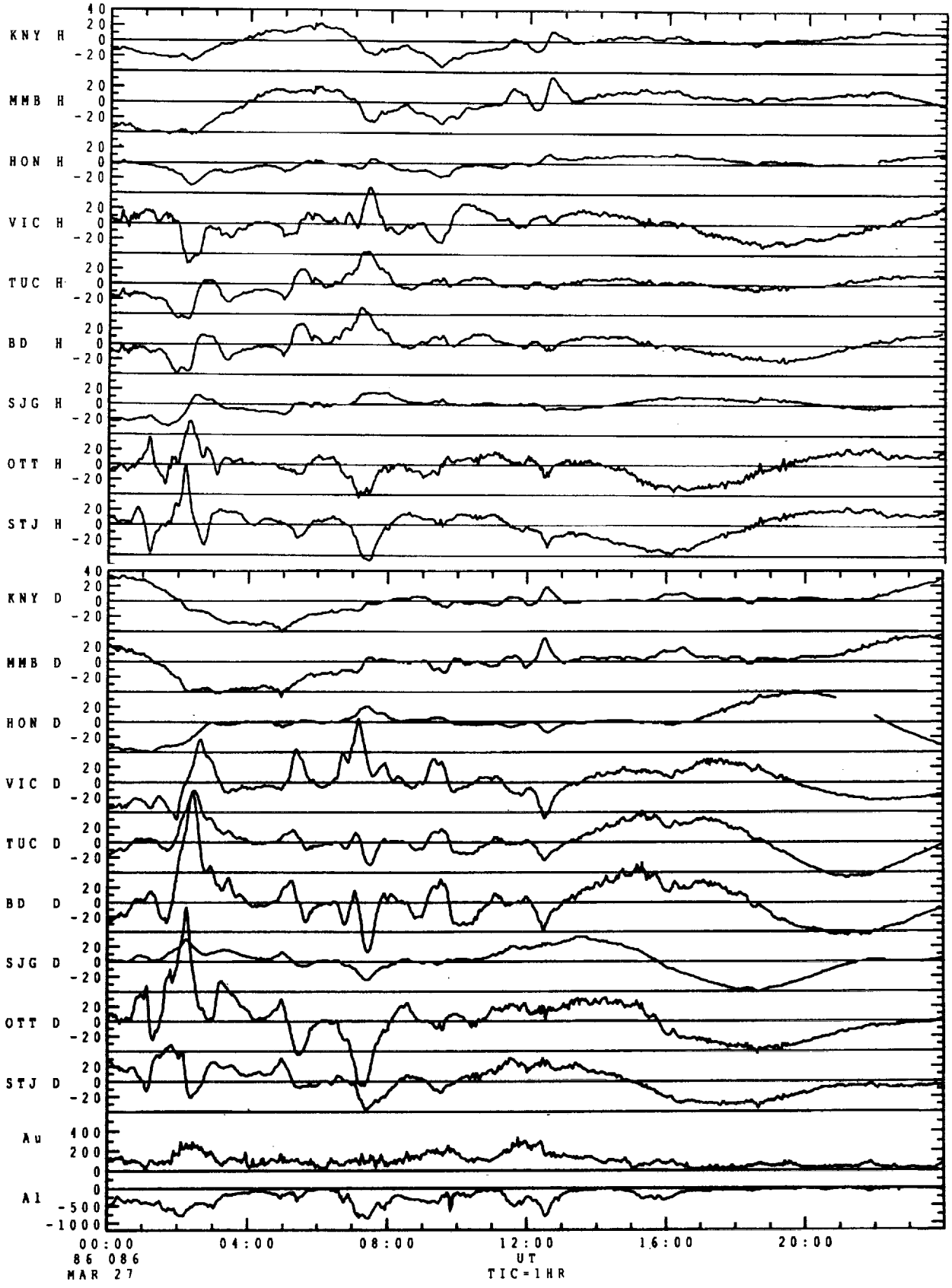
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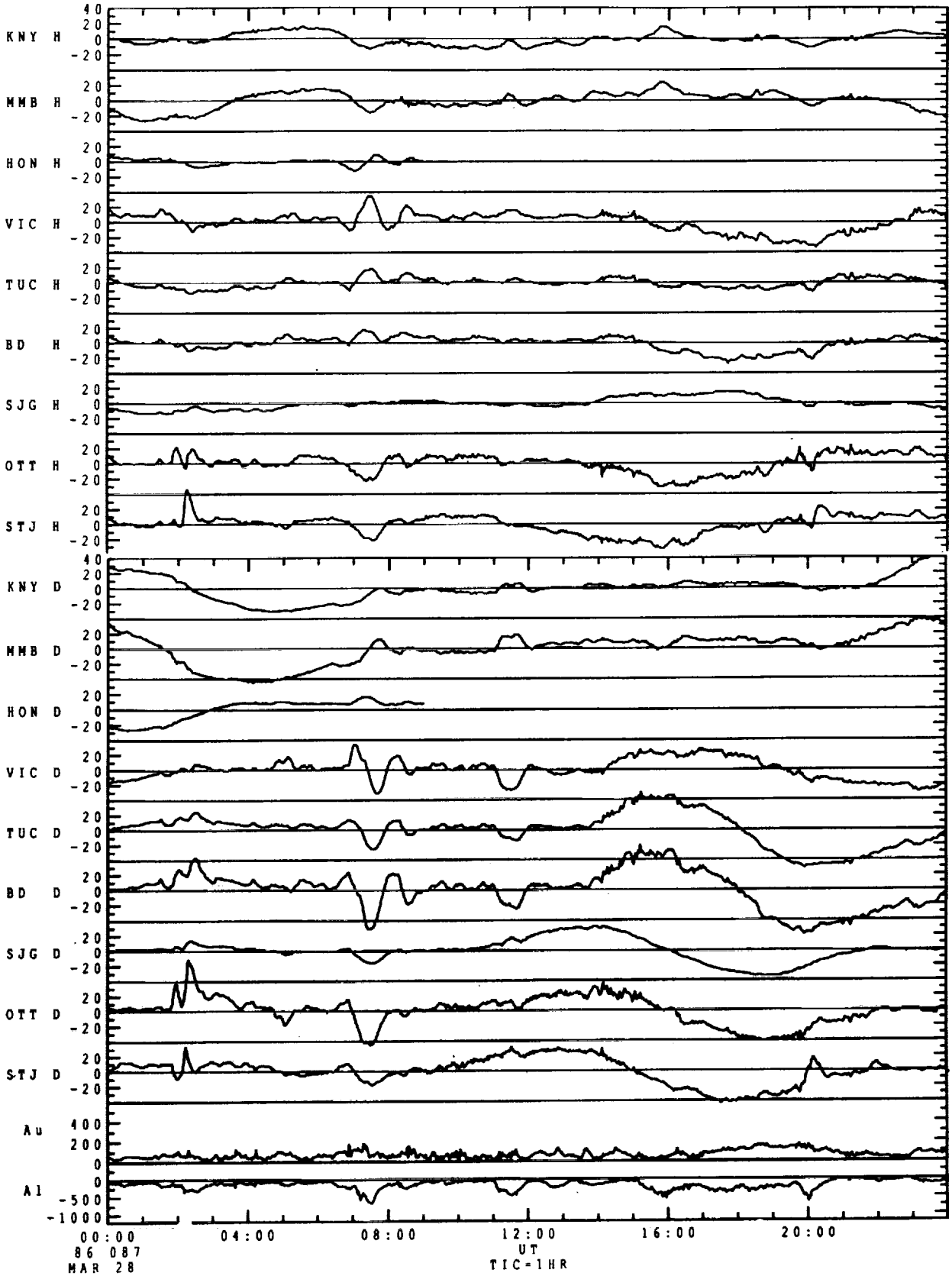
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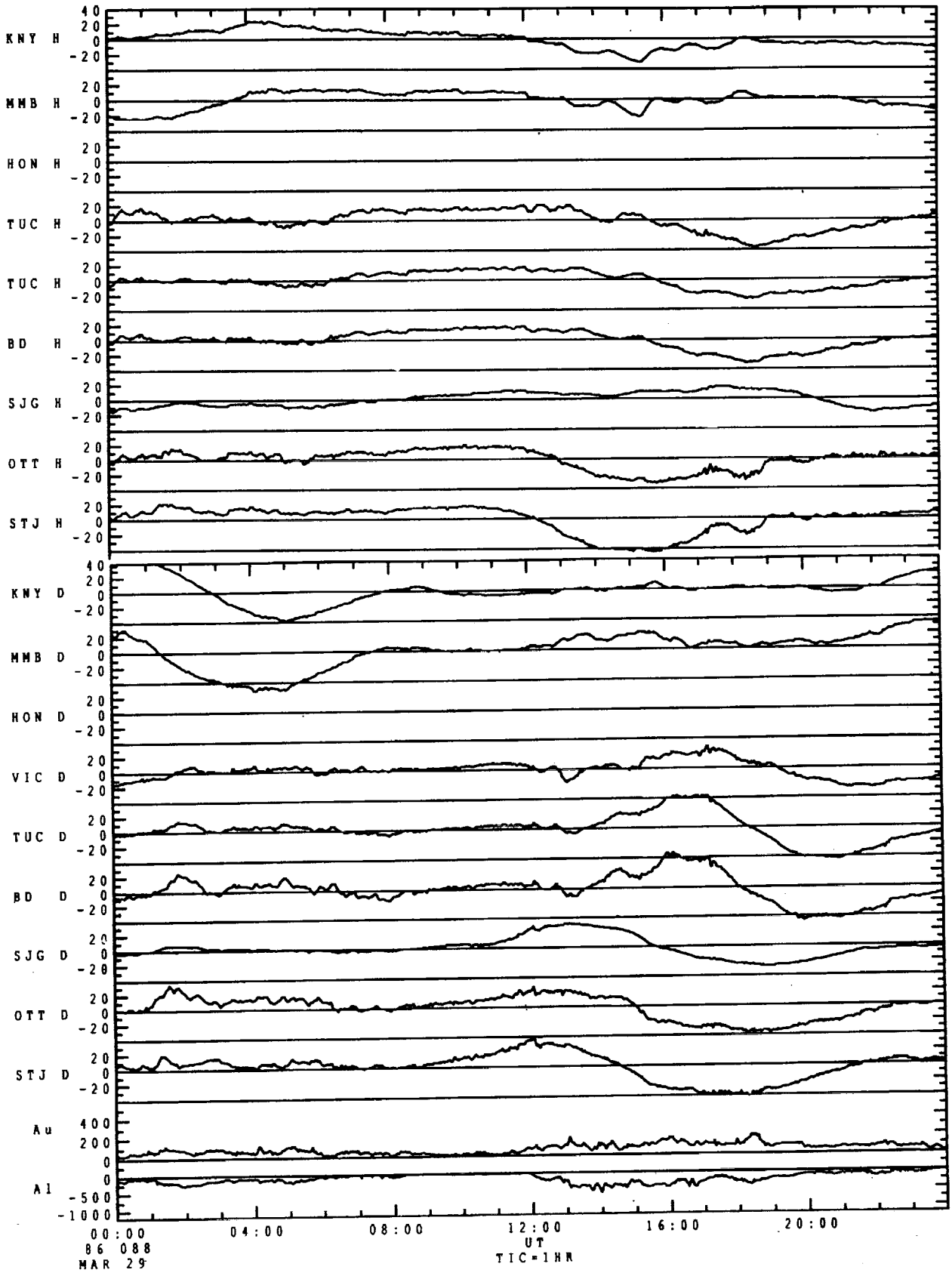
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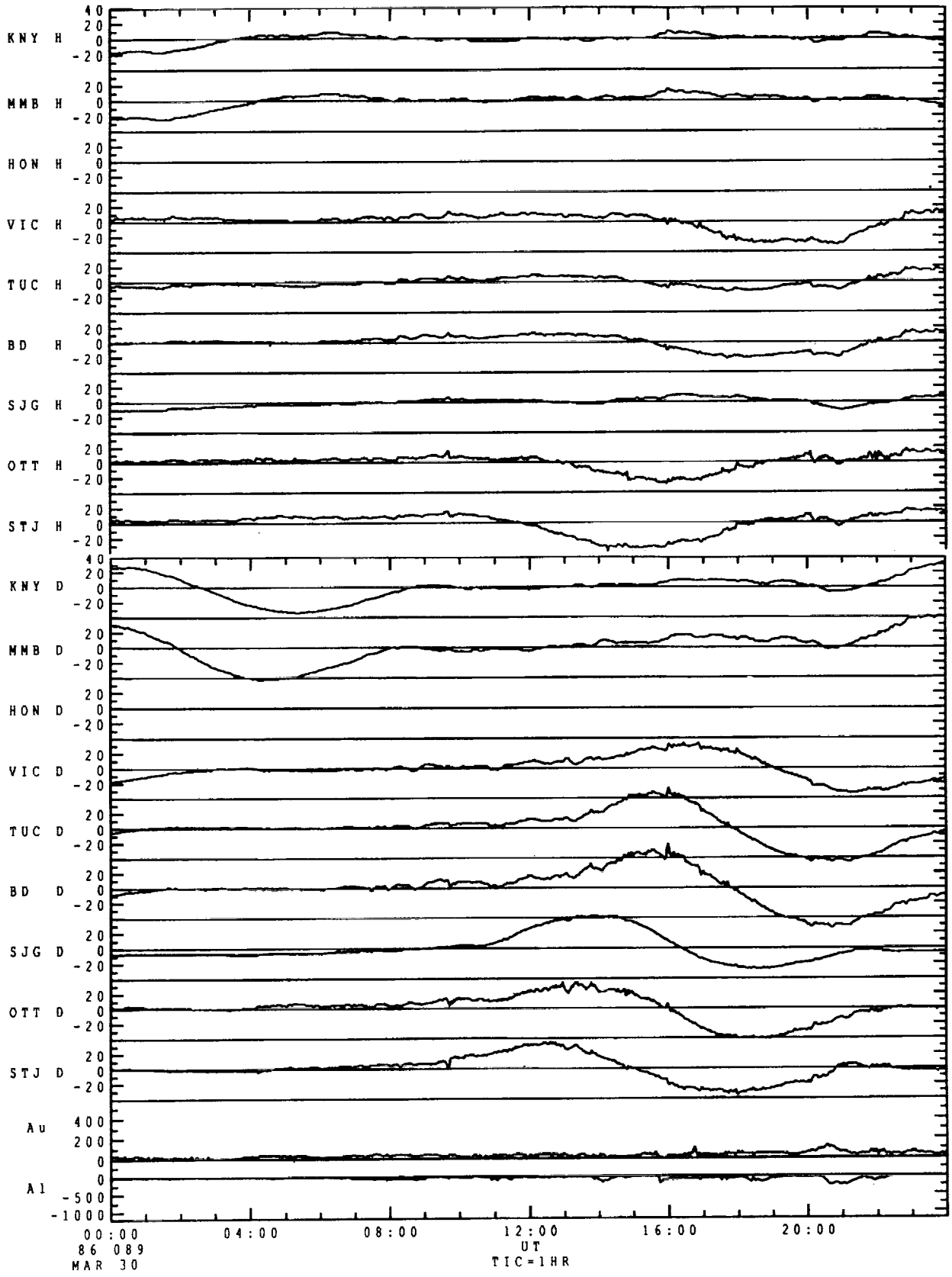
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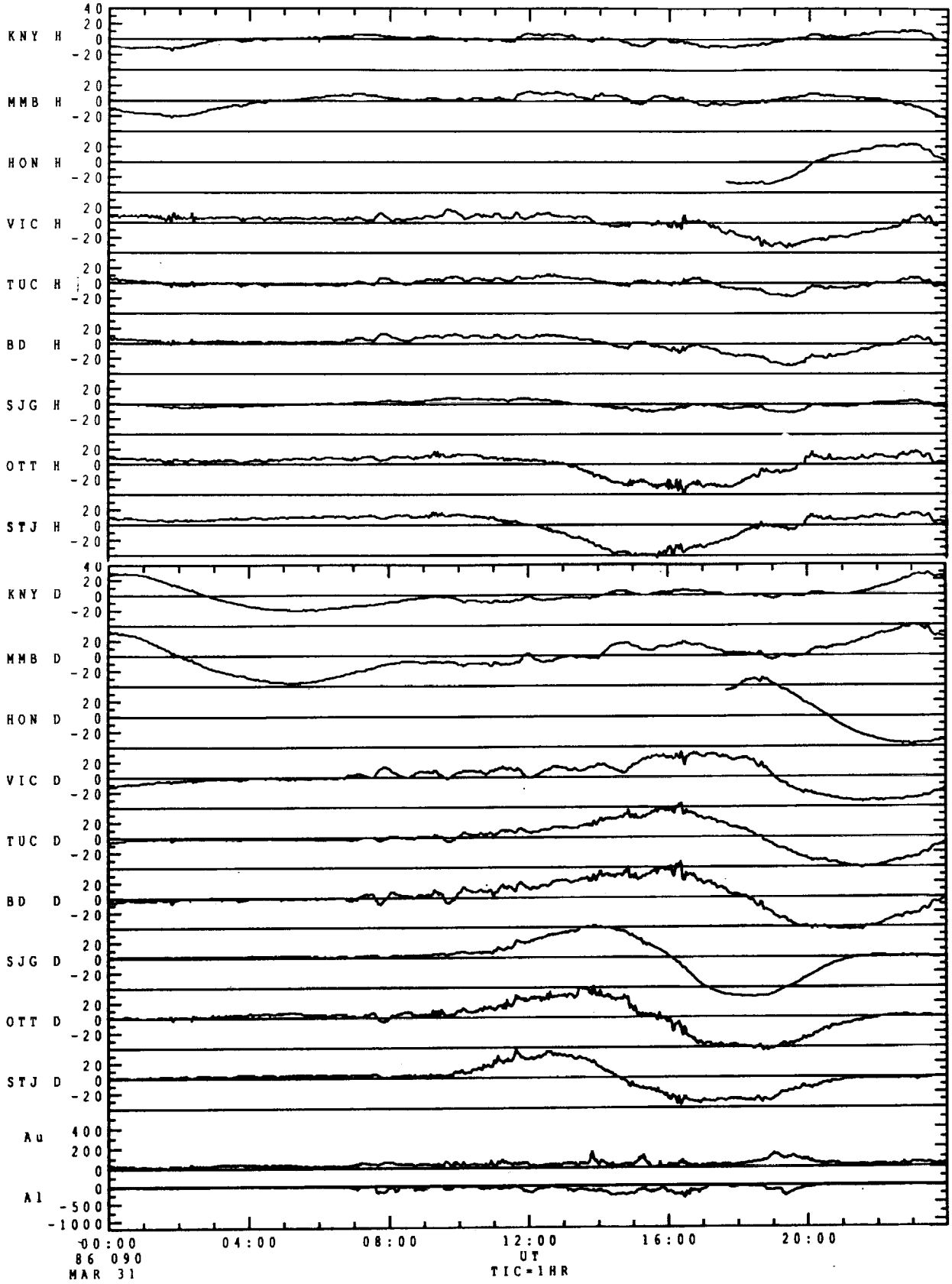

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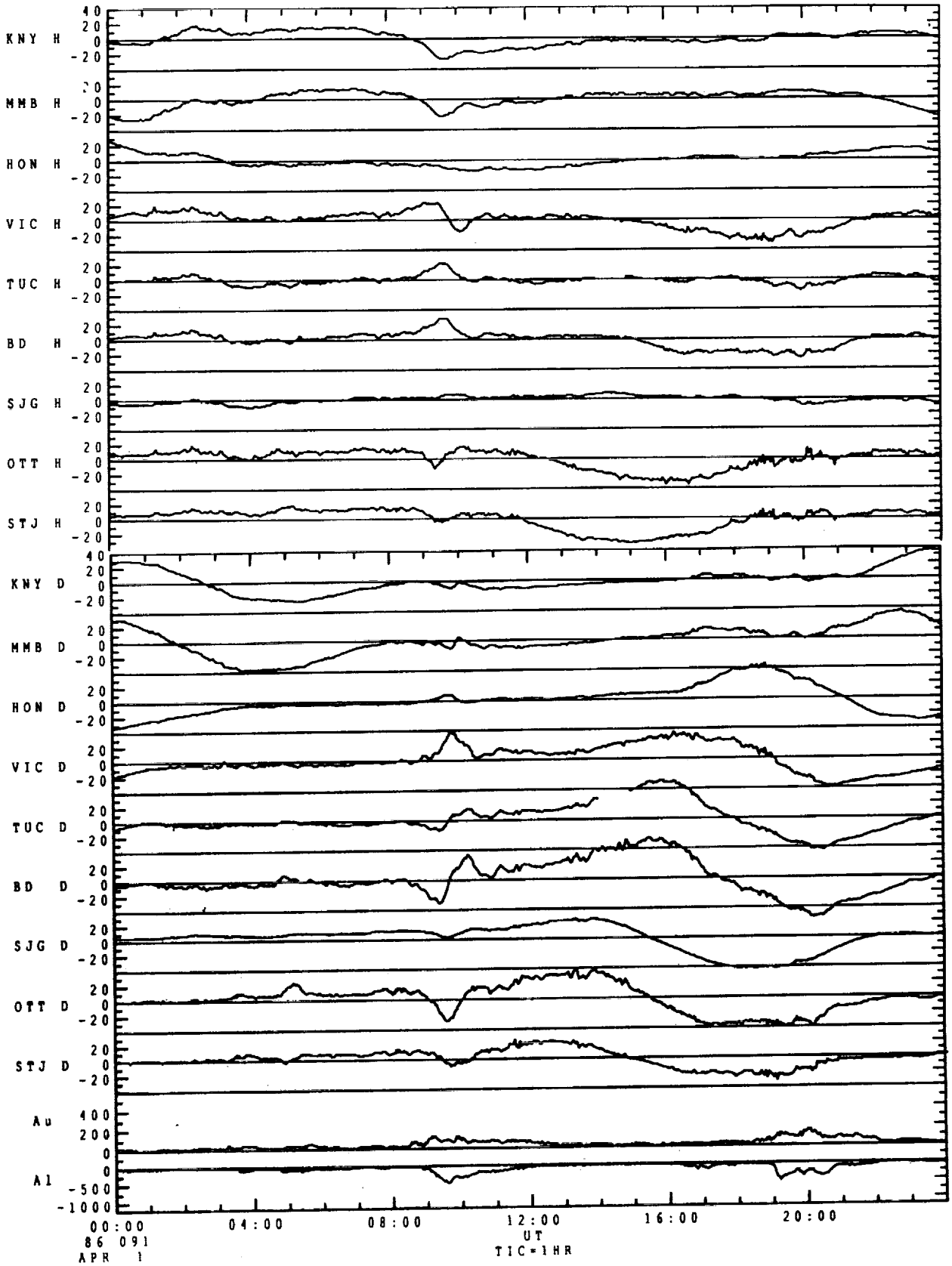

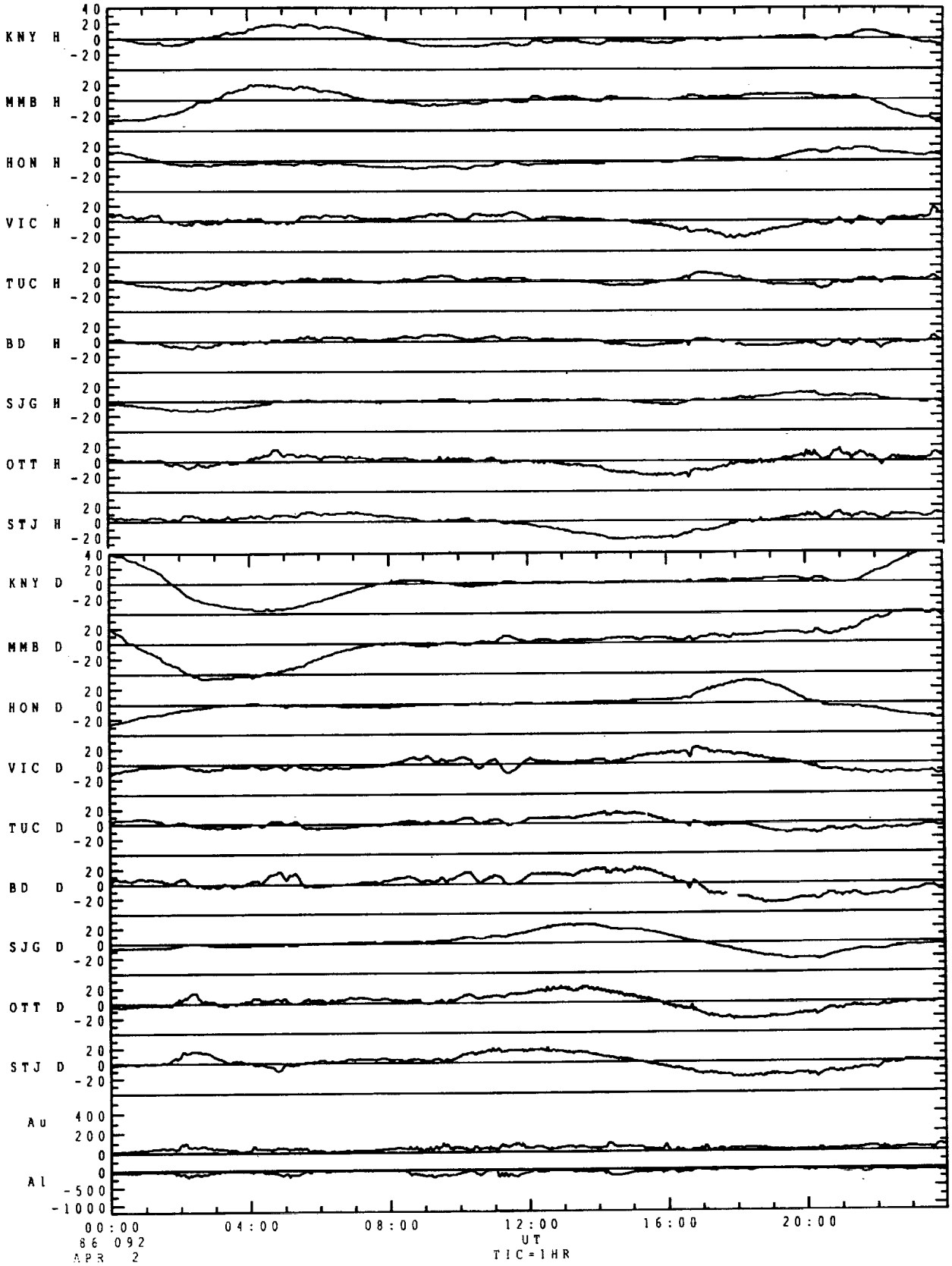
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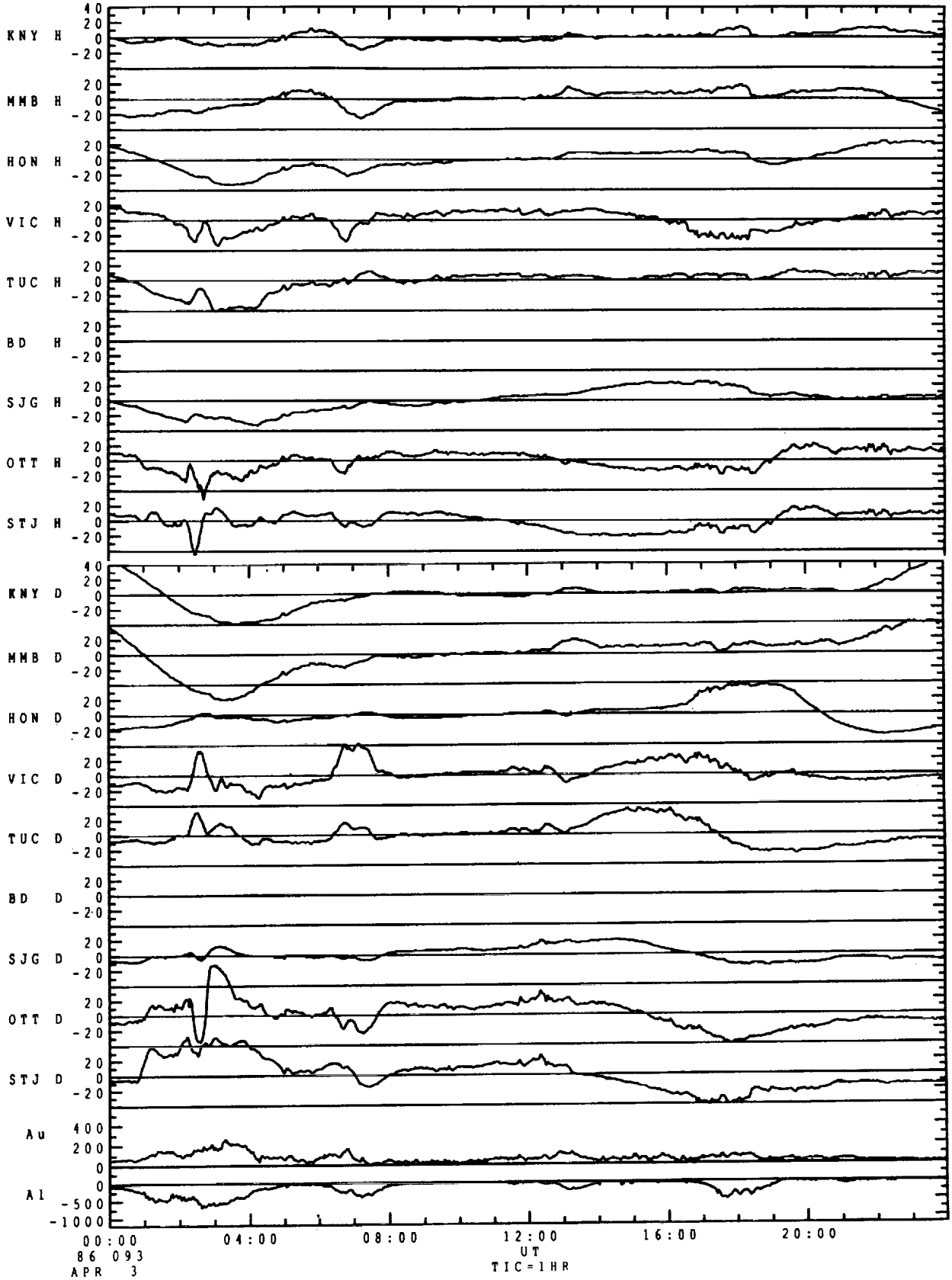

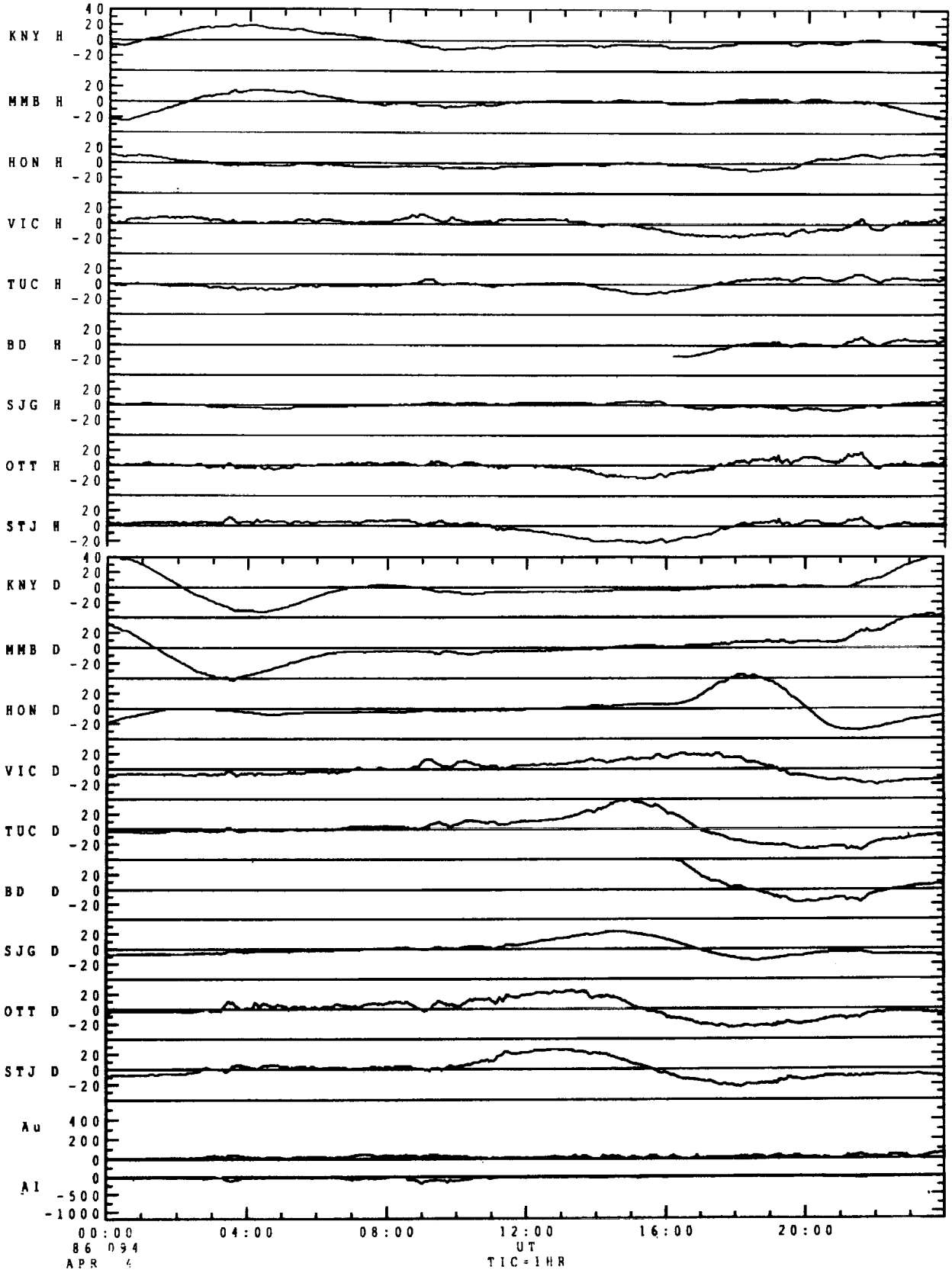
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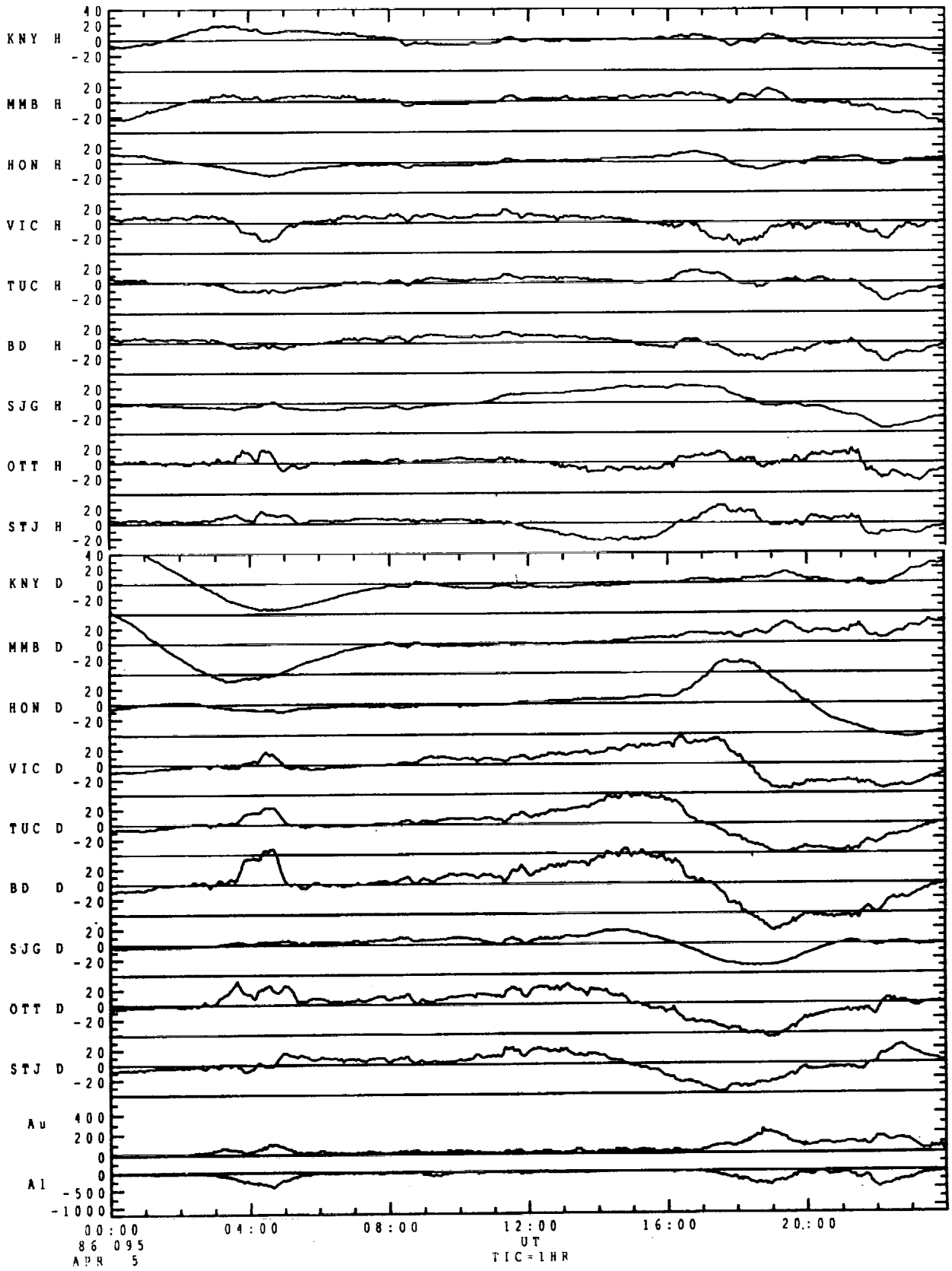
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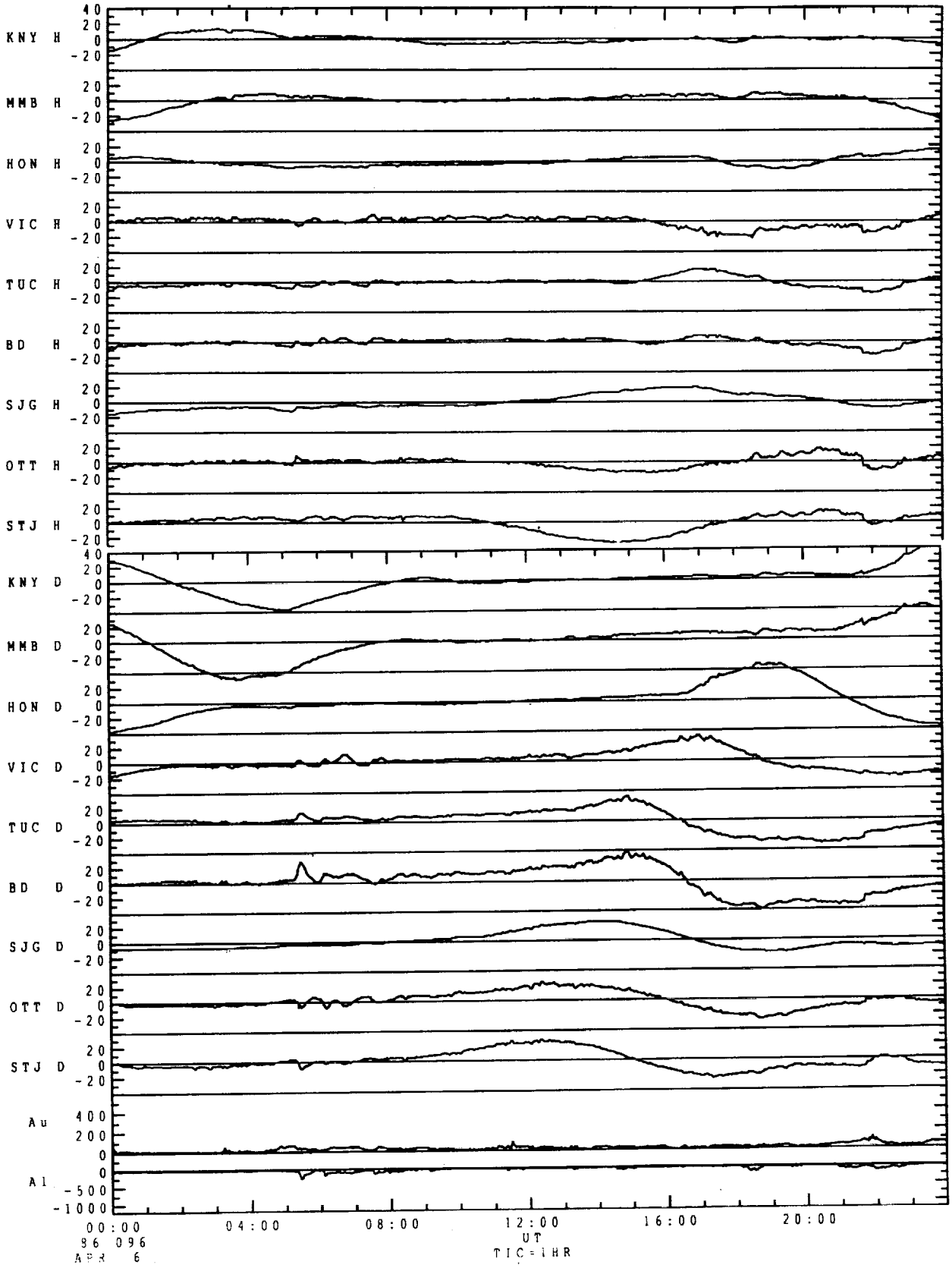
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APR 07, 1986

