A Continuous Long-Term Record of Magnetic-Storm Occurrence and Intensity

Jeffrey J. Love
USGS Geomagnetism Program
http://geomag.usgs.gov
Equatorial Ring Current and Dst

Measurements made near the Earth’s equator of the disturbance of the horizontal magnetic field made during magnetic storms can be represented by an equivalent magnetospheric ring current in the magnetosphere. The longitudinal average of these measurements is the Dst index, a fundamental measure of magnetic-storm intensity.
HER  Hermanus South Africa
KAK  Kakioka Japan
HON  Honolulu United States
SJG  San Juan Puerto Rico

Observatory distribution is not ideal and it doesn't exploit the many additional observatories that are available.

Dst service provided by Kyoto WDC

USGS is planning on providing its own Dst service, with additional Dst-related services
San Juan, Puerto Rico (SJG)

Kakioka, Japan (KAK)
Method of Magnetic Variometer

String of metal or crystal
Mirror
Magnet
Declination Component

Geomagnetic north

Horizontal Component
Vertical Component

Cylindrical lens
Slit
Light source
Printing paper

Light source
Prism

* String of the horizontal component is twisted to direct the magnet perpendicular to the geomagnetic north.
RESULTS OF OBSERVATIONS MADE AT THE COAST AND GEOGRAPHICAL SURVEY MAGNETIC OBSERVATORY
AT VIEQUES, PORTO RICO
1909 AND 1910

BY

DANIEL L. HAZARD
Computer, Division of Terrestrial Magnetism
### PORTO RICO MAGNETIC OBSERVATORY

#### SEPTEMBER, 1900.

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*The mean hourly values given on the bottom line are derived from the “quiet days” indicated by asterisks.*
Lunar & Annual Splitting of Daily Period

Spectral Power

Period (Days)

10^{-1} 10^{0} 10^{1} 10^{2} 10^{3} 10^{4}
1957 Magnetic Storm
Made the headlines in
Los Angeles

RARE NORTHERN LIGHTS DISPLAY IN SOUTHLAND
Los Angeles Times (1886-Current File) 13, 1957/ProQuest Historical Newspapers Los Angeles Times (1881 - 1985)
Pg. 1

RARE NORTHERN LIGHTS DISPLAY IN SOUTHLAND

Aurora’s Blood-Red Glow Observed Over Widespread Region

The blood-red glow of an aurora borealis, luminous phenomena of the Arctic region, spilled over to light the Southland skies early today.

The aurora, also called “northern lights,” is a common sight in the northern regions, but it seldom is seen this far south, and it caused a sensation of note to police, sheriffs’ deputies and spectators by starting

Communication of an aurora was received in a report re-
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port, from a pilot flying over Seattle, who remarked about the “very good aurora here-
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25 Aug - 9 Oct 1957 H Data

H (nT)

HON

SJG

HER

KAK

Day Number

Day Number

240  250  260  270  280
Continuity of Dst-Suitable MHV Data
Arranged by Longitude

CTO  HER
MRI  TAN
ABG  GNA
ZKW
TOK  KAK
API  HON
PPT  TUC
LOS  SJG
VQS  PIL
?  VSS
SFS
Conclusions

• Century-long (or even longer) record of Dst is possible, giving a good long-term history of magnetic storms.
• Much work remains to be done, however, including digitizing data from a number of observatories & checking those data for problems and consistency with yearbooks.
• Improvements in mathematical Sq model are needed. This is an on-going effort.
• With the incorporation of data from (say) eight or more observatories, the statistical properties of the asymmetric part of the ring current can be studied.