TerraSAR-X and TanDEM-X satellite missions update

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TerraSAR-X Mission

- High-resolution radar mission
- TSX-1 satellite operational since January 2008
- Scientific and commercial applications (PPP)

25 October 2010: official operational release of TerraSAR-X mission on two satellites (TSX-1 and TDX-1) in close configuration

TDX-1 used for TerraSAR-X mission operation together with TSX-1

Data access for science through scientific proposals

http://sss.terrasar-x.dlr.de/
TerraSAR-X mission activities in Antarctica

I. During IPY participation to the WMO IPY STG SAR subgroup coordinated activities of space agencies in polar regions

Applications suited to TerraSAR-X:
1. Supersites: Ant. Peninsula & Ice Shelves (background mission)
2. Supersites: Greenland outlet glaciers
3. Pole to coast InSAR (high resolution acquisitions south of 80°S)

II. Through science proposals submitted by scientists (pre-launch and general)
1. TerraSAR-X background mission: “Antarctic Peninsula & Antarctic Ice Shelves"

Goals:

- Monitoring glaciological processes
- Mapping detailed structures of the glaciers

PI Angelika Humbert (Klima Campus Hamburg)

Areas monitored: Wilkins IS, Antarctic Peninsula, Pine Island Bay, Riiser IS, Flimbul IS, Shackleton IS, Totten Gl, Adelie coast.

Shackleton Ice Shelf (65.5°S, 101.5°E), East Antarctica, TDX-1 satellite, ScanSAR mode on 9 Oct. 2011
2. TerraSAR-X science project: Ice velocity measurements of Greenland outlet glaciers

- 22 rapidly changing outlet glaciers were monitored with TerraSAR-X from Jan. to Dec. 2009. Acquisition planning (repeat pass pairs) by Ian Joughin (Univ. of Washington)
- 245 High resolution (stripmap) TerraSAR-X scenes acquired / year and L1b processed.
- Mission continued through 2010 and 2011 as “Greenland Ice Mapping Project” (PI Ian Joughin)
3. TerraSAR-X science project: High resolution surface velocity measurements of Antarctic outlet glaciers and ice streams

Glacier basins in the Transantarctic Mts; descending coverage

TerraSAR-X planned left looking acquisitions 2009 - 2011

Courtesy Katy Farness, OSU
TerraSAR-X planned left looking acquisitions 2011 → ongoing

Recovery Glacier, Filchner-Ronne ice shelf; ascending coverage

RAMP Glacier
Previously acquired

Foundation Ice Stream
Support Force Ice Stream
Blackwall Ice Stream
Recovery Glacier
Unknown Glacier

Courtesy Katy Farness, OSU
High level geophysical products from TerraSAR-X: ice surface velocity

Nimrod Glacier

Byrd Glacier

Marsh Gl.

Kon-Tiki Nunatak

Ross Ice Shelf

Jezek, Abdel Jaber & Floricioiu, IGARSS 2011
TanDEM-X mission

• TDX-1 satellite launched 21 June 2010
• Pursuit monostatic (20 km formation) commissioning phase 20 July - 5 Oct. 2010
• Bistatic (close formation) commissioning phase 25 Oct. - 12 Dec. 2010
• Start of operational global DEM acquisitions 12 Dec. 2010
• Start of science acquisitions 1 Apr. 2011
• Start of operational processing Aug. 2011

Status of science activities:  http://tandemx-science.dlr.de

• Pre-Operational Announcement of Opportunity: for user specific experimental acquisition requests (closed 1. Nov. 2010) -> CoSSC data (not DEM)

• 174 proposal submitted in various topics, major in **glaciology** (30 proposals).

  - including proposals for 22 Greenland glaciers (PI Ian Joughin) and for Byrd, Pine Island Gl, Ant. Peninsula (PI Ken Jezek) which complement TerraSAR-X proposals during IPY/STG
Drygalski glacier (64.7°S, 61.1°W), Antarctic Peninsula

TerraSAR-X amplitude

TanDEM-X DEM generated from bistatic data