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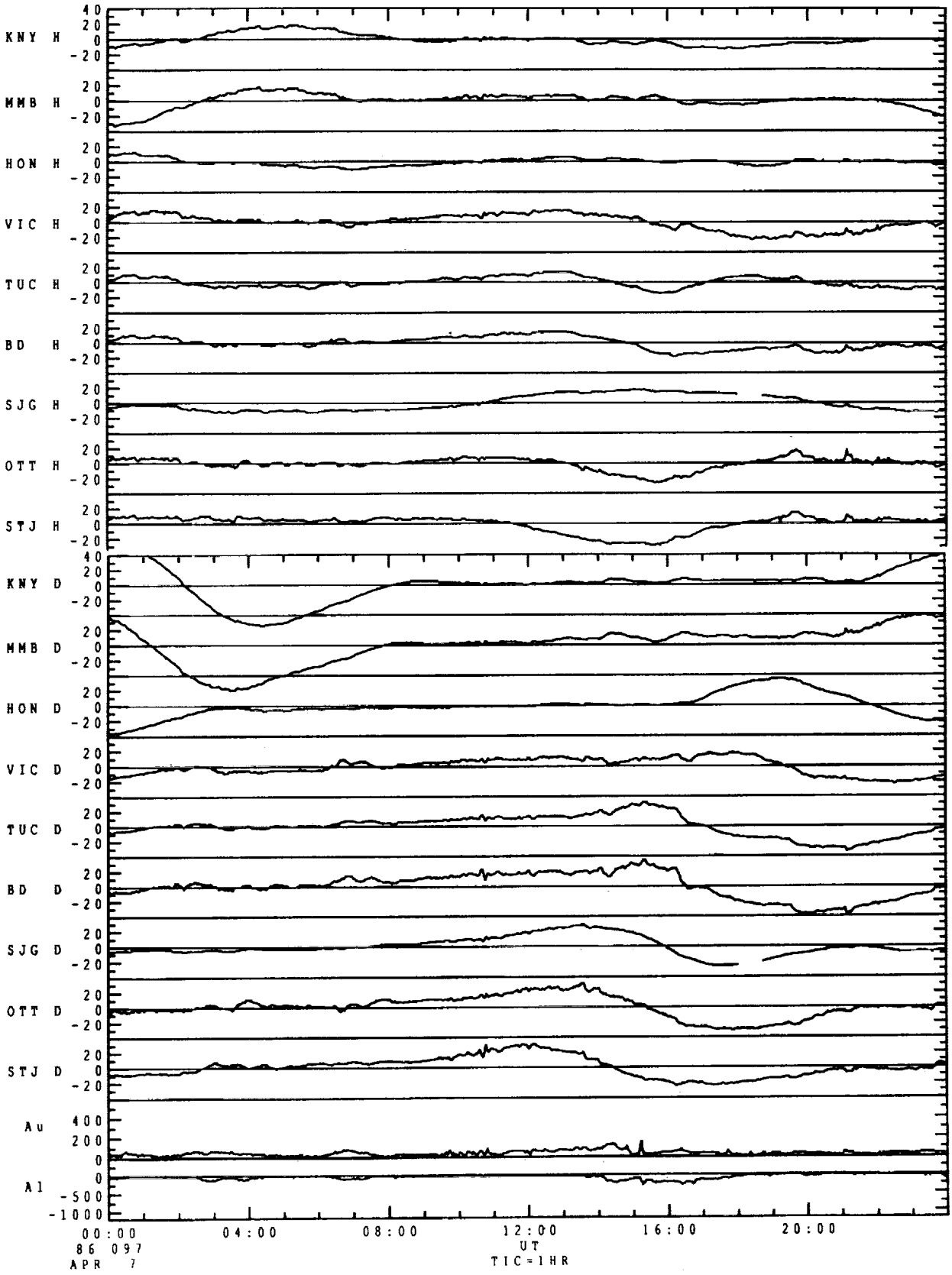

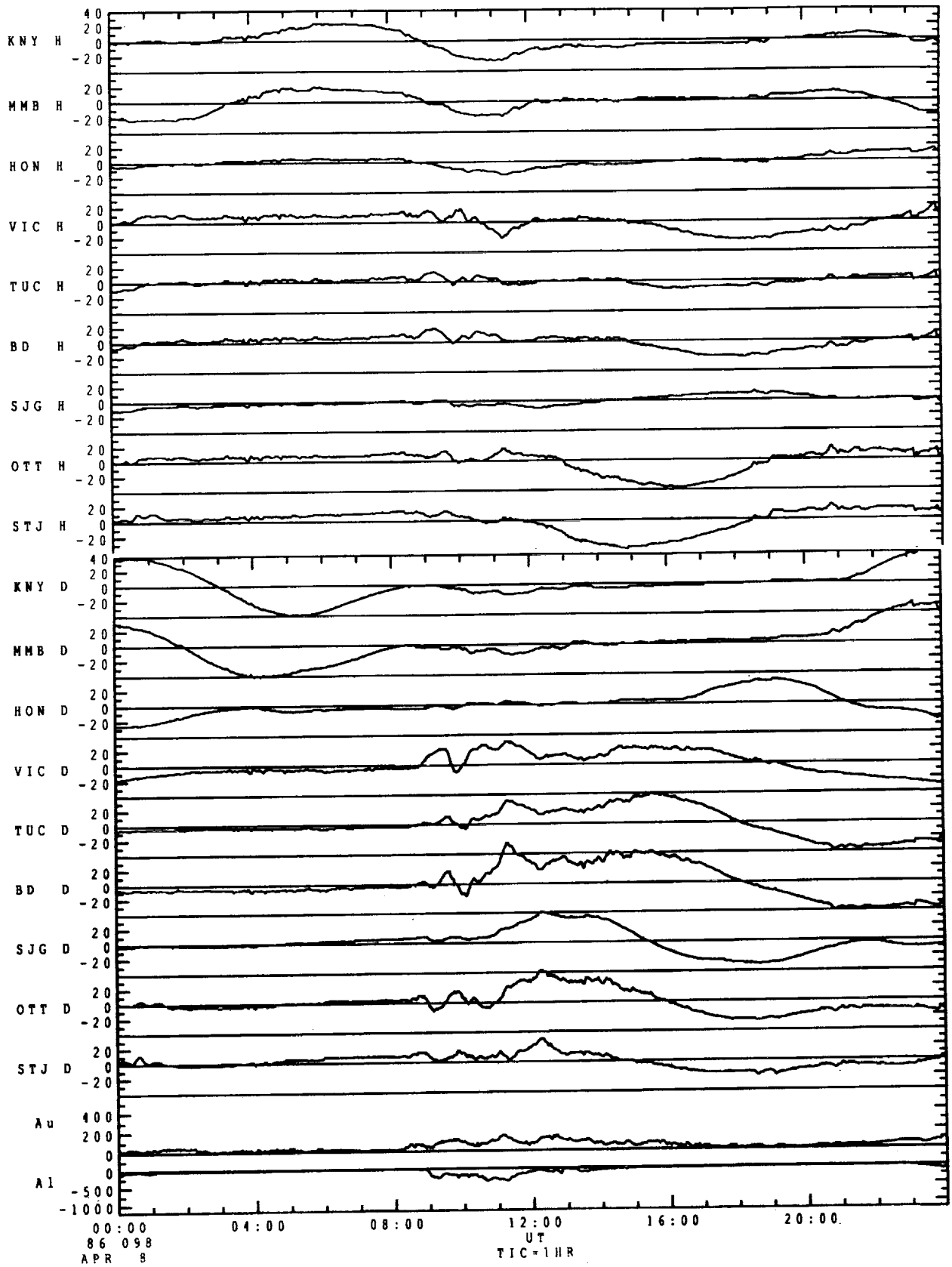
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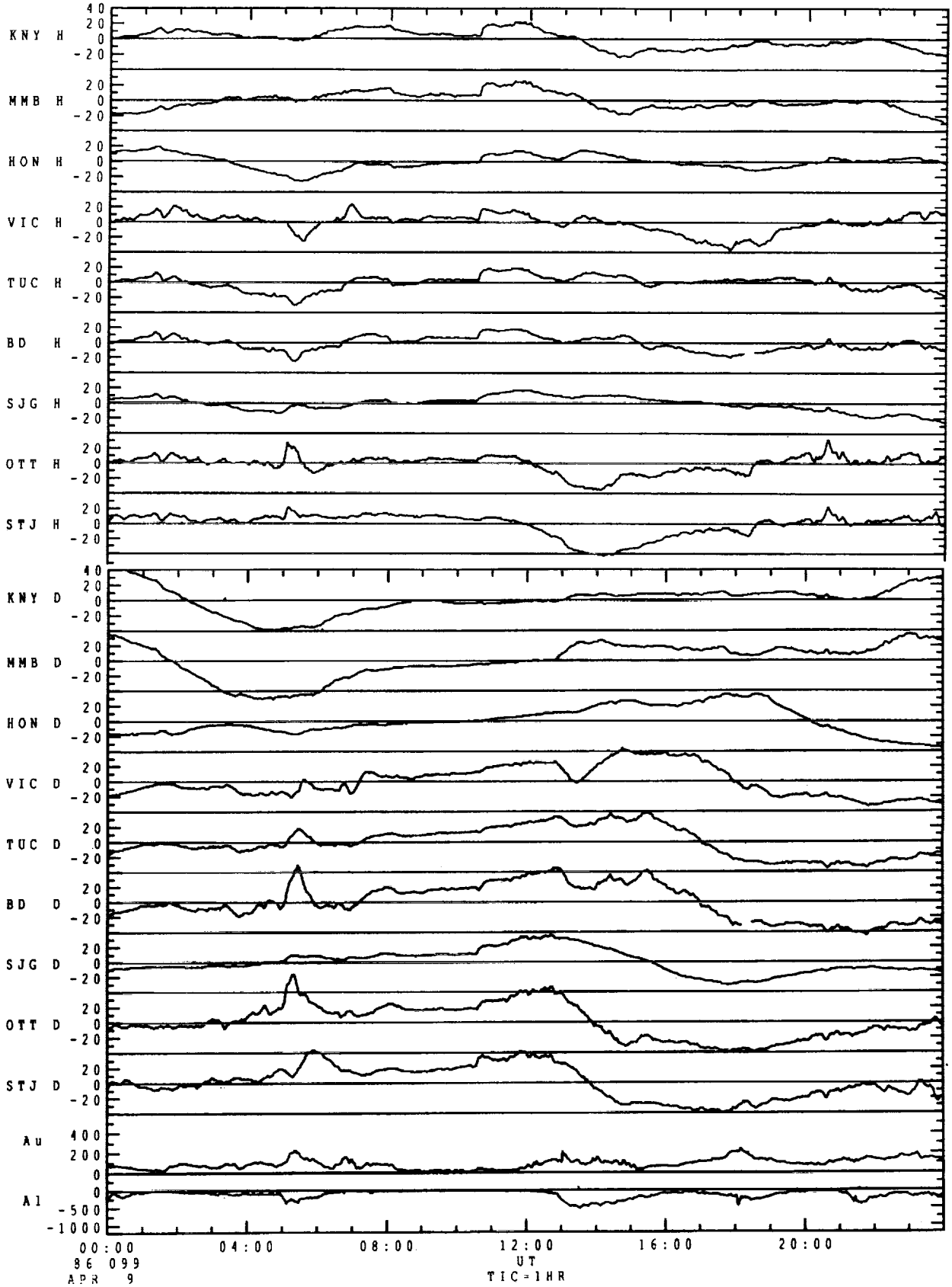
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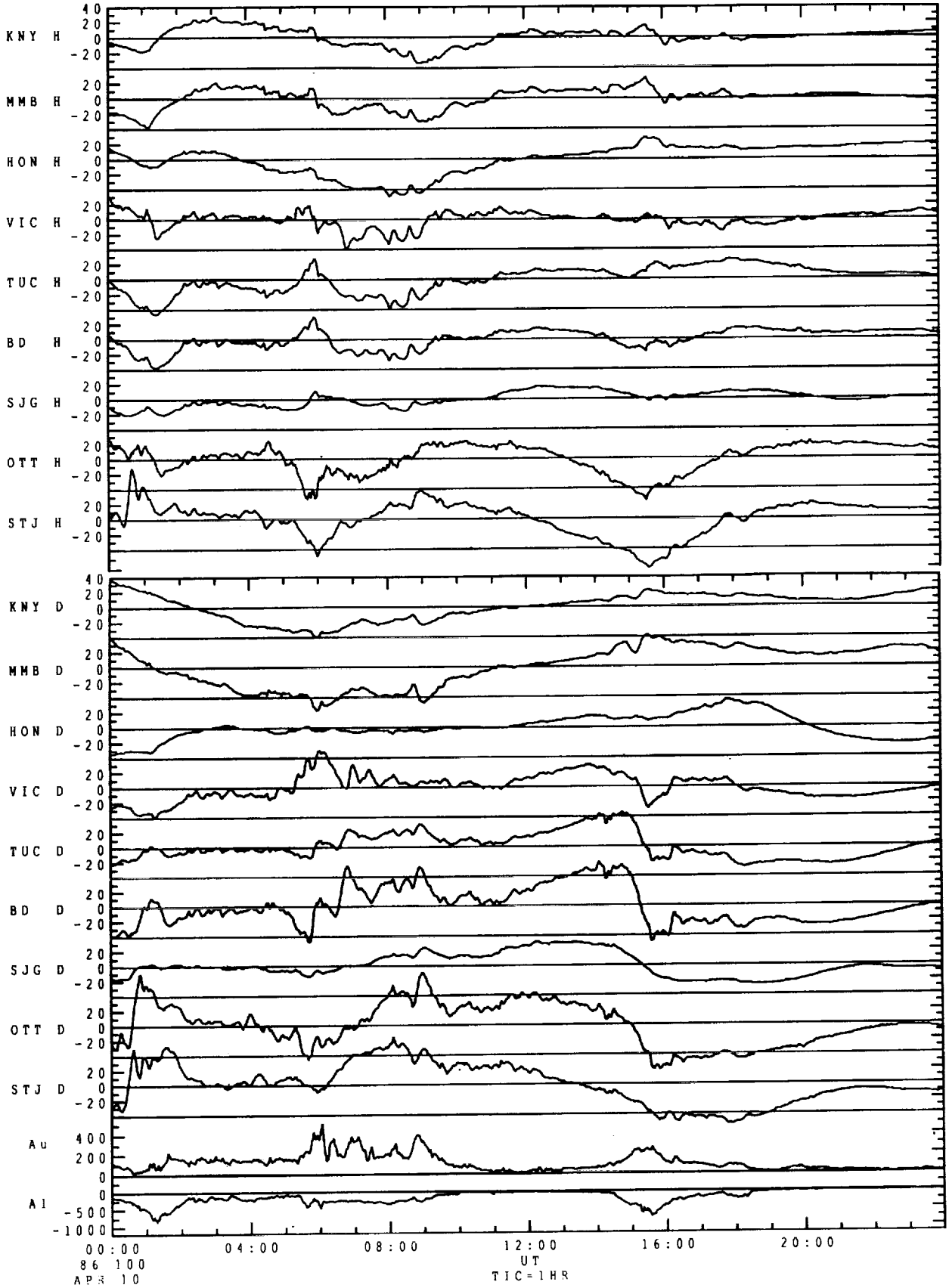
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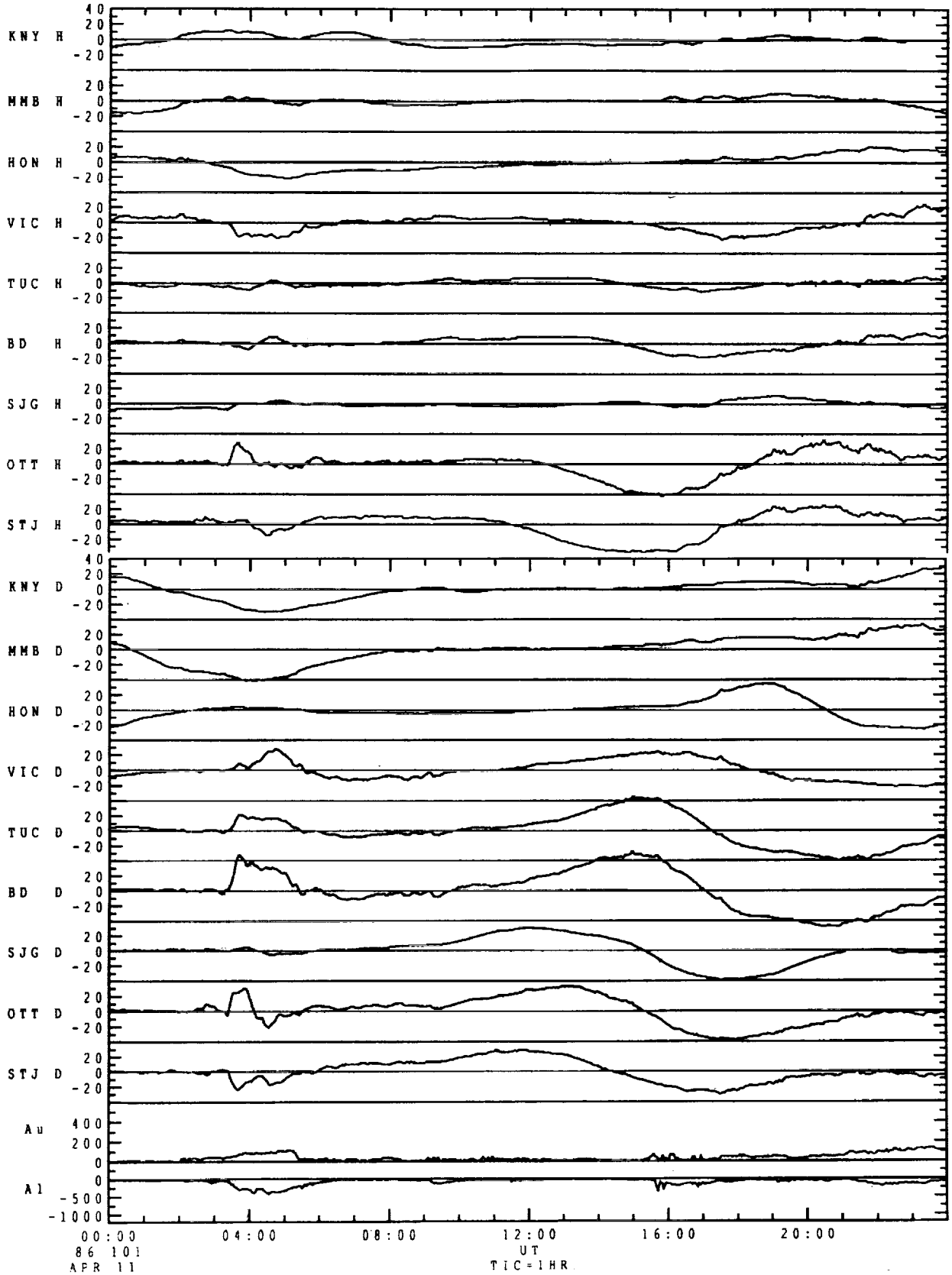
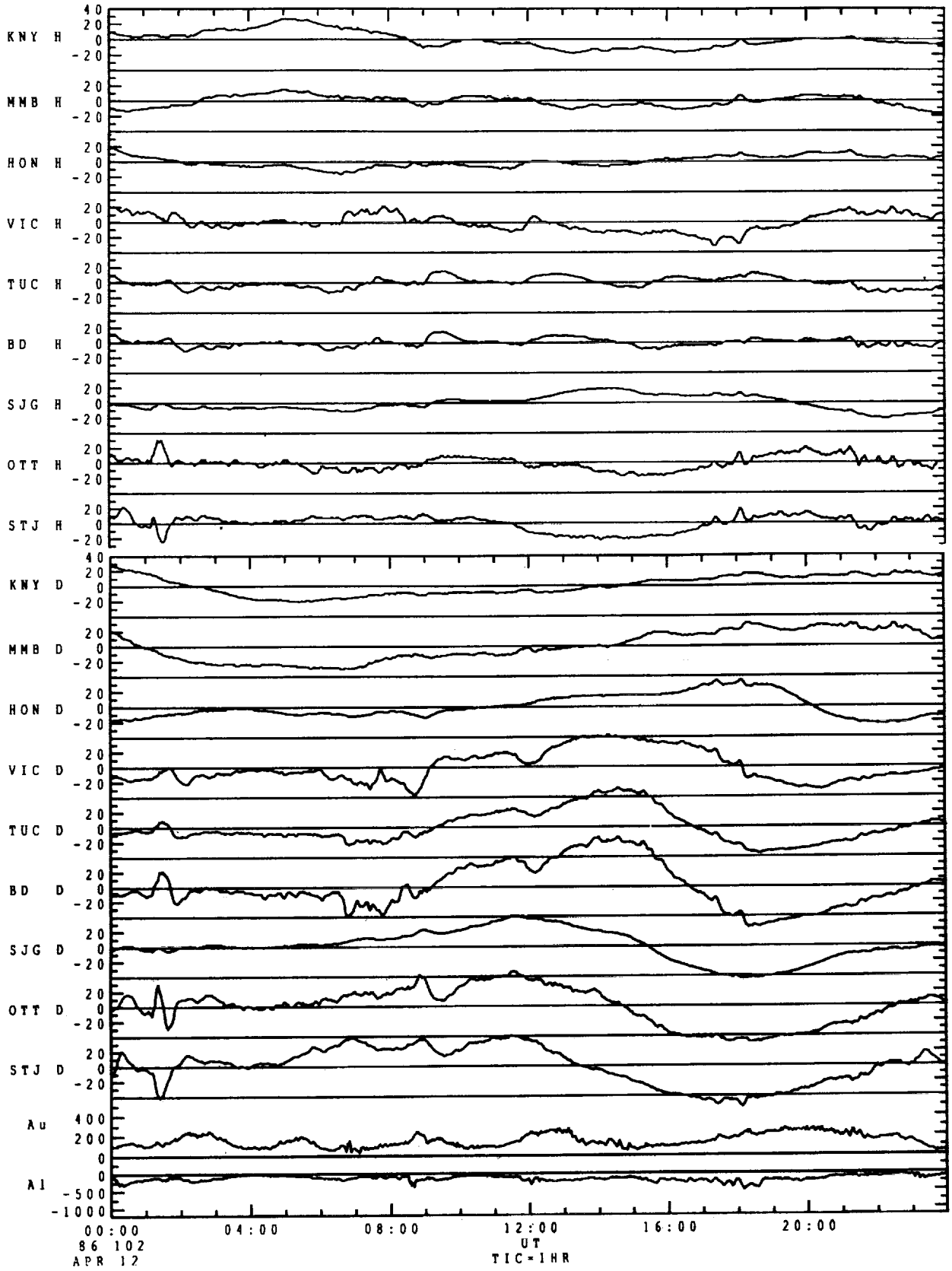
APR 11, 1986

