



# GMES potential in the Arctic

Space and the Arctic workshop 20-21.10.2009

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**European Commission**  
Enterprise and Industry



# What is GMES?

- An earth observation system for Europe
  - The largest fleet of satellites related with atmosphere/earth-based monitoring in the world
  - An end user-focused program of services for environment and security
  - Joined-up information for policymakers, scientists, businesses and the public
  - Europe's response to the global need for environment and climate monitoring
- 
- A young boy with brown hair, wearing a white button-down shirt, is holding a small globe of the Earth. He is looking down at the globe with a focused expression. The background is a soft-focus image of a cloudy sky with a bright light source, possibly the sun, creating a hazy, ethereal atmosphere.

# What is the objective?

...to provide information services  
to policy-makers and other users



Space Agencies  
In-situ Observing systems  
Scientific Community  
EO Value Adding Industry



National Governments and Agencies  
European Union Institutions  
Inter-Governmental Organisations (IGOs)  
Non Governmental Organisations (NGOs)  
Businesses

# GMES Overall View

## USERS

Policy makers & Public & Private, commercial

What is their need?



Farming Oil Spill Tracking Air quality Flood Surveillance Climate Change

Examples provided



Land Marine Atmosphere Emergency Security Climate

Information services

Space Infrastructure & In Situ Infrastructure

Sustainable information

## OBSERVATION

# Space component Sentinel-1

## C-band SAR mission



### Applications:

- monitoring sea ice zones and the arctic environment
- surveillance of marine environment
- monitoring land surface motion risks
- mapping in support of humanitarian aid in crisis situations

### 4 nominal operation modes:

- strip map (80 km swath, 5x5 m res.)
- interferometric wide swath (250 km swath, 5x20 m res.)
- extra wide swath (400 km swath, 20x40 m res.)
- Wave (5X5 m res, sampled images of 20x20 km at 100 km along the orbit)

2300 Kg spacecraft mass

Sun synchronous orbit at 693 Km mean altitude

12 days repeat cycle

7 years design life time, consumables for 12 years



# Space component Sentinel-3

**ocean & global  
land mission**



## **Applications:**

- **Sea/land colour data and surface temperature**
- **sea surface and land ice topography**
- **coastal zones, inland water and sea ice topography**
- **vegetation products**

