

Third QB50 Workshop

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Science and In-Orbit-Demonstration (IOD) CubeSats

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Standard atmospheric double CubeSats

- For QB50, double-unit CubeSats are foreseen, with one half (the 'functional' unit) providing the usual satellite functions and the other half (the 'science' unit) accommodating a set of standardised sensors for lower thermosphere/ionosphere and re-entry research. University teams are free to use any space left in the 'functional' unit of the double CubeSat for a technology package or a sensor of their own choice.

Special In-Orbit Demonstration (IOD) double or triple CubeSats, 1

In addition to the 40 'atmospheric' double CubeSats, up to 10 'special' double or triple CubeSats for science and technology demonstration will be selected. Examples of such special In-Orbit Demonstration (IOD) CubeSats are

- 2 triple CubeSats* (Delta and Phi) for formation flying from TU Delft,
- A double CubeSat (RESat) equipped with a heat shield for re-entry research from VKI,
- A triple CubeSat (Armada prototype) with full instrumentation, expandable solar arrays, S-band from the University of Michigan, a forerunner of a later network of 48 triple CubeSats at ~500 km altitude,

Special In-Orbit Demonstration (IOD) double or triple CubeSats,2

- A triple CubeSat accommodating a high-precision dual-frequency GPS receiver,
- A double CubeSat accommodating the Spherical EUV and Plasma Spectrometer (SEPS) from the Fraunhofer Institute in Freiburg,
- A double CubeSat* accommodating a magnetoresistive 3-axis magnetometer with inboard and outboard sensors on a boom from Imperial College London,
- A double CubeSat* accommodating a Silicon Drift Chamber from the University of Trieste,
- A double CubeSat* accommodating a charged particle detector from the Mullard Space Science Laboratory (MSSL),

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- A double CubeSat accommodating the Atmospheric Drag Environment Sensor (ADES) from the Air Force Research Laboratory in the US,
- A triple CubeSat (Inflate-Sail) for testing a solar sail with inflatable (gas pressure) booms from Surrey Space Centre,
- A double CubeSat* (GTSat) for testing the link quality between the satellite and the GENSO ground stations from TU Vienna,
- A double CubeSat, using a lightweight satellite structure composed of composite materials and for measuring surface degradation from the University of Bremen,
- A triple CubeSat (PICASSO), PICosatellite for Atmospheric and Space Science Observations from BISA in Brussels,

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- A triple CubeSat to demonstrate de-orbiting technologies for debris mitigation from the University of Rome
- A triple CubeSat carrying a biological μ -gravity payload from NASA Ames Research Center
- A triple CubeSat for limb sounding of the slant total electron content using a dual-frequency GPS receiver from the Royal Observatory in Brussels
- The GAMA-Sat network* proposed by the University of Porto for testing inter-satellite communications using three of the standard 40 double CubeSats

These CubeSats can also accommodate either the Set 1 or Set 2 standard sensor package

Science and In-Orbit-Demonstration (IOD) CubeSats

- Most likely, not all of the CubeSats in the list above will actually be proposed, and it is quite possible that other IOD CubeSats will be proposed and selected.
- If less than 10 IOD CubeSats are proposed and selected, the number of selected atmospheric double CubeSats can be higher so that the total of 50 CubeSats is maintained.
- If less than 40 atmospheric CubeSats are proposed, the selected the number of special IOD triple or double CubeSats can be higher so that again the total of 50 CubeSats is maintained.