COSMO-SkyMed Mission: Application and Data Access

A. COLETTA
COSMO-SkyMed Mission Manager
ITALIAN SPACE AGENCY
The COSMO-SkyMed PROGRAMME

- The Largest Italian investment in Space System for Earth Observation
- A National Program conceived by Italian Space Agency (ASI) and funded by Italian Ministry of Research and Italian Ministry of Defence
- Managed by ASI in cooperation with the Italian MoD
- Developed by the Italian National Industry

DUAL USE SYSTEM
WIDE APPLICATION RANGE IN A DUAL SCENARIO

- RISKS MONITORING AND PREVENTION - MANAGEMENT OF EMERGENCIES
  - Floods
  - Oil spill
  - Earthquakes
  - Landslides
  - Volcanoes
  - Seismic risk
  - Fires

- TECHNICAL CARTOGRAPHY - URBAN PLANNING

- SCIENCE APPLICATIONS

- OCEAN AND ICE MONITORING

- MONITORING AND MANAGEMENT OF COASTLINES AND INLAND WATERS

- MONITORING AND MANAGEMENT OF FORESTRY AND AGRICULTURAL RESOURCES

- SECURITY APPLICATIONS

- WIDE APPLICATION RANGE IN A DUAL SCENARIO
A QUICK LOOK AT THE SYSTEM...

SPACE SEGMENT

GROUND SEGMENT
Prague - 29 June 2009

**ORBITAL PERIOD** ~ 97 m

**FOUR X-BAND SAR CONSTELLATION**

**HEIGHT** 619.6 Km

**ORBIT** DAWN/DUSK SSO

**INCLIN.** 97.8°

**EQUIPH.** 90° Separ.

**LTAN** 6 a.m.

**SENSOR** X-BAND SAR (9.6 GHz)

**WORLDWIDE GLOBAL COVERAGE**

**ALL WEATHER** NIGHT / DAY ACQUISITIONS

**OPERATIONAL AUTONOMY** ≥ 24 H

**GT REPEATABILITY** 1 km

**DOWN-LINK DATA RATE** 310 Mbps

**ON-BOARD MEMORY** 320 Gbit EOL

**S/L OPERAT. LIFETIME** 5 YEARS

**SPACE SEGMENT**
Nominal Incidence Angle Range: 25° - 50°

Extended Incidence Angle Range: 20° - 59.5°

Nominal Direction: 34°

EXTENDED ACCESS AREA

∼ 600 Km (one side)

ELECTRONIC STEERING CAPABILITY
Prague - 29 June 2009

FULL CONSTELLATION – RL/LL –
EXTENDED INCIDENCE ANGLE RANGE

REVISIT TIME

4 Satellites
MAX < 12h (worst case)
AVERAGE REVISIT TIME AT EUROPEAN LAT. ~ 3,5 - 4,5 h
Polarimetric products are provided by using the STRIPMAP mode in PINGPONG configuration.

The STRIPMAP (PINGPONG) operative mode achieves medium resolution, medium swath imaging with two radar polarizations selectable among HH, HV, VH and VV, a spatial resolution of 15 meters on a swath $\geq$ 30 km.

The acquisition is performed in strip mode alternating the signal polarization between two of possible ones i.e. VV, HH, HV and VH.

A periodic polarisation switching at T/R modules level during the synthetic aperture time is programmed according to a predefined schema. A greater number of polarisation swapping during the synthetic aperture time will result in a larger spatial resolution.
GROUND SEGMENT
SIASGE INTEGRATED SYSTEM with 2 L-Band SAOCOM Satellites

C-USER GROUND SEGMENT

ARGENTINEAN PARTNER

FEEDBACKS

CIVIL PARTNER #2

CIVIL PARTNER #3

CIVIL PARTNER #4

CIVIL PARTNER #5

ORFEO FEDERATED SYSTEM with 2 Optical PLEIADES Satellites

FRENCH PARTNER

SYSTEM PARTNERSHIP CAPABILITY
VERY URGENT

CRISIS

ROUTINE

DEPENDING ON TARGET AND GROUND STATIONS LOCATION

TIME PERFORMANCES

4 SATELLITES

- 4 satellites: 4 - 18 h
- 5 satellites: 5 - 36 h
- 9 satellites: 9 - 72 h
### Products Overview

