

Dataset Name

Vertical sounding ionogram data from DPS-4D at Fuke station

Abstract

This dataset collects images of ionization map measured by digisonde at the Fuke station, Hainan of the Meridian Project. The data is the visualization of SAO file and stored in PNG format, which can show directly the structure of ionosphere and give the critical frequency, scale height and other ionospheric parameters. The data serves from March 2010, and is up-to-date.

Key Words

Digisonde, Chinese Meridian Space Weather Monitoring Project (Meridian Project), Fuke station (19.5°N, 109.1°E, dip latitude 8.1°N, Hainan island, China), Ionospheric Parameters, Critical Frequency, Scale Height, Electron Density, Ionosphere, Space Physic, Physics of The Middle and Upper Atmosphere

Space Location

Geographic Longitude: 109°08' E

Geographic Latitude: 19°31' N

Time Span

Start Date: 2010.3

Stop Date: up-to-date

Parameters

Image data in PNG files, including the ionospheric parameters of E-layer and F1/F2 layer critical frequency, scale height and electron density altitude profile above the Fuke station, Hainan.

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Statio YYYY DAY   DDD HHMMSS P1  FFS S AXN PPS IGA PS
Hainan 2014 Jan01 001 000000 RSF 005 2 512 100 03- B1

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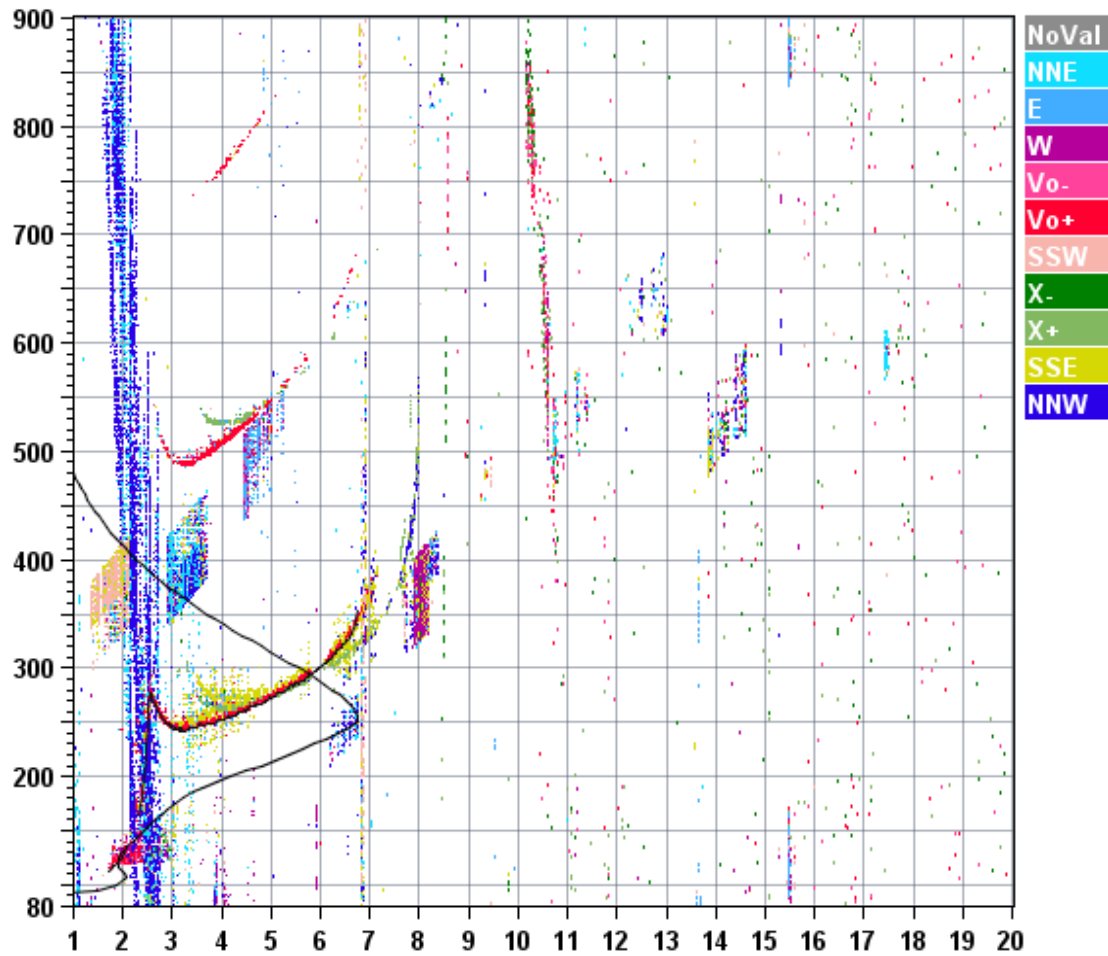


Figure 1 Image of the dataset

Observatory and Instrument

Observatory: The Fuke Station, Hainan

Fuke field station, the national major station of observation and scientific research of space weather is located at the geomagnetic coordinates of 178.95° E and 8.1° N, in the lower latitude area of China, by the south side of the north peak area of the ionospheric equatorial anomaly, encountering many kinds of ionospheric irregularities. As an observation station for the exploration and research of the comprehensive space environment of the middle and upper atmosphere and ionosphere, and one of the most important observation stations of the Meridian Project, and it serves a significant role in monitoring the space environment of the low latitude area of China.

