DLR/TerraSAR-X: development of IPY portofolio since the 3rd STG IPY meeting (Frascati, 5/6 May 2008)

Dana Floricioiu
with contributions from Katy Farness
DLR/TerraSAR-X Activities after STG-3 meeting:

- Participation at SCAR St Petersburg 7 – 11 July 2008
  Poster presentation: **TERRASAR-X CAPABILITIES IN POLAR REGIONS**

- Contribution to the publication in Environmental Geology

- New IPY related TerraSAR-X science proposal over Antarctica:
  **High-Resolution Surface-Velocity Measurements of Antarctic Outlet Glaciers and Ice Streams**
  Submitted on behalf of GIIPSY: PI and Co-Is: D. Floricioiu, K. Jezek, M. Drinkwater, I. Joughin

  **Areas:** Transantarctic Mountains, Filchner Ice Shelf → south of 80°S

  Left looking TSX Stripmap acquisitions over 3 TSX cycles (1 cycle = 11 days) required.

  Presently the project is in evaluation at TSX science coordinator and Mission Operations Segment (MOS)
Areas of interest for the InSAR coverage in Antarctica

Coverage polygons for Transantarctic Mountains (lower) and Ronne-Filchner Ice Shelf area (upper) (blue)

Glacial flow extent with the exception of the TransAntarctic Mountain region (purple)

Areas extend north of 80°S degrees encompassing continuation of glacial flow (yellow).
**TSX acquisition planning proposed:**

Filchner Ice shelf, ascending, 3 beams, Stripmap mode

swath width 30 km
TSX acquisition planning proposed:
Transantarctic Mts, ascending, 3 beams
Filchner Ascending  114.8 minutes  90 swaths
Trans Antarctic Ascending  125.7 minutes  82 swaths

Filchner Descending  127.7 minutes  89 swaths
Trans Antarctic Descending  127.7 minutes  93 swaths
## Summary table for the amount of proposed LL acquisitions for one coverage

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<th>Area</th>
<th># seconds</th>
<th># minutes</th>
<th>L012 Swaths</th>
<th>L013 Swaths</th>
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3 such repeat pass coverages needed for InSAR
TerraSAR-X left looking acquisitions

Rockefeller Plateau Antarctica 81.2S 140.1W
Stripmap mode strip_012L 41 deg incidence, left looking
DT 8075 29.06.2008
TerraSAR-X out of full performance acquisitions

Mac Robertson Land, Antarctica 73.3S 56.5E, 2700 m a.s.l.

Stripmap mode **strip_027R 60 deg incidence**, right looking

DT 6357 23.05.2008

Test for range ambiguity ratio at **max incidence angle**. Beam can be used in left looking for South pole hole mapping.
Quad- and dual-pol acquisitions over common supersites

Two IPY supersites included: **Devon Island** (Canada) and **Jakobshavn glacier** (Greenland), quad pol data acquired
Stripmap, dual polarization

East Greenland, glaciers, 12.12.2007

Polarisation: HH/HV

Incidence Angle: 24.793 ..26.780 deg
(beam: stripNear_005 R)

68.3N 31.1W HH,HV,HH-HV
Velocity fields from TerraSAR-X feature tracking

(1) Jakobshavn glacier, June 2008

 Courtesy Ian Joughin, Univ. of Washington
(2) Drygalski glacier, Antarctic peninsula

Polarisation: HH

Incidence Angle: 37 deg

(beam:strip_010 R)

23 repeat pass TerraSAR-X images

5.5 m/day

Courtesy Michael Eineder, DLR
(3) Upsala glacier (Southern Patagonia Icefield) January 2008

Last ice velocities from stakes were measured in **1993**: max. 4.9 m/day

**TerraSAR-X**: max 5.6 m/day

D. Floricioiu, IGARSS’08