

ESA

EO Programmes and Climate Data

mark dohery, esa

MARCDATIII

ESA ESRIN May 2011



- ***Welcome***
- ***ESA***
- ***ESA's Earth Observation Programmes***
- ***ESA Climate Change Initiative***
- ***Future Prospects***



18 MEMBER STATES



Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Norway, the Netherlands, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Romania to be ESA's 19th Member State by mid 2011.

Canada takes part in some programmes under a Cooperation Agreement. Hungary, Poland, Slovenia and Estonia are European Cooperating States.



ACTIVITIES



ESA is one of the few space agencies in the world to combine responsibility in nearly all areas of space activity.

- Space science
- Human spaceflight
- Exploration
- Earth observation
- Launchers
- Navigation
- Telecommunications
- Technology
- Operations

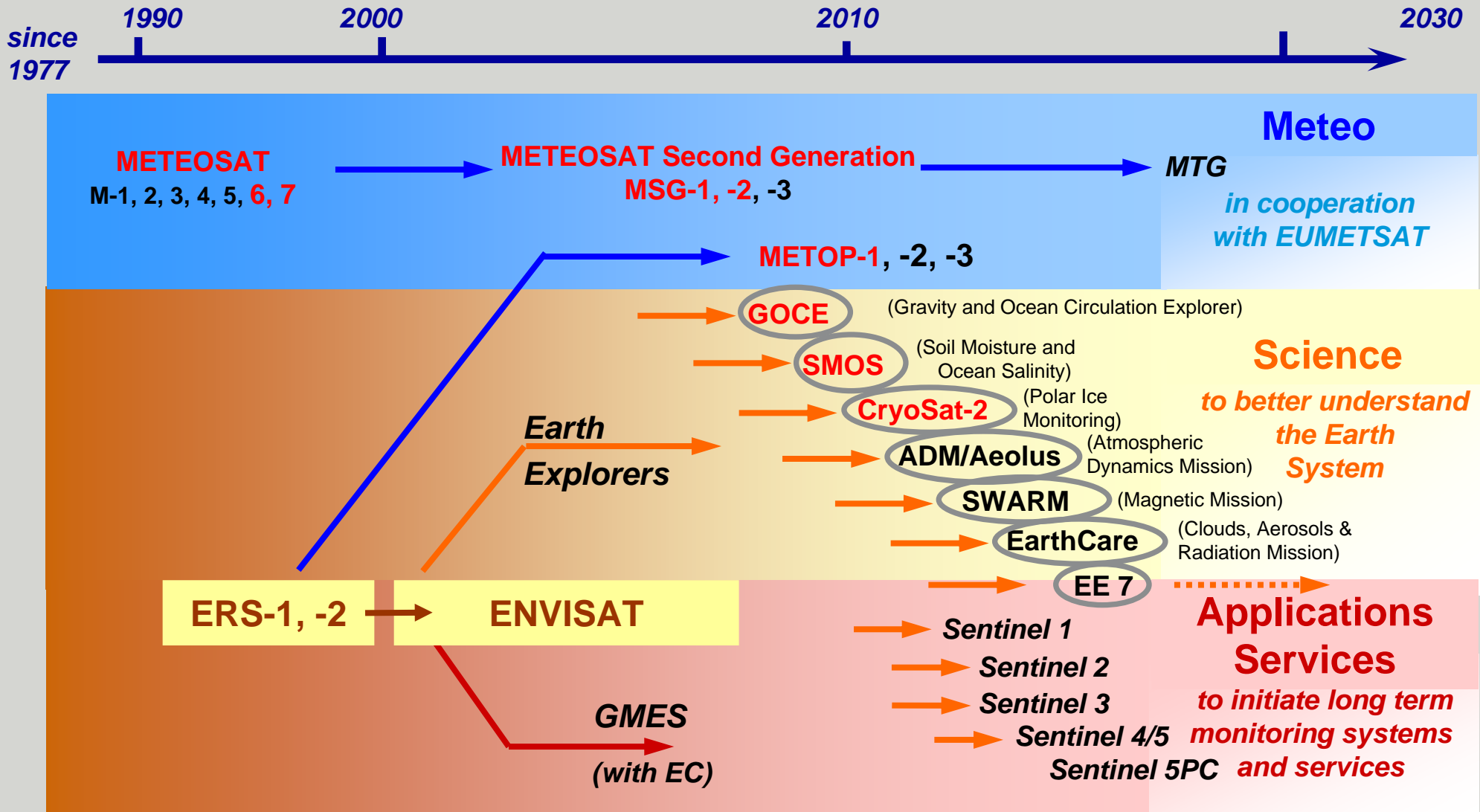




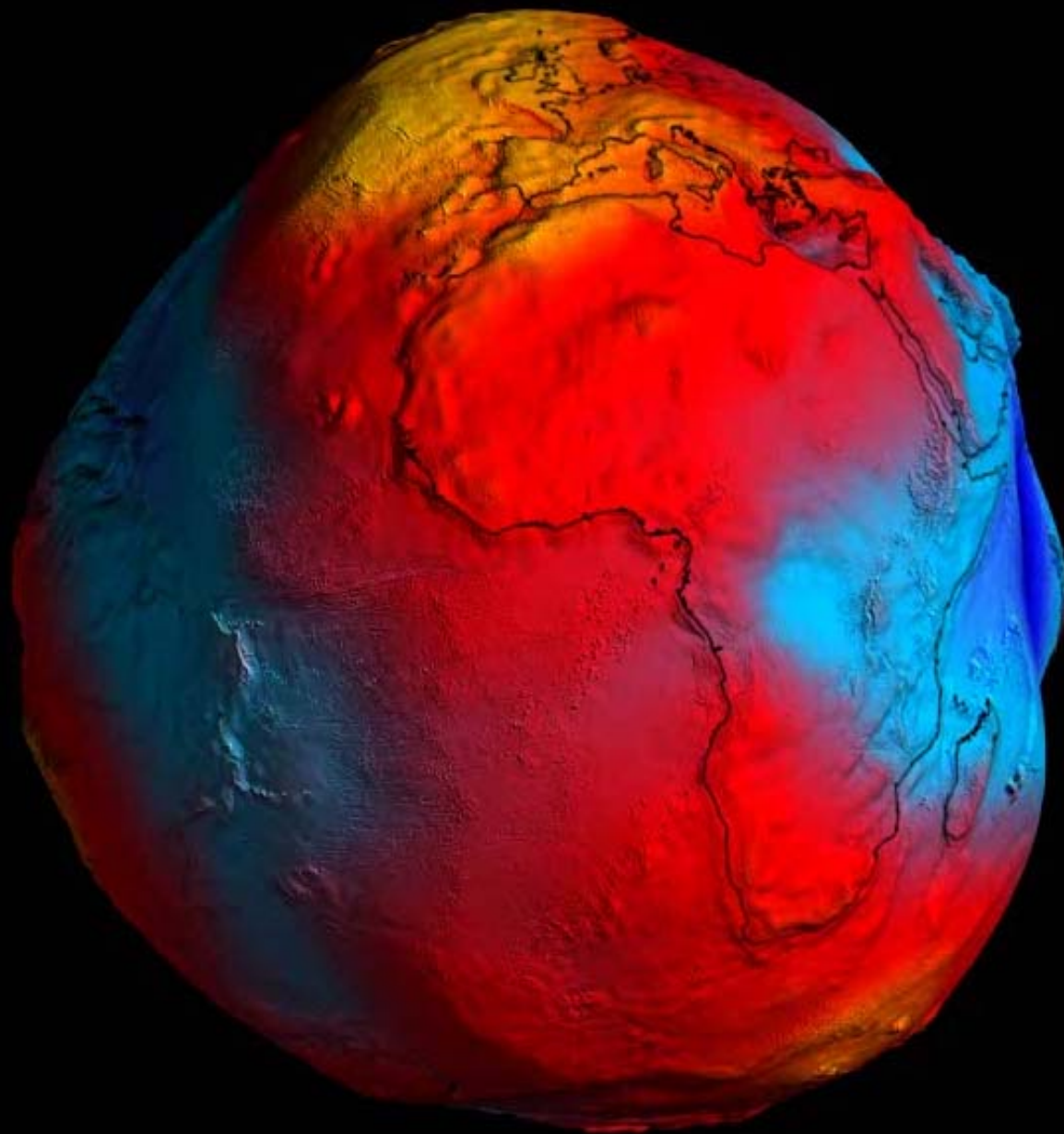
METEOSAT-1

FIRST IMAGE: 9 DEC 1977
COPYRIGHT ESA

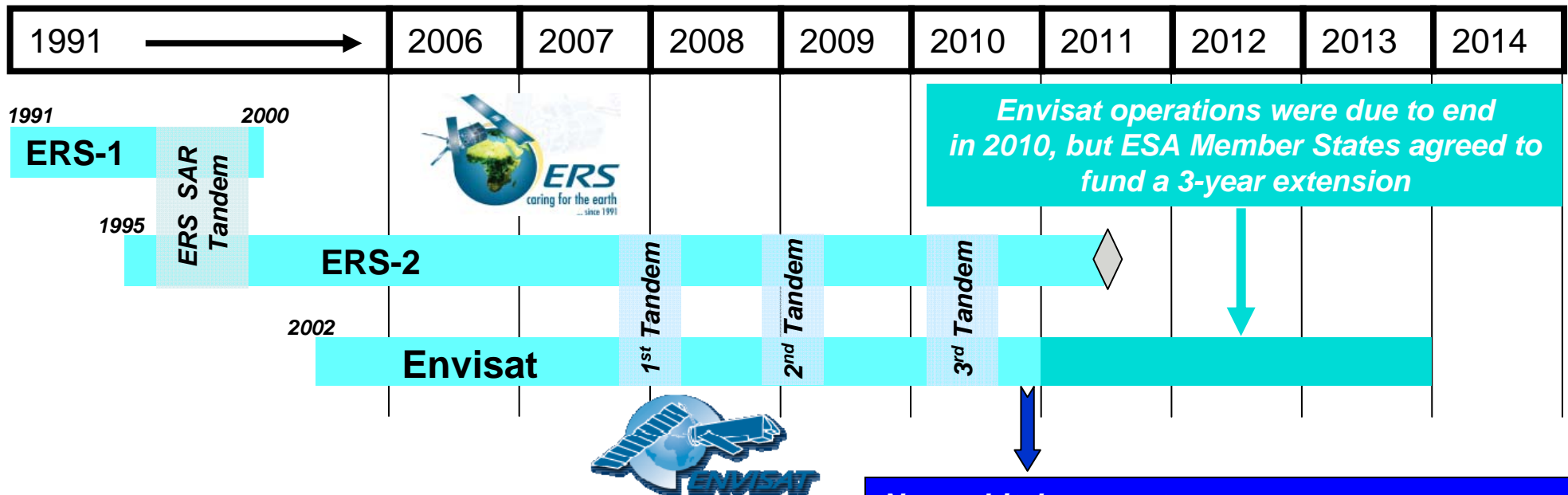
ESA EO Systems past present future



2011