**1250 kg spacecraft mass**

**Sun synchronous orbit at 814.5 km  
mean altitude over geoid**

**27 days repeat cycle**

**7 years design life time, consumables  
for 12 years**

# GMES Services

## Monitoring of Earth systems



Land



Marine



Atmosphere

## Horizontal applications



Security



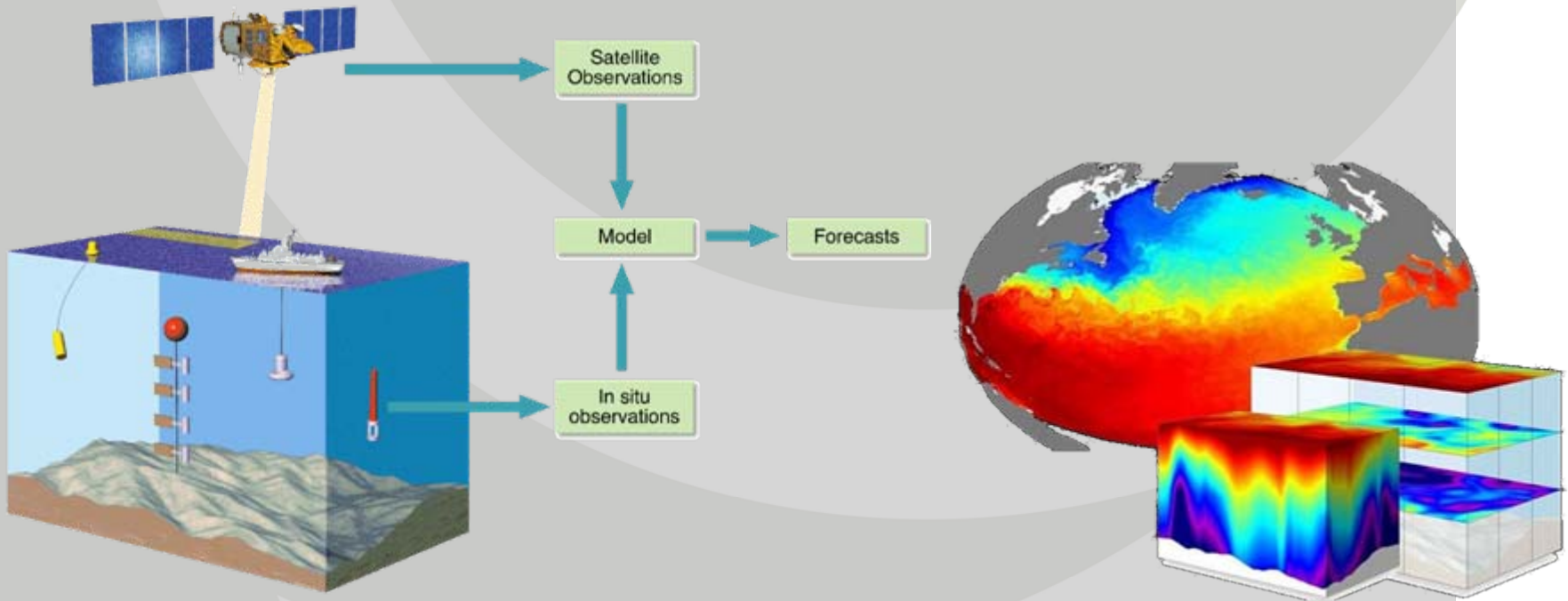
Emergency



Climate



# Marine



- global ocean & main European regional seas (Baltic, Med, NE Atlantic, Black Sea)
- physical ocean state: “**ocean weather**” and primary ecosystem
- hindcasting, nowcasting, forecasting
- reanalysis for marine ECVs
- evolution towards coastal domain & marine resources



# GMES political status



- **Commission Proposal for a Regulation on « the European Earth observation Programme (GMES) and its initial operations (2011-2013) »**
- **adopted by European Commission on 20 May 2009**
- **EP ITRE Committee vote 4th Feb. 2010**
- **European parliament approval planned for ~Summer 2010**
- **European Council simultaneously**

# Regulation Scope (articles 1-3)



- **Main objectives (Article 1)**
  - **European Earth observation programme**
    - scope, organisational arrangements, funding arrangements, data policy, participation of third countries
  - **Rules for initial operations**
    - to list activities and propose supplementary funding
- **Definition of the GMES Programme (Article 2)**
  - It builds on FP7 and ESA GMES Space Component Programme
  - It comprises:
    - **a service component** (land, marine, atmosphere, emergency response, climate change, security),
    - **a space component**
    - **an in-situ component**
- **Definition of Initial Operations (Article 3 and Annex)**
  - Cover the period 2011-2013
  - Comprise actions in the following fields
    - emergency response, land monitoring
    - users uptake
    - data access, including support to in situ data collection
    - space component
  - Specific objectives defined in the Annex

# Council Requests for more CC



## Space Council September 2008

- Recognised space & CC as key priority of the European Space Policy
- Invited the EC to conduct a study
  - to assess the **needs for full access to standardised data/for increased computing power**, taking into account existing capacities and networking in Europe
- Called to define how GMES services and European space observation archives can contribute most effectively to the **provision of data including ECVs for scientific research**

## Competitiveness Council December 2008

- Invited the EC to foster the implementation of the GMES climate change monitoring to support the related European Union policies

# European CC user needs



- **Sustained** monitoring & reanalysis of **all ECVs** is needed
  - **CC Adaptation** needs are emerging strongly
    - What impacts are to be expected?
    - How much would they cost society?
    - What would be the most efficient adaptation?
  - Impacts are most needed as trends from a more than 30 years history up to ~10-20 years predictions
  - This involves making best possible **time series** from all sources and **updating** them **constantly**
  - Translating bio-geophysical variables into **cost factors**, which can be put into socioeconomic models
  - Impacts can usually only be described combining Terrestrial, Ocean and/or Atmosphere ECVs
- => Consistency between all ECVs** is required

# GMES climate service scope



- Directly answer needs for sustained, operational ECV monitoring
- Directly answer needs for global reanalysis
- Support Adaptation needs by providing ECVs and reanalysis in a way that will facilitate and stimulate
  - Provision of past and projected climate impacts information
  - Impact modelling
  - Production of information directly usable for policy- and decision-makers (e.g. deforestation, emissions)

Activities will be jointly implemented with ESA and EUMETSAT



# New GMES CC projects



## FP7 Space projects are under negotiation to start 1Q 2010

- Project 1: Downscaling global atmospheric reanalysis to fine scale over Europe
- Project 2: Focus on arctic change analysis on selected terrestrial and ocean ECVs
- Project 3: Major mitigation aid. Carbon cycle with CO<sub>2</sub> sinks and sources reanalysis for the last 30 years to validate CC models

## Next steps for CC



- Prepare a proposal for a GMES climate service
- Coordinate ECV provision implementation in Europe, starting with space agencies (today, fiches, ...)
- Coordinate cooperation with our international partners (GEO)
- Additional arctic needs can well be addressed within this development also ...