

The ILRS contributions to the TerraSAR-X/ TanDEM-X mission and its success

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Abstract

The TerraSAR-X/TanDEM-X mission has proven to be a very successful mission, SLR contributed considerably to its success. In a subjective and brief manner we list the advances in science and in particular the role of SLR. We also take a look into the future and the challenges resulting for the ILRS community.

Mission Objectives

- Monitoring of changes of the Earth's surface
- Generation of a global Digital Elevation Model (DEM)
- Atmospheric and ionospheric sounding

Requirements on SLR

- Complementary tracking system to on-board GPS
- Validation and quality control of GPS based Precise Orbit Determination (POD)
- Validation of the GPS based precise baseline between the two satellites (accuracy 1 mm)

Success of the TerraSAR-X/TanDEM-X Mission

- TerraSAR-X monitors changes of the Earth's surface
 - Changes by groundwater lowering (China)
 - Changes of surfaces of glaciers (Greenland)
 - etc.
- TanDEM-X recently completed a global DEM with unprecedented accuracy (1 m in height)
- The occultation measurements are an important complement to data taken by other missions

SLR Tracking Record

- SLR tracking record and accuracy are sufficient to fulfill the basic validation and quality control requirements for POD
- SLR accuracy is not sufficient for the validation of the precise baseline (<1 mm needed)

Future Needs

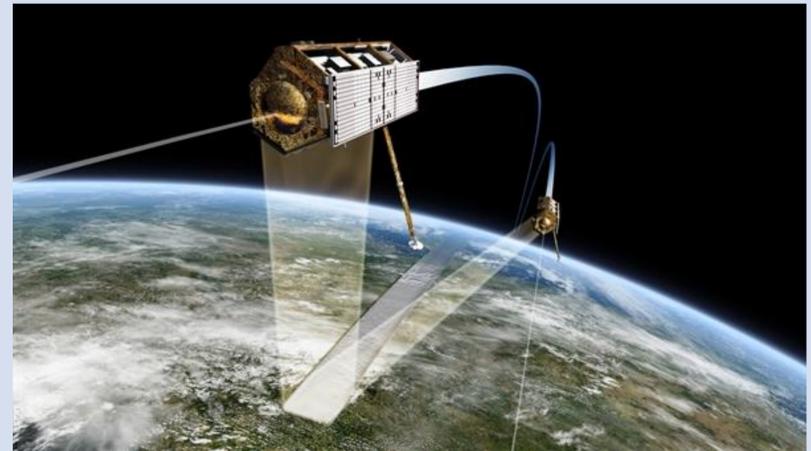
- Continued support needed for
 - POD quality control
 - Usage of space ties in a GGOS reference frame
 - Gravity field monitoring with or without GPS but together with SLR data from the geodetic satellites

Issues

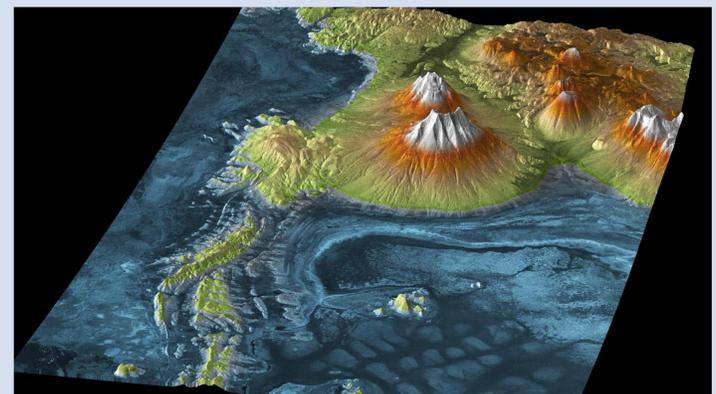
- The mission will continue in 2017

Summary

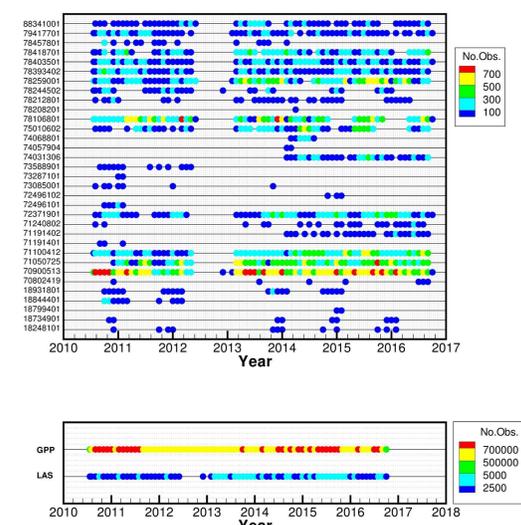
SLR contributed considerably to the success of the TerraSAR-X/TanDEM-X mission. The validation of the precise baseline at sub-millimeter level has not been achieved. Nevertheless, ILRS is doing a great job despite running on a voluntary basis and the ongoing financial discussions.



The TanDEM-X mission (courtesy DLR)



DEM of the Atacama desert (courtesy DLR)



Number of observations per month for satellite TanDEM-X in Rapid Science Orbit operations