Continuity of observations



Efficient consumption of on-board hydrazine allowed operating nominally Envisat until 2010 (nominal 5-years lifetime ended in Feb. 2007), but most of hydrazine is now consumed.

- New orbital parameters (End-October 2010):**
- Altitude change: -17.4 km
 - Repeat cycle: 30 days / 431 orbits
 - Orbit control: altitude control with inclination drift
 - Mean Local Solar Time variation: +/- 10 min.

The Envisat 3-year extension required modification of the orbital parameters in October 2010 so as to continue satellite operations with minimum hydrazine

IMPROVED DATA ACCESS



FREE DATASET:

→ For data collections available on-line

- open and free of charge
- user registration done electronically
- for all uses (i.e. science and operational applications)

RESTRAINED DATASET:

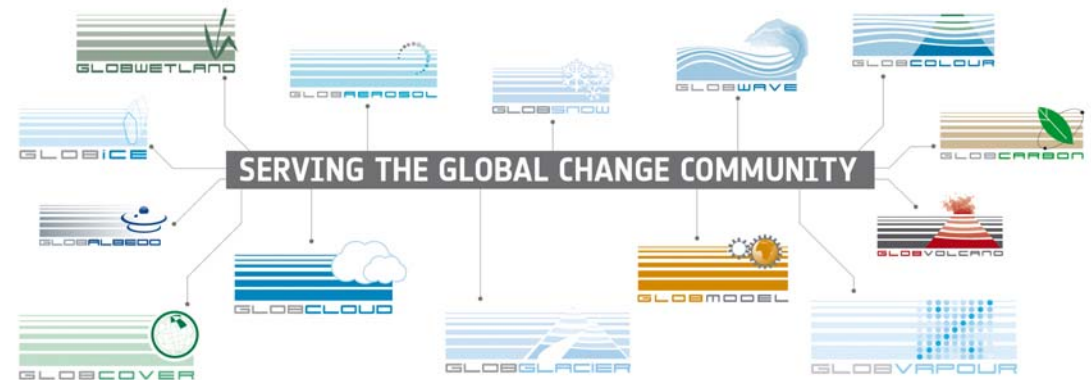
→ For all datasets not (yet) available on-line

- project proposals for data free of charge data
quota limit related to processing or acquisition constraints
- for SAR: , possibility higher level of priority

