



# Sentinel-1 Implementation Status



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## Sentinel-1 Mission Objectives

- Component of EU & ESA's Global Monitoring for Environment and Security Programme (GMES)
- GMES Core Services:
  - GMES Marine Services
  - GMES Land Monitoring Services
  - GMES Emergency Response Services
  - GMES Atmospheric Monitoring Services
  - GMES Security Services
- GMES Downstream services

## Driving Requirements for Sentinel-1 Mission Design

- Continuity of measurements for services
  - C-band SAR at medium resolution (10m and lower)
  - Routine day-and-night all-weather data supply
  - Data quality similar or better than ERS/ENVISAT
  - High system availability
- Improvements to better meet requirements of GMES services
  - Greatly improved coverage and revisit
  - Conflict-free operations (wide-swath, dual-pol, high-resolution modes)
  - Equalized performance across swath

## Sentinel-1 Programme Status

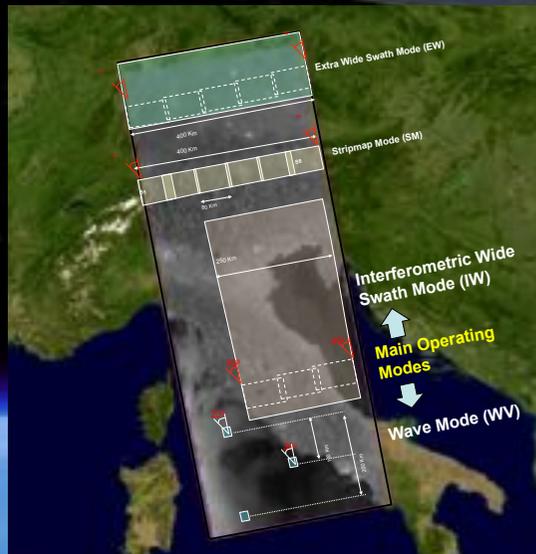
- Thales Alenia Space Italia as Prime Contractor
- EADS Astrium GmbH as Instrument Responsible
- First (S-1A) satellite launch May 2013, S-1B 18 months later



## Sentinel-1 System

- Space Segment
- A constellation of two satellites
  - nominal lifetime in orbit of 7 years (consumables for 12)
  - Global coverage
  - Near-Polar Sun-Synchronous dusk-dawn orbit @ 693km.
  - Repeat Cycle 12 days
  - A second satellite in the same orbit but with a different Mean Anomaly
  - C-Band Synthetic Aperture Radar Payload
- Ground Segment
- Mission operations for a system of satellites over a period of 20 years
  - S-Band station (Kiruna proposed) with a back-up for S/C contingencies
  - Downlink currently assumes three X-Band receiving stations

## Sentinel-1 Imaging Modes



## Sentinel-1 Reference Scenario

The continuous and systematic data acquisition and download required for the Sentinel-1 mission requires predefined Mission Timelines, i.e. sequences of SAR imaging fulfilling as much as possible the mission operational drivers and observation requirements from the GMES services, in line with system sizing and resource constraints.

In its main operational IW mode operating up to 25 minutes per orbit, it potentially provides complete global coverage of all relevant land surfaces, sea ice, coastal zones and North Atlantic shipping routes once per 12 days for each of the two satellites. For high priority areas within Europe, Canada and the Northern Atlantic coverage will be more frequent ranging from 4 to 2 days per satellite depending on latitude.

Over the open ocean, except the North Atlantic, data are normally collected in the wave mode operating all the time. This provides images of 20 by 20 km separated by 100 km for use in data assimilation in global wave models.

In order to satisfy the service requirements for Sentinel-1 geographic coverage and temporal re-visit, 2 satellites (Sentinel-1A and 1B) are required.

The observation plan shall be regularly updated based on:

- The evolution of the requirements from the services
- The constraints on the space and ground segment resources (data volume generated by the mission, instrument duty cycle, core ground station network and overall data acquisition strategy, etc.)
- The main system capacity scenarios (e.g. inclusion of the 2nd Sentinel-1 satellite, use of European Data Relay System)

