

International Cooperation within IAG's Geodetic Services ILRS and IVS and the Japanese Contribution

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Space geodetic techniques have drastically expanded what geodesy can do in terms of the global scale and the high precision. It is vital for these techniques to distribute the observation data globally in good order. In this presentation, we shall focus on two international organizations: the International Laser Ranging Service (ILRS) that serves for satellite/lunar laser ranging (SLR/LLR), and the International VLBI Service for Geodesy and Astrometry (IVS) that serves for very long baseline interferometry (VLBI).

SLR/LLR measures the absolute distance between a ground station and a satellite or the Moon. The ground station network consists of a few tens of a geodetic point each of which is equipped with a large-size optical telescope and a laser ranging system. A number of various satellites including the Moon carry a retroreflector array that reflects the incoming laser pulse from a ground station exactly back to the station.

VLBI, on the other hand, receives very faint radio signal from quasars. The ground station network consists of a few tens of a geodetic point each of which equipped with a large-size radio telescope, an atomic clock and an ultrafast recording system. The radio signals from an identical stellar object received at two or more ground stations, which become a large amount of data exceeding a few terabytes per day, are brought together points the same stellar object at the same time, and the difference of the arrival time is very precisely determined through the correlation procedure.

ILRS and IVS have coordinated the data flow of such a wide variety and a huge amount. It is no exaggeration to say that the significance of existence of these services is based on the supply of the observation data and the product data. The frameworks of the services are therefore organized to manage the data flow. It is nowadays getting important to update the geodetic products quickly and frequently, which is benefitted greatly from ultrahigh-speed communications.

Japan has been involved in the development and the operation of these geodetic techniques since the early days, often leading the key technologies. Partly due to the geographical aspect, Japan has somehow uniquely contributed to the international community in terms of the station placement, the technological development and the personnel contributions.