The Analysis on the Electromagnetic Anomalies before Wenchuan Earthquake Based on Satellite and Ground Observing Data

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The information about the Wenchuan earthquake

Time: 2008.5.12 06:27:58.7(UT)

Epicenter: 30.97°N. 103.57°E

magnitude: Ms 8.0
The anomalies observed at surface stations
The distribution of earth resistivity stations
Geomagnetic field

2008.4.24

Low point displacement

2008.5.9
ULF Electromagnetic field observation

0.01-1Hz

1-10Hz

Deyang station in a distance of 35km to the epicenter

10-20Hz
GPS TEC and foF2 anomalies recorded at GPS station and ionosonde stations.
The anomalies observed at satellite
Demeter level-2 pictures
The distance and azimuth of peak ne values to the epicenter.

Ni (O⁺) analysis by time series
VLF electric field spectrums at 31°N
VLF(<10kHz) spectrums distribution at eastern hemisphere
The model of LAI coupling
Seismic model of Lithosphere-Atmosphere-Ionosphere Coupling and Main Quake-related Phenomena

- Strengthening of stress in lithosphere
- Electromagnetic emissions/Decrease of earth resistivity
  - Penetration of electric field into ionosphere/Seismo-acoustic waves
  - Ionospheric effects from earthquakes
  - Change of properties of ionospheric plasma
    - Concentration of plasma
    - Structure of plasma
    - Heating of plasma
- Low-frequency electromagnetic oscillations
  - VLF electric field
  - GPS TEC
  - foF2
  - Ne, Te, Ni

Ionospheric effects from earthquakes:
- Change of properties of ionospheric plasma
  - Concentration of plasma
  - Structure of plasma
  - Heating of plasma

Electromagnetic emissions/Decrease of earth resistivity:
- Penetration of electric field into ionosphere/Seismo-acoustic waves
  - Ionospheric effects from earthquakes
  - Change of properties of ionospheric plasma
3D electromagnetic observing system

- EM Wave and Plasma
- GPS/BD-2
- IR Sat.
- GPS Obscuration Sat.
- Electro-magnetic Sat.
- TEC/f₀F₂
- OLR/TBB& SHF
- Ground-based EM/TBB
- Ionosounding
- EM Station
- Quake Focus
- GPS Receiver
Thanks for your attention!