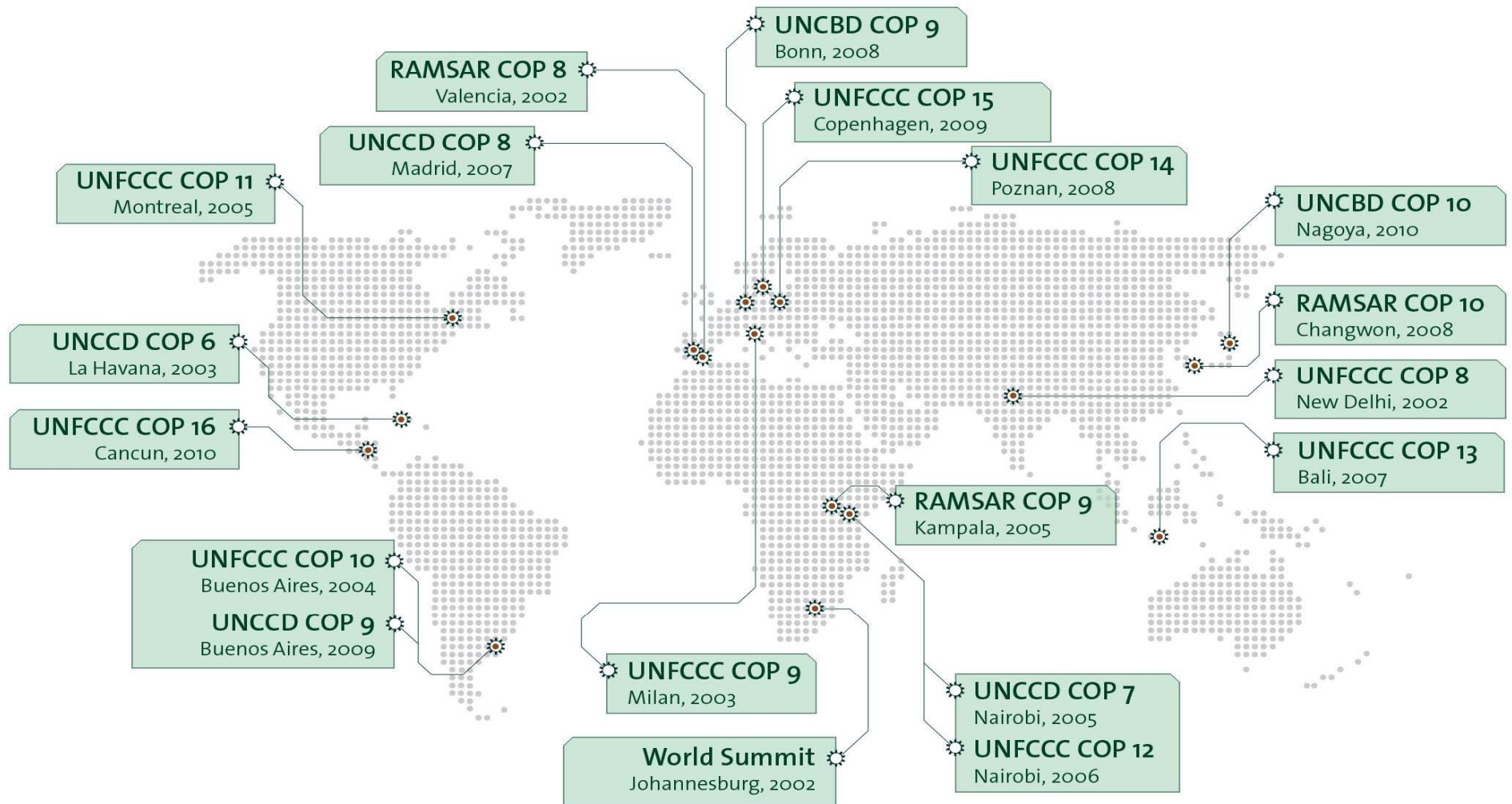
global products for global change research



GlobCover	254
GlobCarbon	84
GlobWetland	58
GlobColour	51
Medspiration	44
GlobAerosol	34
GlobGlacier	28
DesertWatch*	25
GlobSnow*	17
GlobVolcano	17
GlobModel	11



supporting International Environmental Conventions



Fostering Scientific Cooperation



- Building long-term cooperation

- Ensuring ESA data contribution to major international scientific efforts;
- Promote ESA missions within new and wider Earth science communities;
- Ensuring coordination of ESA activities with international scientific priorities;



