

IAF SPACE OPERATIONS SYMPOSIUM (B6)  
Ground Operations - Systems and Solutions (1)

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THE CHINA-BRAZIL EARTH RESOURCES SATELLITE - CBERS-4A: A PROPOSAL FOR GROUND  
SEGMENT BASED ON THE SPACE LINK EXTENSION PROTOCOL SERVICES.**Abstract**

The CBERS program is a unique partnership between Brazil and China in the space technical and scientific sector for the primary remote sensing data generation technology, this partnership agreement involves the National Institute for Space Research (INPE) and China Academy of Space Technology (CAST). The program is a family of remote sensing satellites CBERS (CBERS-1 and 2, CBERS-3 and 4) that brought significant scientific advances to Brazil. The INPE, using only the CBERS-4, has distributed for free over the internet, approximately 90,000 images. Their images are used in important fields such as controlling deforestation and burning in the Amazon, the monitoring of water resources, agriculture, urban growth, land use and education. It is also critical for large strategic national projects such as Measurement of Deforestation by Remote Sensing (PRODES) and Brazilian Real-Time Deforestation Detection (DETER). The next satellite, CBERS-4A, is due to be concluded in 2019, its will be placed in a sun-synchronous Low Earth Orbit. Their optical payloads will be operated in the visible spectrum with resolutions in the range of 2 to 60 meters. As in previous missions, the Ground Segment is responsible for tracking and controlling of the satellites CBERS during the routine phase, including the orbit adjustment maneuvers to maintain the proper phase, that are made by Brazil, and by China, in alternating periods. In Brazil, the Ground Segment is comprised by the Satellite Control Center (SCC) - located in São José dos Campos, the TT&C Ground Stations of Cuiabá and Alcântara, the Mission Control Center, the Data Processing Center and the End User. The Ground Segment has more and more served as cross support and interoperability to space agencies, which requires an appropriate architecture to support them. The architecture proposal is based on Dynamic Management of the Space Link Extension (SLE) Protocol Services. These services are recommendations of the Consultative Committee for Space Data Systems (CCSDS) for cross support and have been adopted by several space agencies, for example: CNES, ESA, JAXA, NASA and INPE. This paper presents an overview of the CBERS Program, its science objectives and the CBERS-4A satellite's ground segment. It will then describe a proposal for implementation an Architecture for Dynamic Management of the Space Link Extension Protocol Services to be applied as part of the Ground Segment at INPE. The design's status, the possible contributions for a reduction the cost of space missions and limitations are also presented.