DLR’s Activities to Support the GEO Supersite Initiative with TerraSAR-X Data

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Overview

- GEO / ESA Supersite initiative
- Support by TerraSAR-X project
- Scientific results
- Recommendations by DLR / TerraSAR-X
Original Supersites
Event Supersites
TerraSAR-X Constraints

- **Public Private Partnership Mission**
  - 50/50 science / commercial data share
  - Not to impair commercial rights and interests of ASTRIUM GEO-Information Services

- **German Satellite Data Security Act**
  - Keep control in DLR over who is using which data

- **No mapping mission – individual acquisition planning required**

- **No project funding for GEO activities**

- **KISS: Use of well established TerraSAR-X Science Service System mechanisms**
TerraSAR-X Project Implementation of Supersites

- Supersite
  - Scientific Advisory Committee
  - Super-PI Nomination
  - Proposal
  - Decision

- TerraSAR-X
  - POC & Science Coordination
  - Free Acquisitions
  - Simple User Proposal
  - DLR Raw data archive
  - Data Ordering
  - Site Report
  - Super Proposal

- Super-PI
  - Acquisition request coordination
  - Free Processed Data

- Other PIs
  - Simple User Proposal
## TerraSAR-X Supersite Activity

<table>
<thead>
<tr>
<th>Regular Sites</th>
<th>Acquisition Proposal / PI</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>Tokyo-Mt. Fuji</td>
<td>???</td>
<td>?</td>
</tr>
<tr>
<td>Vancouver-Seattle</td>
<td>??? / H. Dragert</td>
<td>?</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>GEO0895 / P. Lundgren, USGS</td>
<td>+</td>
</tr>
<tr>
<td>Istanbul</td>
<td>GEO0988 / Z. Cakir, TU Istanbul</td>
<td>?</td>
</tr>
<tr>
<td>Hawaii</td>
<td>GEO0875 / M. Poland, USGS</td>
<td>+</td>
</tr>
<tr>
<td>Etna</td>
<td>GEO0891 / E. Sansosti, IREA</td>
<td>+</td>
</tr>
<tr>
<td>Vesuvius / Campi Flegrei</td>
<td>??? / S. Borgstrom / Minet, DLR</td>
<td>?/+</td>
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</tbody>
</table>

### Event Sites

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</thead>
<tbody>
<tr>
<td>Haiti</td>
<td>MTH1131 / Minet, DLR</td>
<td>+</td>
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<tr>
<td>Wenchuan</td>
<td></td>
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<tr>
<td>Eyjafjallajökull</td>
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<tr>
<td>Sendai</td>
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DLR – ITD Special Action for Event Supersite “Sendai”

- Acquisition of TerraSAR-X data and distribution via UNAVCO / ESA server
  - Reference data (before event)
  - 3 month time series after event
  - 17 scenes in total
Sendai Data Website / Data Requests 2011

Handling of event supersites after hot phase of public interest?
Selected Results Provided by TerraSAR-X Supersite Investigators
Tohoku-Oki earthquake event Supersite

Colorscales 3 m

Pixel tracking offset of M 6.6 aftershock of April 11

Image from 17 March & 19 April ‘11

E. Fielding, JPL
Sendai: displacement map

Abs. LOS displacements after correction of atmosphere and earth tides

Absolute disp histogram (m)

median = 2.81 m
mode = 2.74 m

N. Yague-Martinez, et al. DLR/Starlab
See talk Wednesday 15:20 h
Mt. Etna

Descending Orbits
Time Interval: Sep 2008 – Dec 2009
27 acquisitions
76 interferograms

E. Sansosti, IREA
End of 2009 Deformation event at the Pisciarelle Site
Campi Flegrei / Naples

See talk C. Minet S. Borgstrom on Thursday
Kīlauea Caldera

Halemaʻumaʻu Crater

spatial resolution: ~30 m

1 km

range change

0 1.55 cm

LIDAR DEM (sp. resolution: ~1 m)

Halemaʻumaʻu Crater

Summit eruptive vent

N

Kīlauea Caldera

Summit eruptive vent

spatial resolution: ~3 m

1 km

range change

0 1.55 cm

N. Richter, M. Poland, USGS
Kīlauea Caldera

Summit eruptive vent

range change
0 1.55 cm

Halemaʻumaʻu Crater

Summit eruptive vent instability

spatial resolution: ~3 m

N. Richter, M. Poland, USGS
Turkey: Proposed TerraSAR-X Coverage

GEO Plenary: in November 2011 in Istanbul
⇒ Development of the Turkey Natural Laboratory
Summary

- Well working system established to support GEO Supersites in TerraSAR-X project
- Most Supersites well established for TerraSAR-X
- Efforts and co-operation from PIs and DLR required to maintain data acquisition and establish a valuable data stack

Our recommendations
  - Keep number of Supersites manageable
  - Establish widely accepted and used high quality Supersites
  - Support by ground truth and government mandatory