- Community consultations

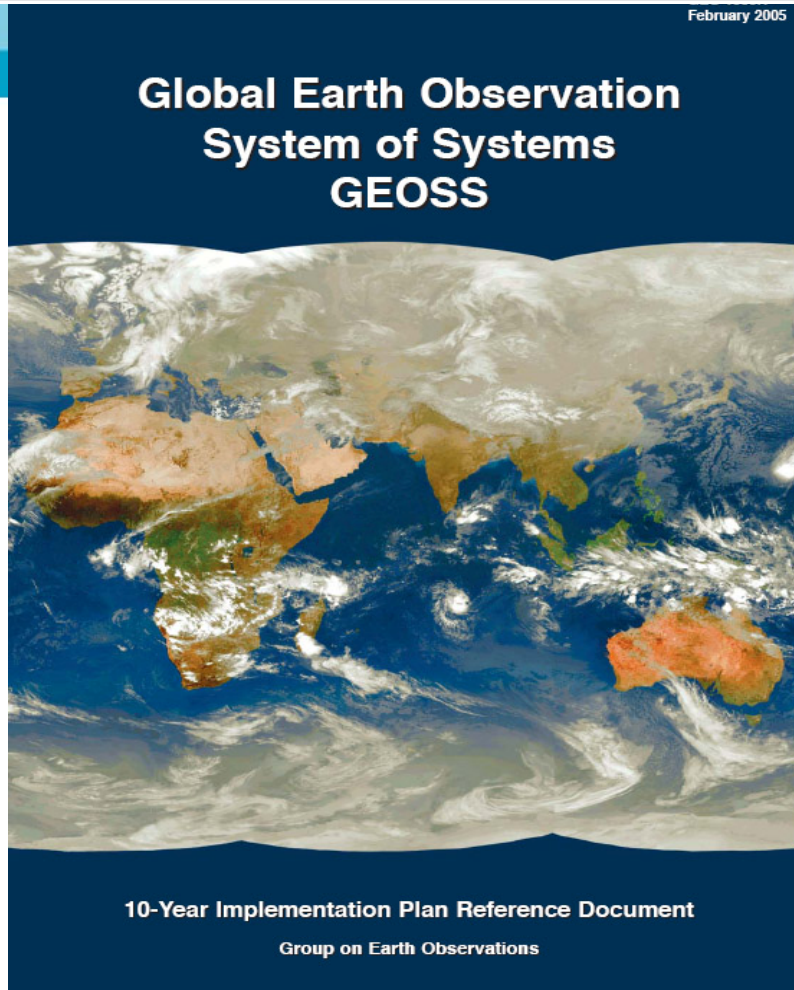
- Dedicated ESA Projects



Realize the full potential of the long-term global EO archives that ESA, together with its Member states, has established over the last thirty years.....

..... as a significant and timely contribution to the ECV databases required by the United Nations Framework Convention on Climate Change

GCOS requirements \Leftrightarrow CEOS response



THE CEOS IMPLEMENTATION PLAN FOR SPACE-BASED OBSERVATIONS FOR GEOSS

Version 0.1.10
7th May 2007



CCI: International coordination



- **UNFCCC** which coordinates the interests and decisions of its Parties on Climate Policy,
- **GCOS** which represents the scientific and technical requirements of the Global Climate Observing System on behalf of UNFCCC,
- **CEOS** which serves as a focal point for Earth Observation related activities of Space Agencies (e.g NOAA, NASA, JAXA, EUMETSAT)
- **Individual Partner Space Agencies** with whom ESA cooperates bilaterally (e.g. EUMETSAT)
- **International Climate Research Programmes**, which represent the collective interests and priorities of the worldwide climate research, (e.g. WCRP)
- **EC and National Research Programmes** which establish research priorities and provide resources for climate research community within Europe (e.g. DG Research, DG-JRC)
- **GMES Partners:** DG Enterprise and Industry, user DGs ENV, EEA...












CCI starts with 11 ECVs

Atmosphere	Surface (0, 0, 6)	<i>Air Temperature; Precipitation ; Air pressure; Water vapour; Surface radiation budget; Wind Speed & direction;</i>
	Upper air (1, 1, 3)	Cloud properties, <i>Wind speed & direction Earth radiation budget; Upper-air temperature; Water vapour;</i>
	Composition (3, 0, 0)	Carbon dioxide Methane & other GHGs; Ozone; Aerosol properties
Ocean	Surface (4, 2, 1)	Sea-surface Temp; Sea-level; Sea-ice; Ocean colour; <i>Sea state; Sea-surface salinity Carbon dioxide partial pressure</i>
	Sub-surface (0, 0, 7)	<i>Temperature; Salinity; Current; Nutrients; Carbon; Ocean tracers; Phytoplankton</i>
Terrestrial (3, 7, 4)	Glaciers & ice caps; Land Cover; Fire disturbance <i>Fraction of absorbed photo-synthetically active radiation; LAI , Albedo Biomass, Lake levels, Snow cover, Soil moisture Water use, Ground water, River discharge Permafrost and seasonally-frozen ground</i>	

