Last Two Year’s Activities of WDC – Ionosphere and Space Weather

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The remit of WDC – Ionosphere and Space Weather (WDC-ISW)

Space weather: cause and effect
宇宙環境じょう乱の発生と障害
Example of Space Weather Application
- ICAO decided to use Space Weather Information to Aviation

- Telecommunications
- Satellite Positioning
- Radiation exposure

HF is the only communication method in this region

Space Weather information becomes more important than before
Current Status of WDC-ISW
— Four domestic observatories and Antarctica —

- Ionospheric sounding measurements at domestic observatories.
- Data rate: Routinely 15 min, 5min in special mode.
- We began five stations but Akita closed on 1993.
- Okinawa was moved from Nakagusuku to Ogimi on 2001.
- Wakkanai is plan to move to Sarobetsu on 2008.
- Now all stations are automatically operated and controlled from Tokyo.
Data Distributions

- We archive the digital data and available on the web.
  http://wdc.nict.go.jp/IONO/index_E.html
- We publish annually a data catalogue of WDC for ionosphere.
Web access status

Logical IP access No. is 200,000-400,000/year

- Physical access No. (x100)
- Logical access No. (x100)
- Physical IP No.
- Logical IP No.
Ionogram film digitization

- Digitization project was completed on FY2007-2008 for domestic/Antarctic observatories.
- Digitization of exchanged data between foreign site will be finished on FY2014.
- However, the digitization project in phase I was executed with binarization which is difficult to scale manually. We will have phase III project to scan those data with 256 gradation on FY2013-14.
Ribbon Scanning

• Not each frame but total film role is recorded as ONE image.

• Reference: http://d.hatena.ne.jp/denshikA/20100517/1274055193
ISES: International Space Environment Service
(14 countries and ESA as a Collaborative Expert Center)

- Operational Space Weather Forecast
- Ground-based observations
- Developing original space weather forecasting code

Space weather forecast with international cooperation
UGEOA code

• Legend ISES/regional warning center has been using URSIgram Codes which were originally developed to facilitate the rapid exchange of information by telex.
• UGEOA code is one of URSIgram codes and means GEOALERT.
• NICT provide the hit rate of SW-forecast using UGEOA code from each RWC.
Hit rate of Flare forecast

![Graph showing the hit rate of Flare forecast over months for different locations. The x-axis represents months from July to December, and the y-axis represents the hit rate percentage. The graph includes lines and bars for Tokyo, Boulder, Sydney, Brussels, and Beijing, with each location represented by a different color or marker. The black dot in the hit rate graph indicates the month average.]
Formal Assessments/accreditations
On the process of Approval as WMO/DCPC

• We submitted to be WMO/DCPC (Data Collection or Production Center) which will be responsible for the collection or generation of sets of data, forecast products, processed or value-added information, and/or for providing archiving services.
• WMO/CBS approved NICT as a DCPC. Final decision will be in WMO plenary on 2015.
More detailed information are presented in my poster

Thank you for listening!
Ionospheric observation: ionosonde
WDC for Ionosphere and Space Weather

- Established on IGY year 1957
- Archiving mainly ionospheric vertical soundings of four Japanese and 141 worldwide stations.
- Items of ionospheric data
  - Ionospheric vertical soundings
  - Todside soundings
  - Oblique Incidence Soundings
  - Absorption
  - Ionospheric drifts and backscatter
  - Whistlers and VLF
  - Atmospheric Radio Noise
Activities over the previous two years

• Digitization of film-base legend data
• Evaluation of SW forecast in ISES
• Produce/standardization of GTEX format
• Capacity building/training
Developments with WDC-ISW

• Improvement of SW forecast – simulation code
• An example of scientific success – ionospheric disturbance after large earthquakes
Key targets of WDC-ISW for the upcoming two years

• Improvement of SW forecast - Data assimilation especially for aviation
Threat score of Flare forecast

![Graph showing threat score and forecast}

- Threat score of Flare forecast
- Graph showing threat score and forecast
Hit rate of Magnetic activities
Threat score of magnetic activities

![Graph showing threat score of magnetic activities]

- Threat score of magnetic activities.
- Graph with x-axis representing months from July to December, and y-axis representing threat scores from 0% to 100%.
- Different colors and lines represent predictions from different locations: Tokyo, Boulder, Brussels, Sydney, and Beijing.

各局地磁気じょう乱予報のスレットスコア

適中率

黒点数(月平均値)