UCLA IGPP 90 JAN 5

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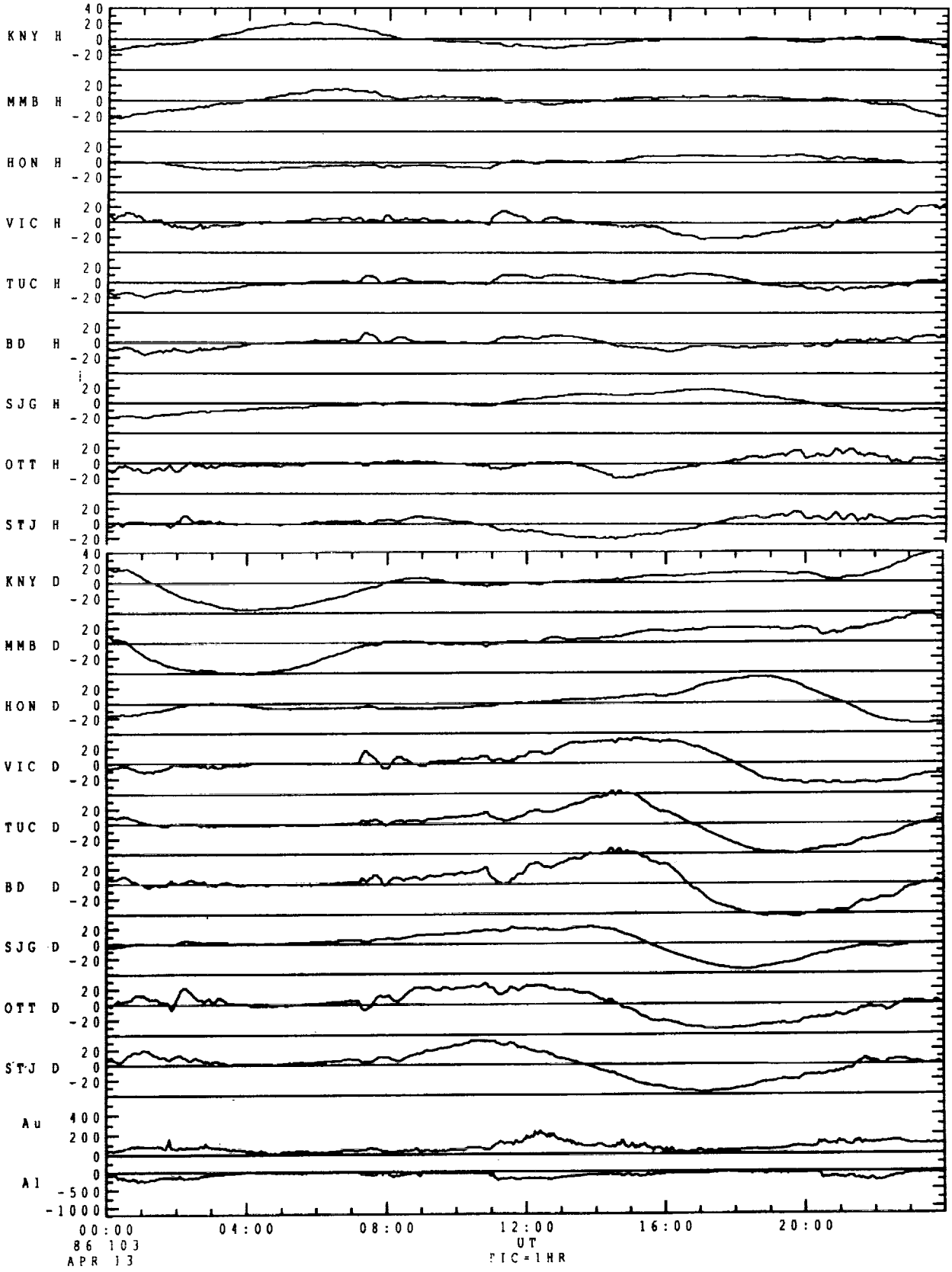
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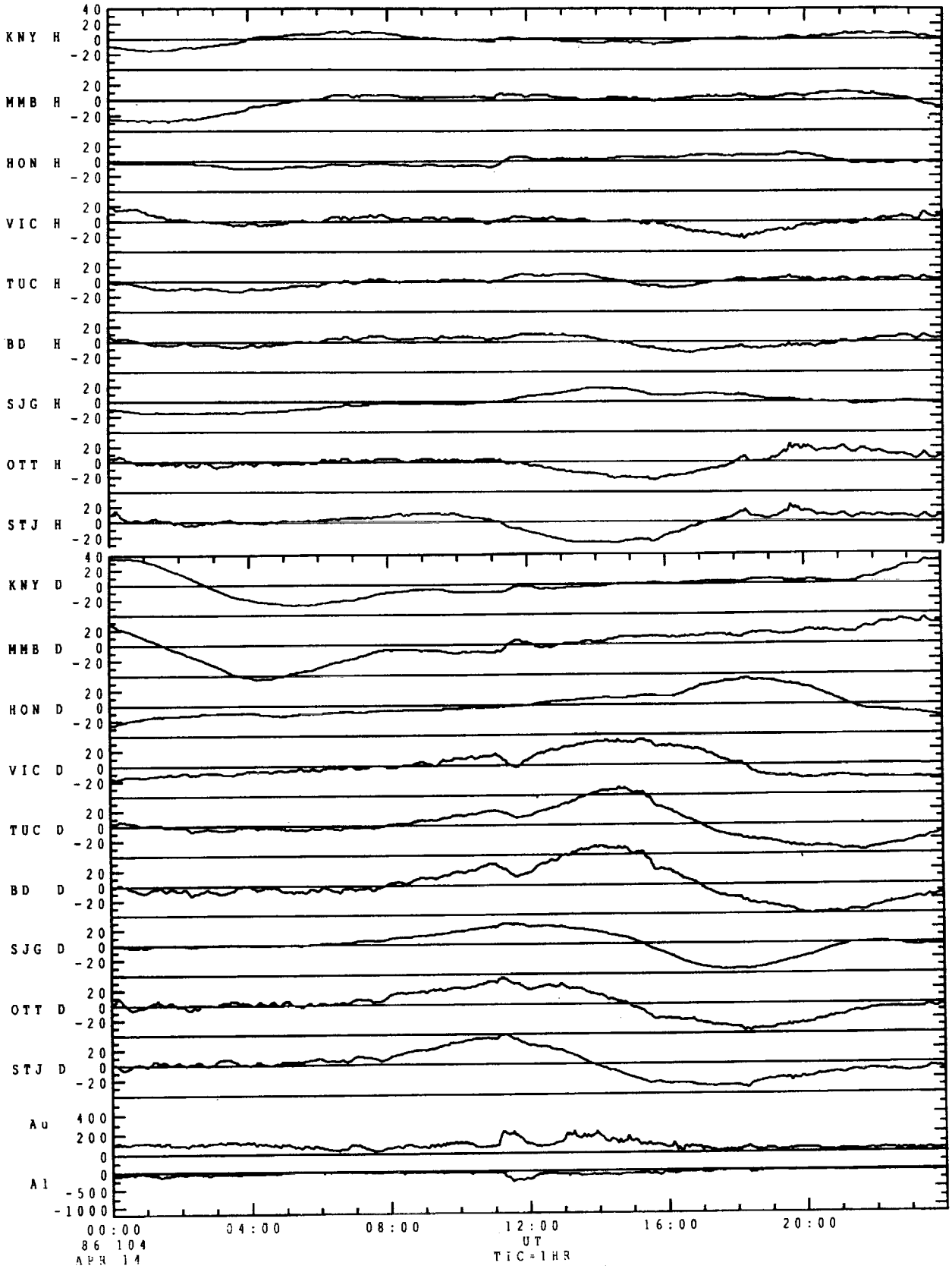
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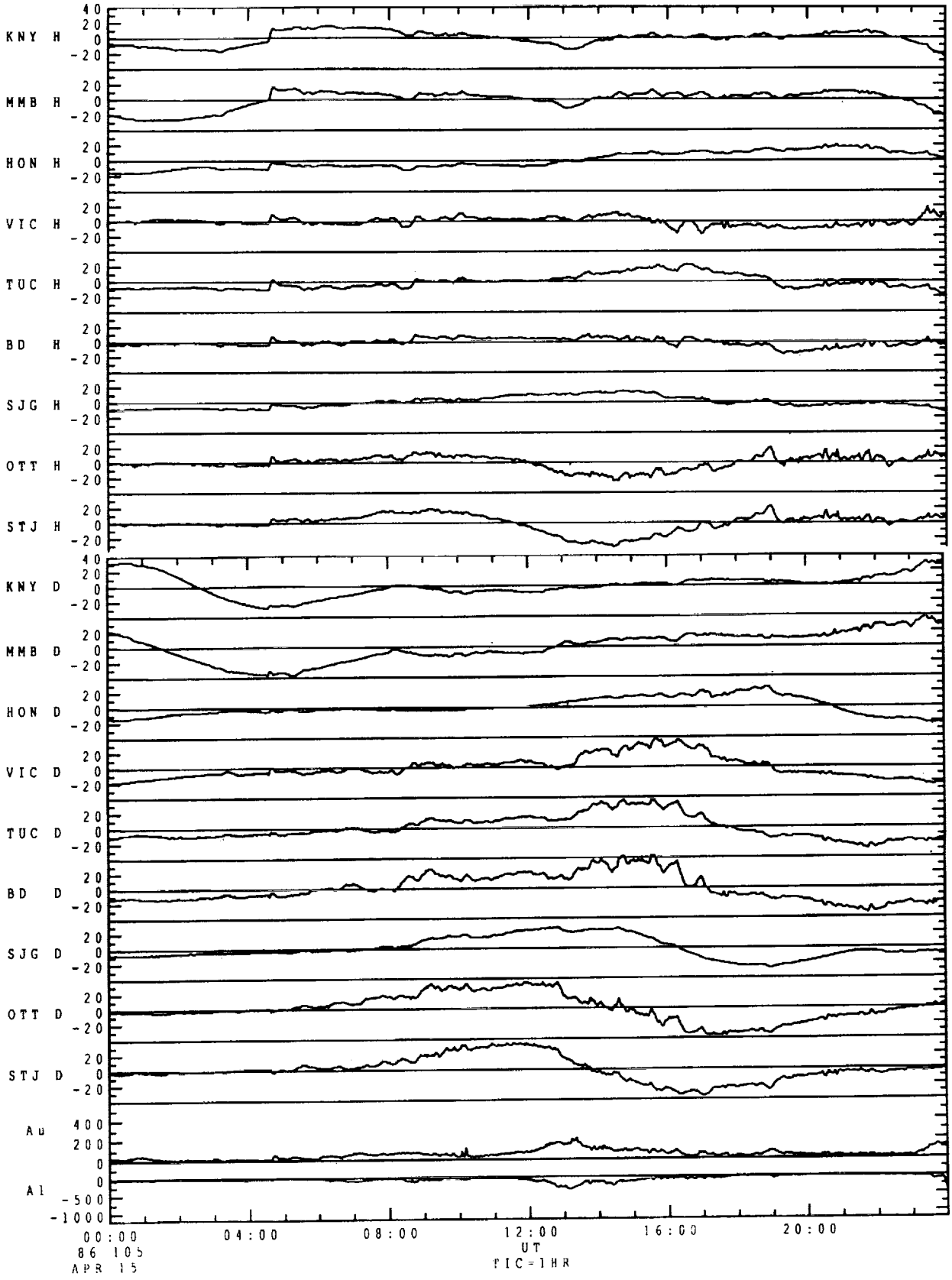
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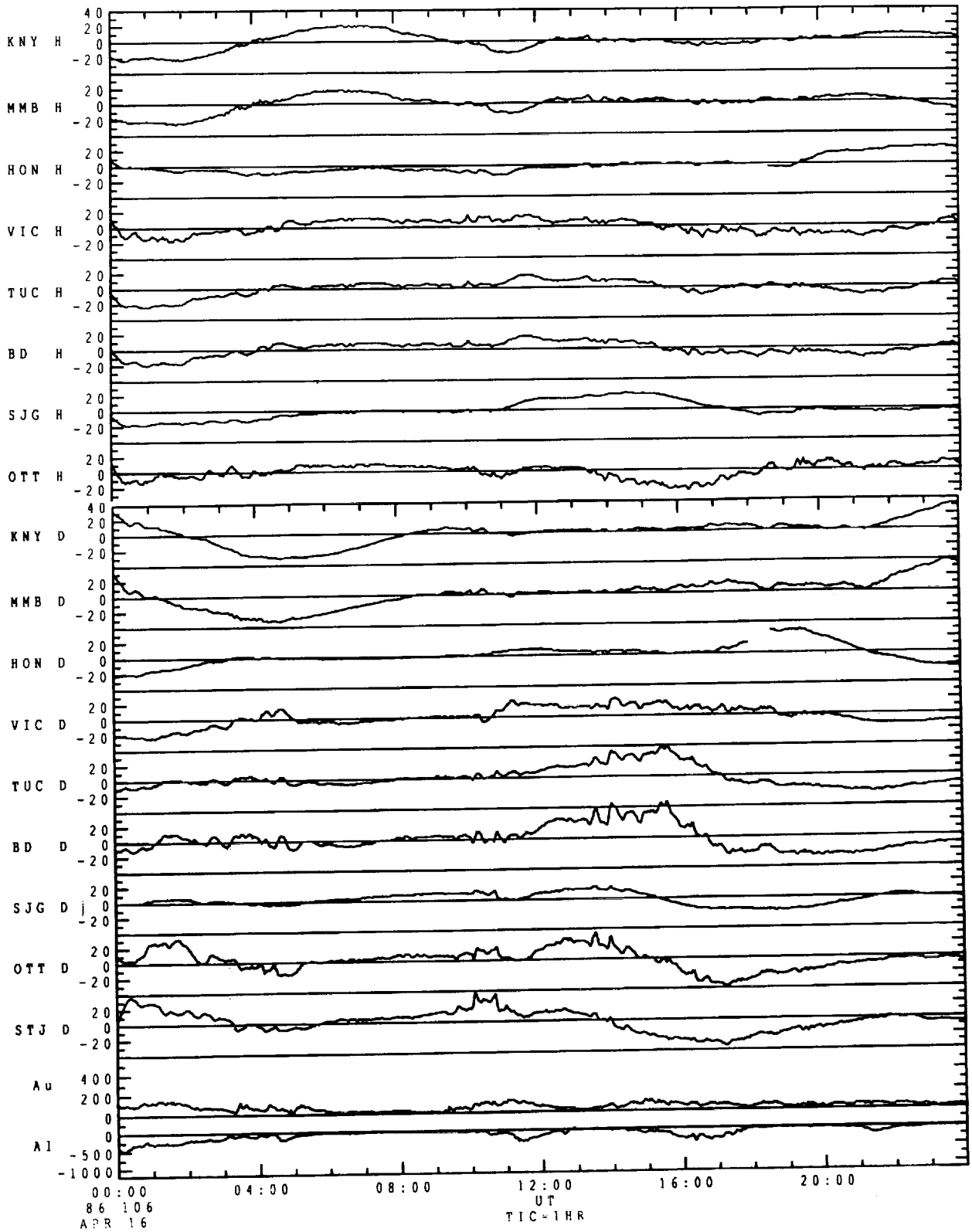
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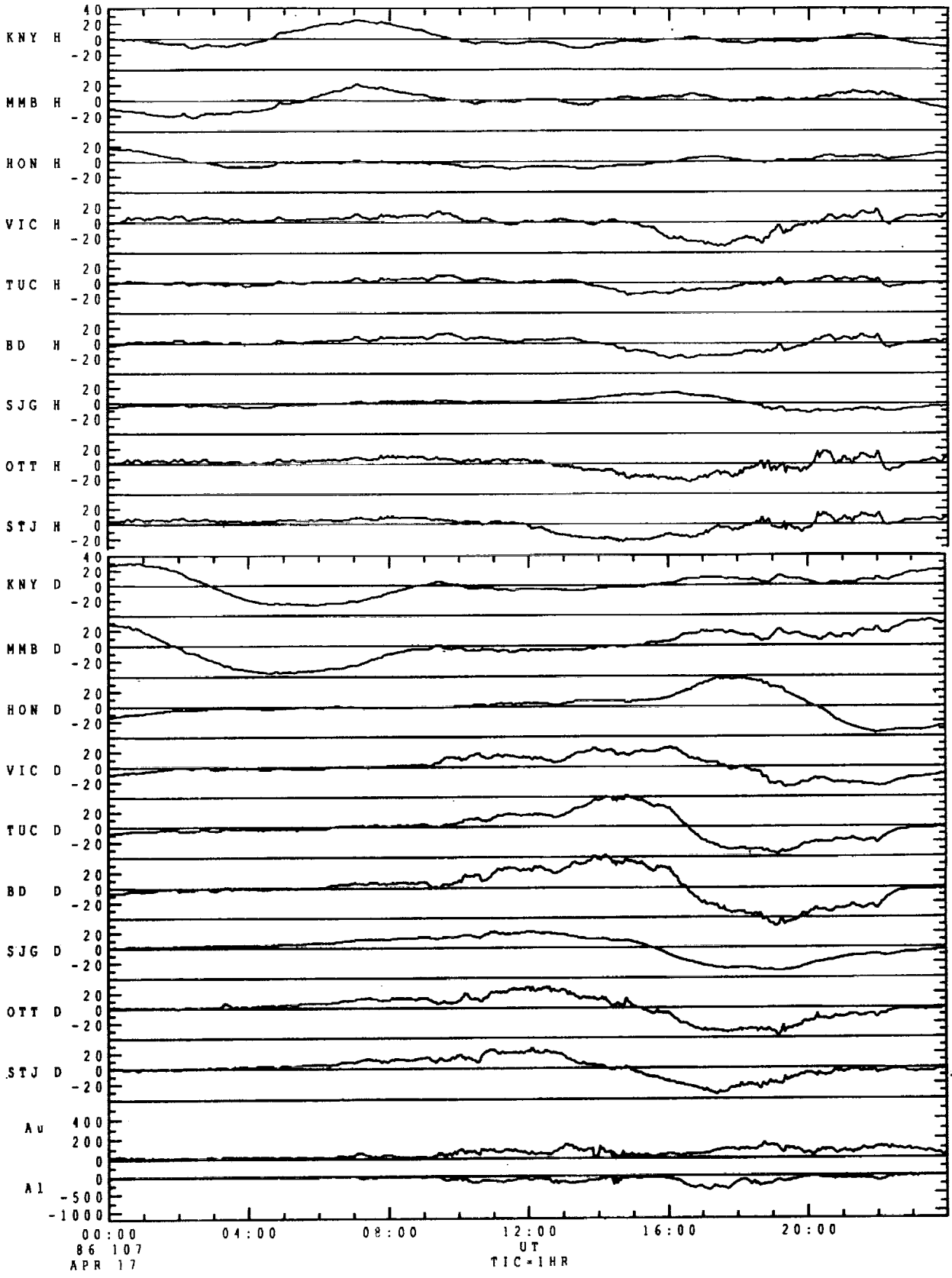
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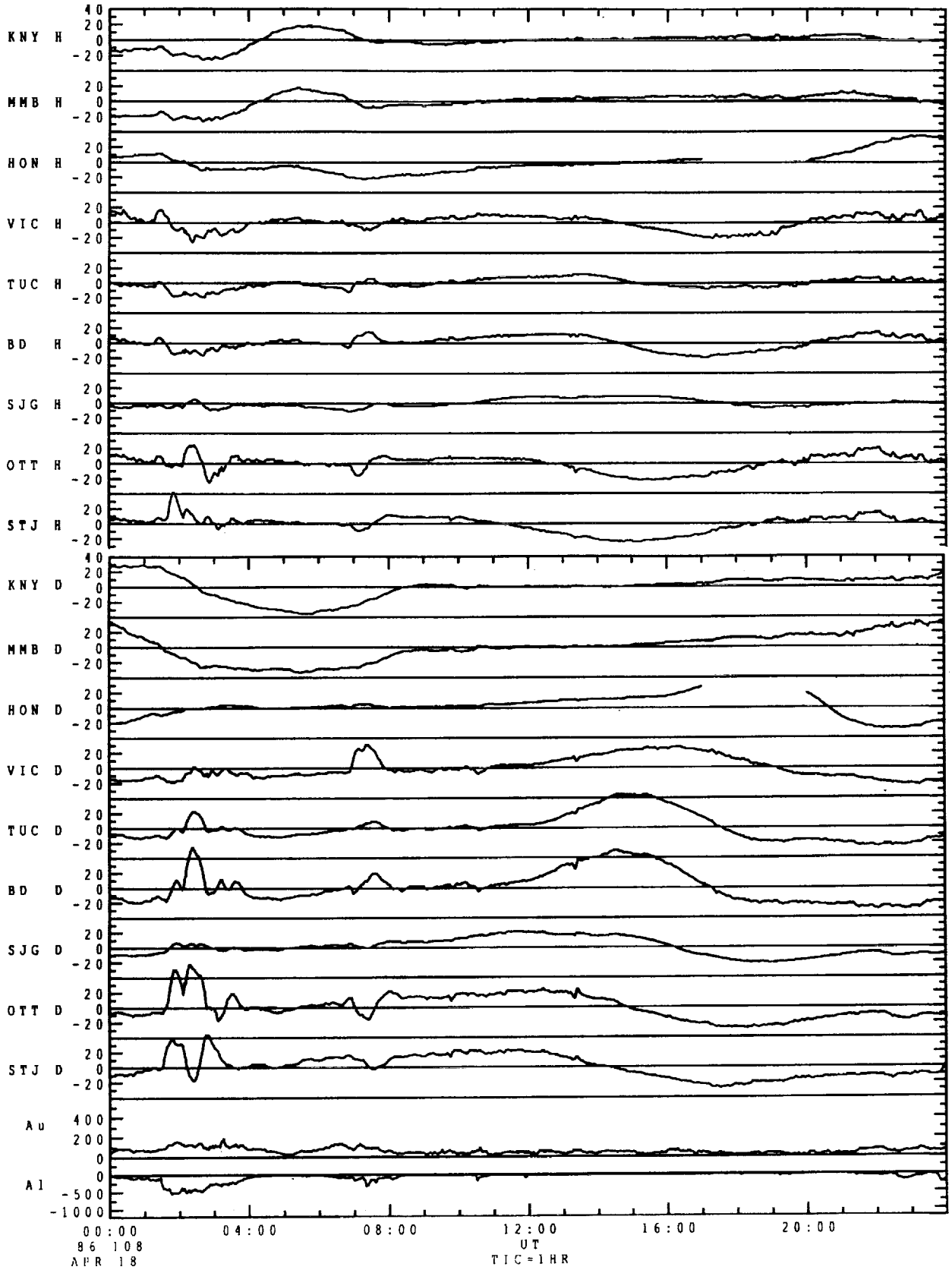
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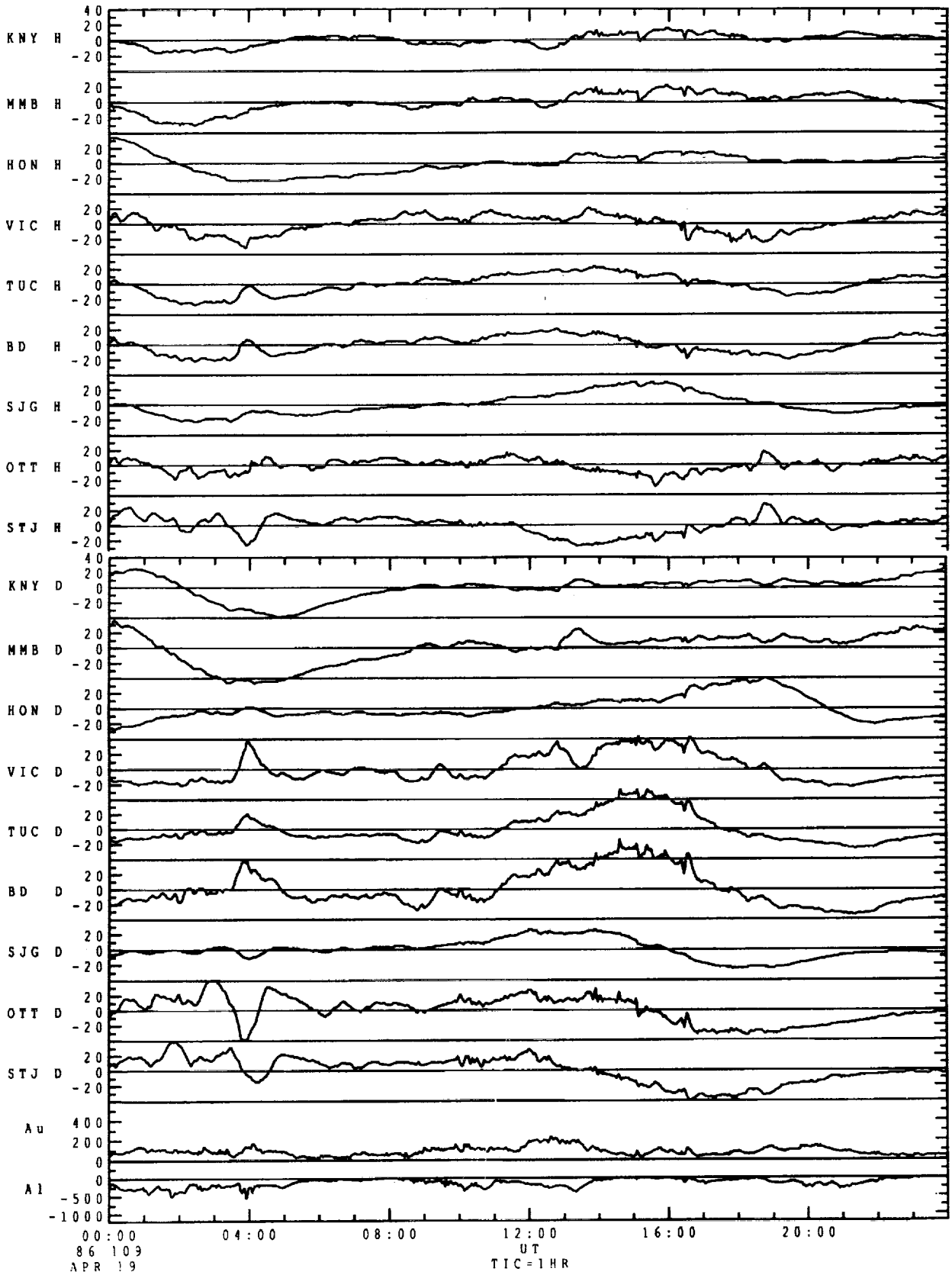
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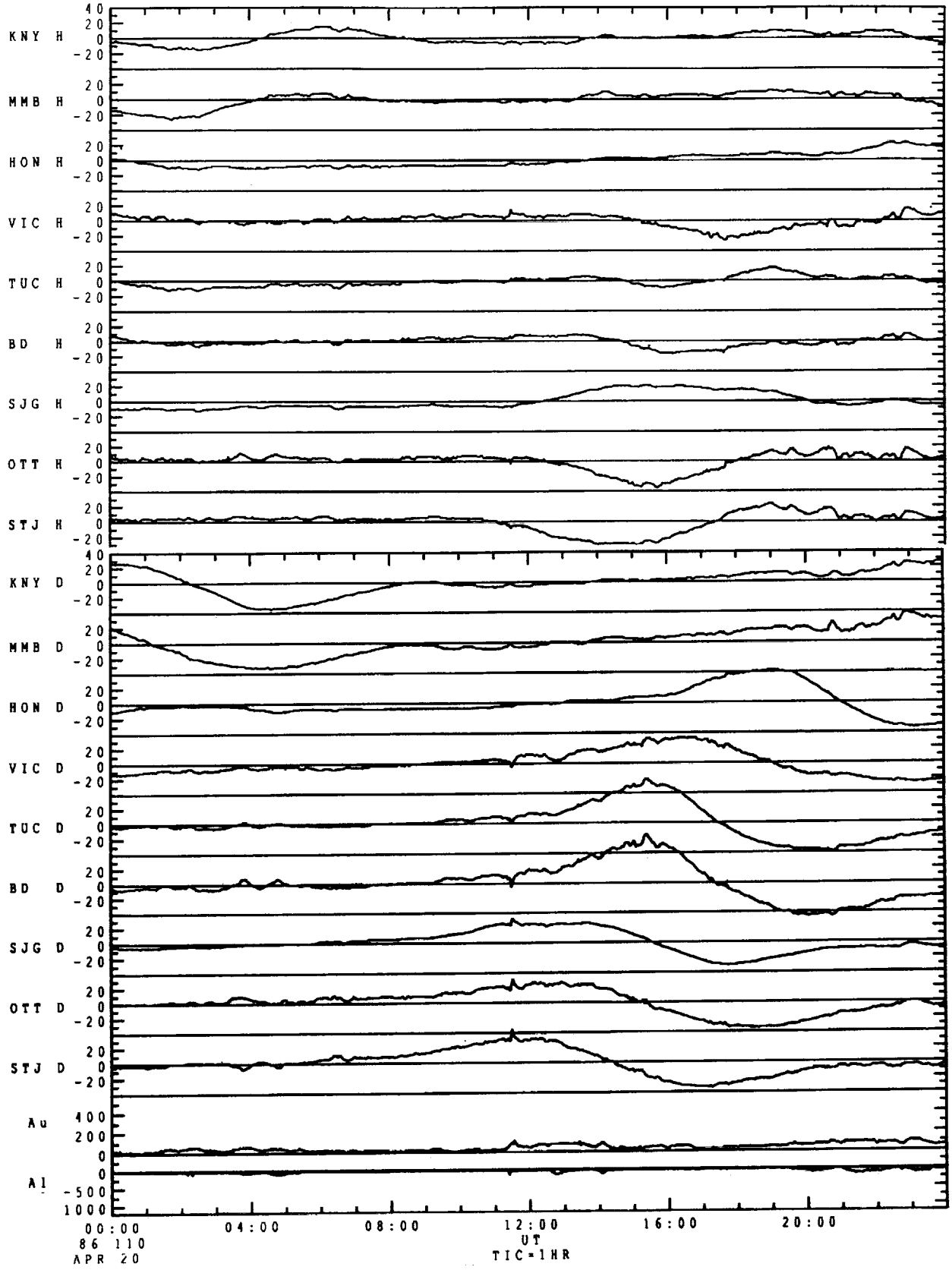
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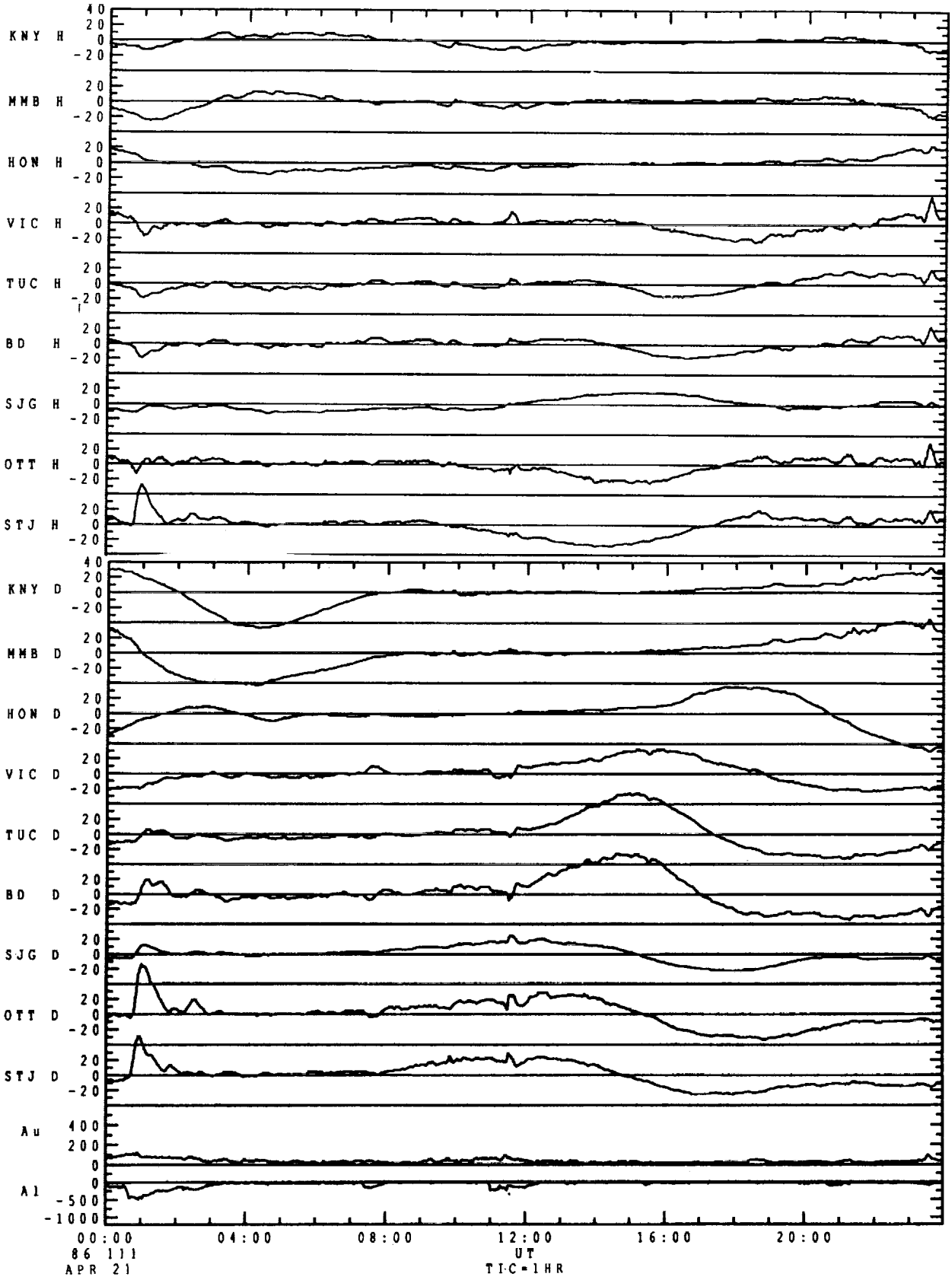
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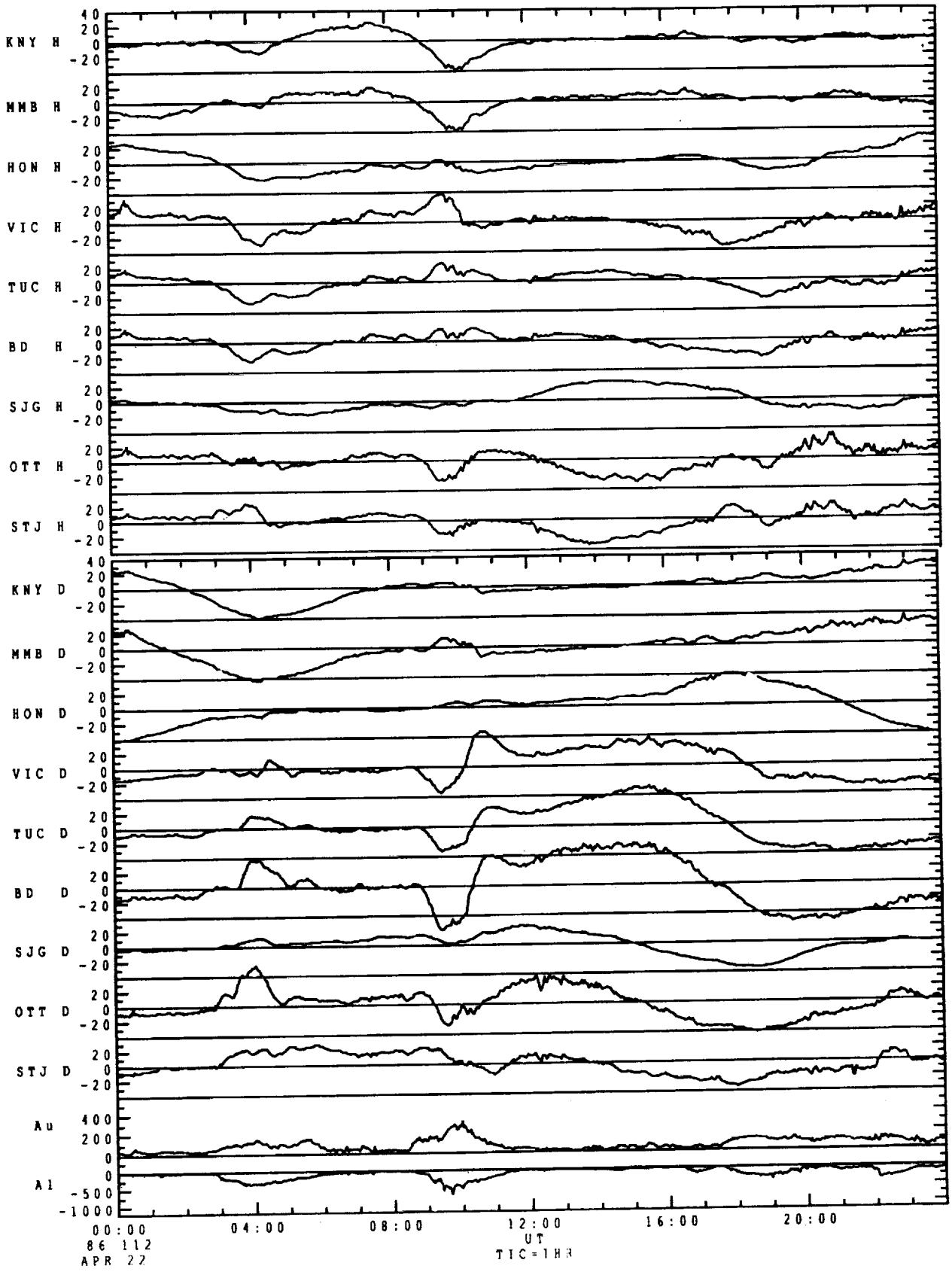
APR 22, 1986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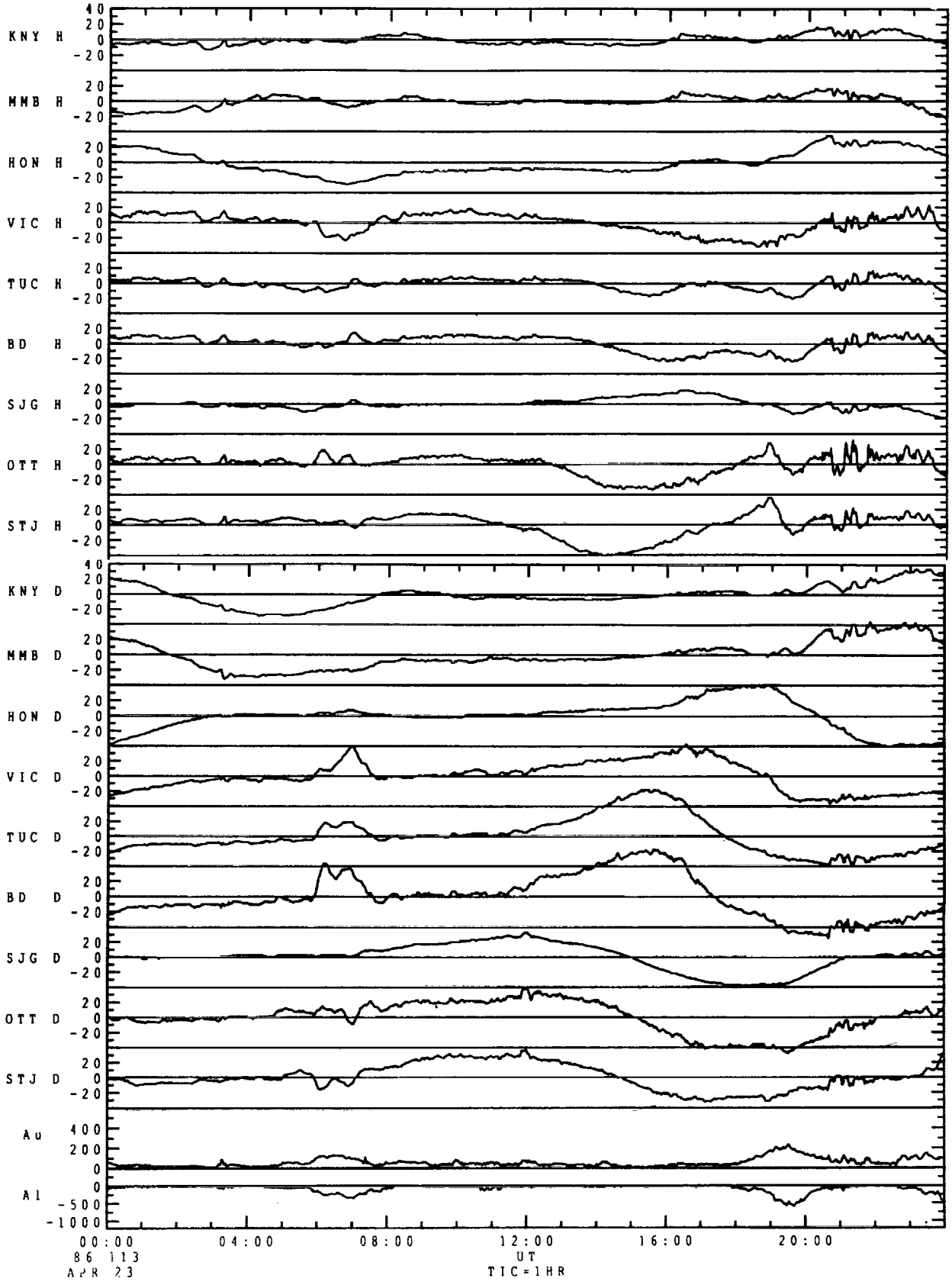
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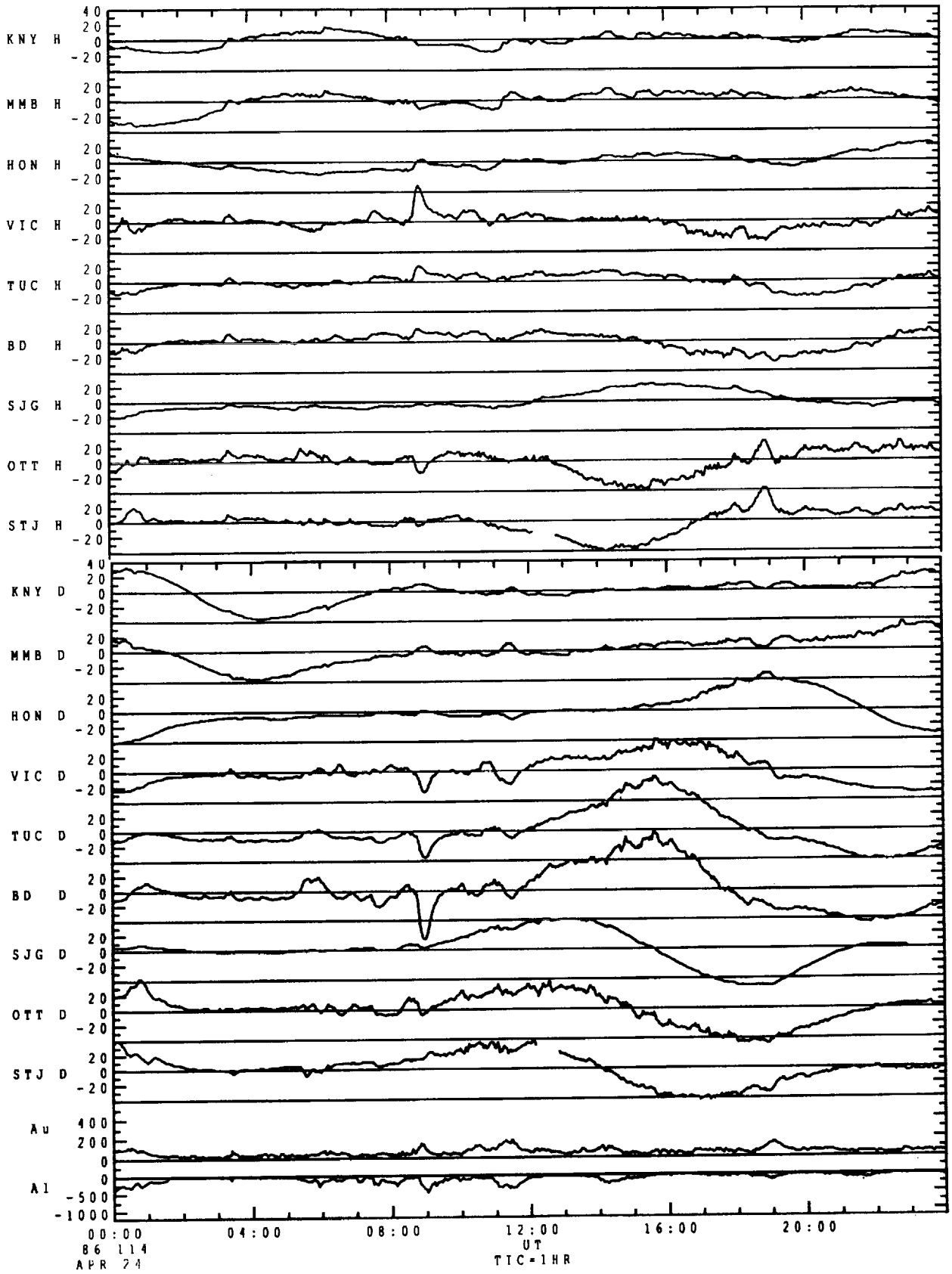
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APR 25, 1986

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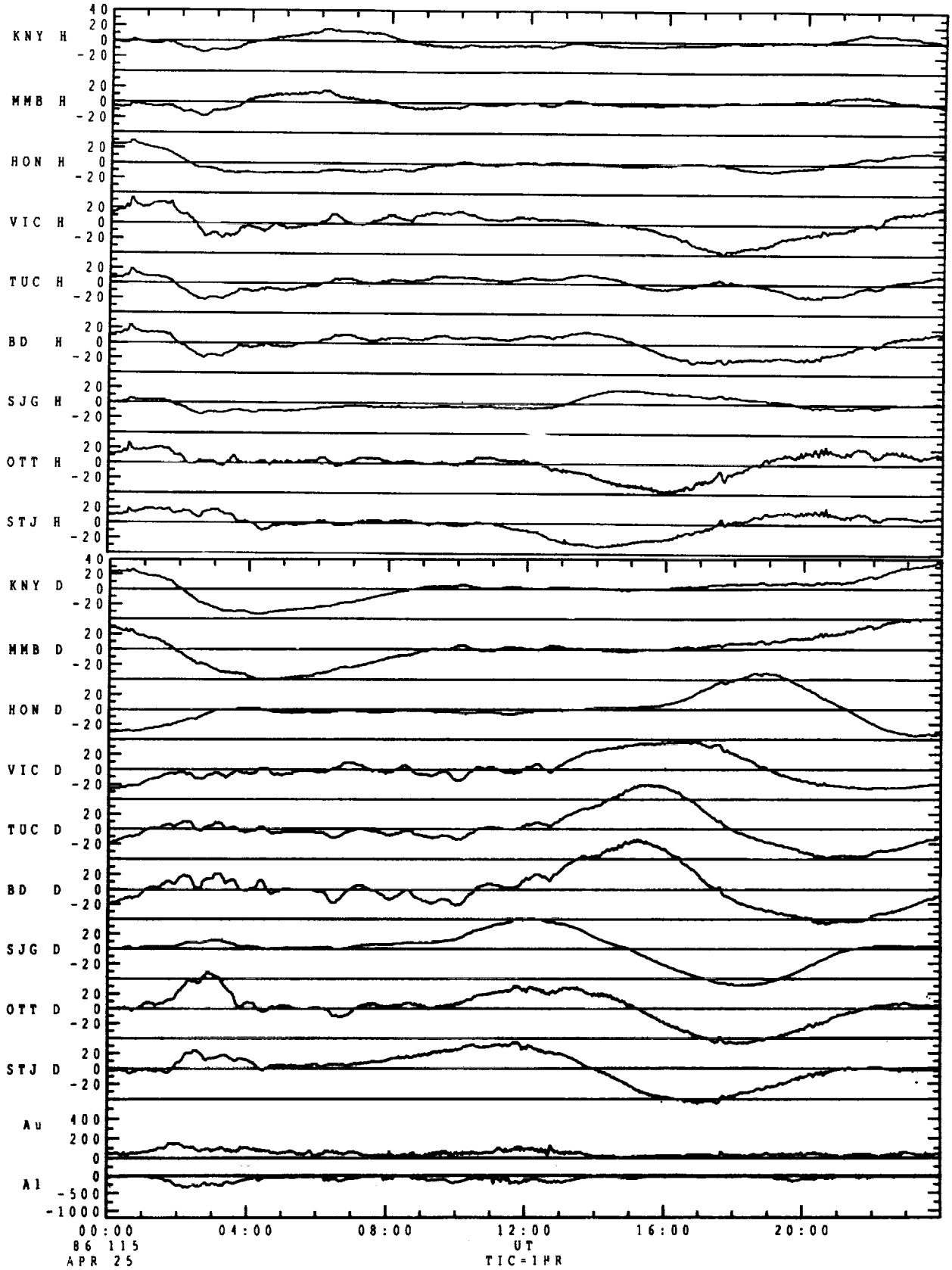

APR 26, 1986

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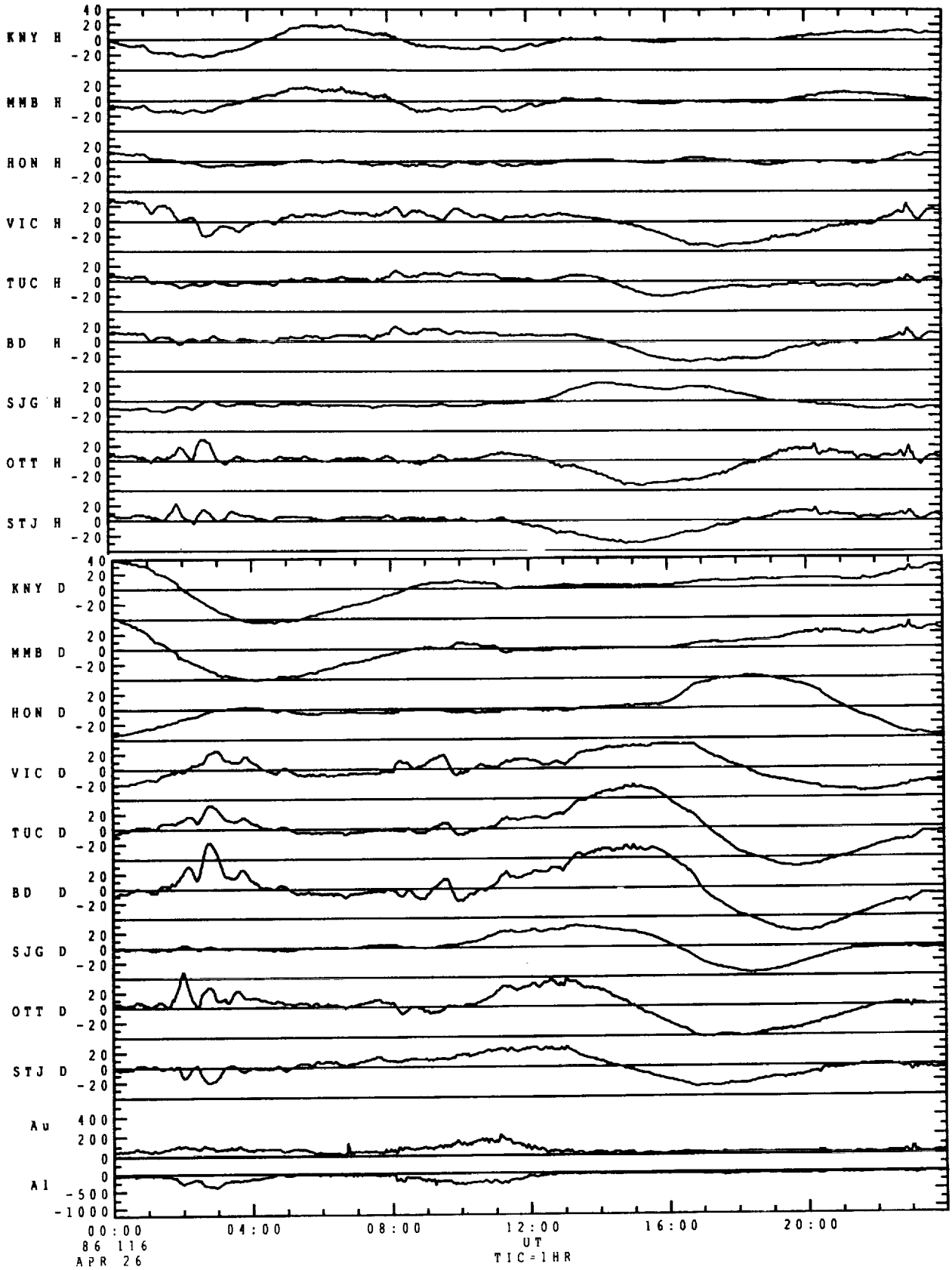