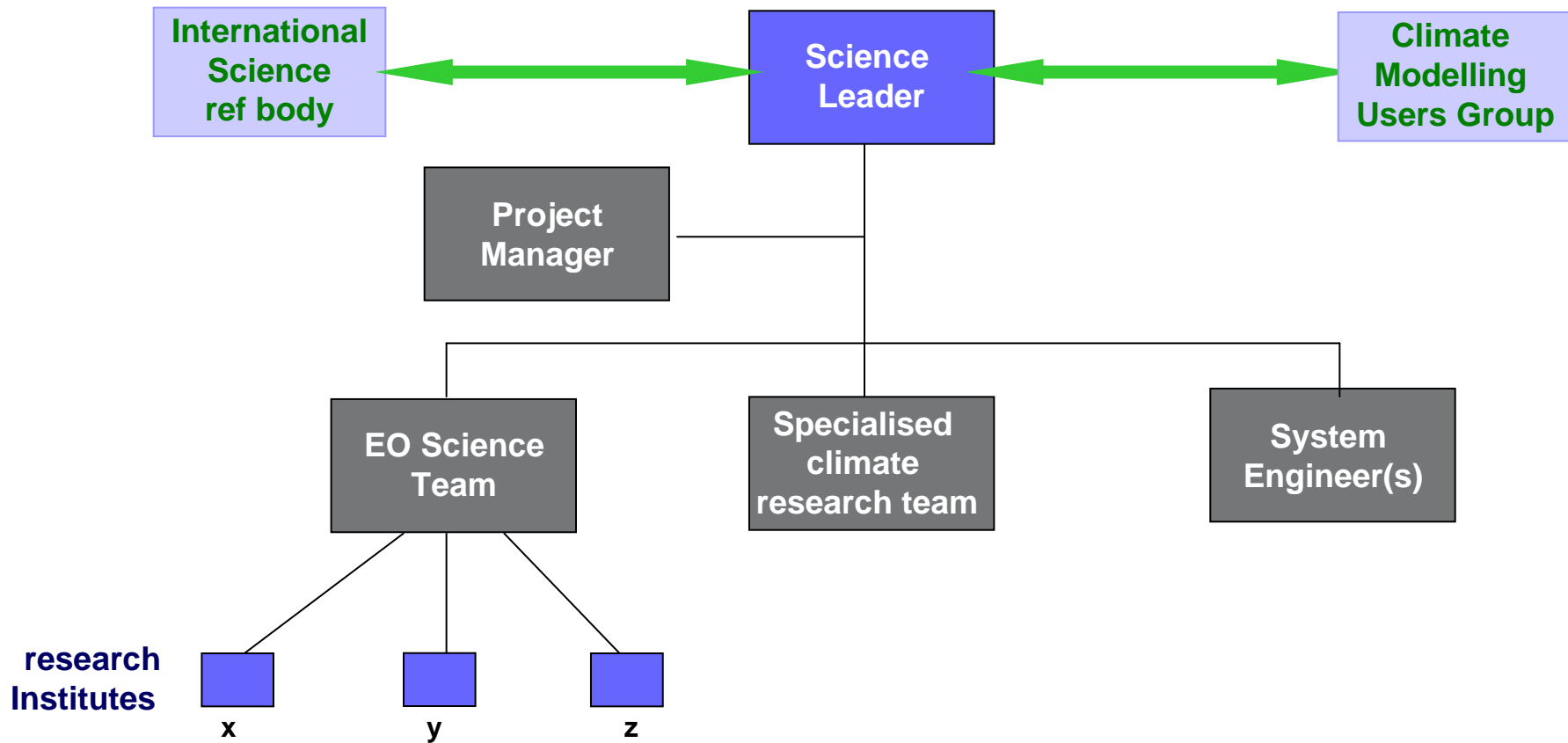
CCI First Steps (11 ECVs) : **Later in CCI (10 ECVs) :** Not in CCI (24 ECVs) ESA Agency