#### Higher Level Products

- Coherence map; Interferograms
- Mosaicked
- Backscattering
- Co-registered
- Speckle Filtered
- Quick look

#### Standard Products

- Dem & Interferometric Products

#### Civilian Products

- **200 Civilian Products** / Day (LEV 1C/1D)

#### Defence Products

- **50 Defence Products** / Day (LEV 1C/1D)
The common quality parameters of all the SAR products are:
- PSLR $\leq -22$ dB
- ISLR $\leq -12$ dB
- Azimuth Point Target Ambiguity $\leq -40$ dB
- Radiom. Accuracy $\leq -1$ dB (single look)
- Radiom. Linearity $\leq -1.5$ dB
- Radiom. Stability $\leq -1$ dB
- Total NE $\sigma^o \leq -19$ dBm2/ m2

SAR products are distributed in:
- Format: HDF5
- Media: DVD, CDROM, Magnetic cassette

Nominal Delivery via ftp
MISSION/SYSTEM SCENARIO

1ST SATELLITE LAUNCH 08 June 2007
2ND SATELLITE LAUNCH 09 Dec. 2007
3RD SATELLITE LAUNCH 25 OCT. 2008

COSMO-1
180°
COSMO-2
67.5°
COSMO-3
Tandem-like Operational Configuration

1st & 2nd Satellites entered the Operational Phase on 5 May 2009
3rd Satellite is currently in its Commissioning Phase. Completion planned in Summer 2009

4TH SATELLITE LAUNCH PLANNING:
FIRST QUARTER 2010

4 OPERATIONAL SATELLITES

3 Satellites
MAX < 35.5h (worst case)
AVERAGE REVISIT TIME AT EUROPEAN LAT. ~ 4 - 5 h

3 Satellites
MAX < 35.5h (worst case)
AVERAGE REVISIT TIME AT EUROPEAN LAT. ~ 4 - 5 h
DATA POLICY

Due to the intrinsic system “duality” nature and to the national and international co-operations, ACCESS and USE of COSMO-SkyMed system and data are ruled by a specific regulation for DATA DISTRIBUTION.

ASI has the main goal of ensuring the availability of data to national and international civil users.
ACCESSING THE SYSTEM

TWO MACRO-CLASSES

- SYSTEM OWNERS (ASI)
- INTERNATIONAL PARTNERS
- NATIONAL & INTERNATIONAL INST. USERS (NAT. ADM. – INT. ORG., e.g. ESA)

ALL THE OTHERS

COMMERCIAL USERS
ACCESSING THE SYSTEM

- SPECIFIC AGREEMENTS WITH ASI
- TERMS AND CONDITIONS
- PROJECT FORM

INSTITUTIONAL USERS

COMMERCIAL USERS

- TERMS AND CONDITIONS
ASI supports the INSTITUTIONAL (incl. SCIENTIFIC) data exploitation

www.cosmo-skymed.it
Product Requests, with parameters such as:
- Geographical Area of Interest
- Time window
- Sensor parameters (e.g. SAR instrument mode, incidence angle, orbit direction)
- Acquisition periodicity (e.g. one-shot, periodic)
- Product Delivery (via FTP, on media)
- User AUTHORIZED

SUBSCRIBING with user info
Provide a PROJECT FORM
User AUTHORIZED

Catalogue browsing, with a query based on multiple criteria:
- Spatial coverage
- Temporal coverage
- Acquisition characteristics
- Data quality (e.g. missing lines)
# INSTITUTIONAL USERS

**INSTITUTIONAL “DEMO” PRODUCTS DISTRIBUTION REQUEST FORM**

<table>
<thead>
<tr>
<th>Area Name (*)</th>
<th>EX: ROME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country Area (*)</td>
<td>EX: ITALY</td>
</tr>
<tr>
<td>Application Typology (*)</td>
<td>EX: OIL SPILL</td>
</tr>
</tbody>
</table>