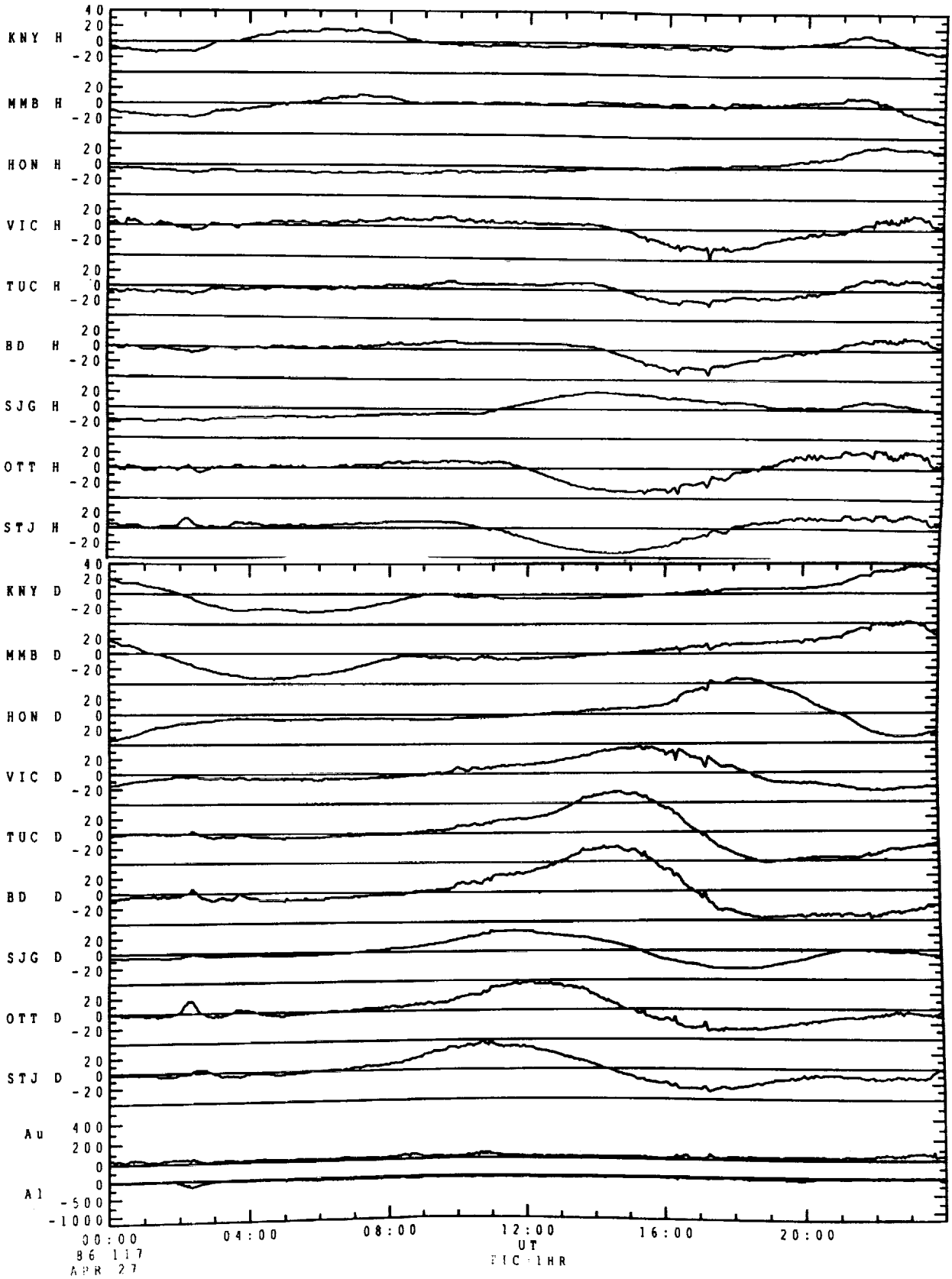
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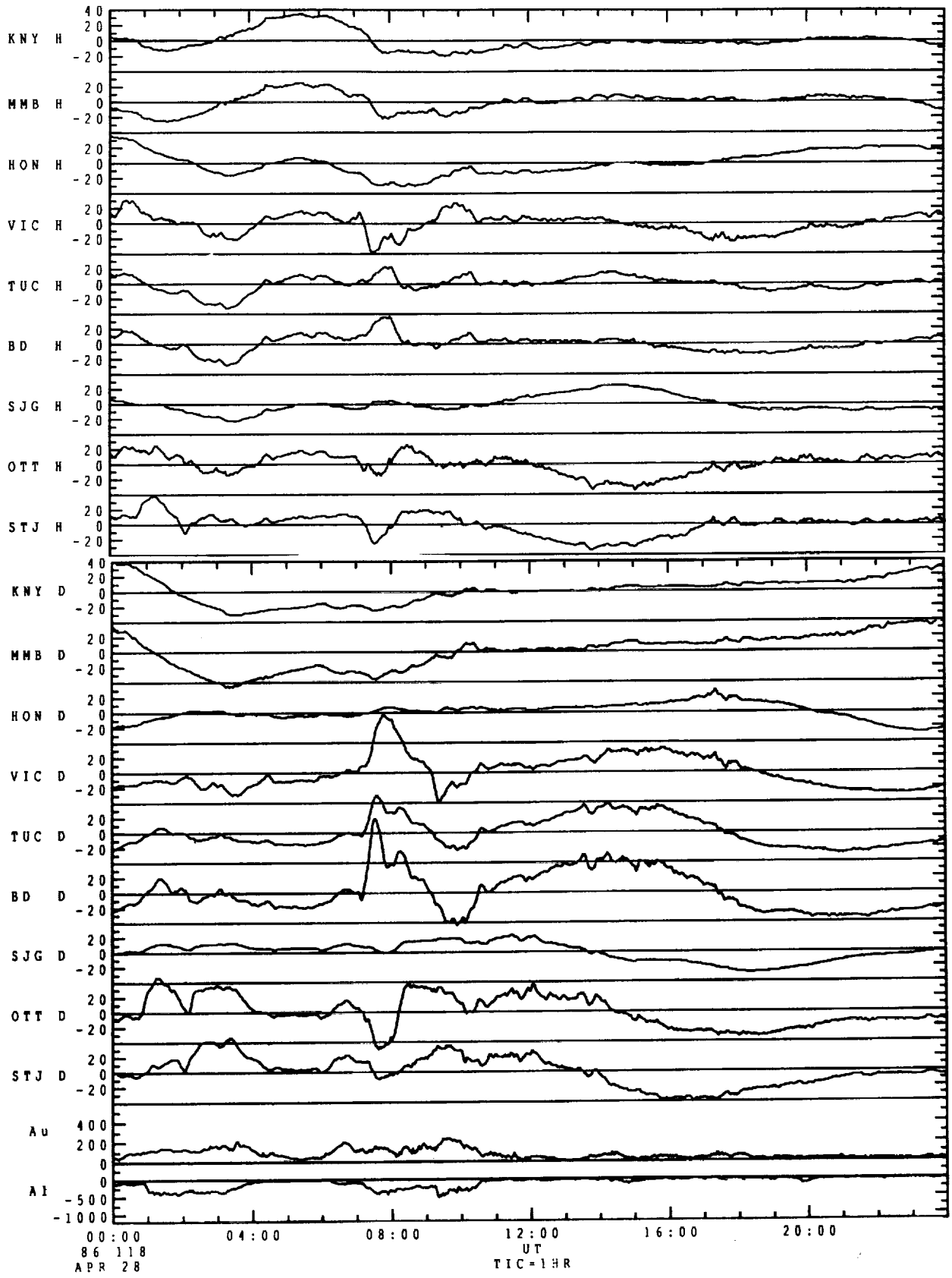
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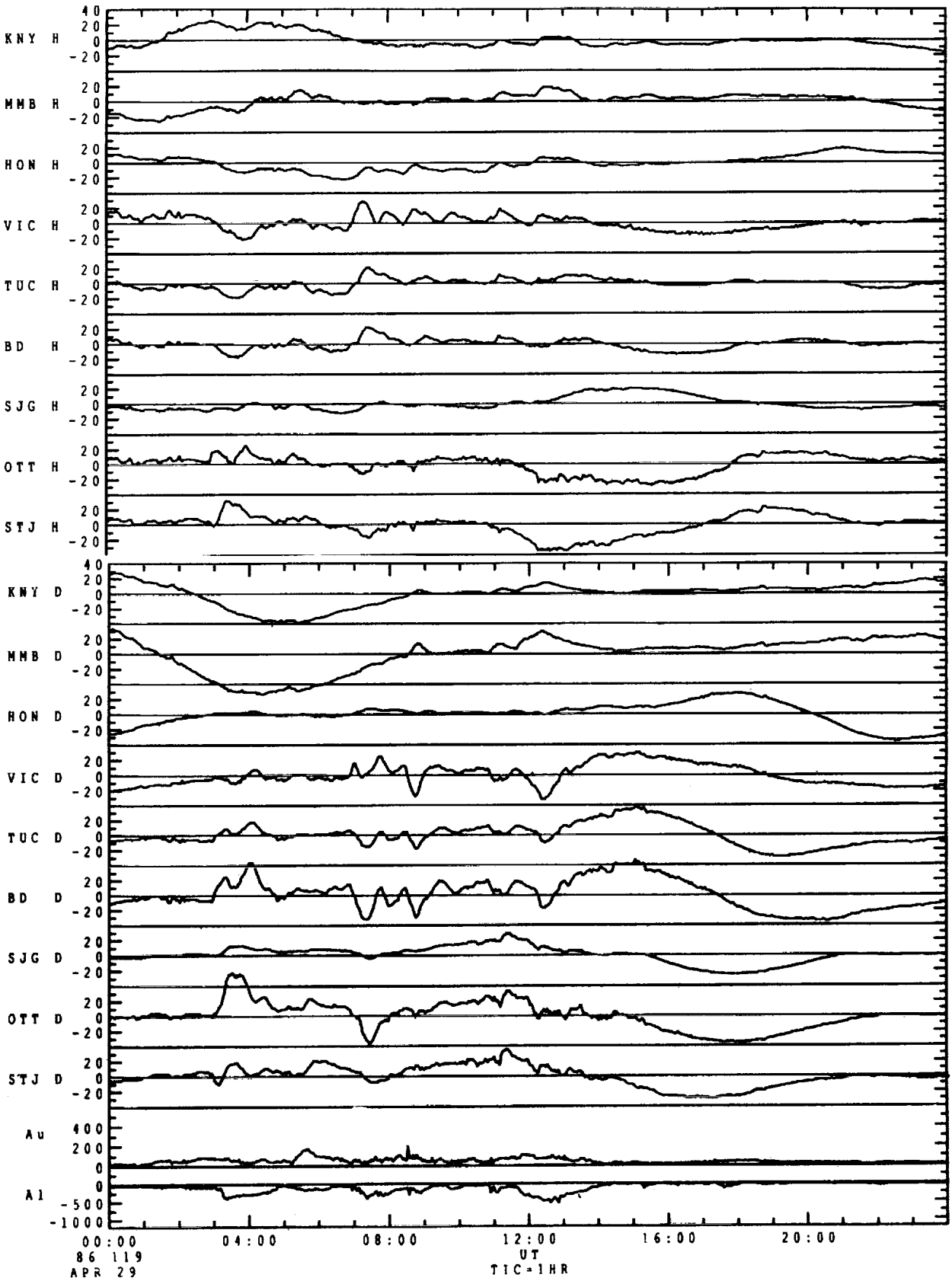
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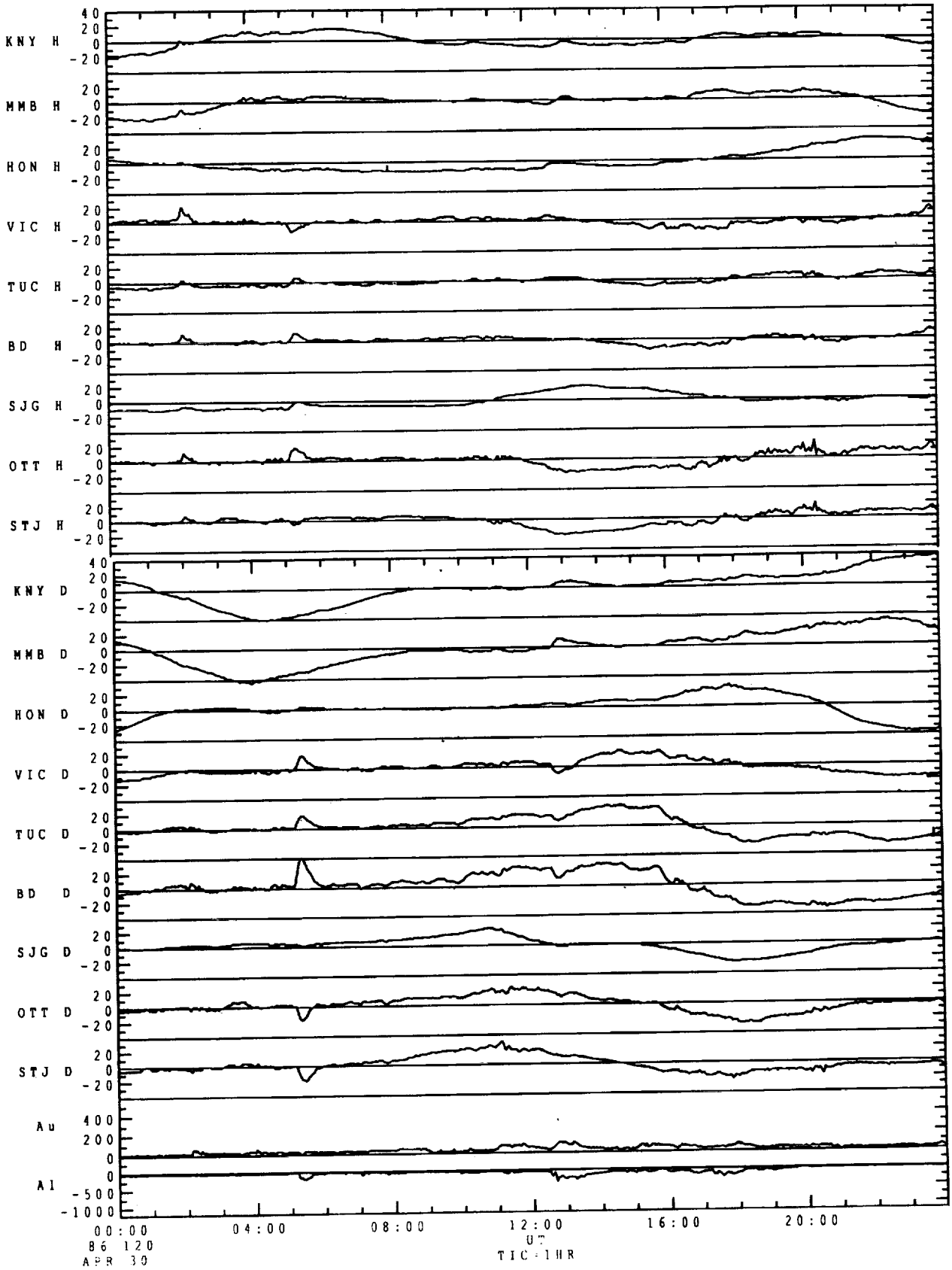
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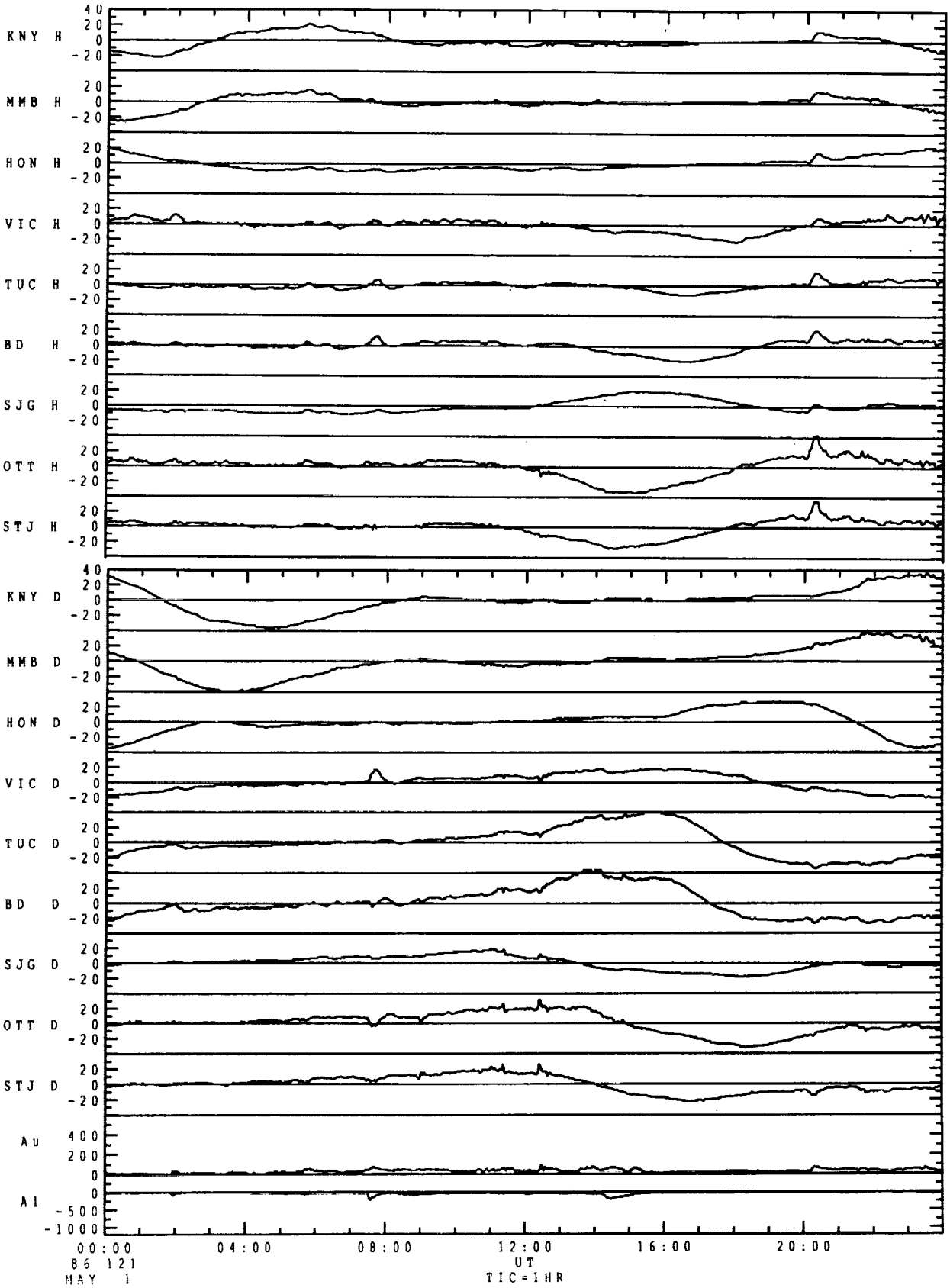
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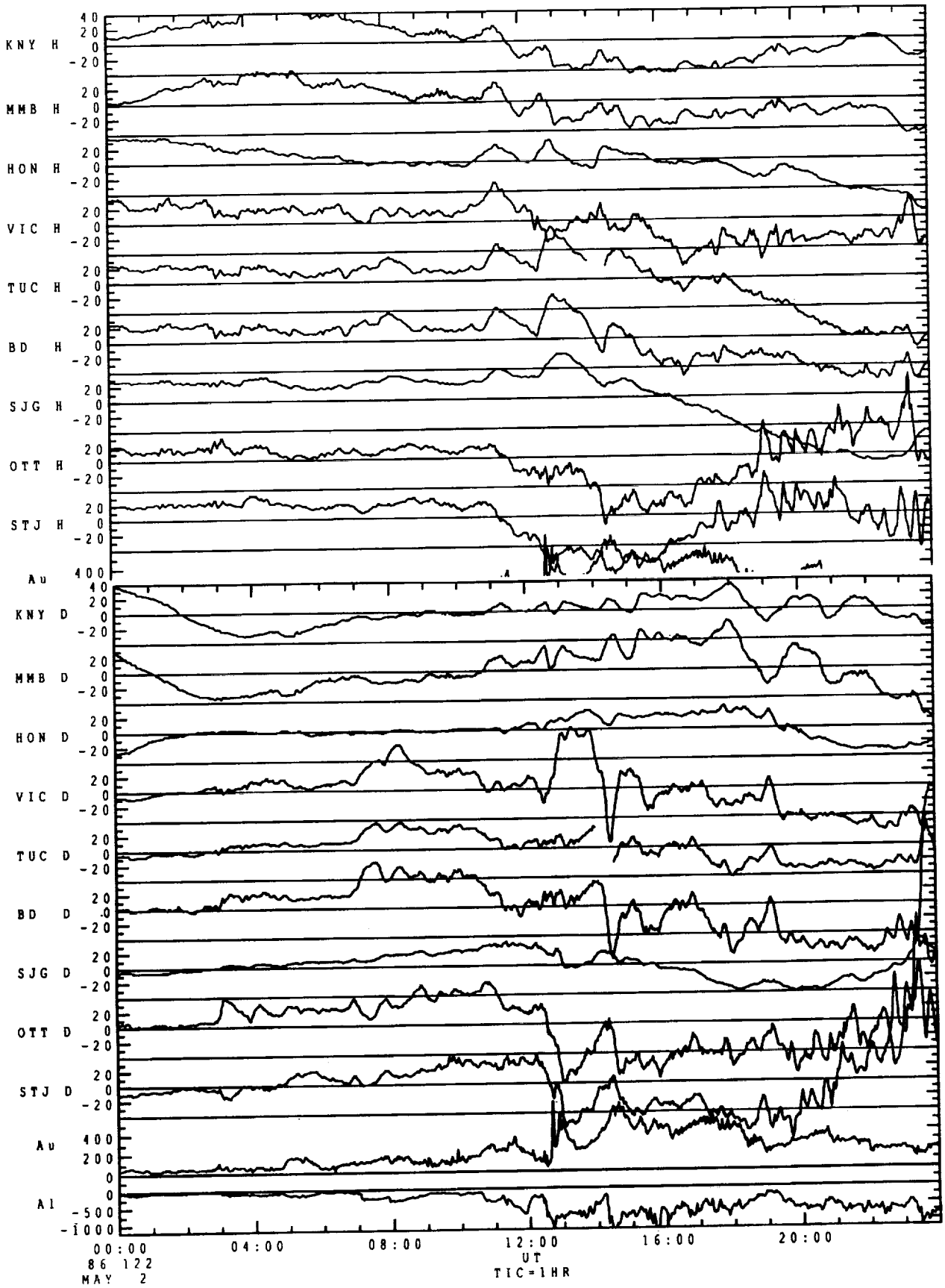
MAY 02, 1986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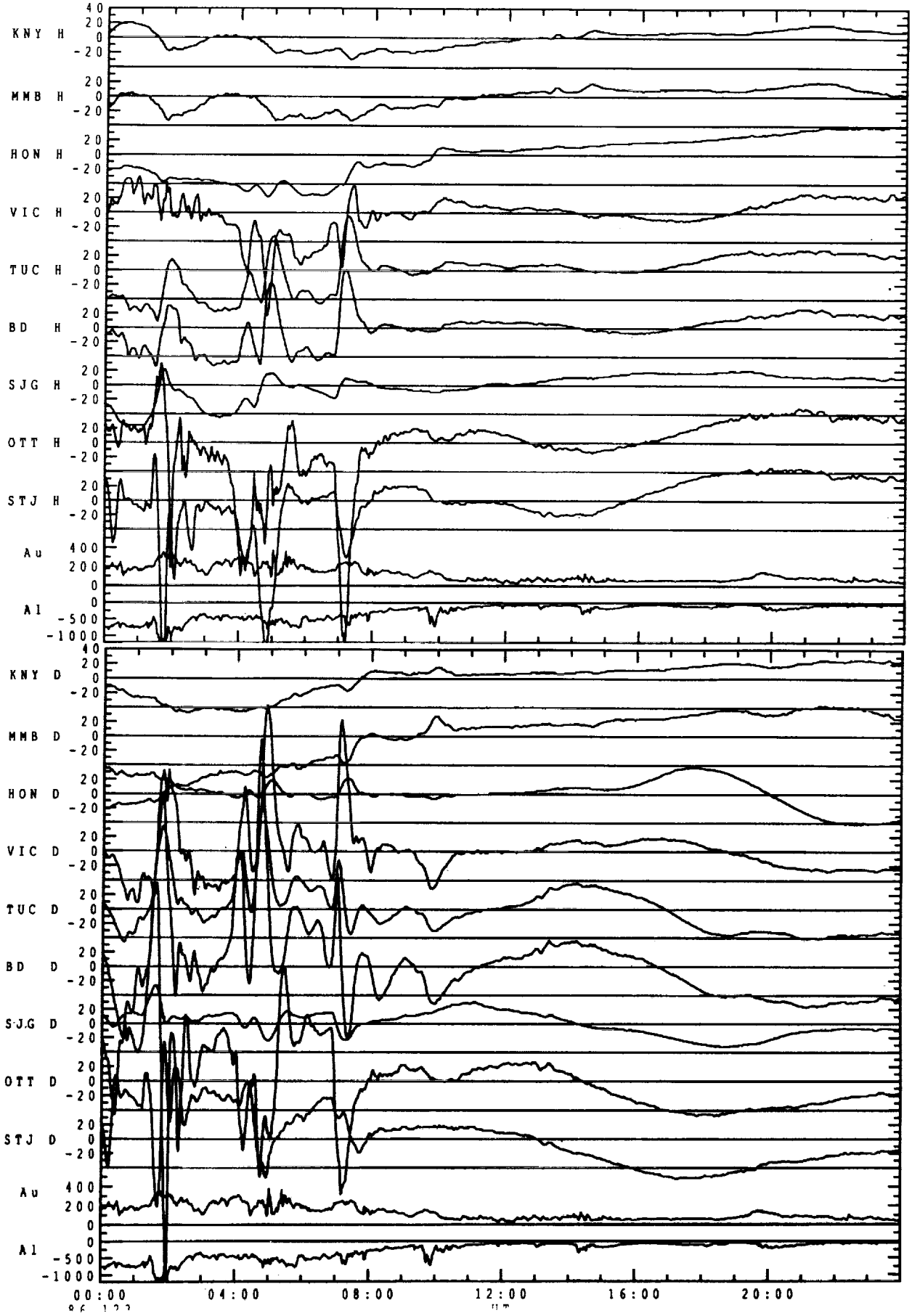
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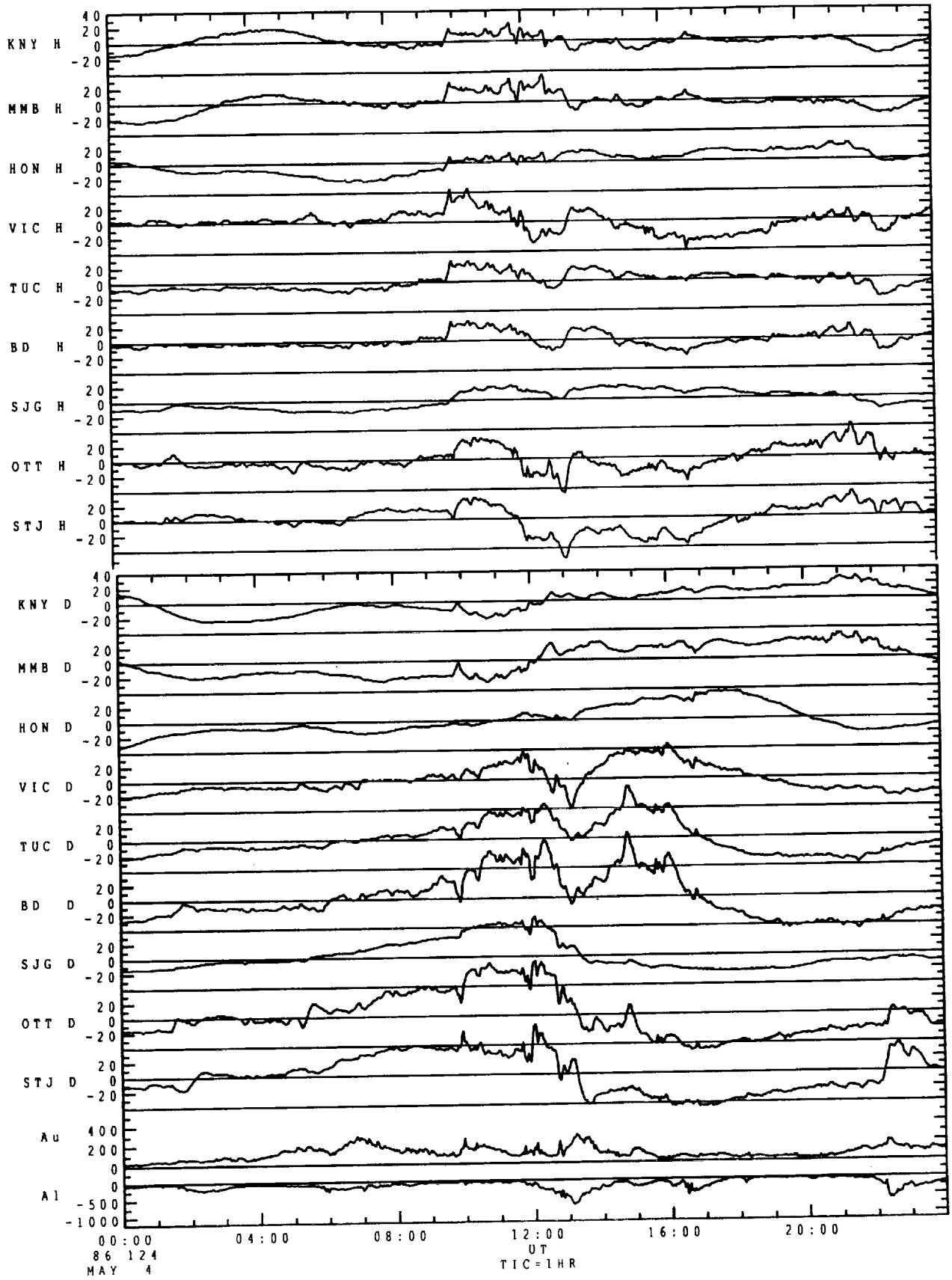
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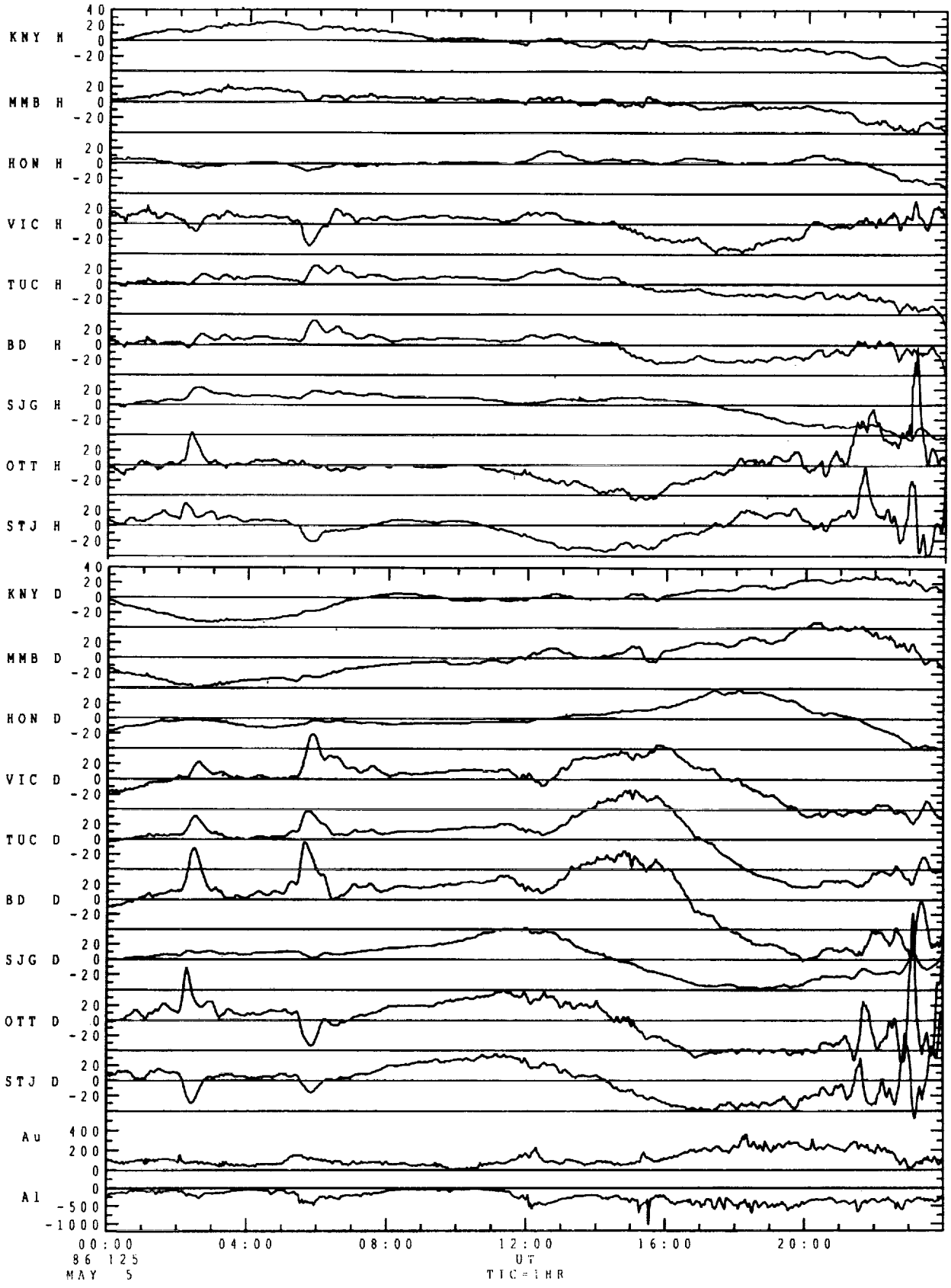
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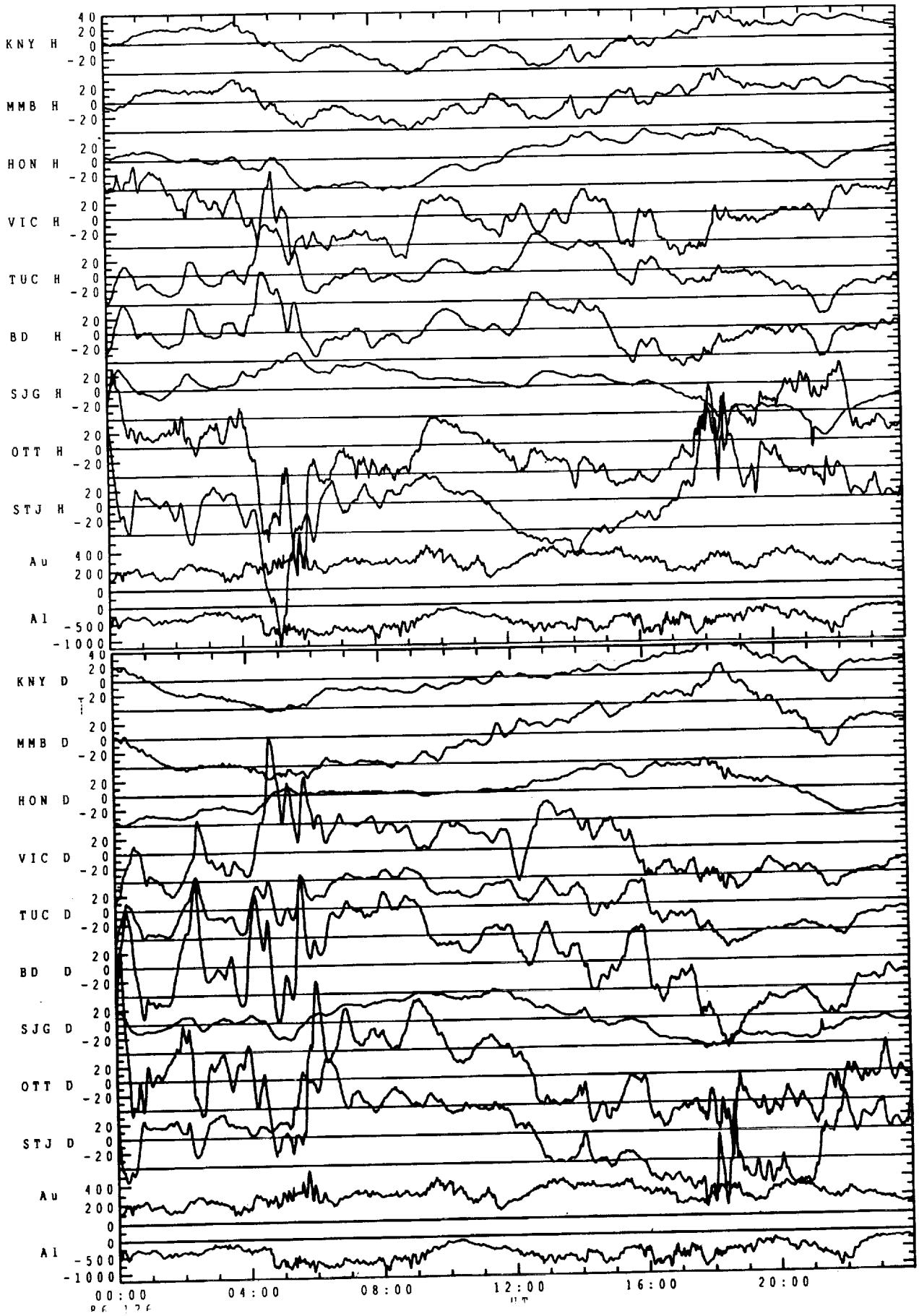
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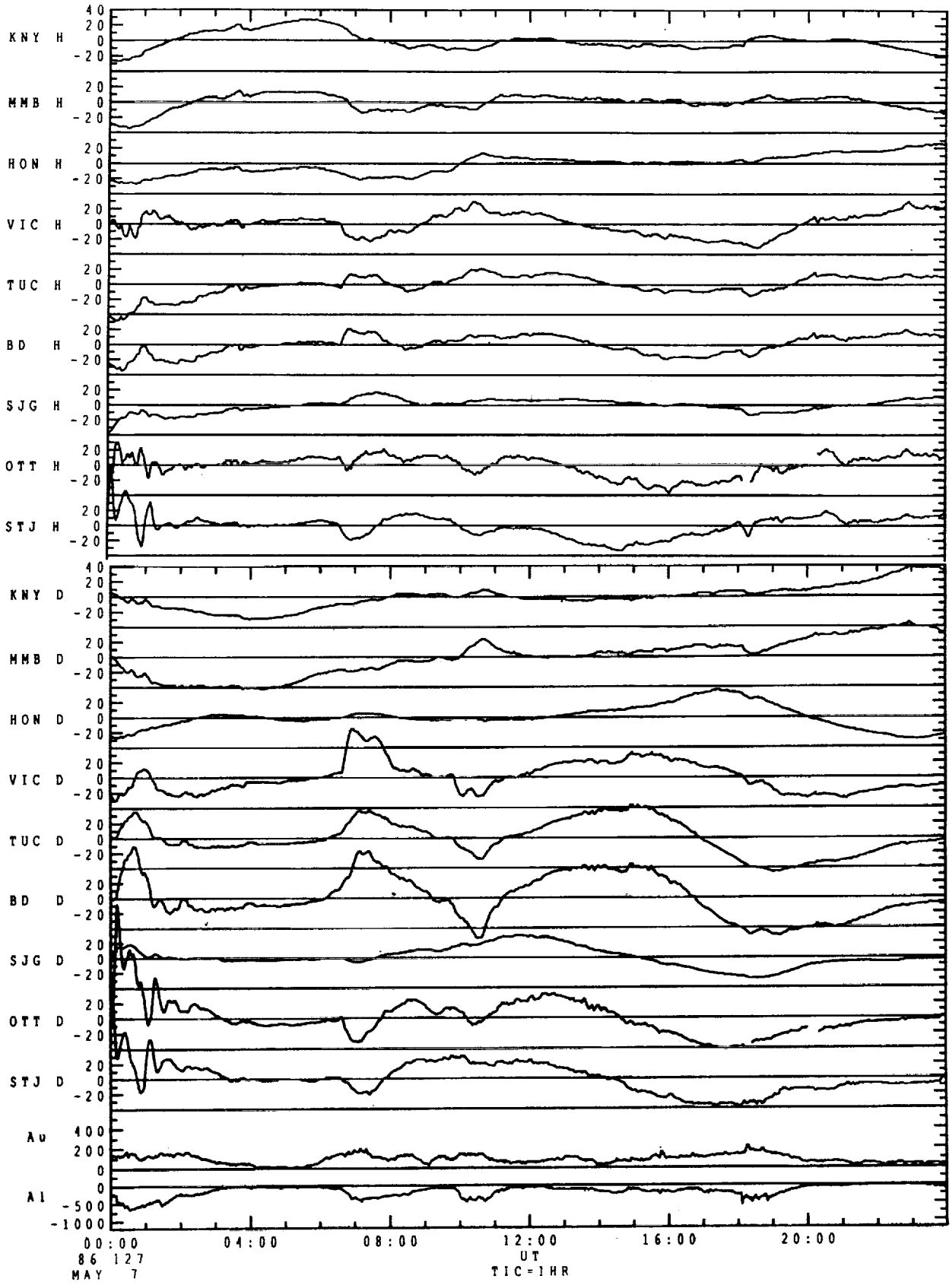
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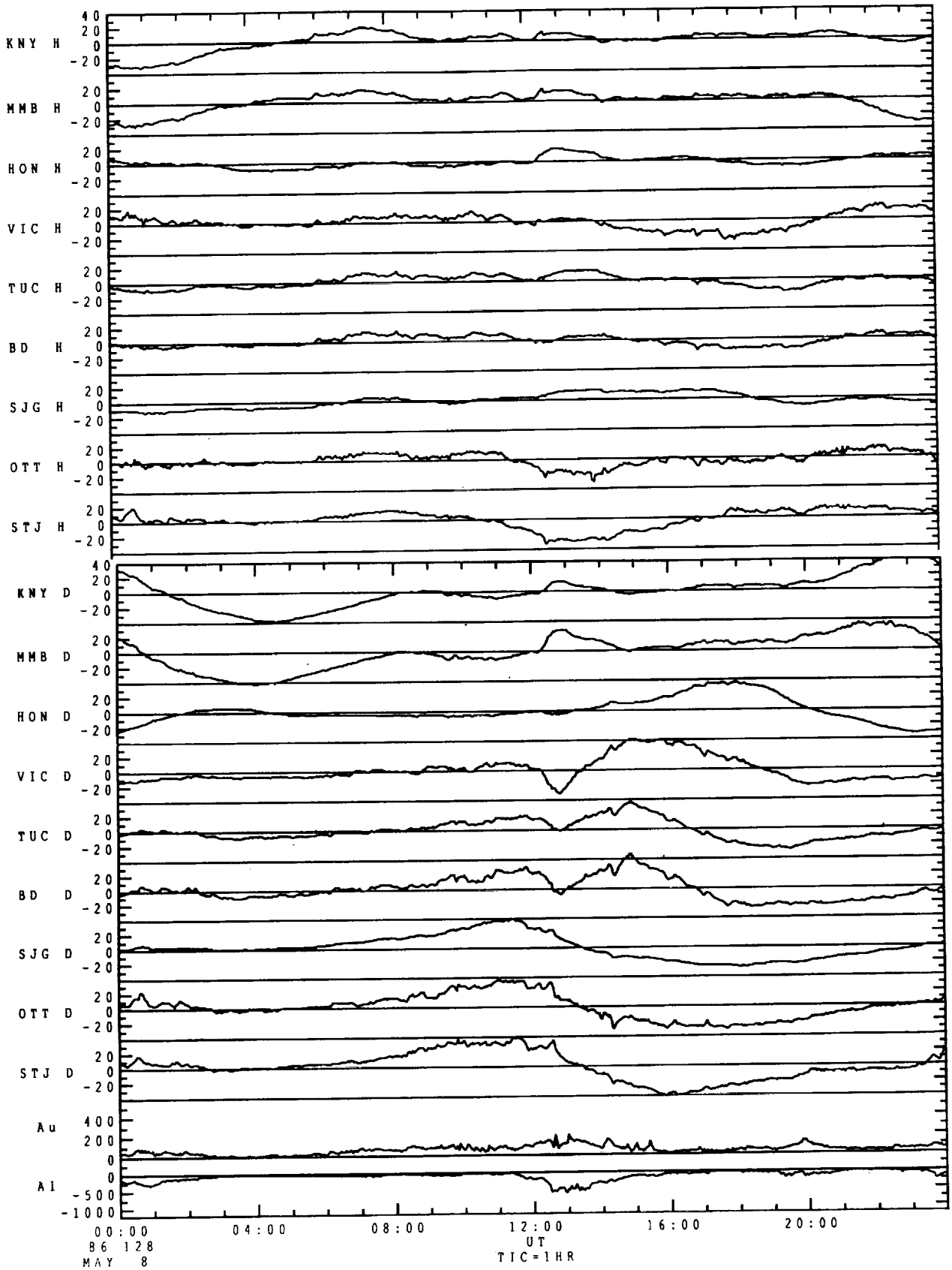
MAY 08, 1986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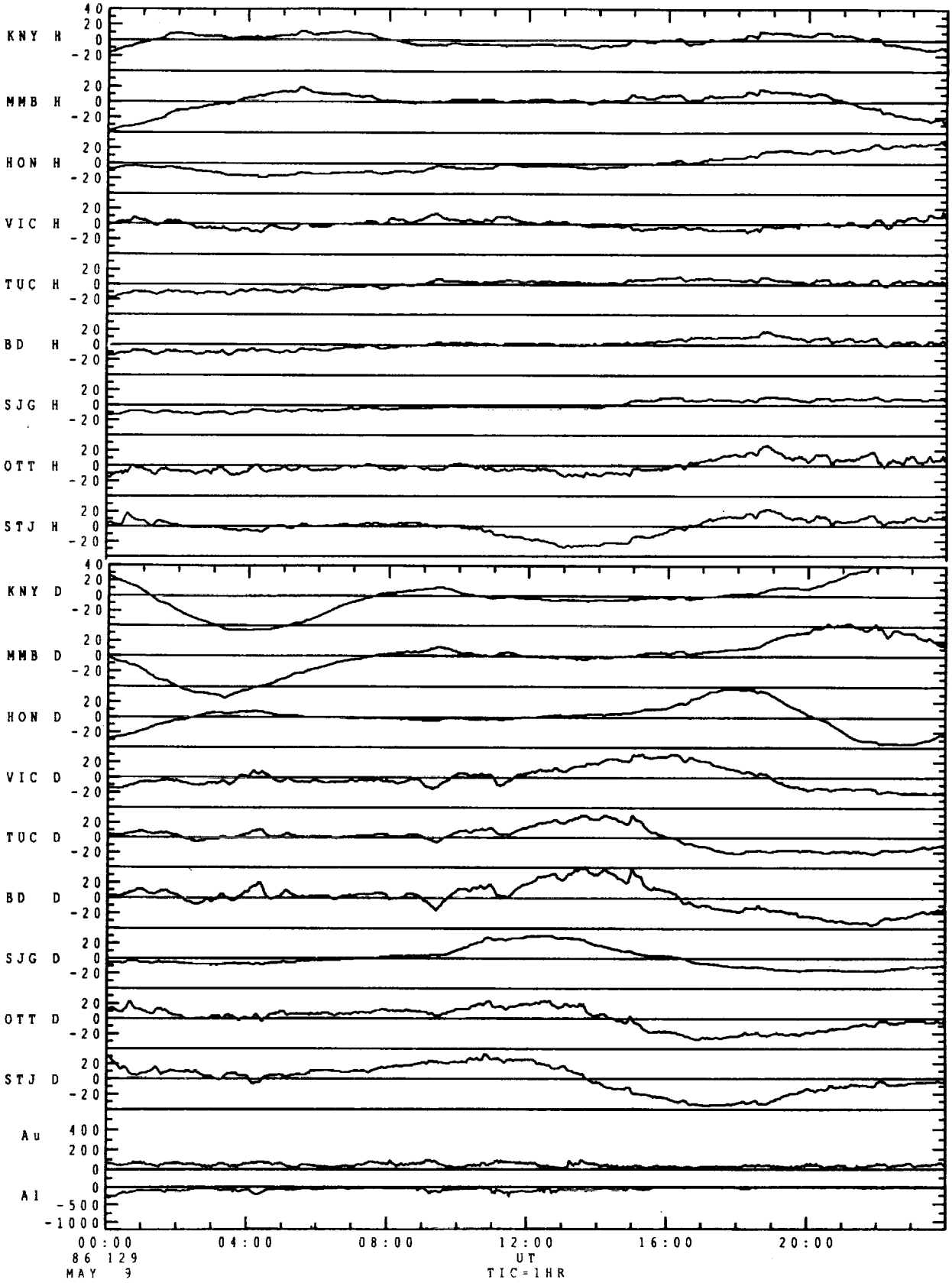
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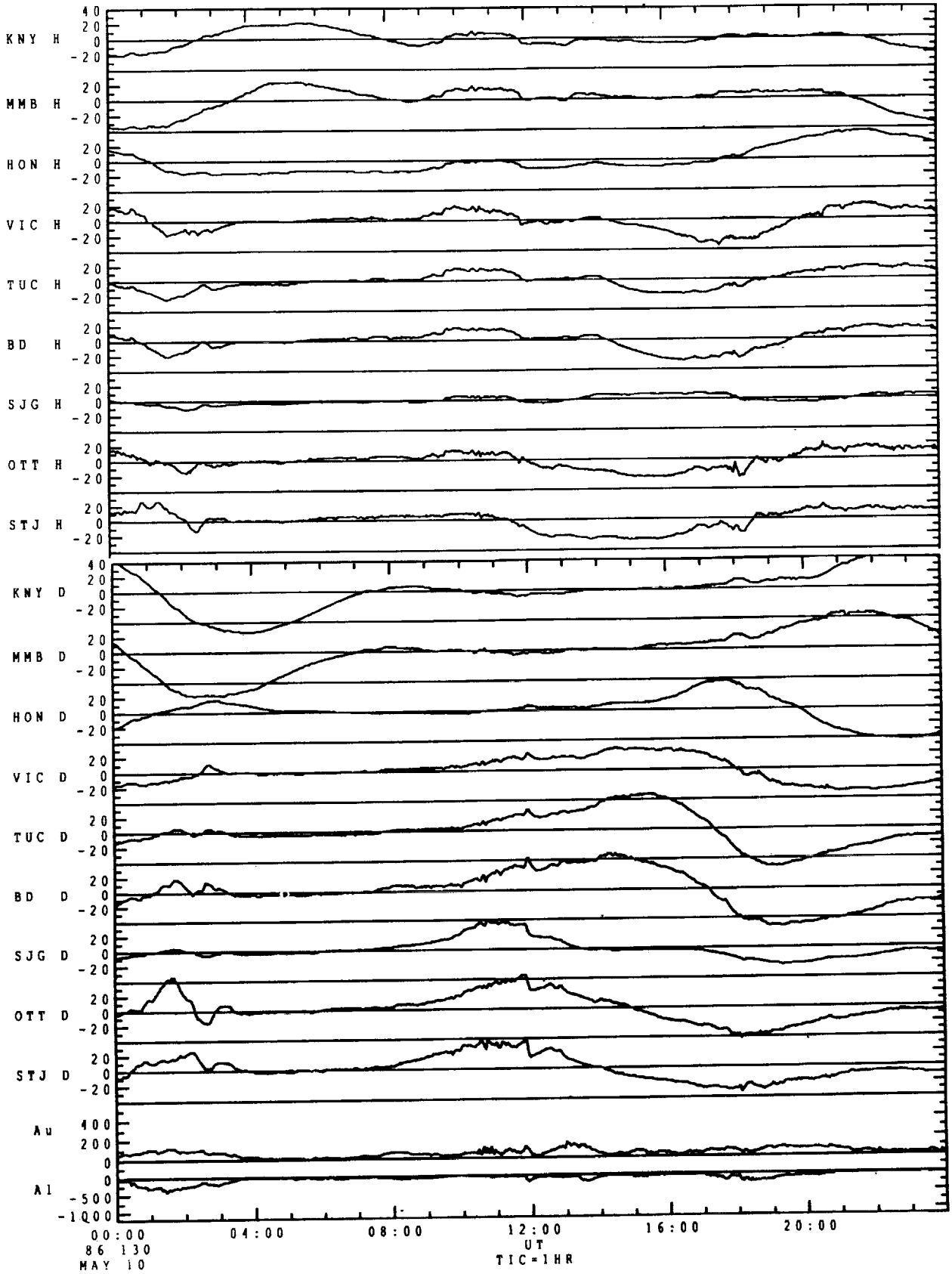
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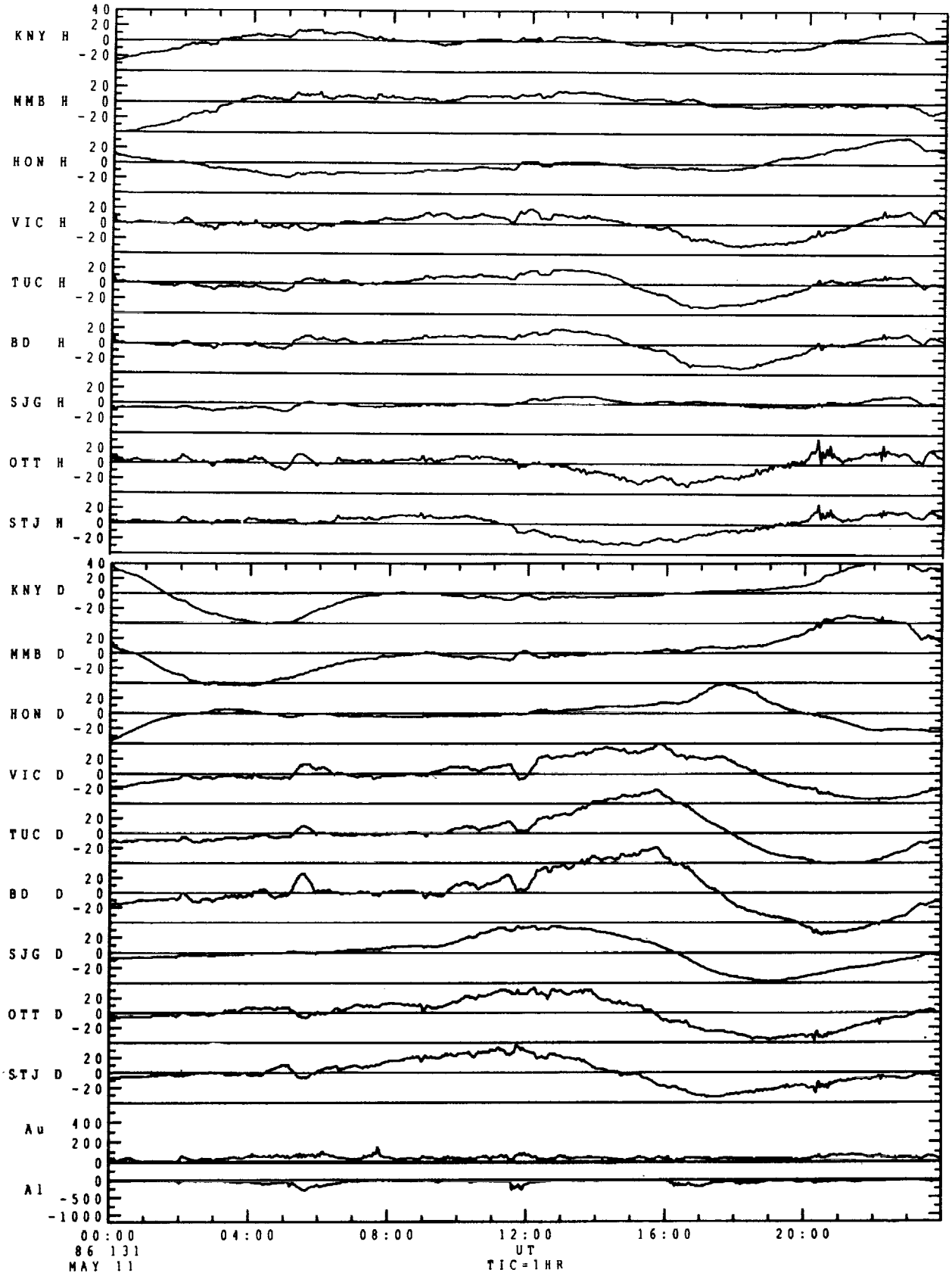
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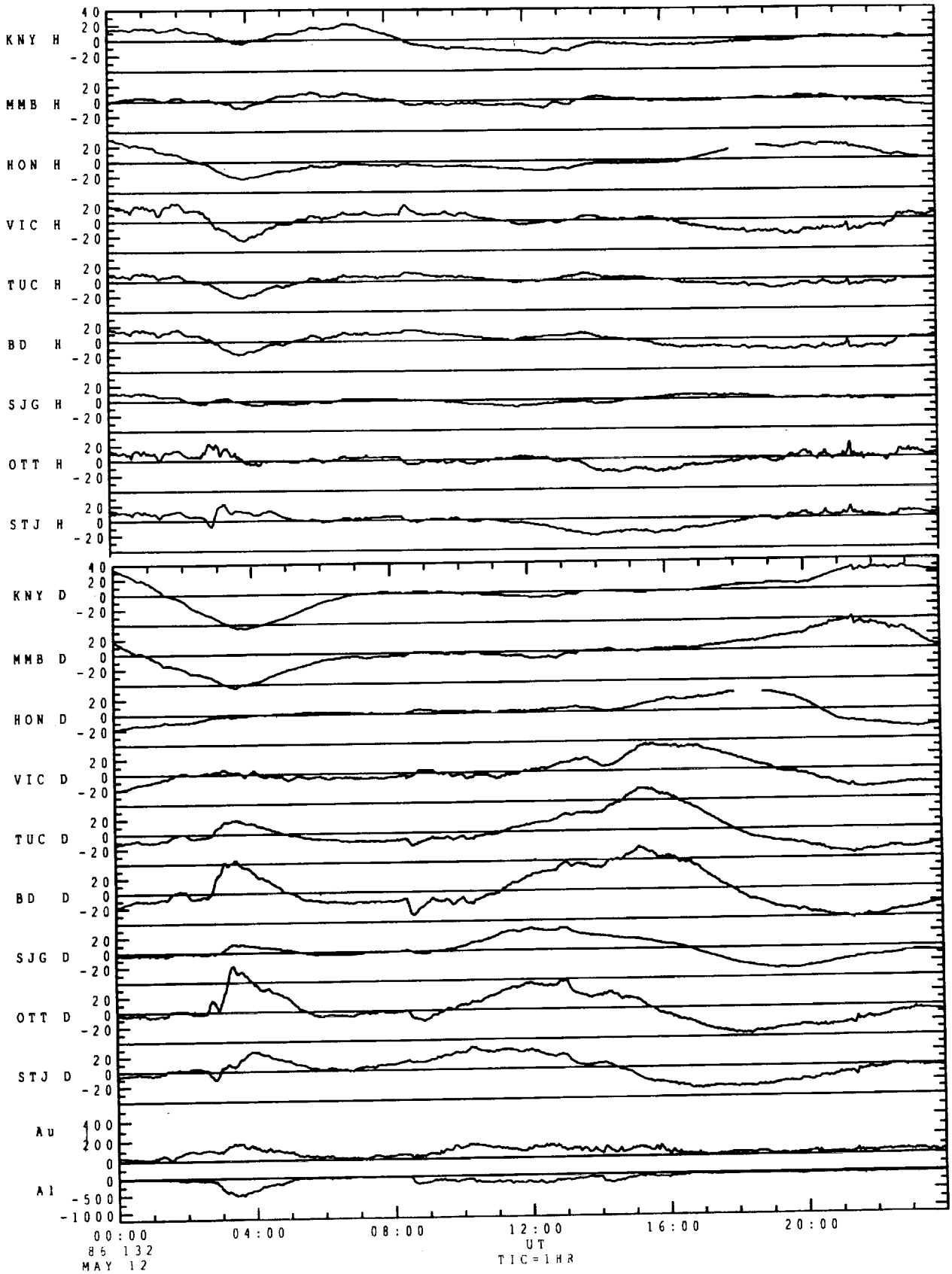
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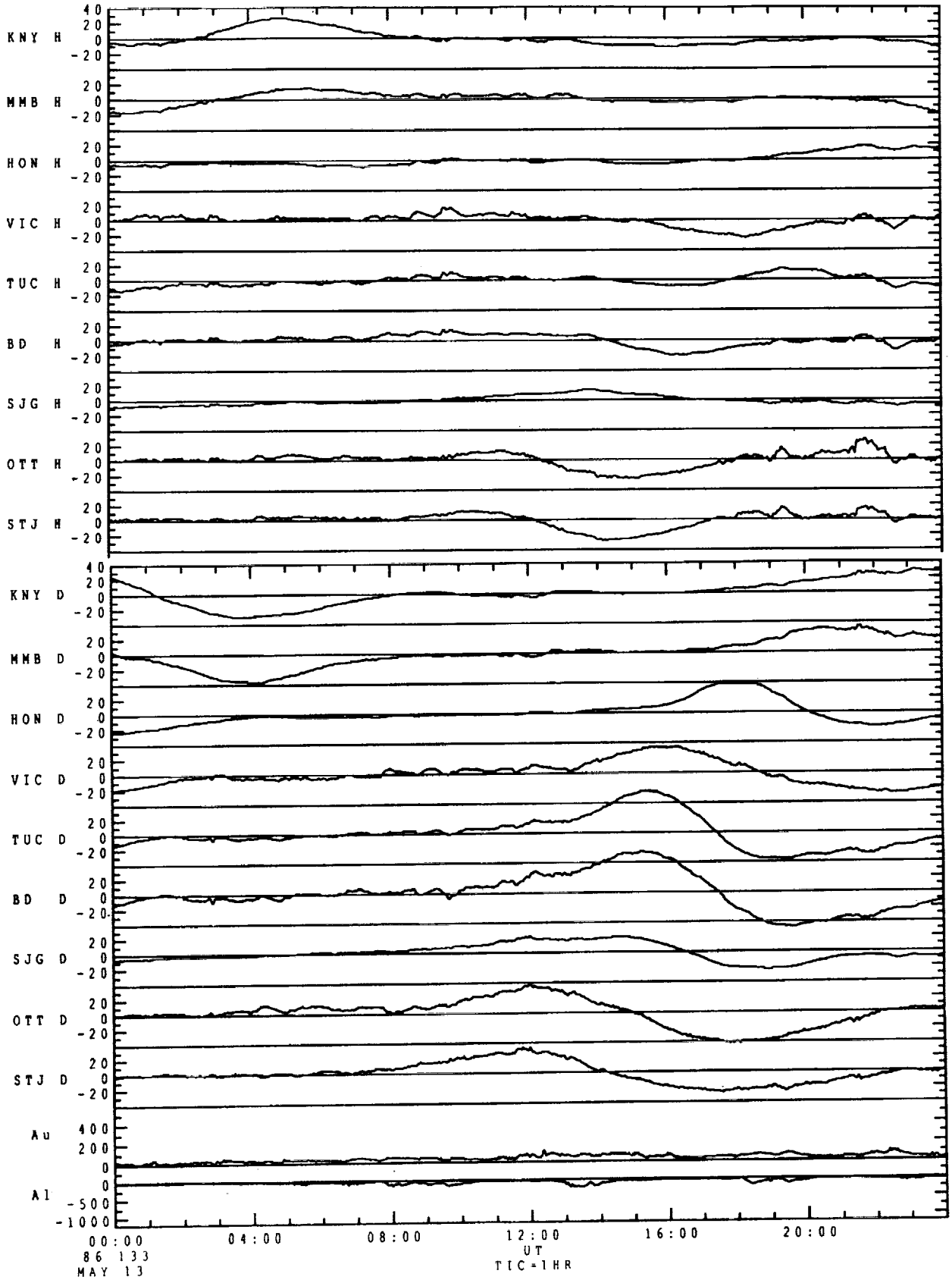
MAY 13, 1986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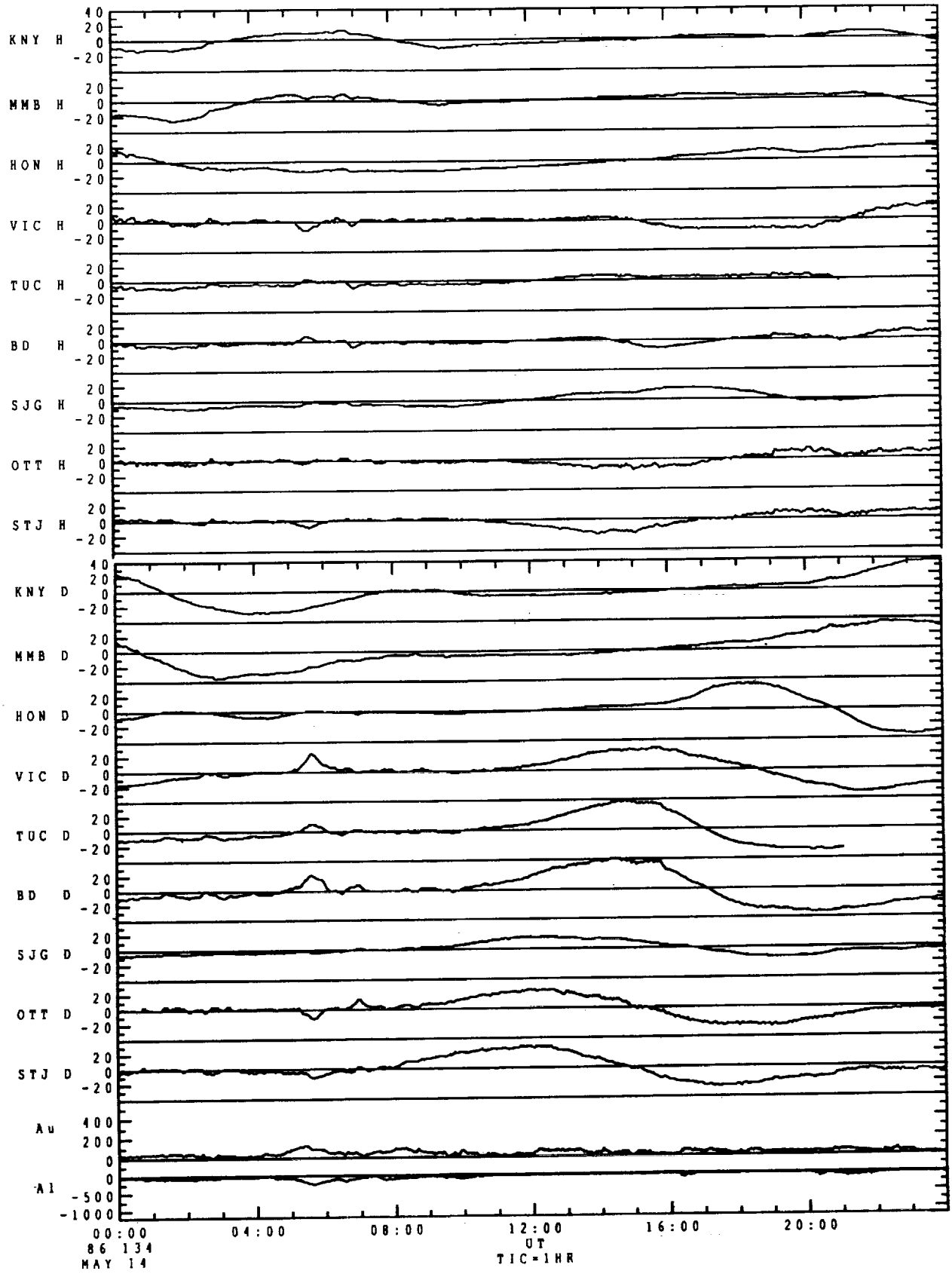
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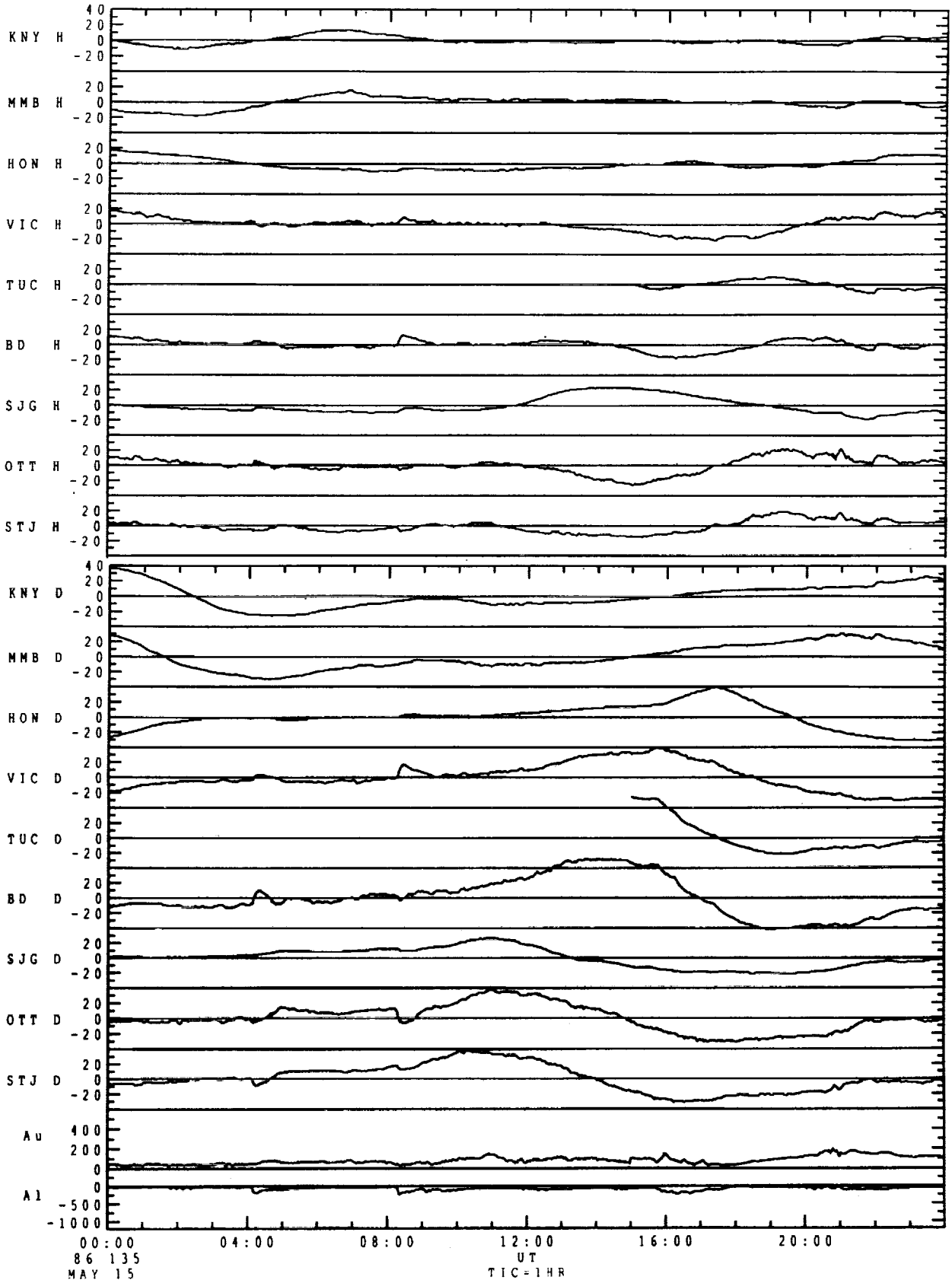
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MAY 16, 1986

