20th SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Small Earth Observation Missions (4)

Author: Prof. yu xiaozhu
Shaanxi Engineering Laboratory for Microsatellites, China

Mr. Jun Zhou
Shaanxi Engineering Laboratory for Microsatellites, China
Mr. yao Zhang
Xi'an Satellite Control Centre(XSCC), China
Ms. Linyu Zhu
Shaanxi Engineering Laboratory for Microsatellites, Northwestern Polytechnical University, China

THE QB50 PROJECT AND THE PARTICIPATION OF CHINESE UNIVERSITIES

Abstract

The QB50 project is jointly put forward by Von Karmon Institute of Technology, TU Delft, Surrey Space Center, and Space Center EPFL, Leibniz-Instituts für Atmosphärenphysik, Stanford University and Shaanxi Engineering Laboratory(SELM) for Microsatellites, etc. It is a network with 50 CubeSats in a 'string-of-pearls' configuration that will be used for the multi-point, in-situ, long-duration measurements of key parameters and constituents in the largely unexplored lower thermosphere/ionosphere and for re-entry research. The 50 CubeSats will comprise 40 atmospheric double CubeSats and 10 double or triple CubeSats for special in-orbit demonstration. All 40 atmospheric double CubeSats and most of the double and triple CubeSats for In-Orbit Demonstration (IOD CubeSats) will carry a set of standardized sensors for atmospheric research. Each of the QB50 CubeSat will consist of two parts, with one part (the 'functional' unit) providing the usual satellite functions (including attitude determination and control, uplink and downlink telecommunications, power subsystem including battery and body-mounted solar cells, on-board data handling and storage by a CPU) and the other part (the 'Science' unit) accommodating a set of standardized sensors for lower thermosphere/ionosphere and re-entry research. According to the plan, all 50 CubeSats will be launched together on a single launch vehicle, a Russian Shtil-2.1, from Murmansk in Northern Russia into a circular orbit at 320 km altitude, with an inclination of 79. Due to atmospheric drag, the orbits of the CubeSats will get progressively lower, perhaps down to 90 km and thus lower layers of the thermosphere will be explored without the need for on-board propulsion. The mission lifetime of the whole CubeSats system is estimated to be about three months. To fulfill satellite control, an international network, the Global Educational Network for Satellite Operations (GENSO), will be used and put into operation in time for QB50. It would eventually comprise more than 100 ground stations in different regions of the world, which will provide a more powerful uplink and downlink capability for all CubeSats. In China, there are more than six Chinese universities have took part in the QB50 project. As the Asia coordinator, and one of the three Mission Control Centers(three Mission Control Centers will be set up at VKI, Stanford and SELM), SELM will ensure the communication between QB50 and China teams.