ENVISAT ASAR
Acquisition Strategy
for IPY 2007-2008

Jorge Del Rio Vera
Mark Drinkwater
Henri Laur
Presentation contents:

1. Data acquisition requirements (scientific projects related to IPY + operational)

2. Envisat ASAR acquisition strategy for IPY

3. Future acquisition strategy
   - KOPERNIKUS - FP7
   - Scientific demand (post IPY?)
Scientific projects overview

269 projects in Arctic/Antarctic areas (not all related to SAR)
out of which 47 specific IPY AO projects

+ coverage demand identified within the IPY STG framework

Operational requirements

Essentially related to Sea Ice monitoring requested by Sea Ice Services
(Baltic, Barents Sea, Greenland waters, Canada, Antarctica)
2- Data acquisition strategy

**ASAR High Rate Data Acquisition**
(average minutes / orbit)

**Data transmitted to non-ESA stations is also acquired by ESA**

- Acquisitions specifically requested by users
  - Acquisitions done as Background Mission (user community consensus)
    - (~ 5500 km / orbit)

- Artemis unavailable due to ESA ATV operations

**Envisat ASAR use: average 18 minutes /orbit**
(i.e. about 7200 km per orbit in average)

Worldwide acquisition thanks to on-board recorders and to ESA data relay satellite Artemis (60% of ASAR High Bit Rate data transmitted through Artemis).

Remaining acquisitions in Low Bit Rate:
Global Monitoring Mode over land and sea ice, Wave Mode over oceans.
2- Data acquisition strategy

- Special ASAR background mission for IPY

- Area in yellow is covered in WS HH
- Area in green is covered once per cycle in IM IS2 HH or WS when IM IS 2 HH is not used
- Sea Ice is monitored in WS HH, with an extended area during Antarctic winter
- One coverage per cycle is guaranteed in IM IS2 HH and WS HH for the green area
2- Data acquisition strategy

Density plots (ASAR-Wide Swath)
2- Data acquisition strategy

Density plots (ASAR-Image Mode)
ASAR products: **free NRT access for all users**

**ASAR Medium Resolution products:**
All with 75 m pixel spacing:

- **Wide Swath Mode (400 km)**
  → SCANSAR main product (*WSM*)
  Volume: 60 Mbytes for 400 km coverage

- **Image Mode (~100 km)**
  *medium resolution product (IMM)*
  Volume: 16 Mbytes for 400 km coverage

- **Alternating Polarisation Mode (~100 km, 2 bands)**
  *medium resolution product (APM)*
  Volume: 32 Mbytes for 400 km coverage

Total volume **per day**: about **10 GBytes**.

**Service description:**

- **data acquired worldwide** using 3 ESA stations (ESRIN, Kiruna, Matera)
- corresponds to about 250 min. of ASAR data / day (in 2007) [1 min. = 400 km]
- performances (in 2007): **about 93 % within 3 hours**, about 97 % within 24 hours
Antarctica 2 hours ago
30 September 2008, 8:30 (6:30 UTC)

E 19 deg, S 70 deg.

Envisat ASAR product
available to all users, free of charge
Antarctica 4 hours ago
30 September 2008, 7:00 (5:00 UTC)

Where is it?
Break-up of Wilkins ice-shelf (May to July 2008)
Wilkins ice-shelf since 1992

- Break-up event since Feb. 2008: ca. 2000 km² loss
- Occurrence during Southern hemispheric winter!
2- Data acquisition strategy

**ASAR LR BRM PLANNING STRATEGY**

- Global Monitoring Mode HH
- Wave Mode

GM over cyclones area from 15 Jul. to 1 Nov.
Up to -55 deg.: Minimum GM coverage from January to March

Up to -55 deg.: Maximum GM coverage from July to October
2008 Arctic sea ice extent

Canada

Russia

Greenland

Early September 2008

ASAR GMM mosaic

European Space Agency
Agence spatiale européenne
2008 Arctic sea ice extent

2007: lowest minimum
2008: second lowest minimum
2- Data acquisition strategy

Support to a specific experiment:

Sea Ice Coordinated Experiment: Sea Ice Kinematics (Adelie and GeorgeV land)

Four coordinated AO projects, supported by researchers of 8 institutions

- Christian Haas (Univ. Alberta, Canada)
- Petra Heil (AAD&ACE CRC, Australia)
- Ron Kwok (NASA JPL, USA)
- Sandra Krutzy (Alfred Wegener Institute, Germany)
- Edward Maksym (British Antarctic Survey, UK)
- Roberto Saldo (Danish Technical Univ, Denmark)
- Takenobu Toyota (Inst. Low Temperature, Japan)
- Burcu Otzoy-Cicek (Univ Texas, USA)

Modification of the acquisition strategy during September 08 to acquire daily imagery over the area.
2- Data acquisition strategy

Sept WSM coverage in Australian box (P. Heil et al).
2- Data acquisition strategy

Sea Ice Coordinated Experiment

"2008-09-02 14:45:14.86" + "2008-09-02 22:56:42.96"

SeaIceExp
Recommendation for Systematic WSM Mapping

- Perform dedicated 1-month remote sensing experiment (100 km square) to assess feasibility of near-daily acquisitions.
- Instead of coverage of entire sea ice zone, focus on daily acquisitions within key regions.

- In addition, for circumpolar fast ice: Temporal sampling: 1-day throughout Feb, Jun, and Oct.
Acquisition Planning:
Amundsen-Bellingshausen Sea
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3- Future acquisition strategy

- ERS/ENVISAT tandem campaign to start 19 November and to last 3 or 4 cycles.

- Focused in the northern hemisphere (followed by a campaign in the southern hemisphere (TBC)).

- Campaign focused in DEM generation and interferometry
3- Future acquisition strategy

KOPERNIKUS (GMES)

• Envisat is expected to give a major contribution to Kopernikus, in particular for sea ice monitoring.

• The data acquisition specifically dedicated to Kopernikus should start in the coming months.

• However the preliminary analysis shows a synergy between KOPERNIKUS and current IPY needs.
There are 7 services for sea ice monitoring in the Arctic region.

Very demanding requirements: daily monitoring in most cases.

Objectives: e.g. Sea ice drift, sea ice edge, ice deformation.
KOPERNIKUS

• There is one service for sea ice monitoring in the Antarctic region.

• 3-days drift monitoring in most cases.
WHAT’S NEXT

• Should we continue the SAR acquisition effort over polar areas after end of IPY?