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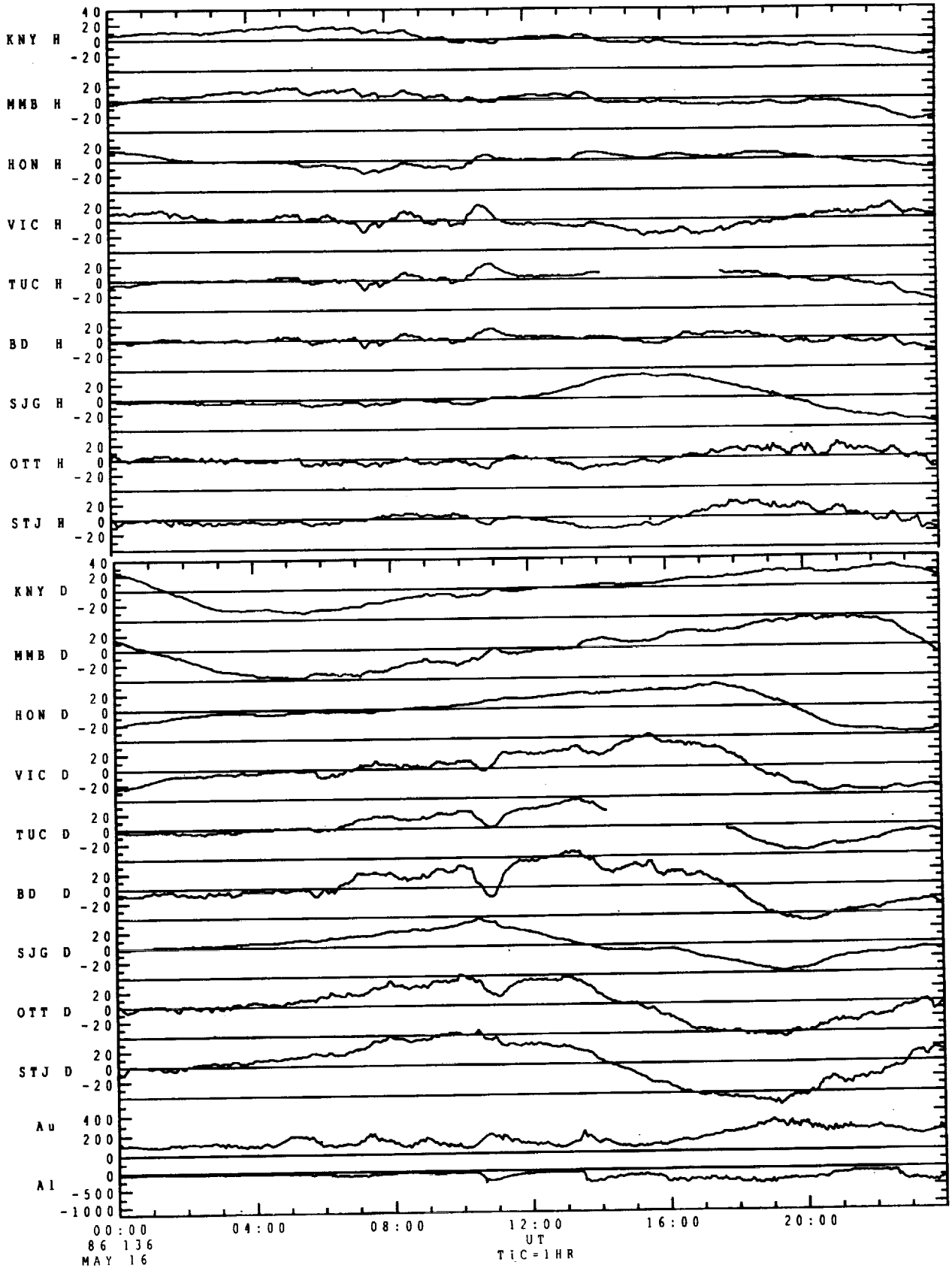