CCI Projects

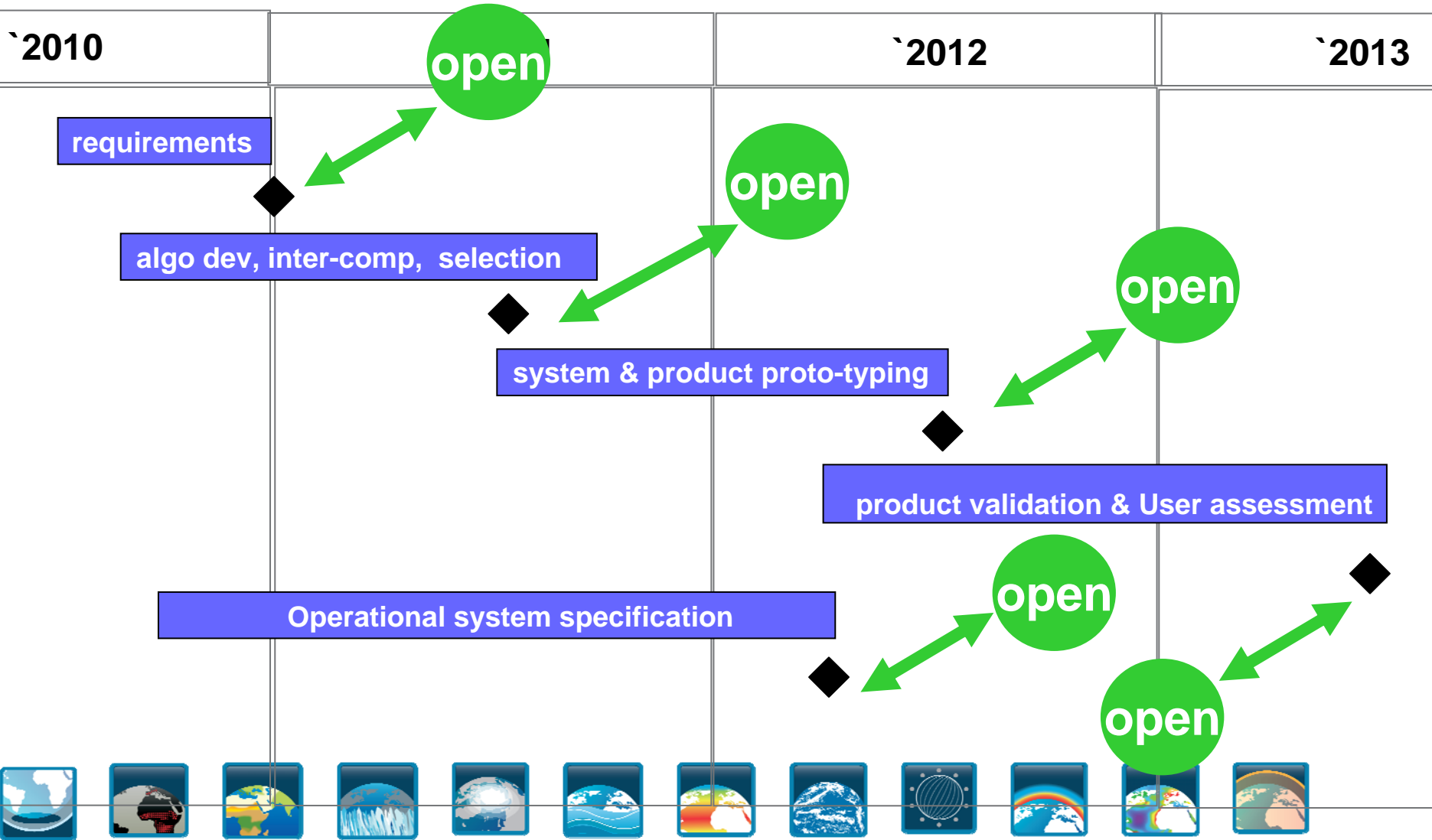


ECV	Science Leader
 cloud_cc	<i>DWD</i>
 ozone_cci	<i>BIRA</i>
 aerosol_cci	<i>DLR/FMI</i>
 chg_cci	<i>U Bremen</i>
 sst_cci	<i>U Edinburgh</i>
 landcover_cci	<i>UCL</i>
 sealevel_cci	<i>CLS</i>
 oceancolour_cci	<i>PML</i>
 glaciers_cci	<i>U. Zurich</i>
 fire_cci	<i>U.Alcala</i>