Instrument: Digisonde

DPS-4d (Digital Portable Sounder) digisonde installed at Fuke station, Hainan

Province, is an active long-term continuous detection instrument of the ionosphere (its technical specifications are shown in Table 1). By vertically transmitting the high-frequency radio pulse with the frequency varying in the range of 1.0-30MHz, it measures the propagation time τ (time of flight) of the echo reflected by the ionosphere to get the ionogram, the cutoff frequency foF2 of the ionosphere, the corresponding maximum electron density value NmF2, and the electron density altitude profile below the peak height of F2 above the detection Location. It can also measure the polarization, amplitude and phase spectrum of the echo wave, as well as the arrival angle of the echo, provide more abundant ionospheric structure and dynamic information, and serve for the monitoring and prediction of the ionospheric space weather.

Table 1 Digisonde-4D Specifications

Quad Receiver	
Frequency Range	0.5 – 30 MHz (all modes of operation)
Bandwidth	34 kHz @ 3 dB
Input Impedance	50 Ω
Noise Figure	11 dB (at receiver antenna preamplifier)
Receiver Sensitivity	-130 dBm (+/-6 dB) into main chassis; better at preamplifier (amount depending on preamp gain setting)
Dynamic Range	>90 dB instantaneous >140 dB total operating range including gain control
Recovery Time	40 μ s
Output	16-bit quadrature samples
RF Output	
Frequency Scan	0.5 - 30 MHz, start, stop and step size selectable to 1 kHz
Restriction of Transmission	Programmable list of frequencies without RF transmission
Ionogram Scan Time	Standard VIS ionogram 2 - 200 sec (varies with programmable settings)
Frequency Synthesis	Fully digital (frequency switching time < 1 μ s)
Pulse Repetition Rate	100 and 200 pps
Pulse Width	533 μ s (16 chips of 33 μ s) waveform with 30 kHz signal bandwidth
Peak Pulse Power	2 channels @ 150 W each
Output Impedance	50 Ω
Transmitter Type	Dual RF MOSFET Amplifiers for polarized transmission using turnstile transmit antenna

Lightning Protection	In-line spark gap discharge devices
User Interface	
Unattended operation	Controlled by 128 measurement programs, 128 schedules, automatic schedule switch rules and preprogrammed campaign events
Remote access & control	Network TCP/IP) interface for Input/Output access to schedules, measurement data, diagnostic data, and operating software. Standard Remote Control Interface uses Microsoft Remote Desktop over Internet or LAN.
Time Setting	Integrated GPS receiver keeps time to +/-25 μ s
Built-in-Test (BIT)	Full diagnostics to isolate failures to line replaceable units runs automatically, remotely accessible
Self Calibration	Built-in internal calibration automatically updates phase/ amplitude adjustment tables. Remotely accessible results.
Signal Processing	
Processors	Two Embedded Intel Core 2 Duo Dual Core processor SBCs (Control and Data Platforms)
# of Range Bins	Selectable: 256 or 512
Height Range	0-1200 km (0 km used for self-calibration)
Height Resolution	2.5 km sample spacing 500 m using differential phase technique
RF Interference Mitigation	RFIM reduces coherent interference up to 35 dB
Waveform Processing	Pulse compression of 16-chip phase code provides 15 dB signal processing gain
Doppler Processing	4 to 128 integrations can provide up to 21 dB signal processing gain
Doppler Range	+/-3 Hz to +/-50 Hz
Doppler Resolution	.0125 to 12.5 Hz
Amplitude Resolution	< 0.01 dB
Wave Polarization	Alternating transmission with O and X, synchronized receive antenna polarizations (doubles reliability of O/X identification by ARTIST). Linear polarization on request.

Data Identifier

DOI: 10.12176/01.06.019

PID: 21.86116.7/01.06.019

Data Citation

Use the citation style required by the editor or publisher. If there is no standard, you can follow the recommended format:

National Space Science Center (2012): Vertical sounding ionogram data from DPS-4D at Fuke station. v1.0. National Space Science Data Center. doi:10.12176/01.06.019. <https://dx.doi.org/10.12176/01.06.019>

Contacts

Data Service Contact

Institute: National Space Science Data Center

E-mail: nssdc@nssc.ac.cn

Tel: 010-52804245

Related Links

Dataset URL 1

http://www.nssdc.ac.cn/eng/data_details.html?dataname=Hainan%20Fukezhen%200ionosonde%20ionogram%20curve%20data