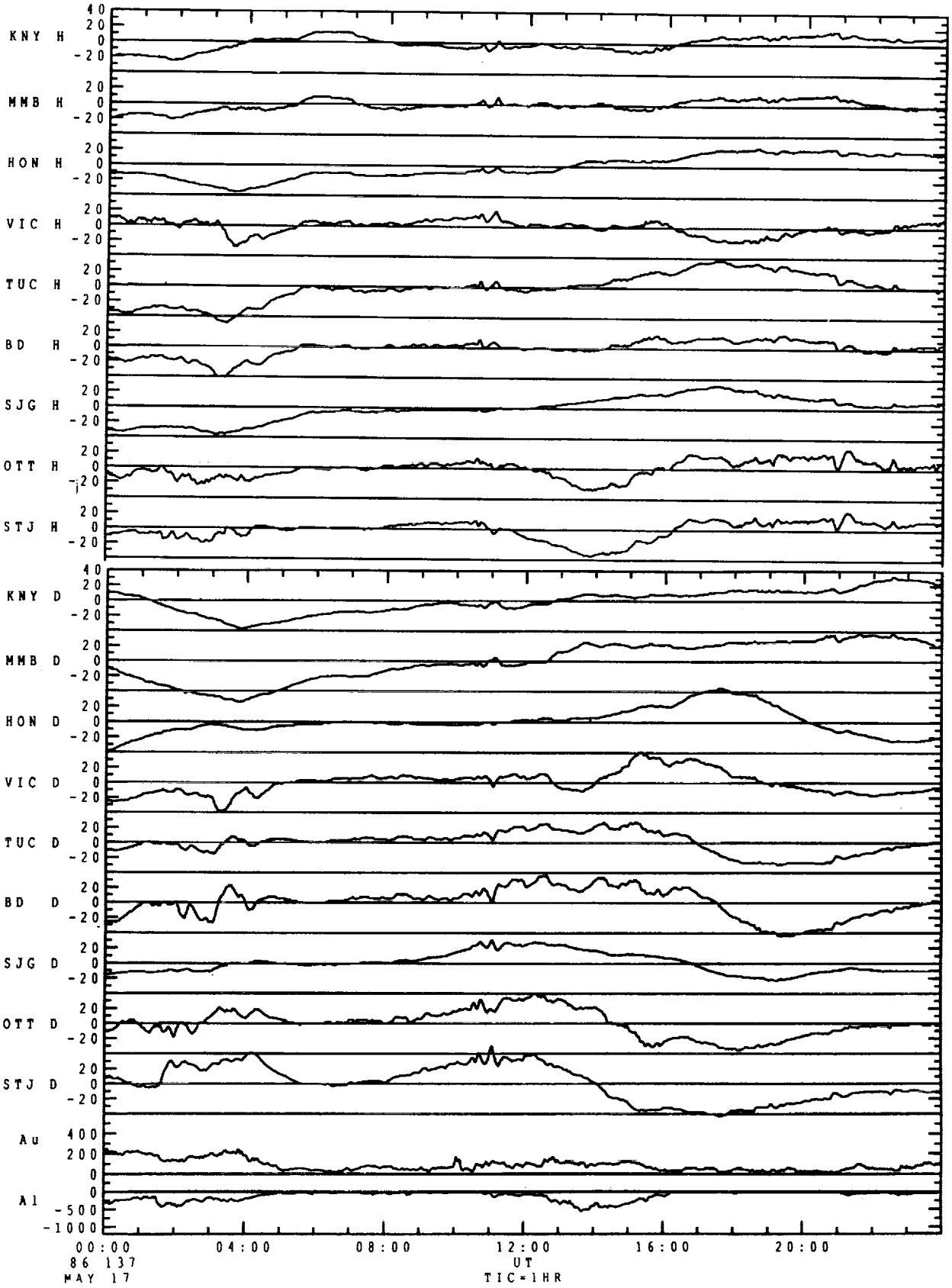
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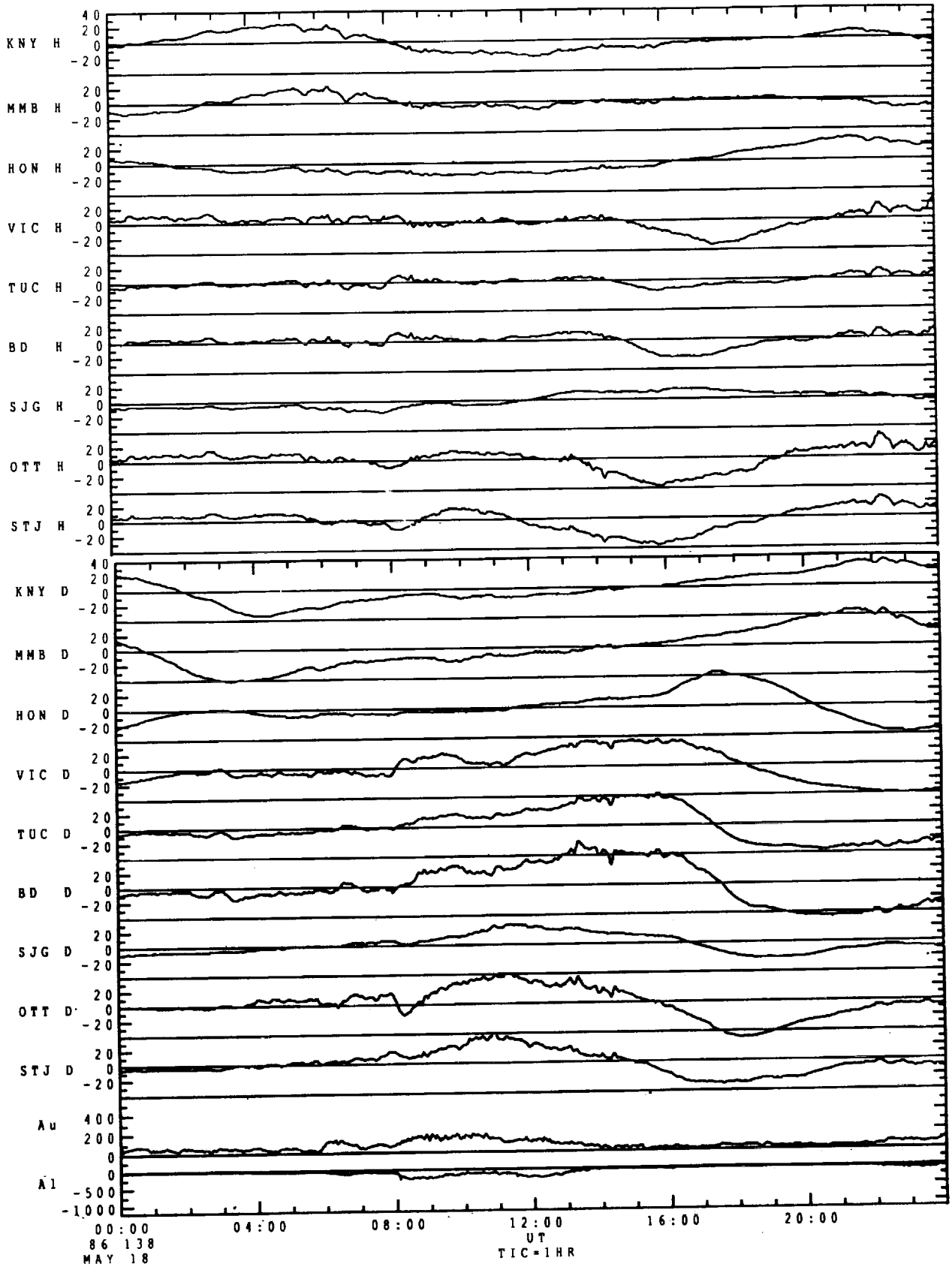
MAY 18, 1986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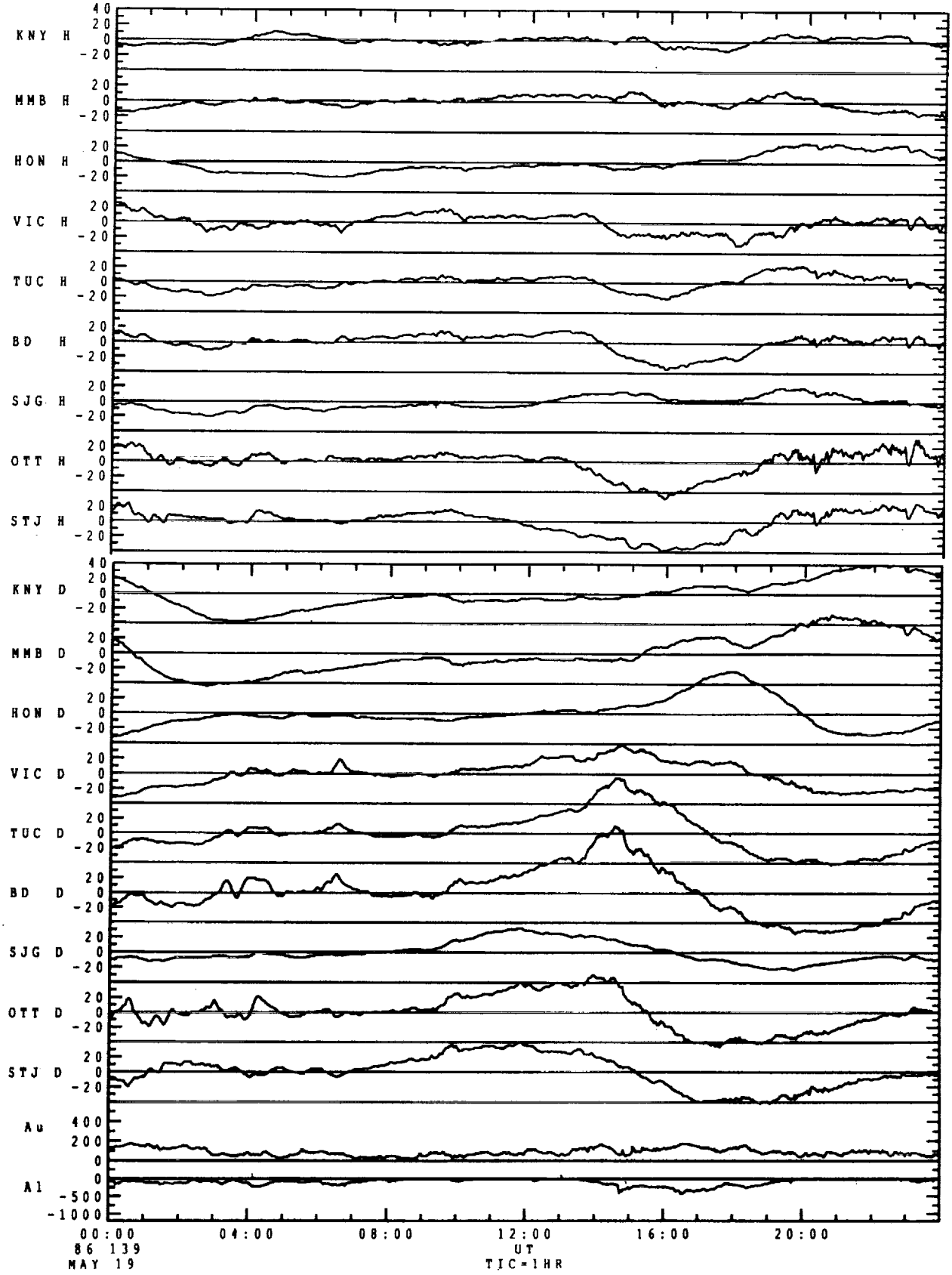
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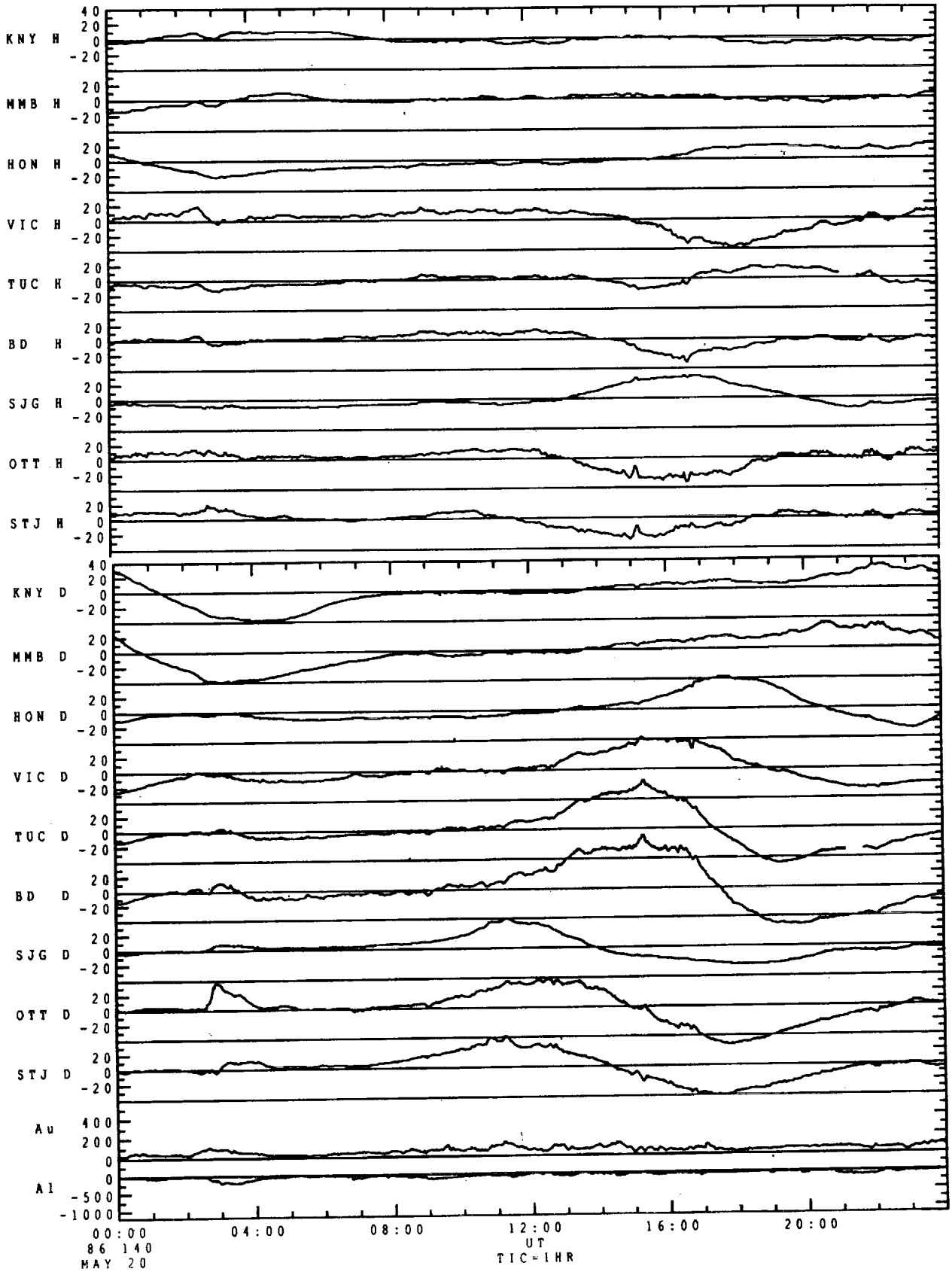
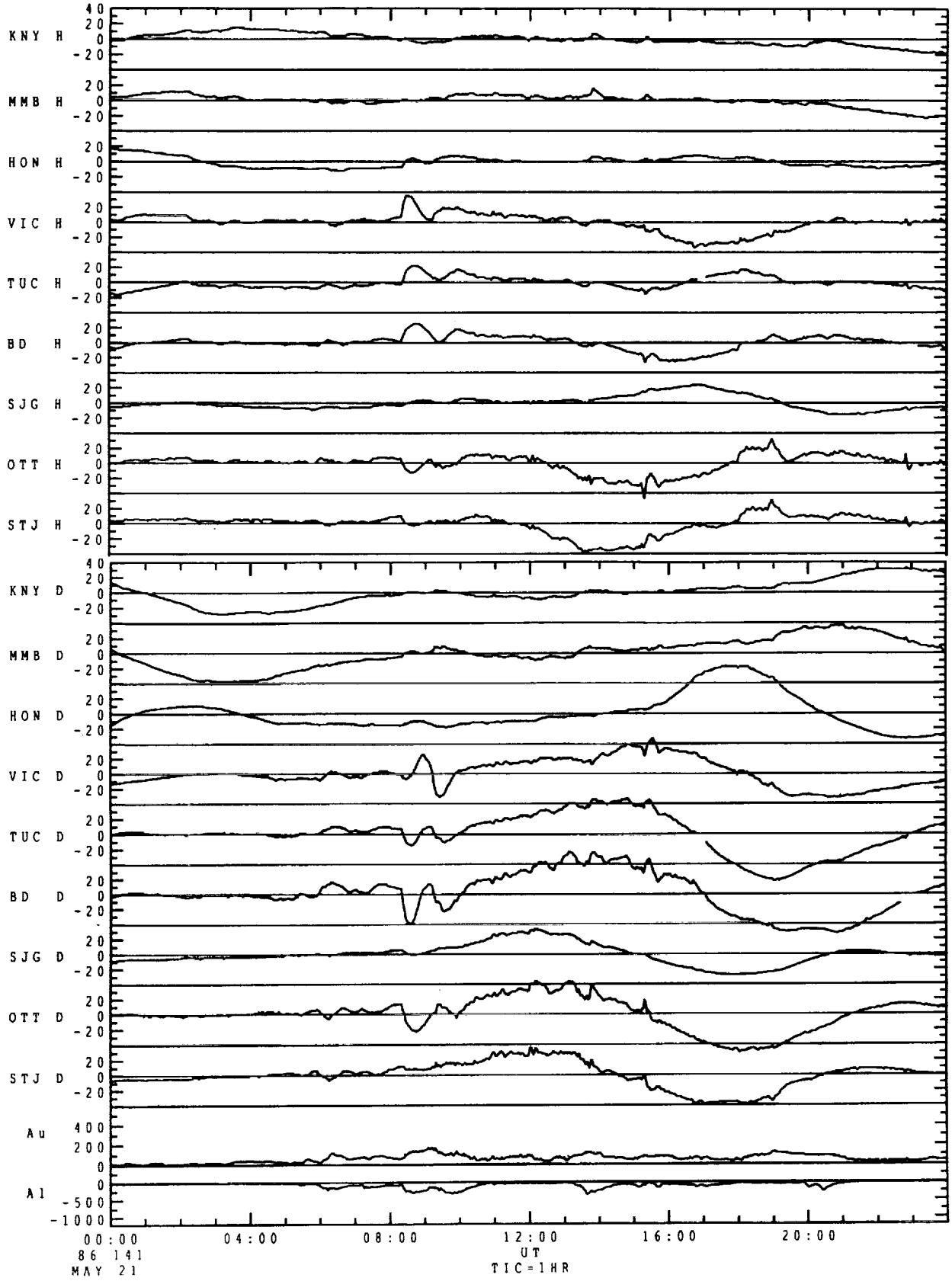
MAY 20, 1986

UCLA IGPP 90 JAN

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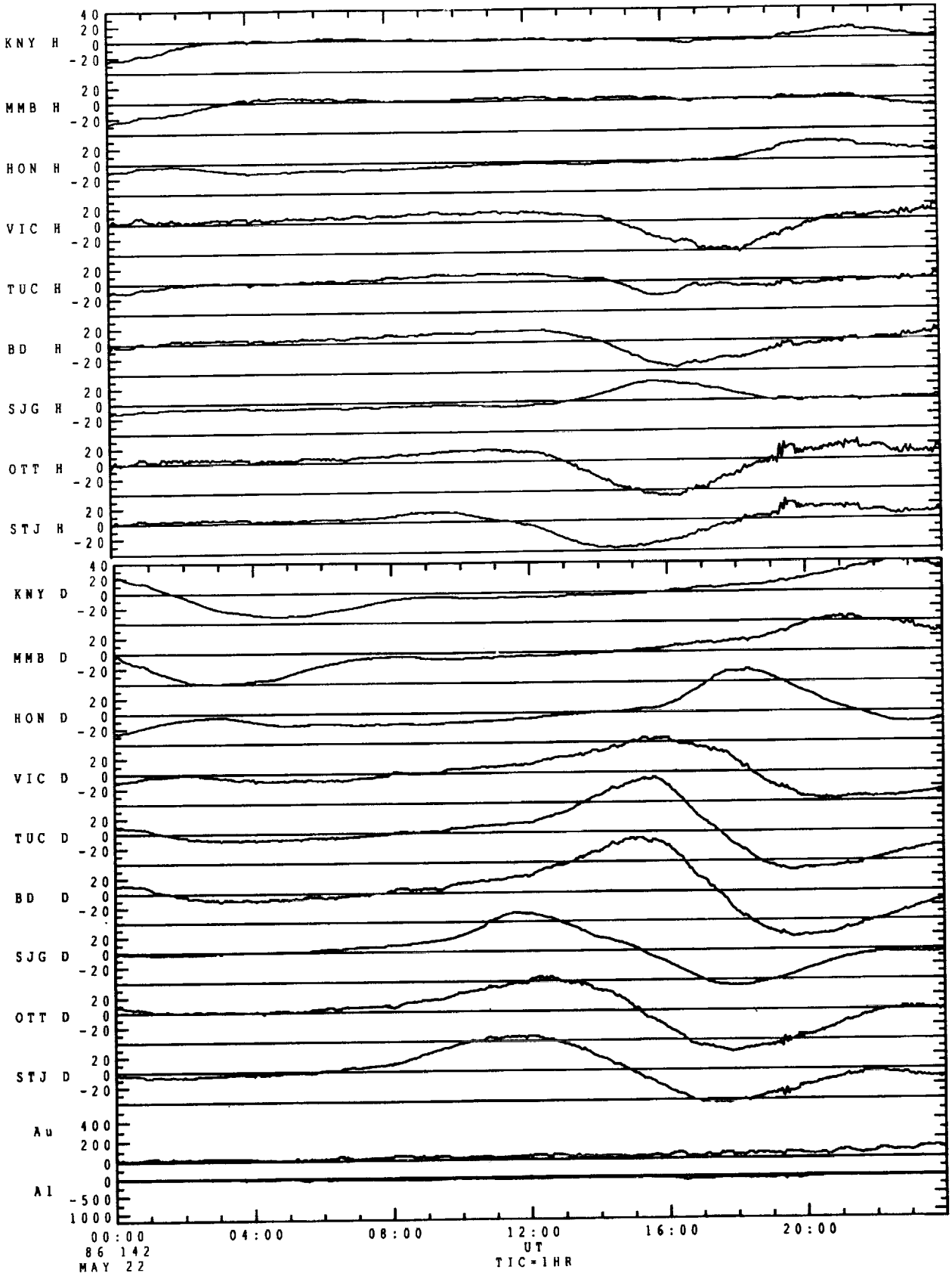
MAY 22, 1986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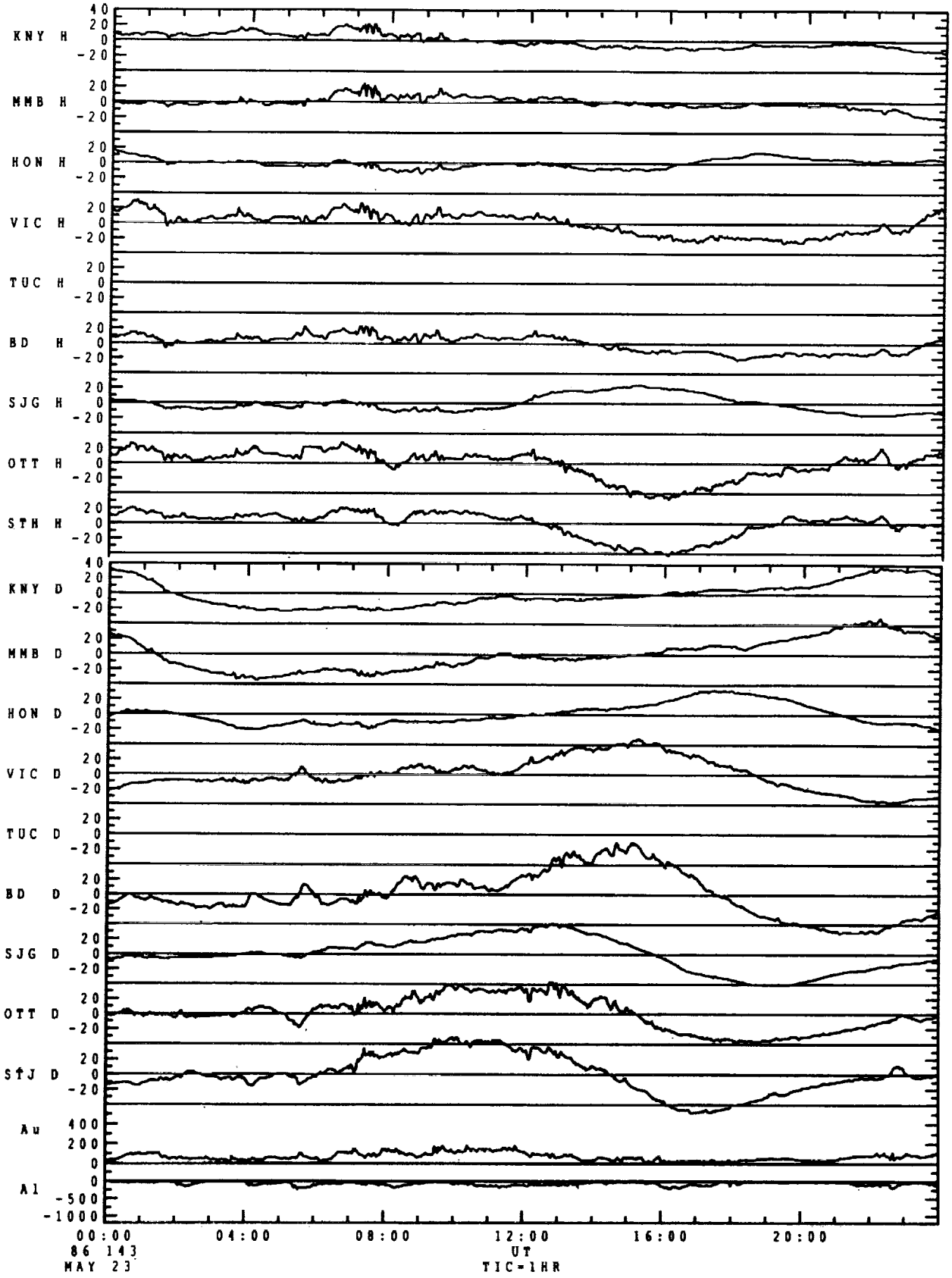
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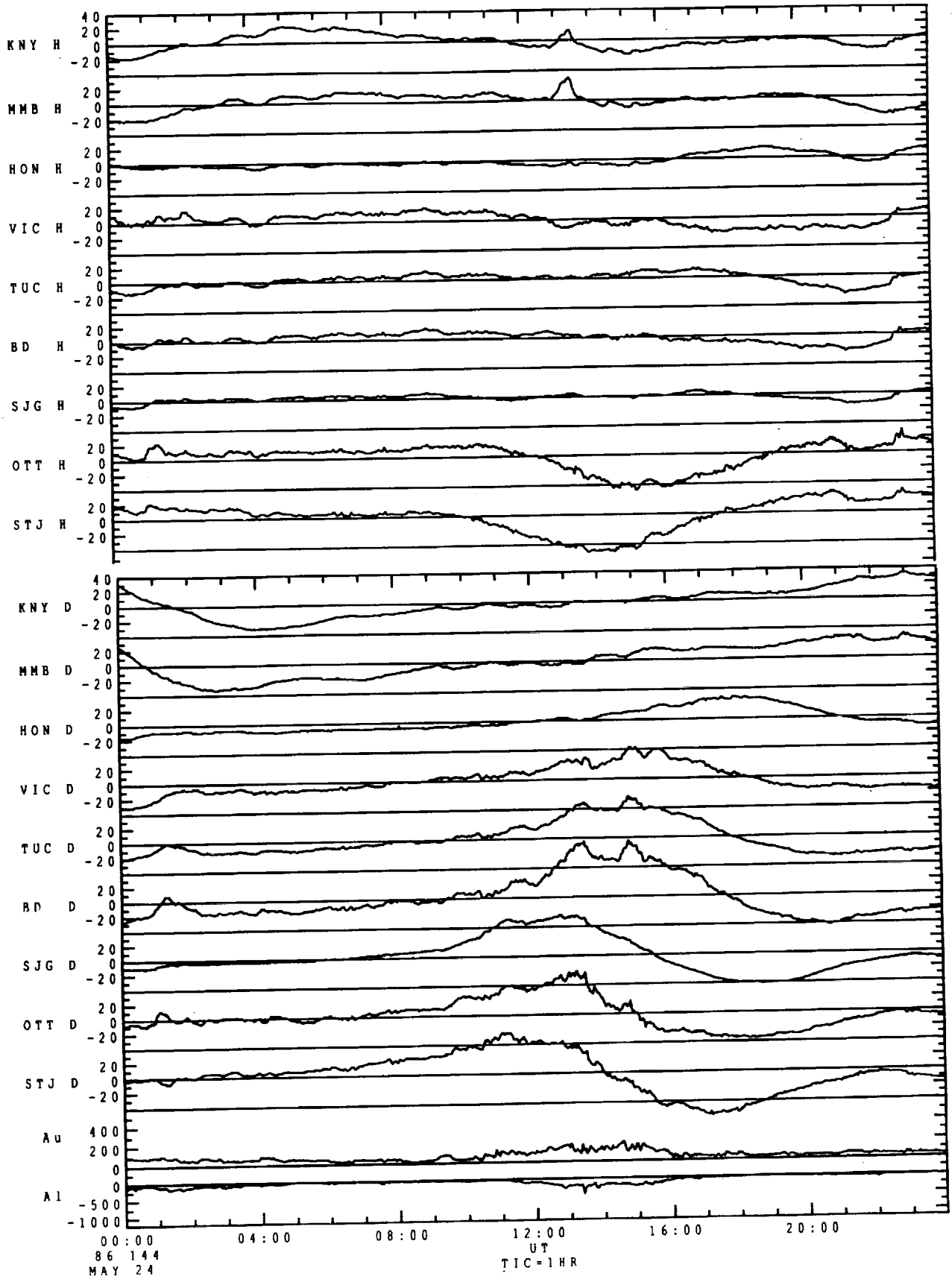
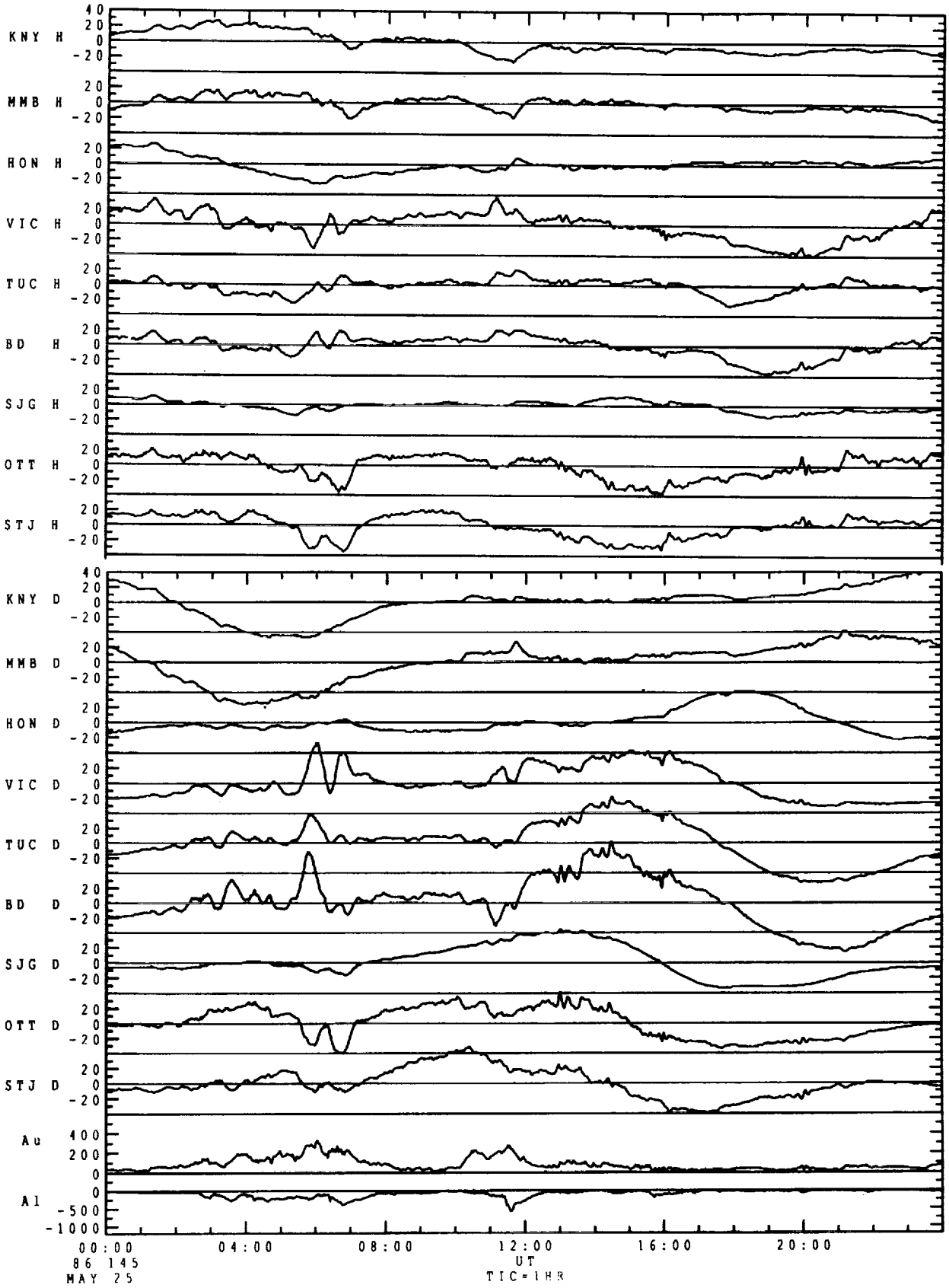
MAY 24, 1986