 CMUG	<i>UKMO Hadley</i>

CCI project teams



CCI projects schedule x 11



CCI global data products



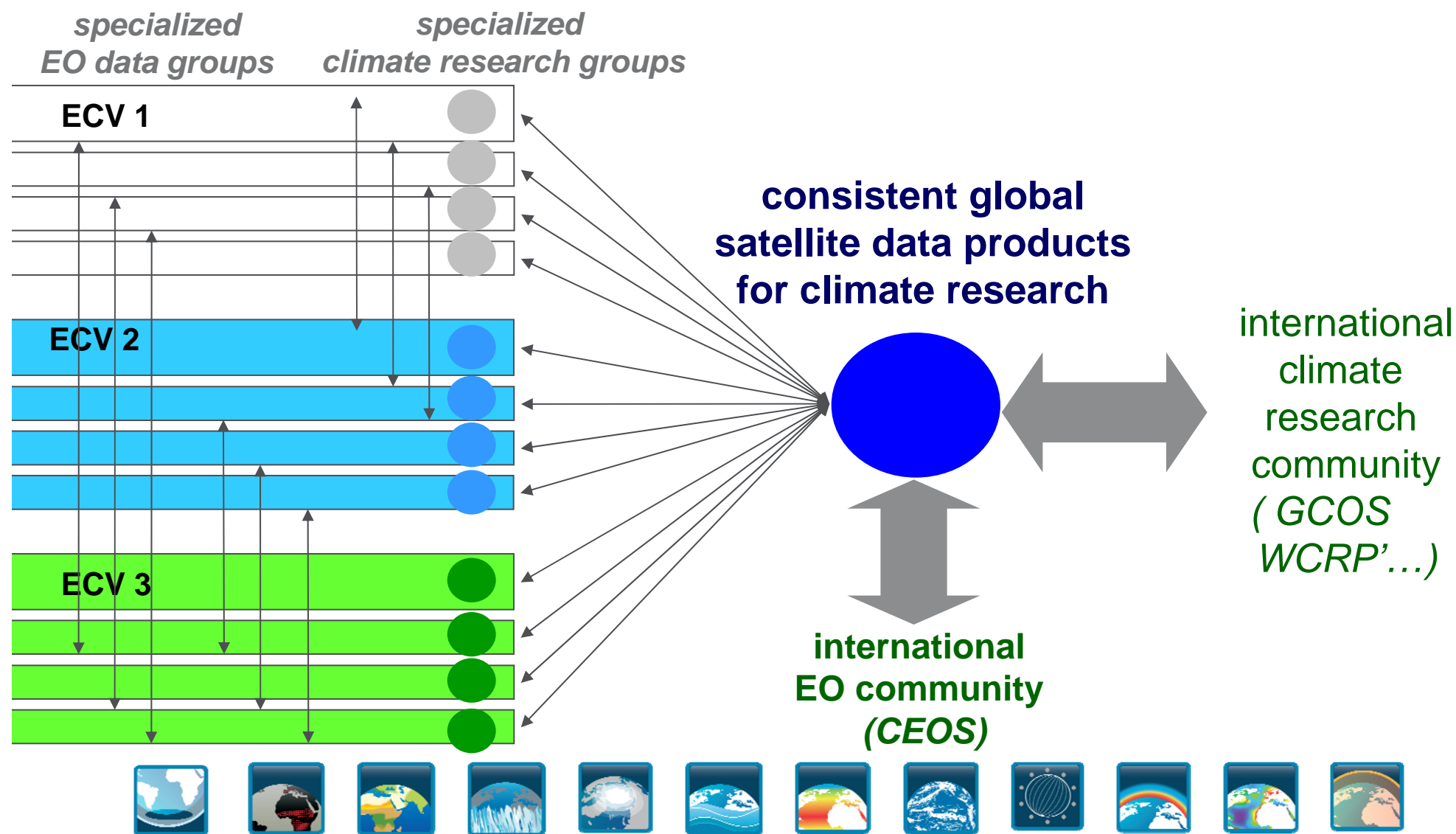
	c l o u d s	o z o n e	a e r o s o l	G H G	S L	S S T	O C	L C	f i r e	g l a c i e r
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2009		p?								
2010										