### Coordinates [lat: long] (*)
(Centre of the Image)

| Latitude [degree] | 42° | 64° | North |
| Longitude [degree] | 5° | 12° | East |

<table>
<thead>
<tr>
<th>Polarisation (if requested)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Locking Mode (if requested)</td>
<td></td>
</tr>
<tr>
<td>Other Specifications (if requested)</td>
<td></td>
</tr>
<tr>
<td>Processing Level (*)</td>
<td></td>
</tr>
<tr>
<td>Higher Level Product (only for higher level processing)</td>
<td></td>
</tr>
<tr>
<td>Delivery Option (ftp, DVD, etc.) (*)</td>
<td></td>
</tr>
</tbody>
</table>

(*) These fields are mandatory

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**TO BE FILLED BY THE USER**

**Request Specification**

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| Redius (*) | |

### TO BE FILLED BY ASI

COSMO-SkyMed Request ID (*)

**Request authorised by**

Giovanni Fabbri Bigamin
ASI President

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**Pagina 2**
**ACCESSING THE SYSTEM**

- **ASI** supports the INSTITUTIONAL (incl. SCIENTIFIC) data exploitation: www.cosmo-skymed.it

- **e-GEOS** supports the COMMERCIAL data exploitation: www.e-geos.it

**INSTITUTIONAL USERS**

- IF REQUESTED:
  - COMMERCIAL USERS

**COMMERCIAL USERS**
COMMERCIAL DISTRIBUTION REQUEST FORM

Richiesta di autorizzazione per distribuzione dati COSMO-SkyMed

Numero richiesta indexing:
Nome area
Nazione area
Origine richiesta:
End User
Referente End User
Motivo
Tipoologia applicazione:
Coordinate (lat long)
Priorità:
Sensor mode:
Livello di processamento:

Richiesta autorizzata da

e-GEOS

Sede Sociale
Matera, Contrada Tarlachio
Italia

ven. 14 marzo 2008  Pagina 1 di 1

e-GEOS – Direzione e coordinamento Sismoelettrica S.p.A.
Società per Azioni Cap. Soc. 101.000 Euro inserimento versato; Tribunale di Matera Codice Fiscale:FI411150077
Prague - 29 June 2009

ACCESSING THE SYSTEM

CIVILIAN DOMAIN

COSMO-SkyMed

User Ground Segment

DEMO PRODUCTS

DEMO REQUEST FORM

ASI MISSION MANAGEMENT

INSTITUTIONAL USERS

COMMERCIAL USERS

COMMERCIAL REQUESTS

www.cosmo-skymed.it

INSTITUTIONAL REQUESTS

www.e-geos.it

COMMERCIAL REQUESTS

INSTITUTIONAL USERS

COMMERCIAL USERS

ACCESSING THE SYSTEM
The COSMO-SkyMed System utilization is based on the evaluation of System Resources Consumption.

DEFINITION OF 3 MACRO RESOURCES

SET OF PARAMETERS

ENERGY
- e.g. POWER

MEMORY
- e.g. IMAGE SIZE

TIME
- e.g. MANOEUVRES TIME
Each authorised Partner of the COSMO-SkyMed System has an assigned resources quota to be used every day.

These rules are applied to each system partnership, both in the Civilian and Defence domains, in the frame of each authorized Partner specific agreement.

Each User pays as much as he consumes System Resources. **No Alterations - No Privileges**
INSTITUTIONAL USERS

• NATIONAL & INTERNATIONAL AGREEMENTS
• ANNOUNCEMENT OF OPPORTUNITY
• ASI THEMATIC PROJECTS
• INTERFEROMETRIC MISSION
• BACKGROUND MISSION
• INSTITUTIONAL REQUEST “ON DEMAND”

COMMERCIAL USERS

• COMMERCIAL AND PROMOTION

- Mapping of seismic and volcanic area; mapping of area under flood risk
- Mapping of Forests, Lake, Rivers, Inland waters
- Land Use – Urban Planning
- Ice - Glaciers