UCLA IGPP 90 JAN

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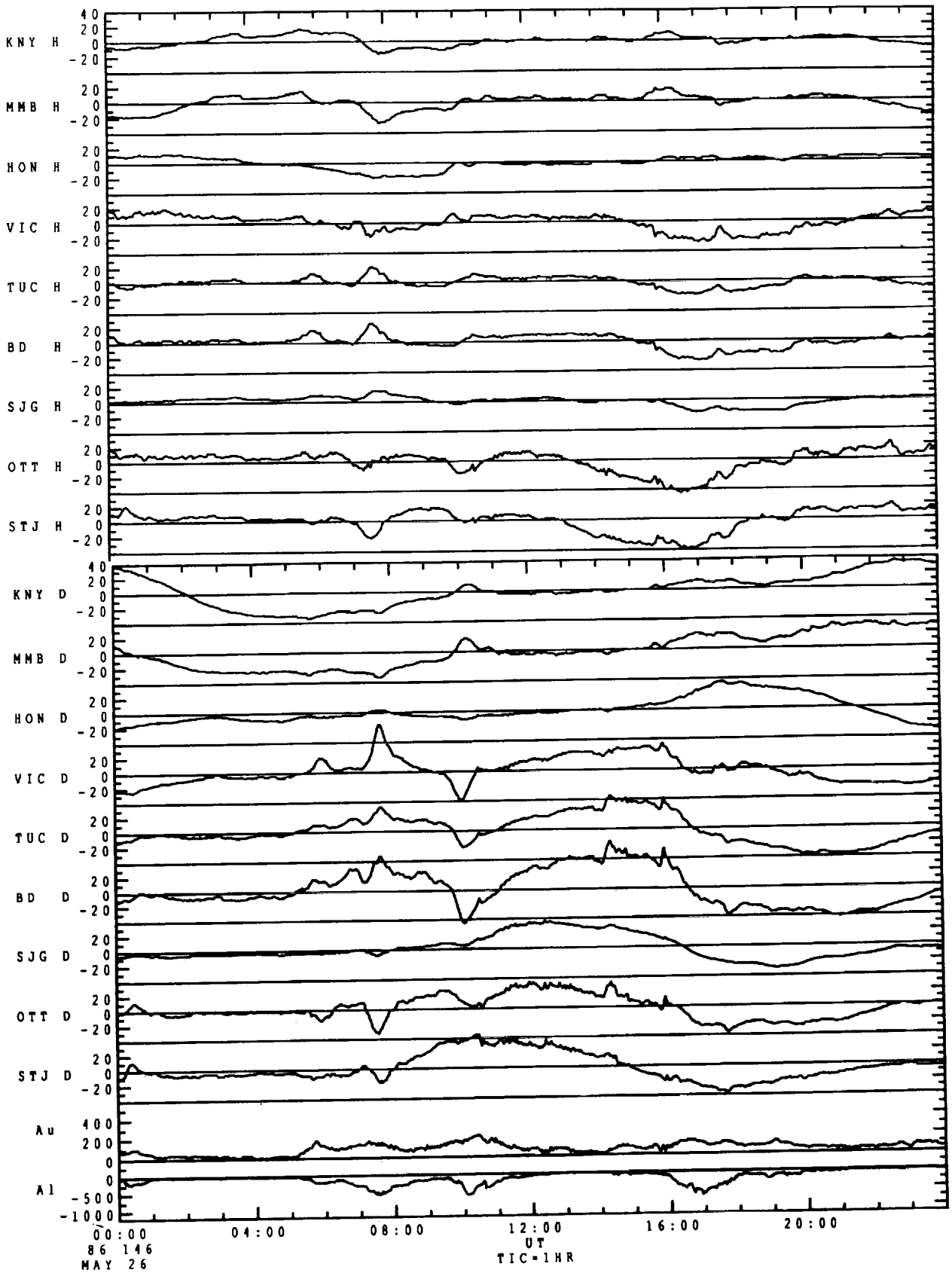
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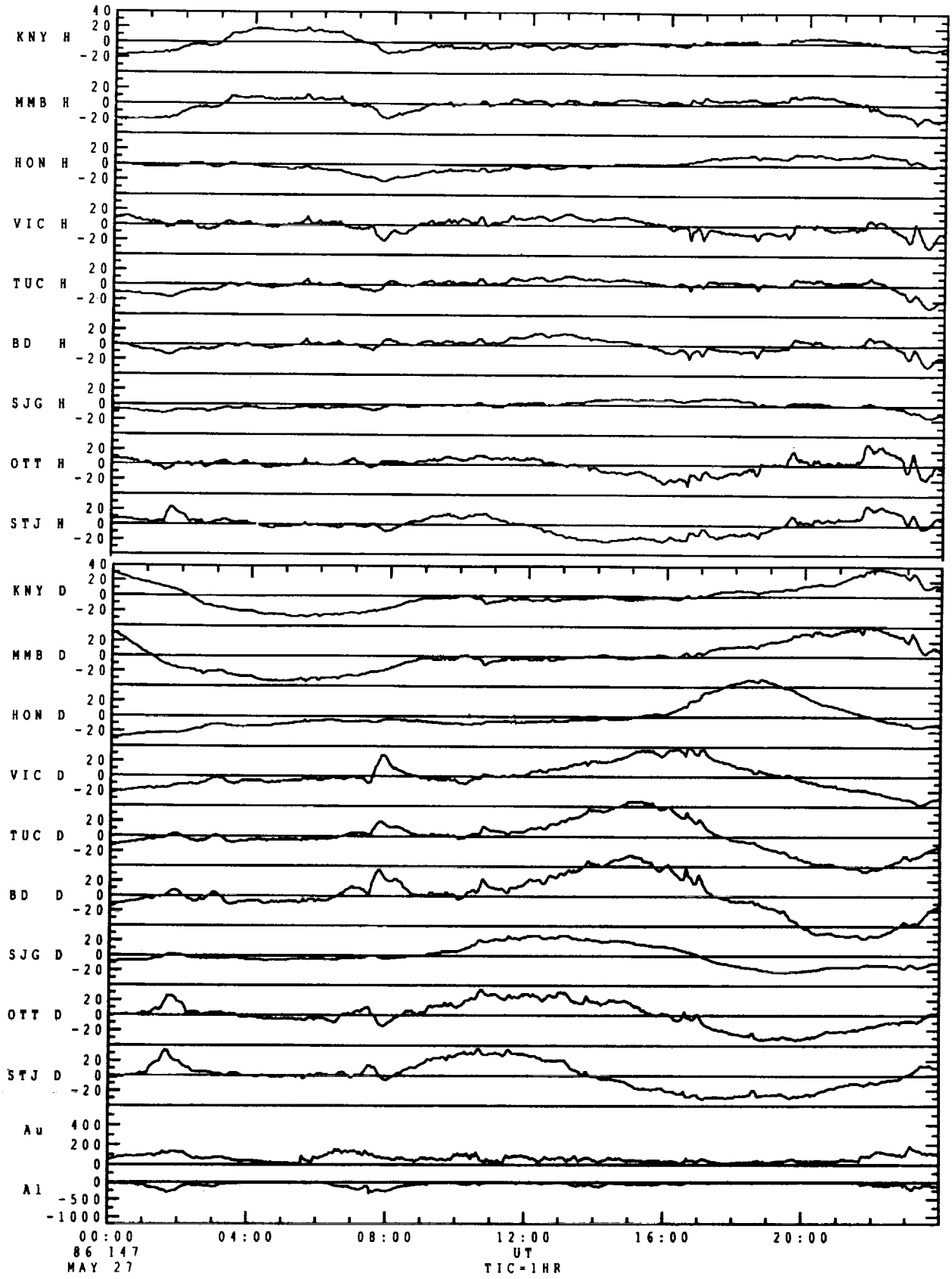
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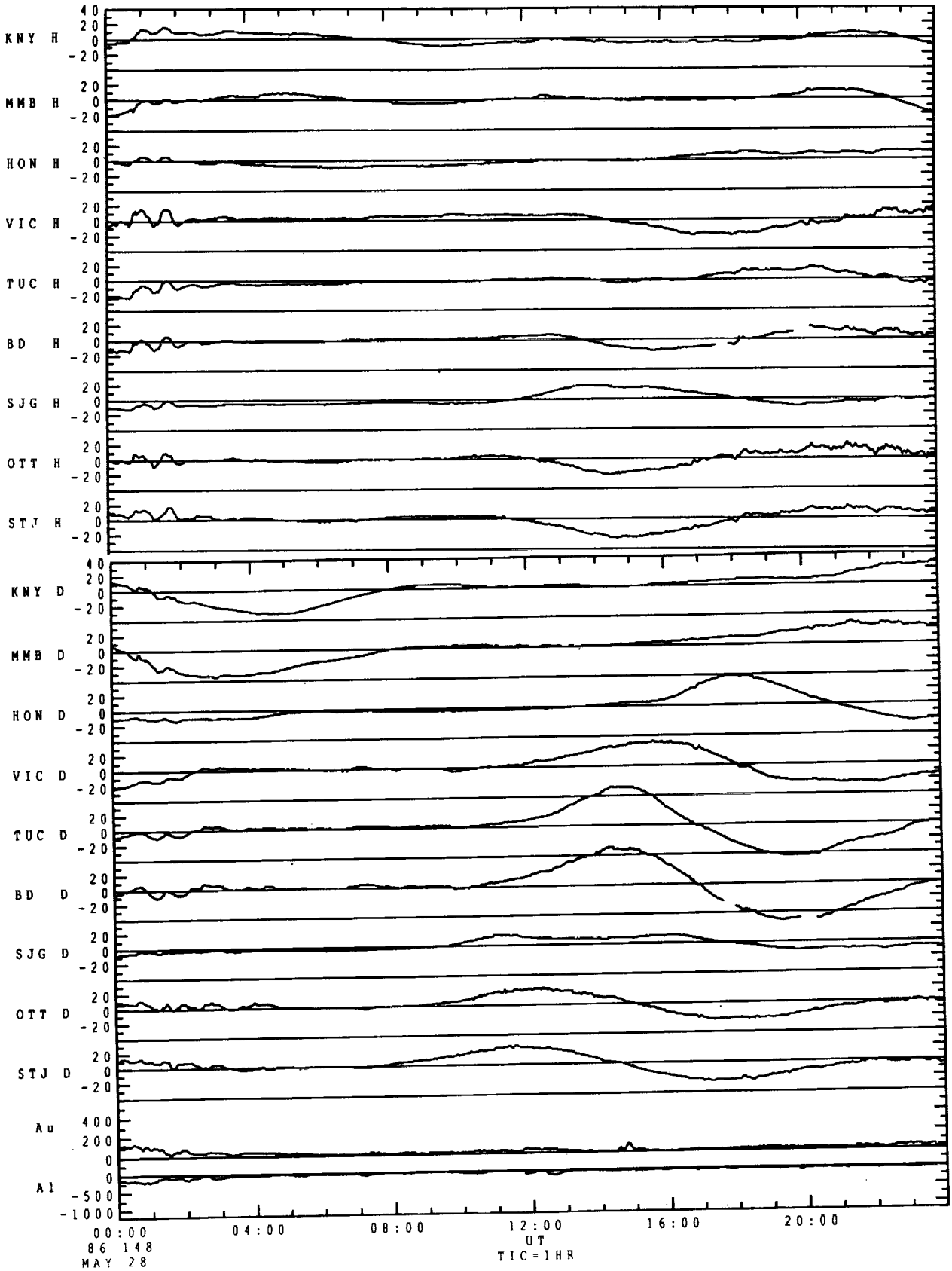
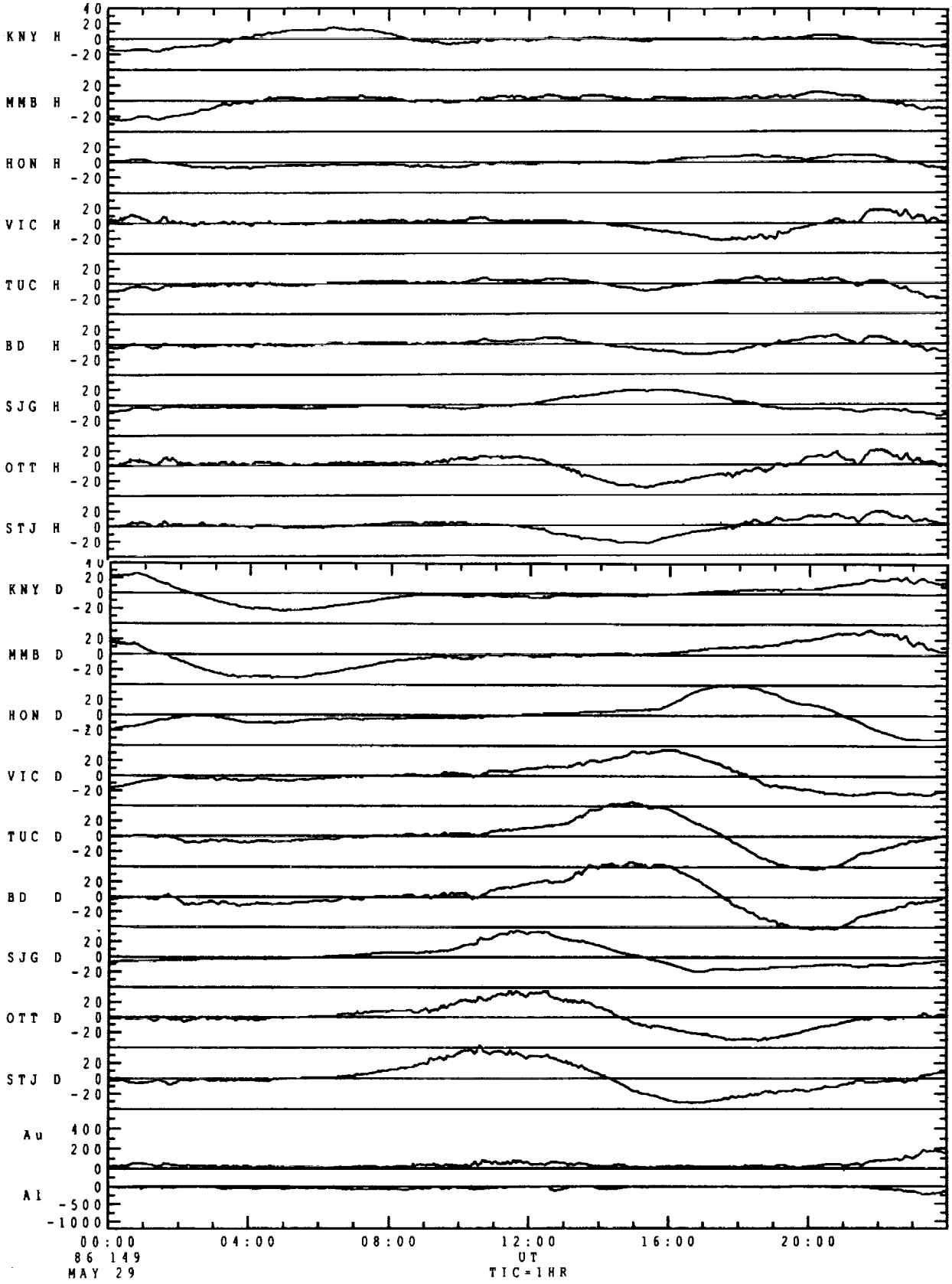
MAY 28, 1986

UCLA IGPP 90 JAN

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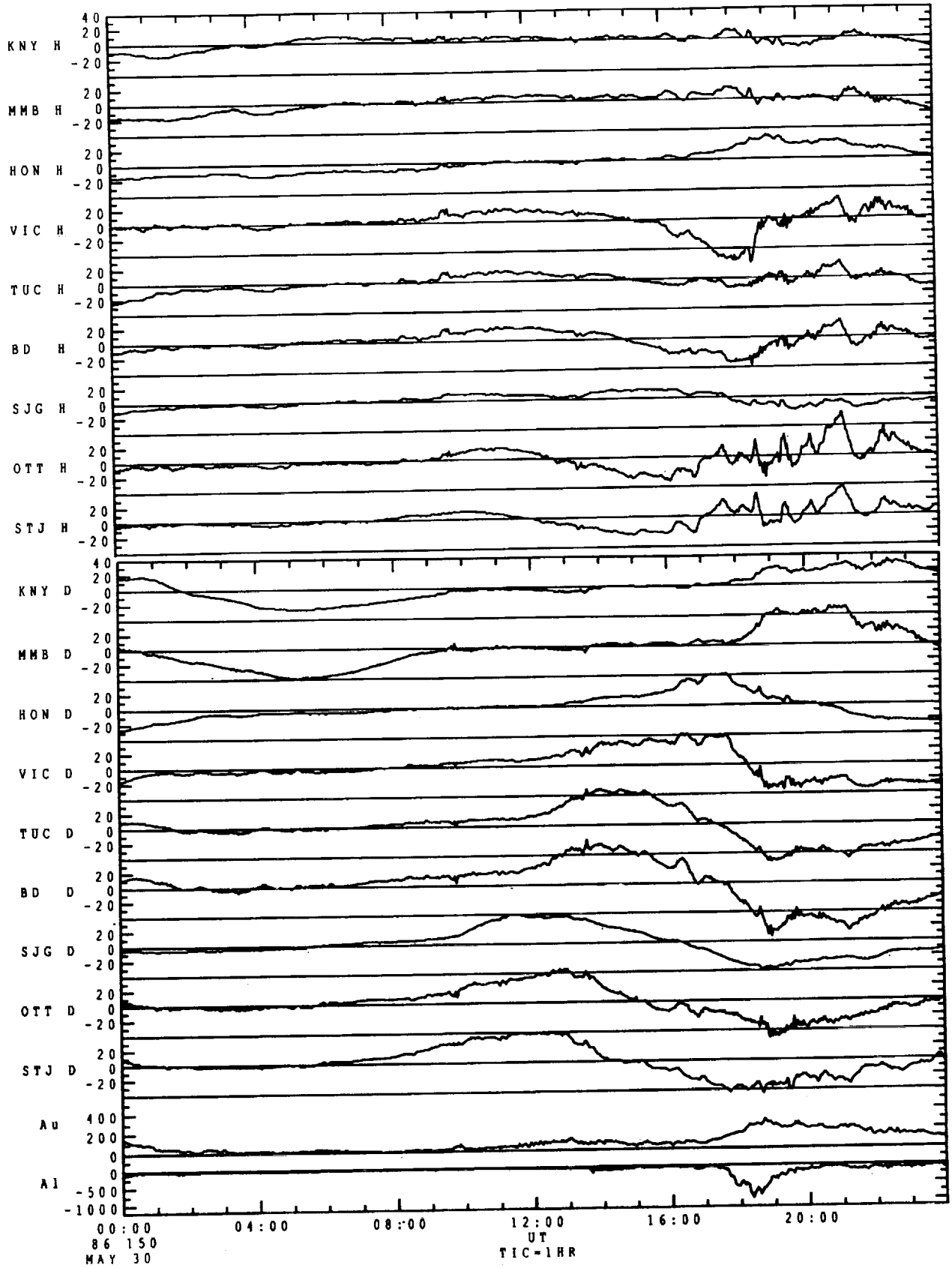
MAY 30, 1986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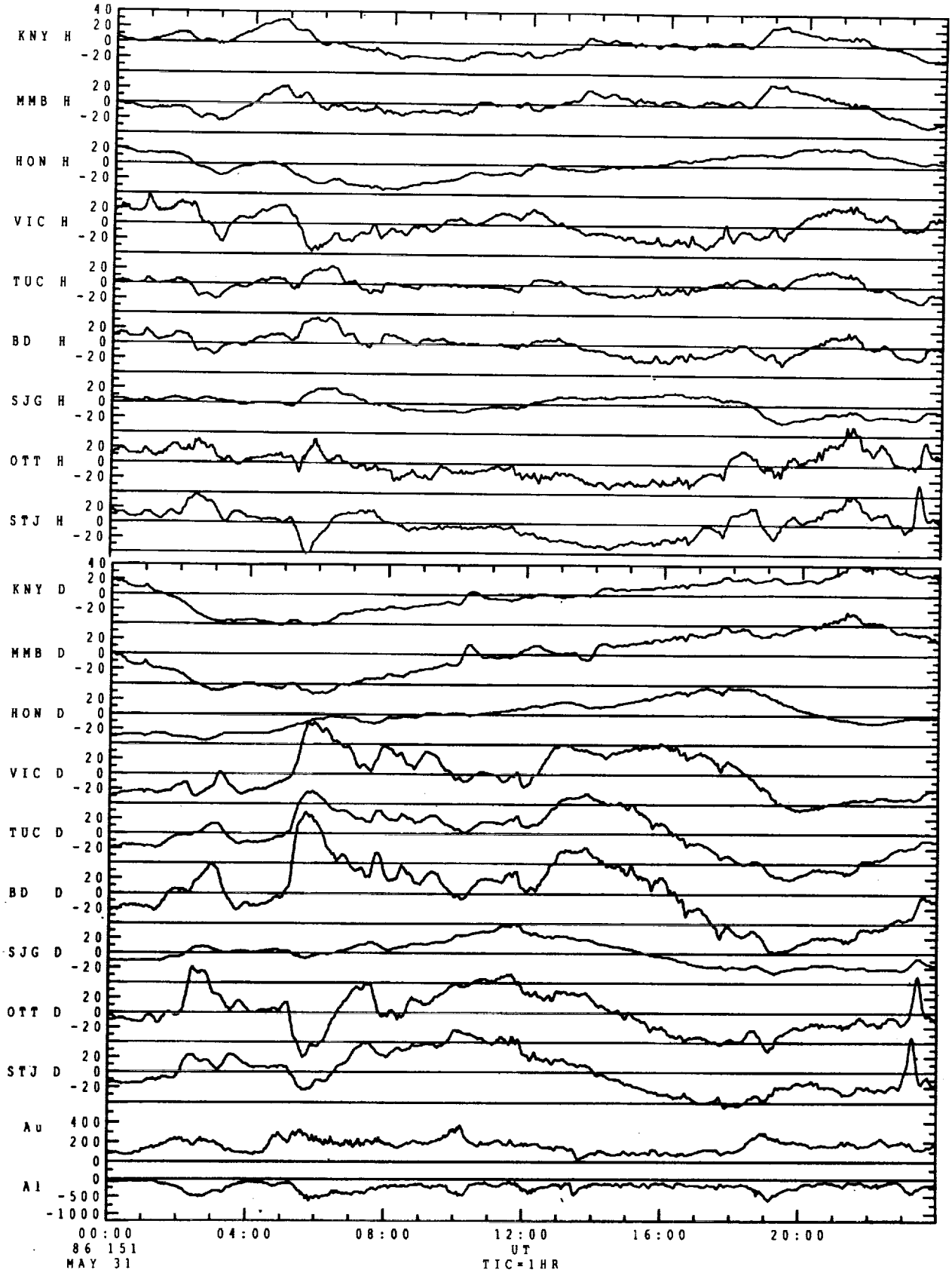
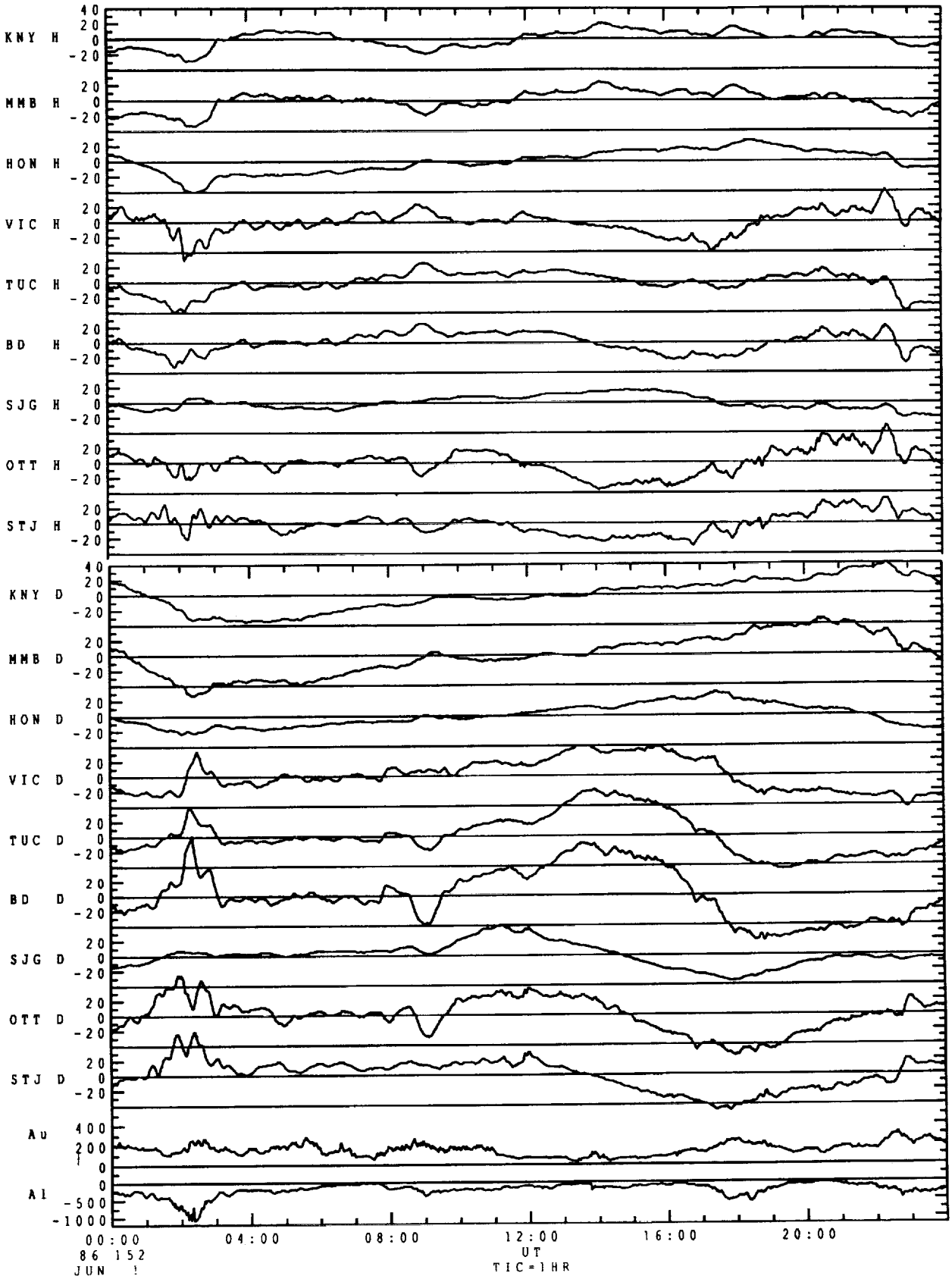
MAY 31, 1986

UCLA IGPP 90 JAN

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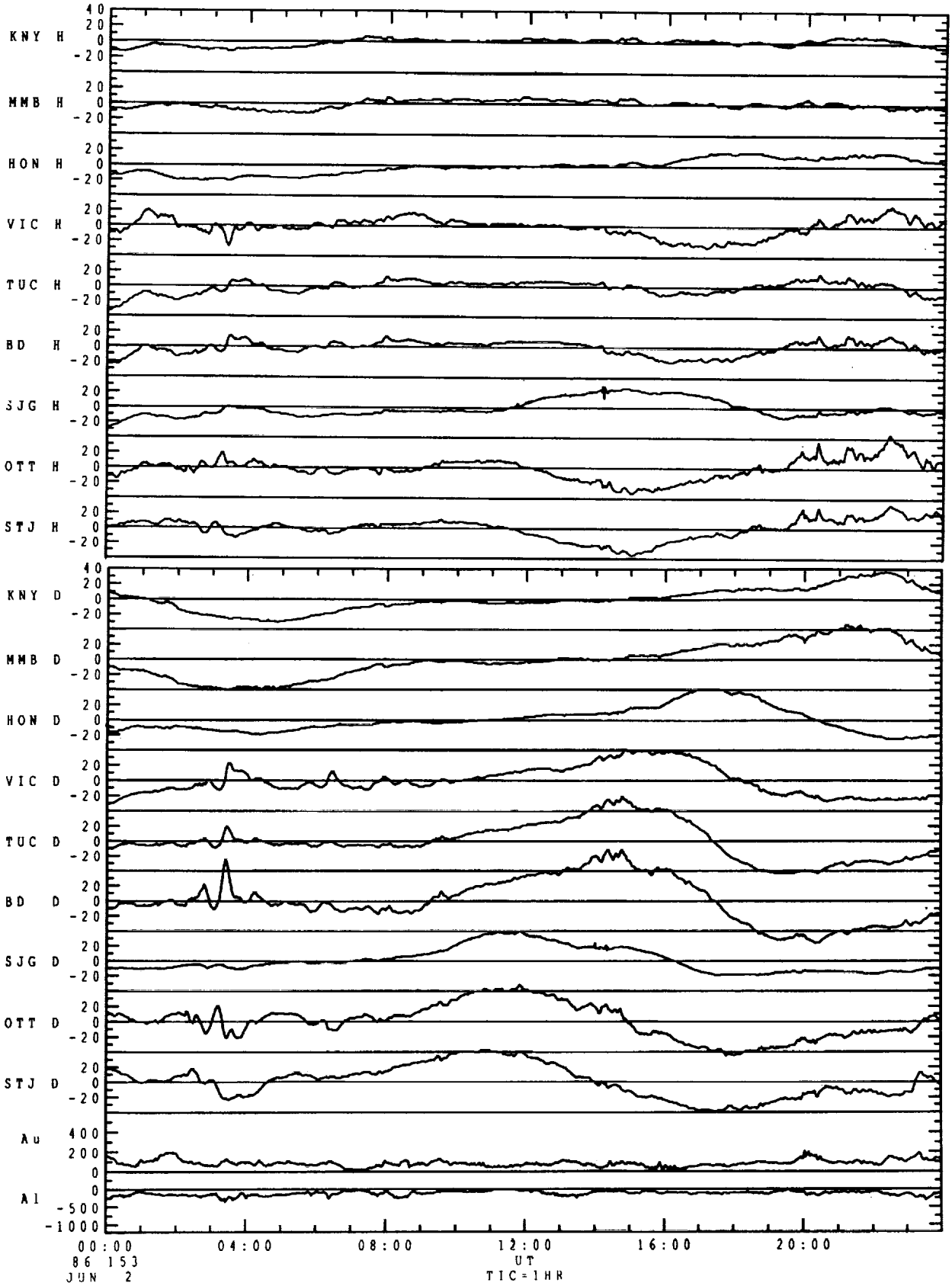
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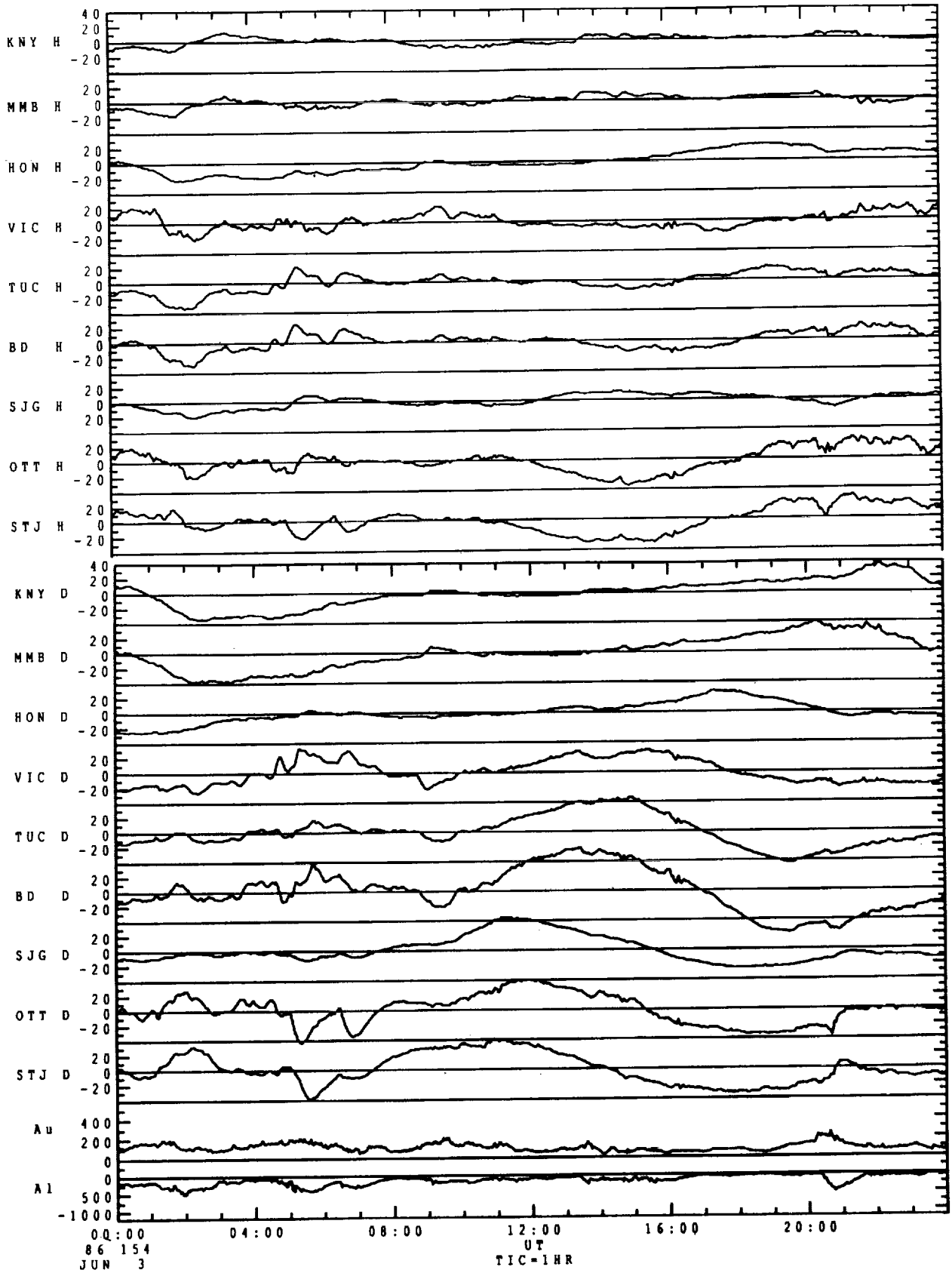
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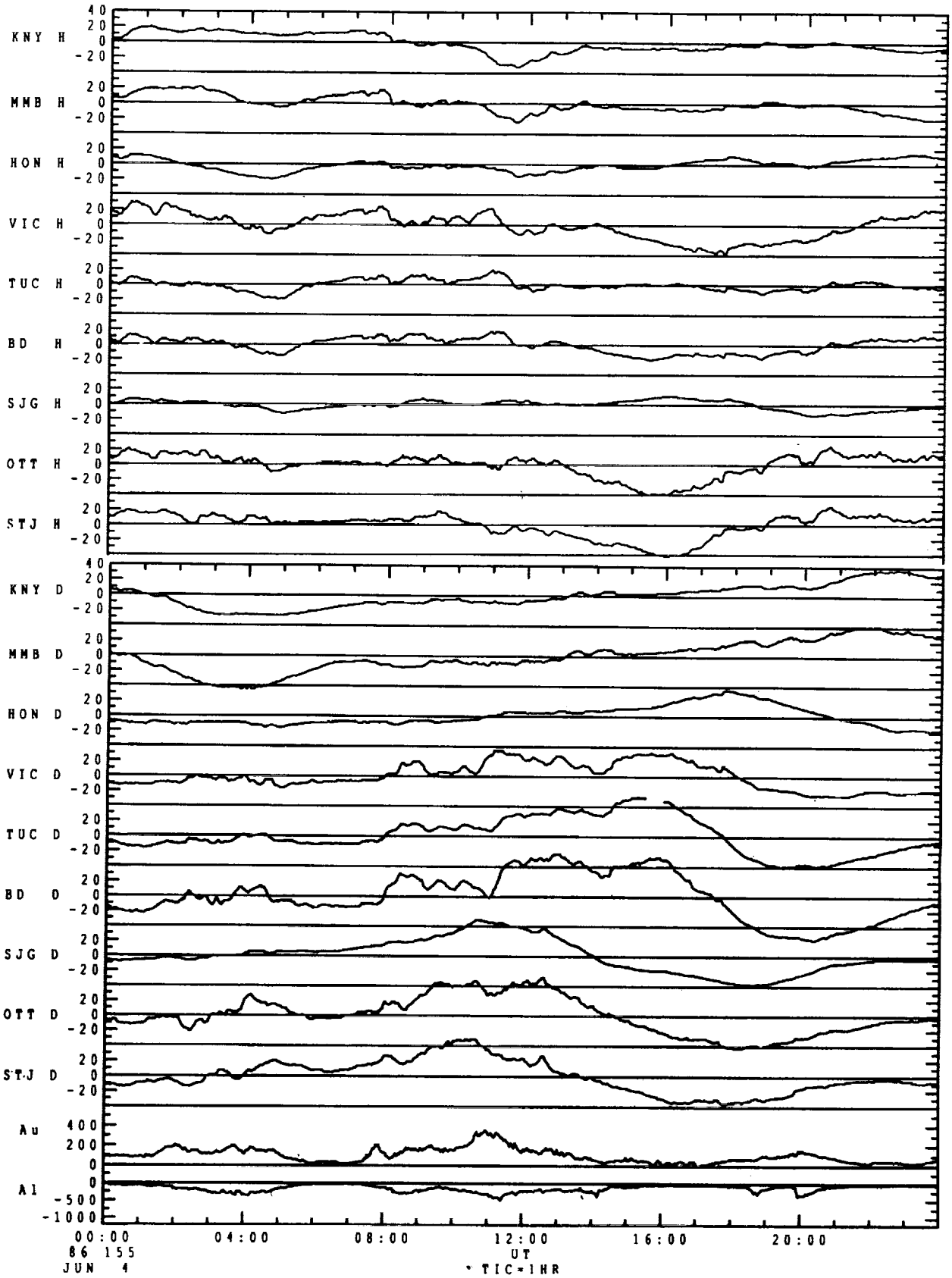
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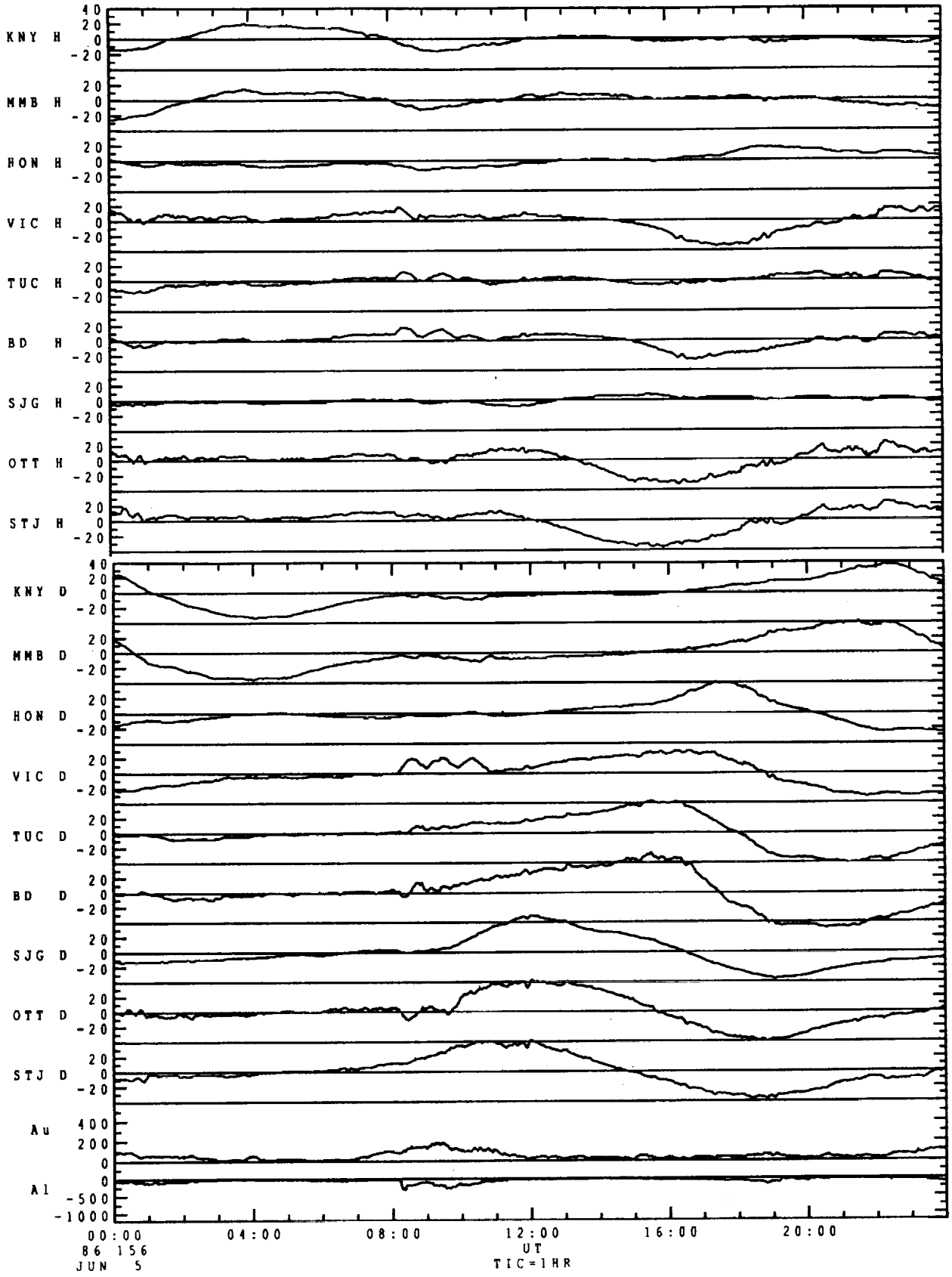
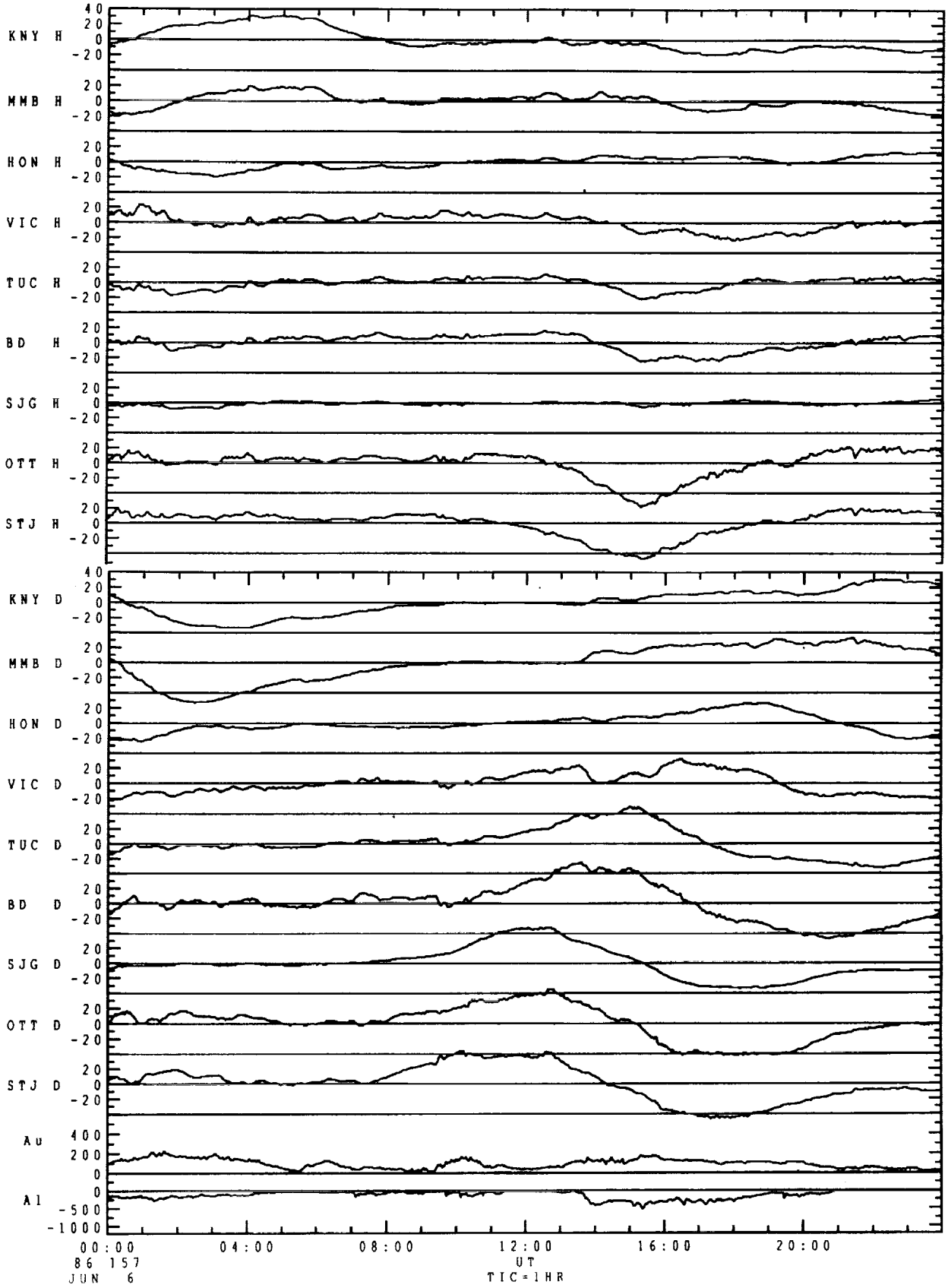
JUN 05, 1986

