

## **ETS-8 and its Laser Reflector Array**

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ETS-VIII, which is a geostationary satellite located at 146N longitude, was launched on December 18, 2006. One of its missions is to demonstrate mobile satellite communication system technology that will enable audio/data communications with hand-held terminals. The satellite is equipped with two large-scale deployable antennas to make a tennis-court-size parabola by expanding its modules. ETS-VIII employs Japan's first 3-ton-class geostationary satellite bus.

Since geosynchronous satellites are in higher orbits than GPS orbits, we cannot use GPS positioning technique. The orbit of a usual geosynchronous satellite is determined using range data by radio wave. However, the accuracy is rough. ETS-VIII has a Laser Reflector Array (LRA) for orbit determination.

Since there are only a few geostationary satellites which have an LRA, there were a number of technical challenges for ETS-VIII's LRA design. We decided to employ a flat-shaped LRA on ETS-VIII after reviewing several factors including return probability by link calculation, size of LRA, optimization of the cube size, and resistance in space environment. The array consists of 36 corner cubes, each of which is 4.1 cm in diameter. The array is 26 cm in length, 30 cm in width and 5.5 cm in height, and whose weight is less than 3kg.

There are not many SLR stations which can see ETS-VIII. Tracking of ETS-VIII is carried out once every 2 weeks in cooperation with the ILRS Western Pacific Ocean network. Tanegashima (GMSL) Japan, Koganei (KOGC) Japan, Yarragadee (YARL) Australia, Mt. Stromlo (STL3) Australia, and Changchun (CHAL) China have succeeded in tracking ETS-VIII.

As the result of tracking, the average return rate is about 10% to 20%. Analyzing data which was observed by Tanegashima (GMSL), standard deviation for ranging of each laser pulse is about 17 mm.

On this ILRS workshop, we introduce ETS-VIII and its LRA, and report the result of tracking for ETS-VIII.