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CSES SATELLITE MISSION IN CHINA AND THE STEREO SEISMO-ELECTROMAGNETIC MONITORING SYSTEM

Abstract

Based on requirements of space technologies for protecting against and mitigating earthquake disasters, China Earthquake Adminstration (CEA) starts and carries out CSES mission, to develop the space-ground stereo earthquake monitoring system. The implement of this mission will be of great importance in earth observation system and earthquake/space weather early warning. For preventing and mitigating earthquake disasters, China is building the earthquake observation network both from ground and space, and the integrated stereo electromagnetic observing system are constructed and improved gradually, especially at seismic regions. 1. Chinese Seismo-Electromagnetic Satellites: The first Chinese seismo-electromagnetic satellite (CSES) is an experimental satellite with promising seismic applications. Its major scientific objectives are to monitor the space environment at topside ionosphere and global seismic activity, to provide space information for studying geosphere coupling mechanism. The scientific payloads installed are optical pumping magnetometer from Austria; fluxgate magnetometer; search-coil magnetometer; Electric field detector from Italy and China; Plasma Analyzer; Langmuir probe; GNSS occultation receiver; tri-band beacon transmitter; High energetic particle detectors cooperated with Italy. 2. Data product levels and key data processing techniques: The scientific data product are classified as four levels, level-0 is the raw data after processes of frame synchronization, descrambling, decoding; level-1 is the data after calibration and inversion; level-2 data is with the geometric correction; level-3 data is the time series from revisited orbits; level-4 is the spatial 2/3D distribution. Data analysis techniques aiming at different levels have been developed, in which calibration, and inversion methods are completed corresponding to different parameters. And also the CIT technique are developed by combing the multi-resource data from ground and satellite, including GNSS occultation, tri-band beacon, ground-based GPS TEC, vertical ionosonding and oblique sounding. 3. Stereo seismo-electromagnetic monitoring system: The ground-based electromagnetic monitoring networkhas been constructed for a long time period, including the observation on apparent resistivity, geoelectric field, geomagnetic field, electromagnetic emission, the GPS TEC network, vertical/oblique ionosounding, VLF radio wave receiver, and Schumann resonance. Combined with the satellite observation at topside ionosphere, a 3D dynamic observation network for seismo-electromagnetic information is built. Some kinds of data have been utilized in the same earthquake study, and the propagation coupling models are developed such as full-wave propagation model, acoustic gravity wave propagation model, etc.