UCLA IGPP 90 JAN

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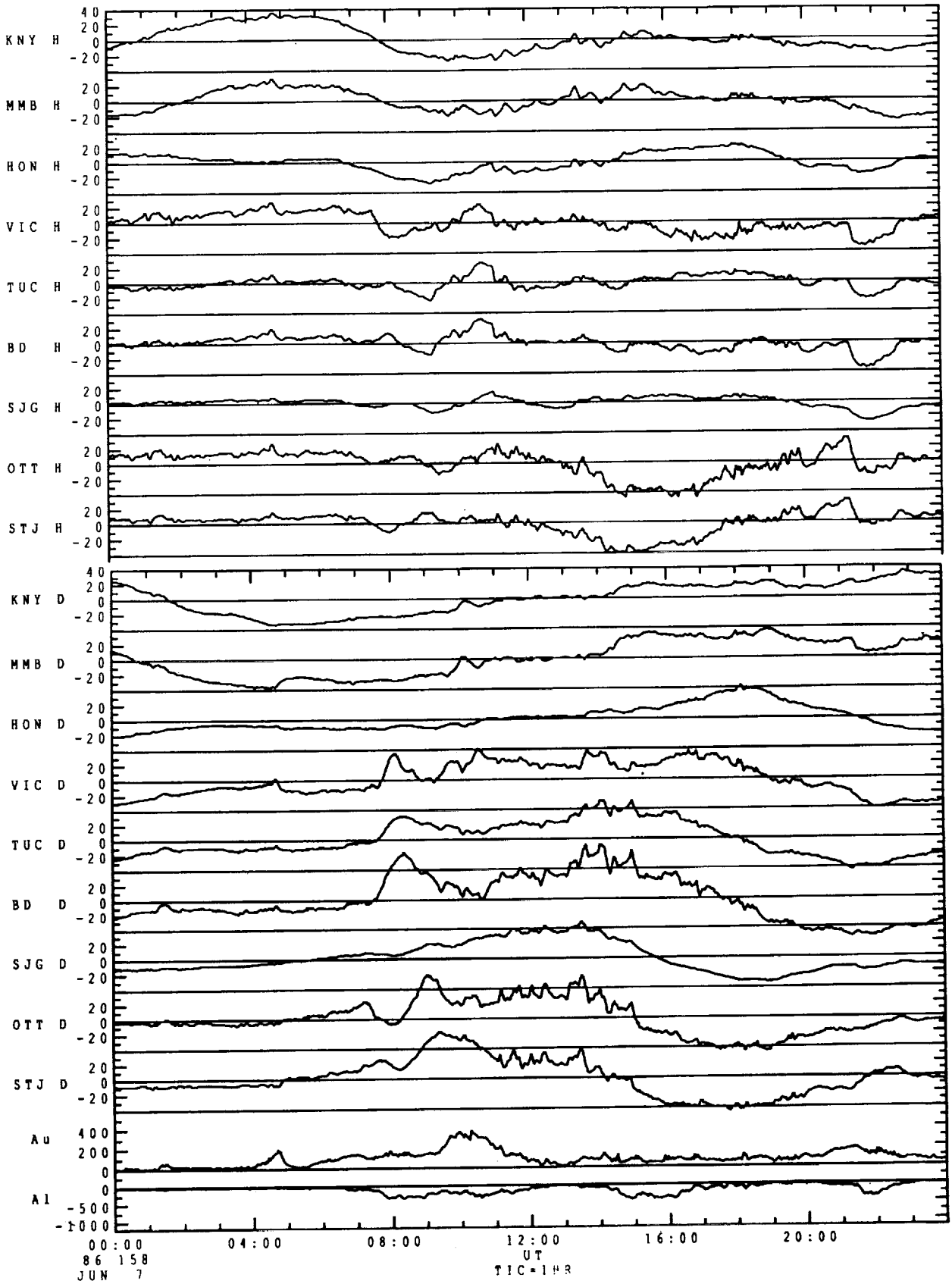
JUN 07, 1986

UCLA IGPP 90 JAN



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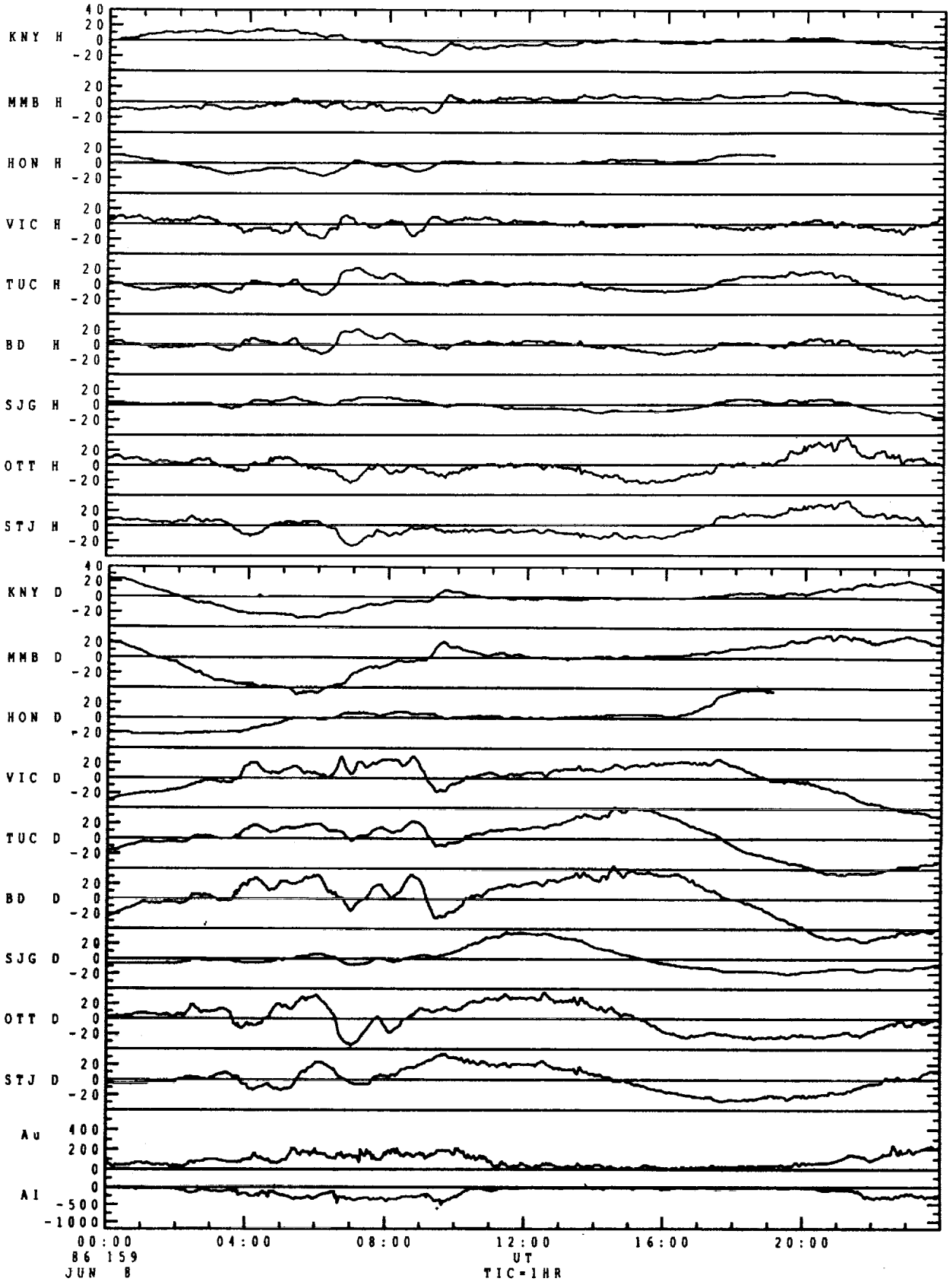
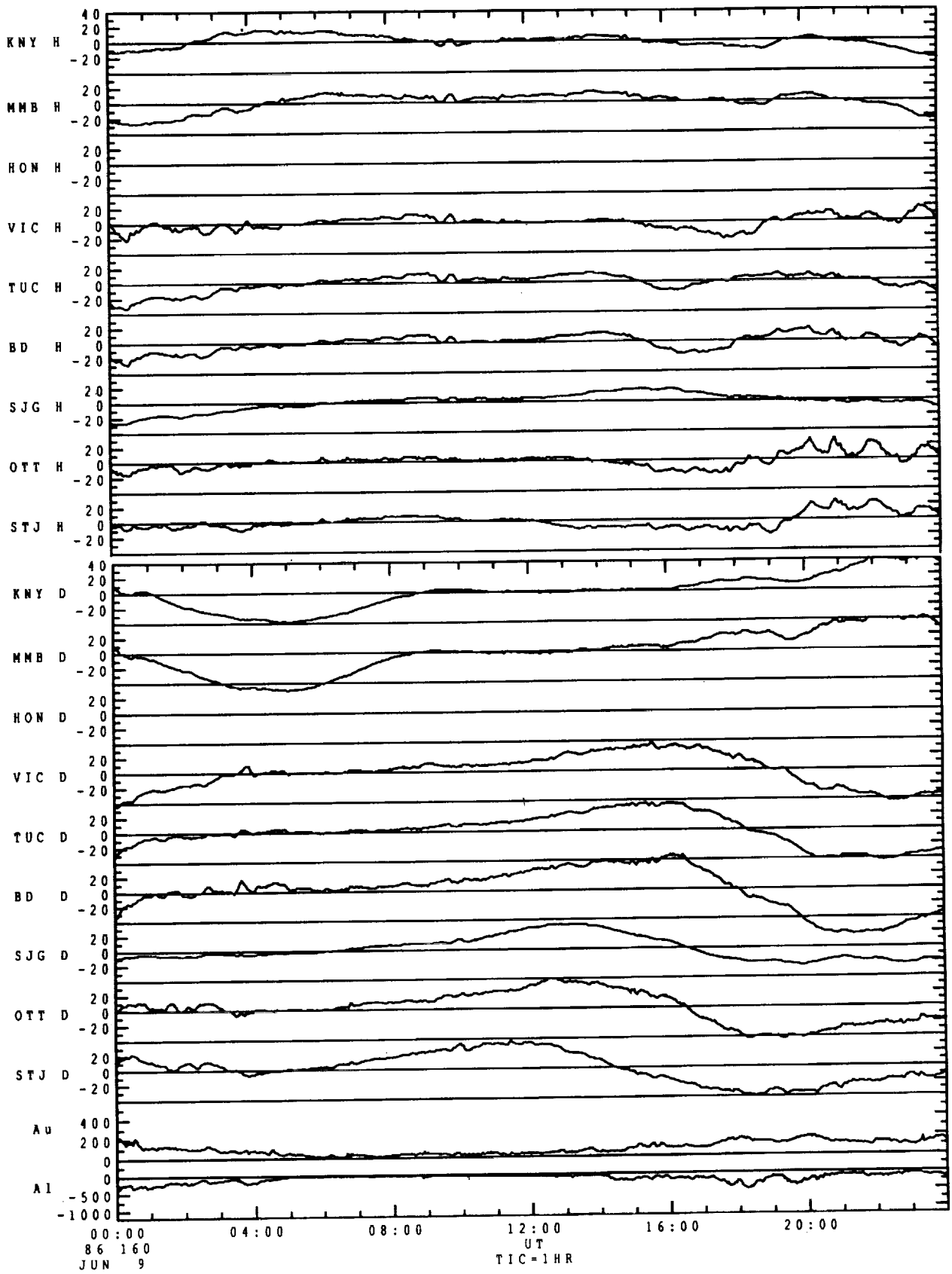
UCLA IGPP 90 JAN 8

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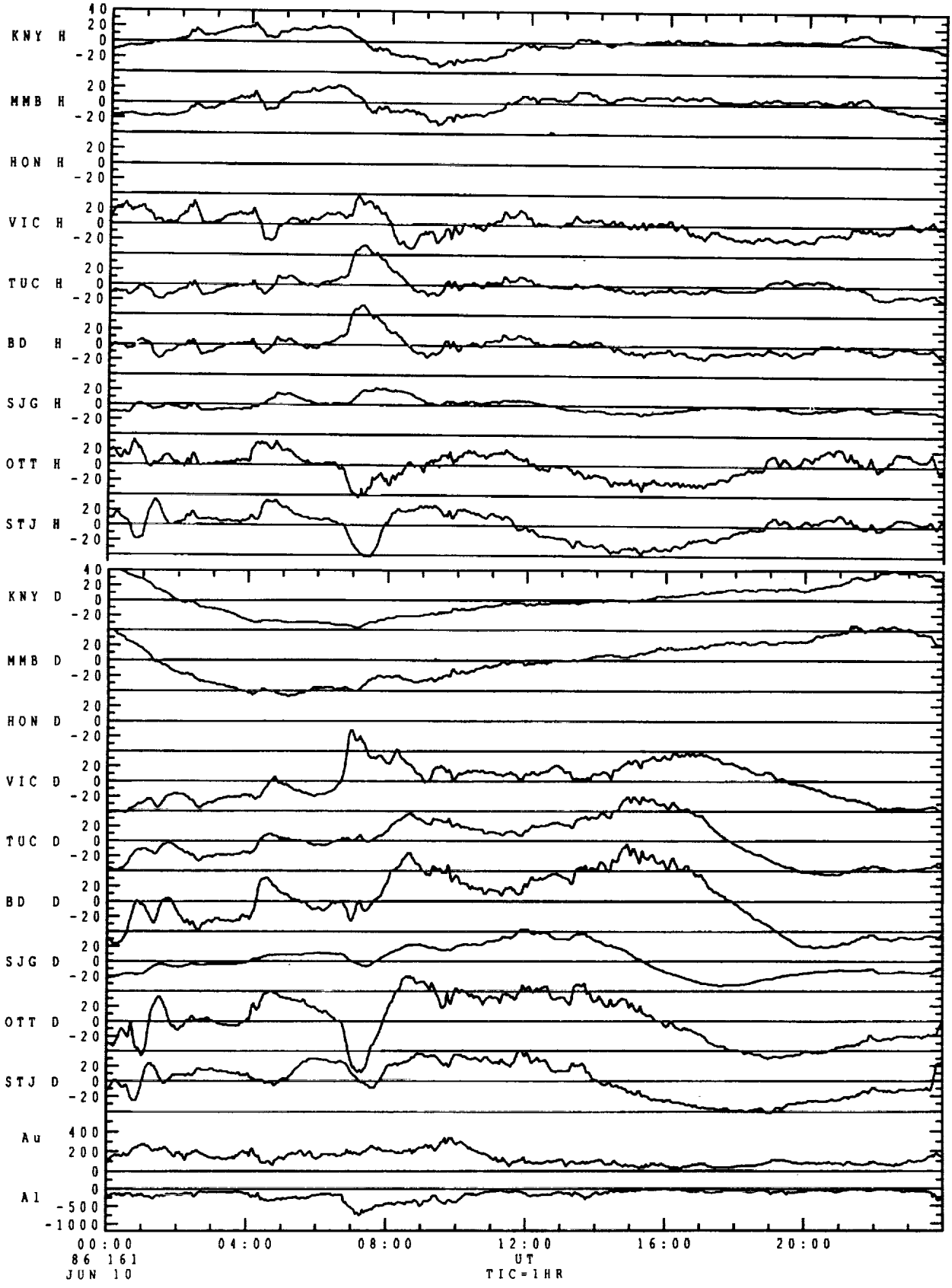
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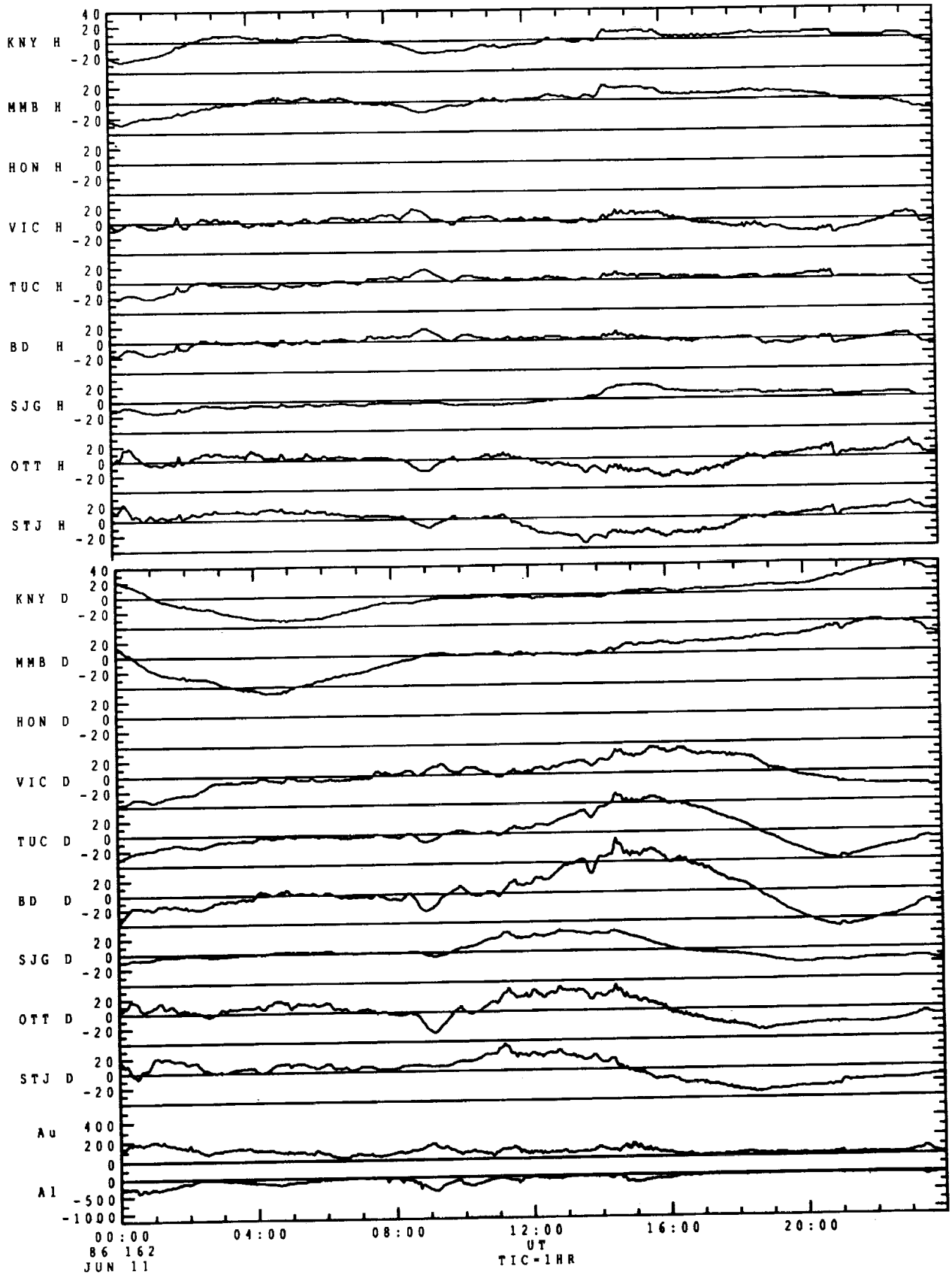
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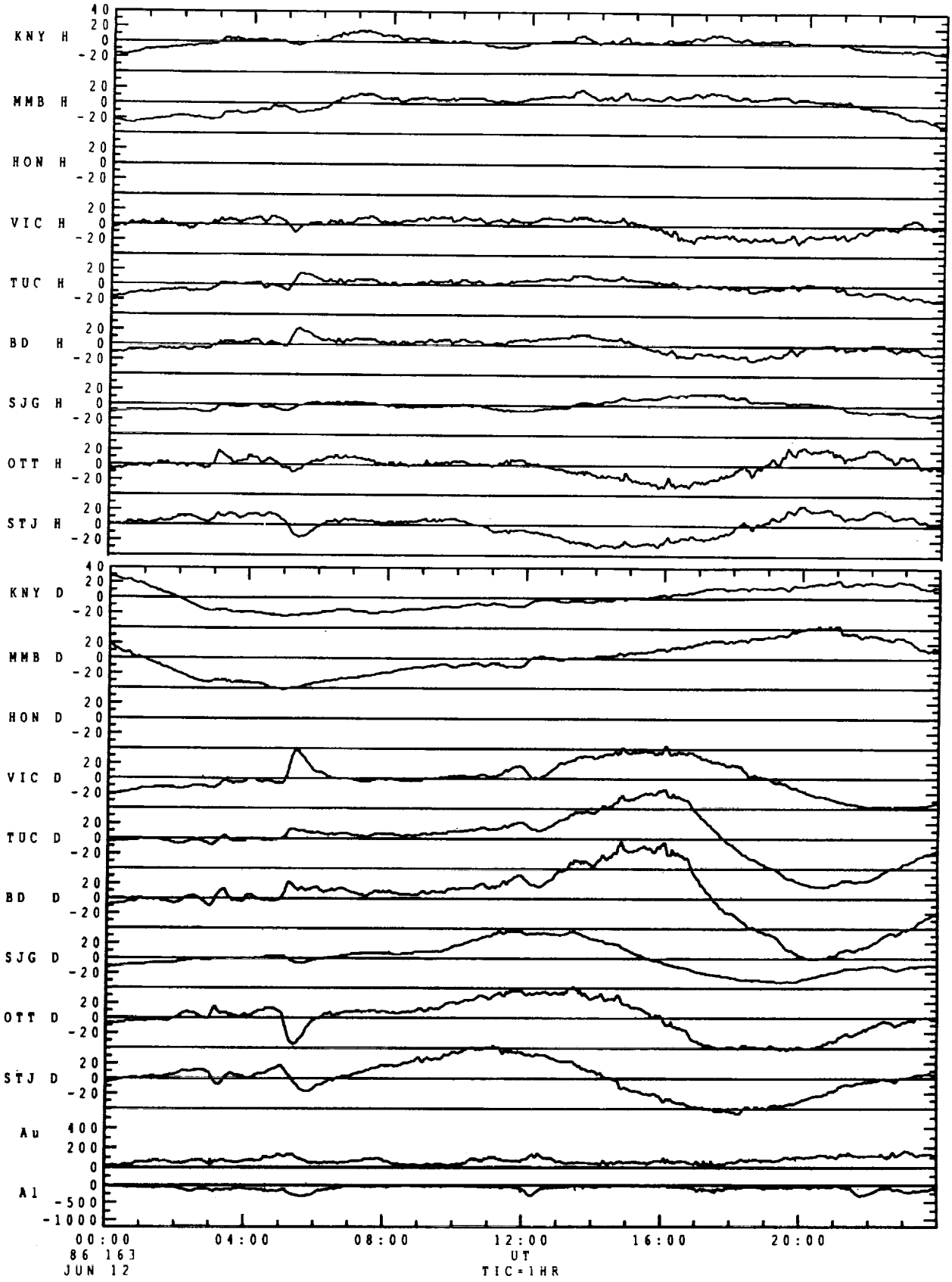
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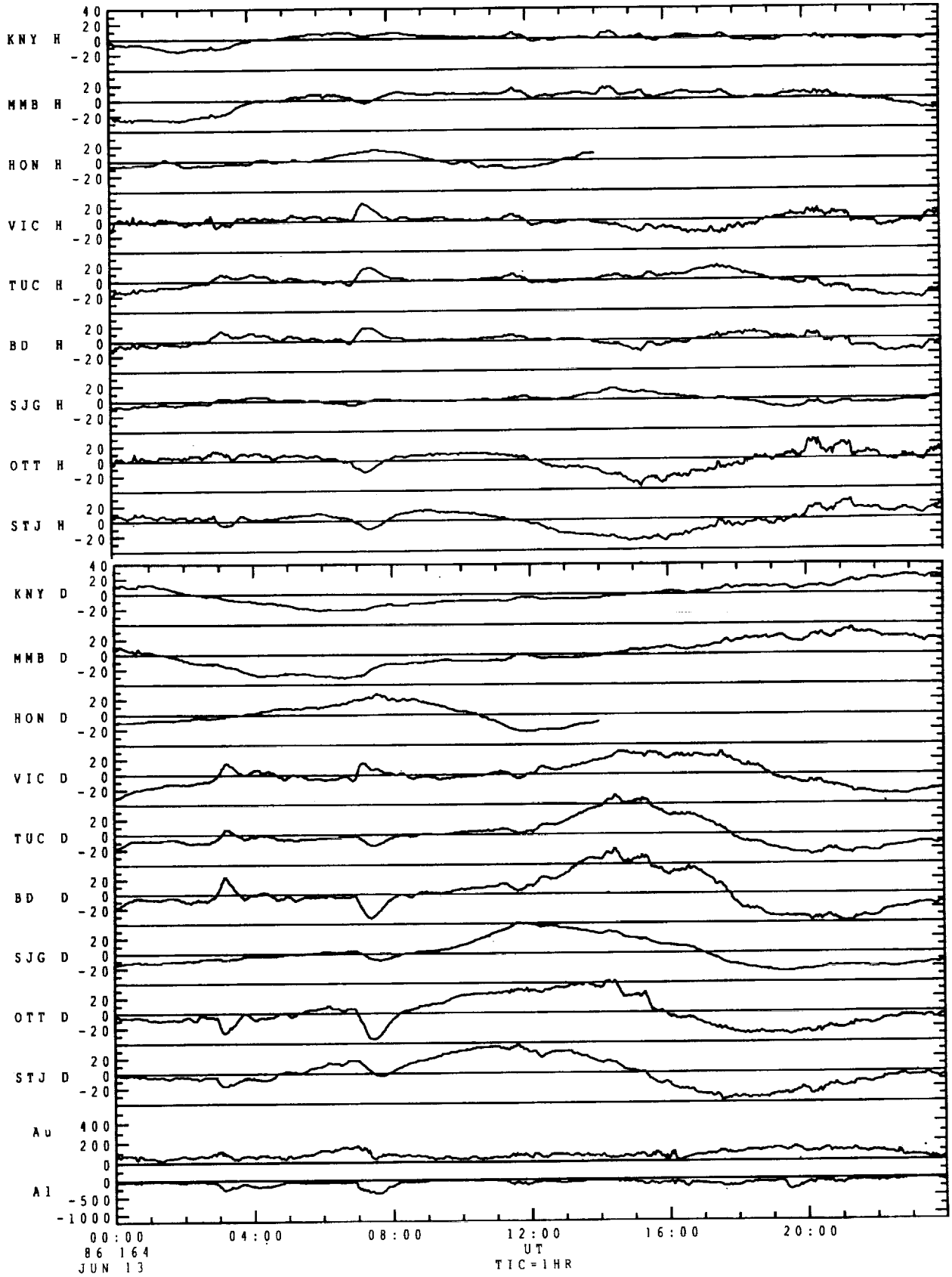
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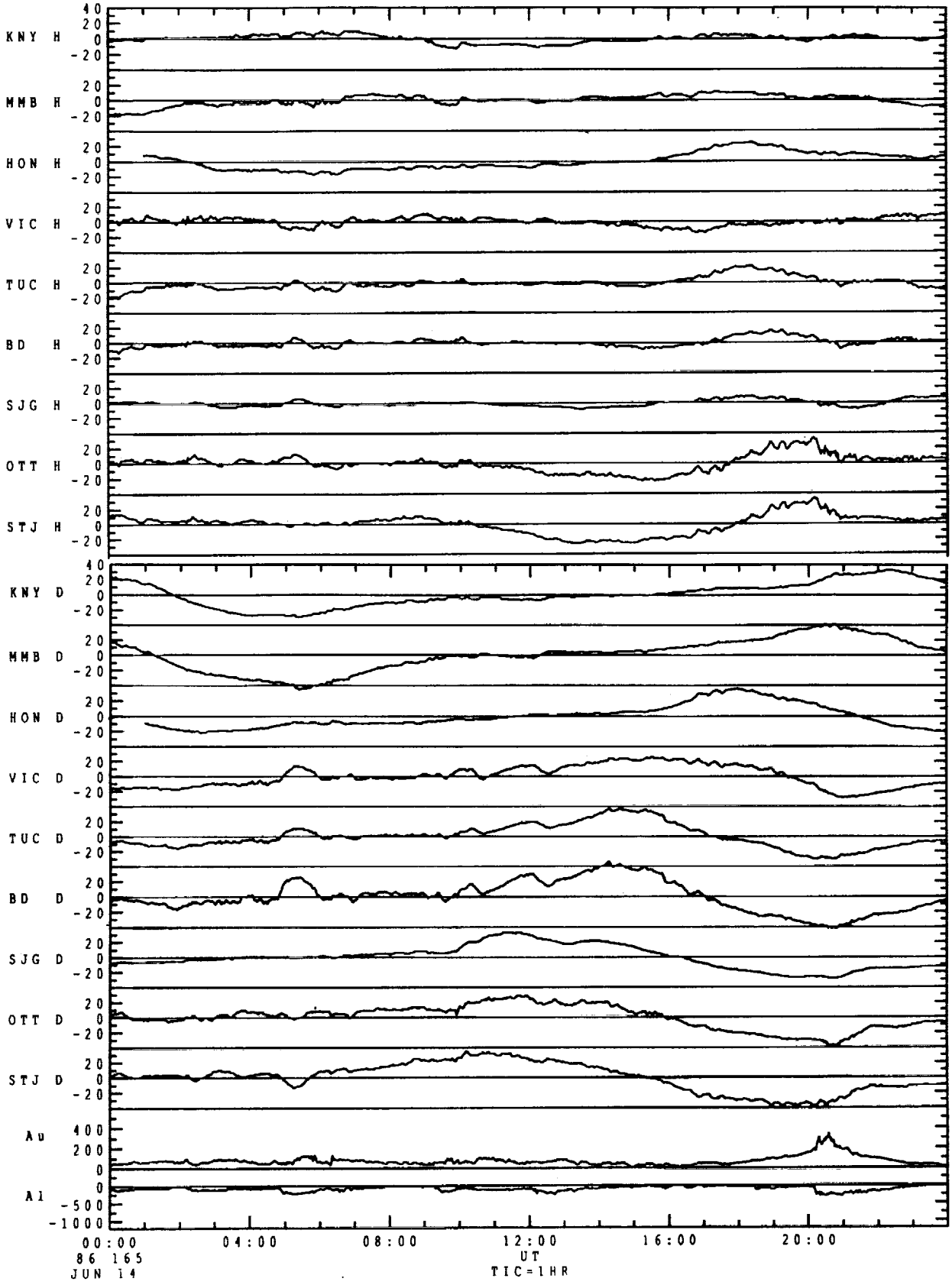
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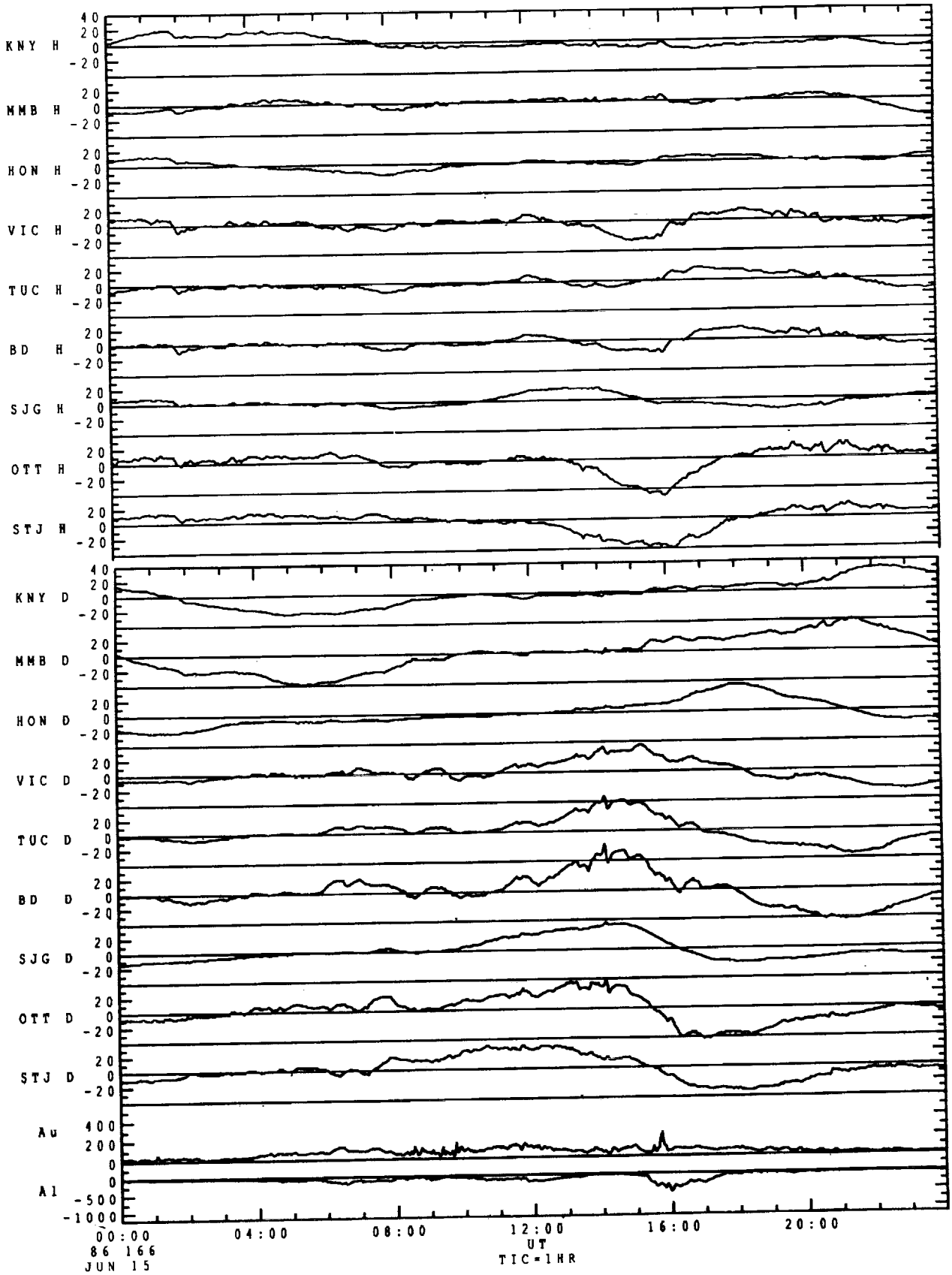
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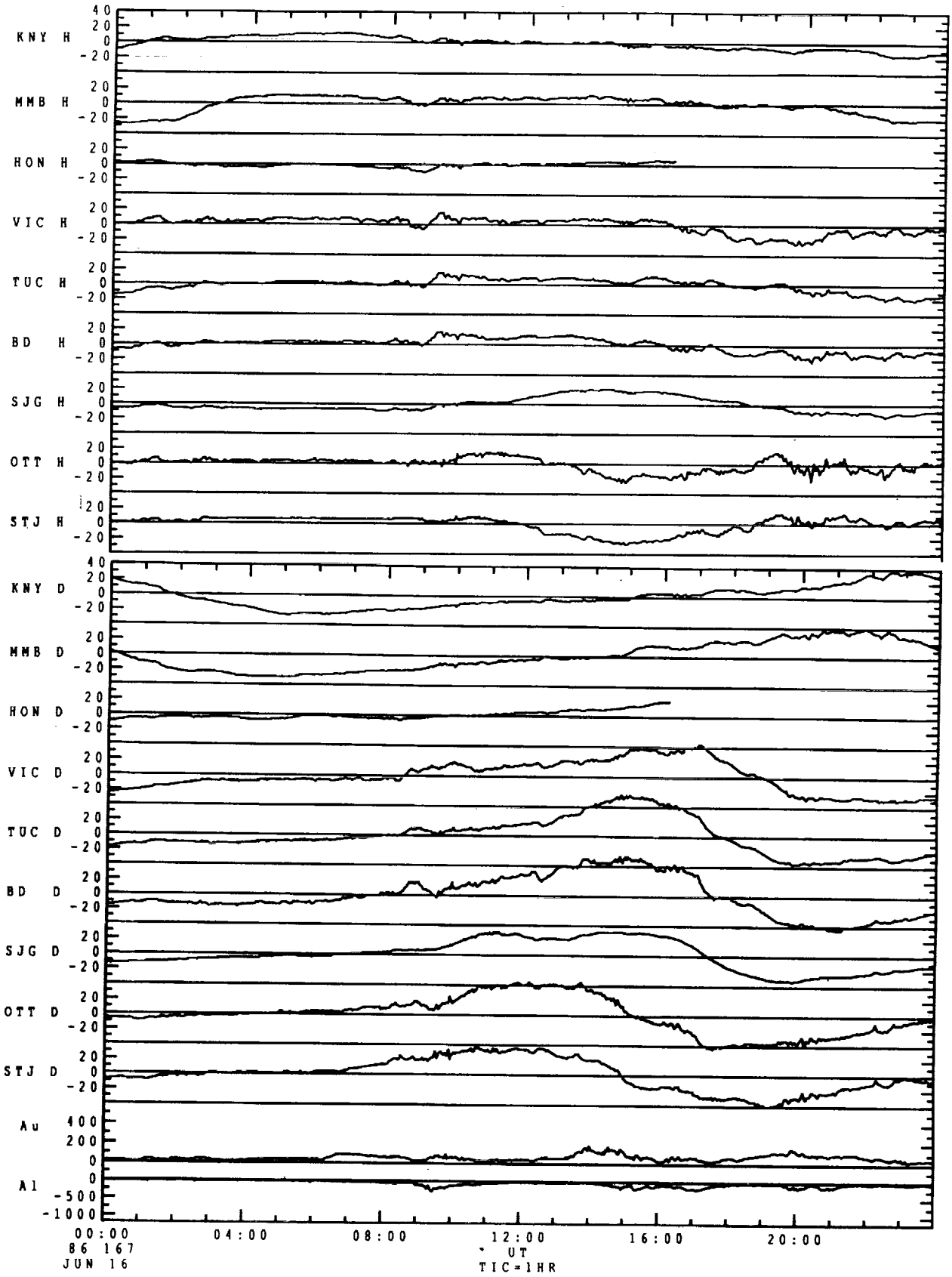
JUN 16, 1986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