COMISIÓN NACIONAL DE ACTIVIDADES ESPACIALES (CONAE)

Laura Frulla (lfrulla@conae.gov.ar)

Space Data Coordination Group meeting 1

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Forest Carbon Tracking
Global Forest Observations Initiative

GEO GROUP ON EARTH OBSERVATIONS

Summary of SAOCOM Mission Capabilities
Mission Objectives

- To satisfy user needs (soil moisture information)
- To satisfy Space information Cycles-National Space Program:
  - agriculture, fishing and forestry,
  - weather and climate, hydrology and oceanography,
  - emergencies,
  - environment and natural resources of land and sea,
  - urban areas, cartography, geology, mining and territorial planning,
  - health
- To operationally integrate the SIASGE System composed by the SAOCOM Constellation and the COSMO-Skymed Constellation in order to implement a double band (X+L) SAR Mission

Summary of SAOCOM Mission Capabilities

Mission General Description

- a constellation of two identical satellites SAOCOM 1A and SAOCOM 1B carrying on-board an L-band polarimetric SAR instrument
- an end-to-end Earth Observation System
- dedicated to the remote sensing and data exploitation
- SAOCOM satellites shall be injected into a sun-synchronous nearly circular frozen polar orbit (06:12 am LTAN/619.6 km)
- with a repeat cycle of 16 days (8 days with full constellation)

Summary of SAOCOM Mission Capabilities

SAR Instrument Main Features

- ✓ all weather, day/night, polarimetric L-Band SAR information,
- ✓ a uniform world wide observation coverage
- ✓ real time/stored acquisition modes
- ✓ right-looking, in nominal condition
- ✓ left-looking operational capability for limited periods of time in accordance with system resources, dedicated mainly for emergencies
- ✓ mission design lifetime of 5 years

Summary of SAOCOM Mission Capabilities
Mission Acquisition Strategy

- Baseline mission
- Foreground mission
- Background mission

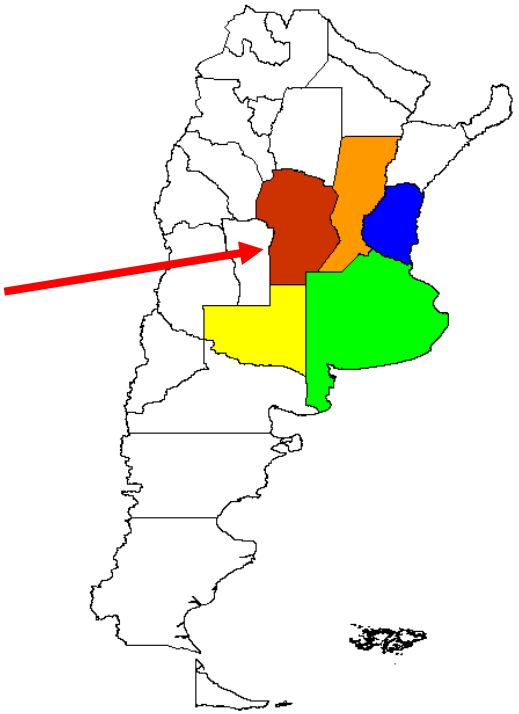
Detailed Acquisition Plan

✓ Under development

Summary of SAOCOM Mission Capabilities

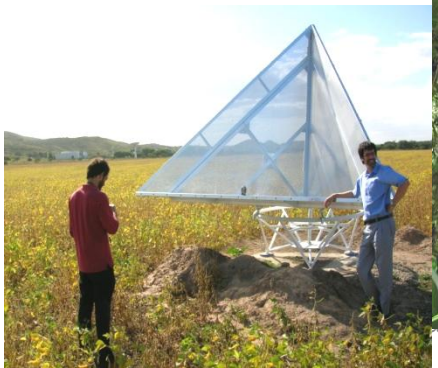
Mission Acquisition Strategy: Baseline Mission

Fixed acquisitions:



- For soil moisture: over Pampas Region (the main Argentinian region dedicated to agriculture and cattle production covering 83.000.000 ha)

- For calibration purposes, mainly over:
  - the rain forest of the Amazon
  - specific point targets



Summary of SAOCOM Mission Capabilities

Mission Acquisition Strategy: Foreground Mission

Variable acquisitions:

- ❑ Initial estimations due to potential users requests in the frame of CONAE's Spatial Information Cycles (from Argentina and abroad)

- ❑ ASI interest area, including exclusivity area

25ºW - 120ºE of longitude

0º - 80ºN of latitude

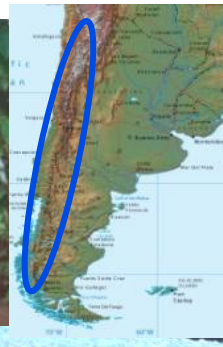
Summary of SAOCOM Mission Capabilities

Mission Acquisition Strategy: Background Mission (1/2)

The objective is to foresee acquisitions of certain valuable data to generate a data base useful for future uses.

Predetermined acquisitions according to available resources:

- Over Argentina:
  - emergencies (for prevention, monitoring and mitigation)
  - forest biomass
  - land
  - maritime
  - the mountain chain at the West (the Andes): plates and glaciers movement

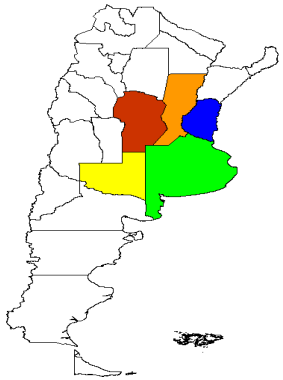


- Over Latin America and the rest of the world:
  - forest biomass

Summary of SAOCOM Mission Capabilities

Key Mission Scenario Requirements

- For nominal side looking (right-looking) the L band SAR instrument shall be capable of operating in any condition:
  - ✓ allowing continuous acquisitions of 10 minutes
  - ✓ 15 minutes per orbit as an average on a daily basis
  - ✓ allowing up to 20 minutes of non continuous acquisitions in an orbit
- For non nominal side looking (left-looking) the L band SAR instrument shall be capable of operating up to 5 minutes, according to resources and preserving spacecraft safety, returning afterwards to the nominal side looking
- Each time a SAOCOM satellite accesses the areas defined for the strategic applications, it shall be capable to perform a continuous data acquisition in TOPSAR Wide QP



Summary of SAOCOM Mission Capabilities

Nominal Modes Features

acquisition mode	polarization mode	swath width	spatial resolution	minimum incidence angle range
StripMap	SP: HH or HV or VH or VV	> 40 km	< 10 m	21° - 50°
	DP: HH/HV or VV/VH	> 40 km	< 10 m	21° - 50°
	QP: HH/HV/VH/VV	> 20 km	< 10 m	20° - 35°
TOPSAR Narrow	SP: HH or HV or VH or VV	> 150 km	< 30 m	25° - 45°
	DP: HH/HV or VV/VH	> 150 km	< 30 m	25° - 45°
	QP: HH/HV/VH/VV	> 100 km	< 50 m	20° - 35°
TOPSAR Wide	SP: HH or HV or VH or VV	> 350 km	< 50 m	25° - 45°
	DP: HH/HV or VV/VH	> 350 km	< 50 m	25° - 45°
	QP[(1)]: HH/HV/VH/VV	> 220 km	< 100 m	20° - 35°
	CL-POL: RH/RV or LH/LV	> 350 km	< 50 m	25° - 45°

[(1)] TOPSAR Wide QP assigned for Strategic Applications

Summary of SAOCOM Mission Capabilities
Radiometric Features

- Radiometric dynamic range:
  - The L-band SAR instrument shall be capable of acquiring data corresponding to σ° values ranging from -35 dB to 5 dB, in order to serve the envisaged applications.
- Product radiometric accuracy, for the right-looking case, and because of the mission main driver:
  - Absolute radiometric accuracy shall be less than or equal to 0.5 dB
  - Polarimetric accuracy shall be less than or equal to 0.3 dB

Summary of SAOCOM Mission Capabilities

Products Processing Levels

- ✓ RAW data products,
- ✓ Level 0 products
  - ↳ Annotated RAW data-AR
- ✓ Level 1 products
  - ↳ Level 1A: Single Look Complex-SLC,
  - ↳ Level 1B: Detected Image-DI,
  - ↳ Level 1C: Ground Ellipsoid Corrected-GEC
  - ↳ Level 1D: Geocoded Terrain Corrected-GTC.
- ✓ Higher level products

Summary of SAOCOM Mission Capabilities

Higher Level Products on the Main Driver Basis

- Surface Soil Moisture Products from individual strips
- Surface Soil Moisture Mosaics (over Pampas Region)
- Derived products for Agriculture:
  - ✓ Decision Support Data
  - ✓ Fusarium Progression Calculation Processing
  - ✓ User Fusarium Calculation
- Derived products for Hydrology:
  - ✓ Flood Guidance
  - ✓ Deterministic Hydrologic Forecasts
  - ✓ Medium and Long Term Probabilistic Forecasts

Summary of SAOCOM Mission Status

Reviews	*Description*	*Date estimation - Status*
SRR	System Requirement Review	Q4 2008 - Done
PDR	**Preliminary Design Review**	**Q4 2008 - Done**
Pre-CDRs	MTR CDR	Q3 2010 - Done
	Platform and Antenna Structure CDR	Q4 2010 - Done
	SAR Instrument and Strategic App.	Q3 2011 - Done
	GS CDR	Q3 2012
	Flight Segment CDR	Q3 2012
M-CDR	**Mission CDR**	**Q3 2012**

- SAOCOM 1A launch: 2015
- SAOCOM 1B launch: 2016
- Commissioning: 9 months for each satellite

- SAOCOM 2 mission: will give continuity to SAOCOM 1

Thank you for your attention