some ECVs are...

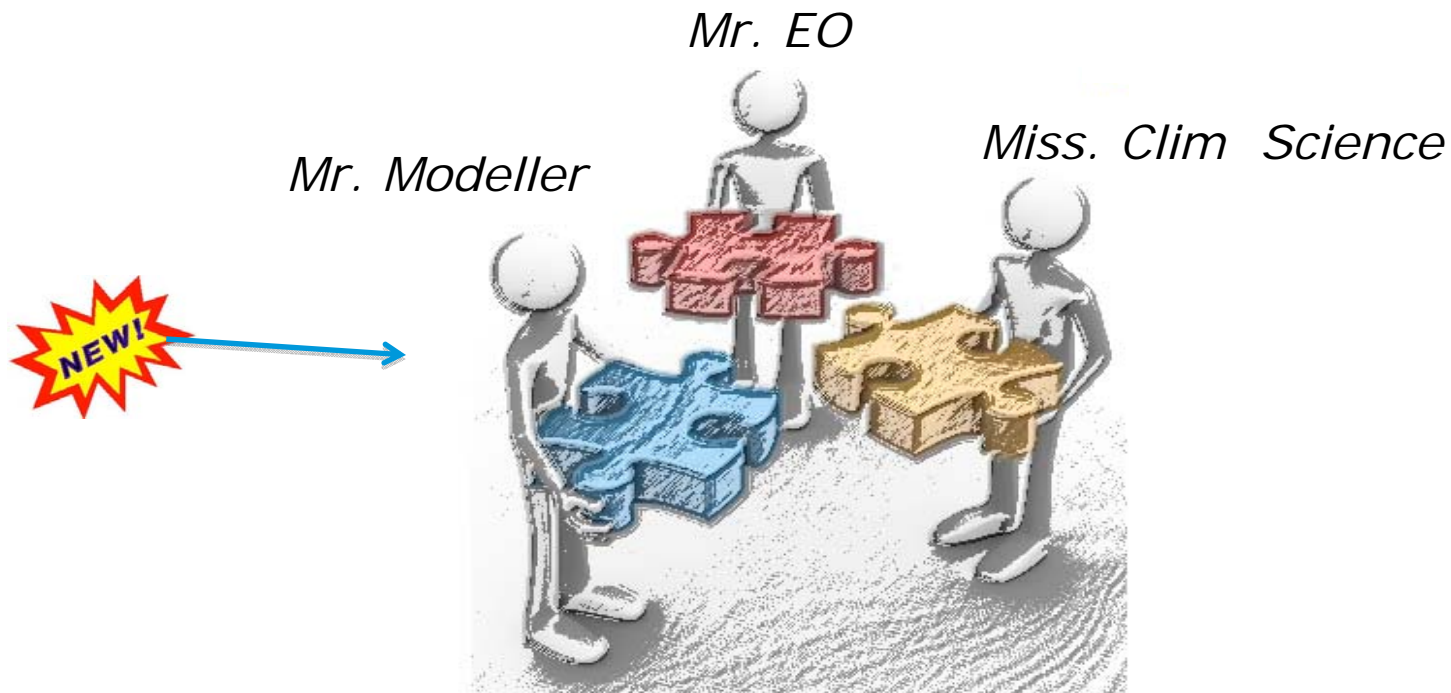
- state variables of models,
- forcing, or boundary conditions,
- poorly or not represented in Models
- inter-linked: e.g. cloud, aerosol,
- of probabilistic nature e.g. clouds



what we want to achieve

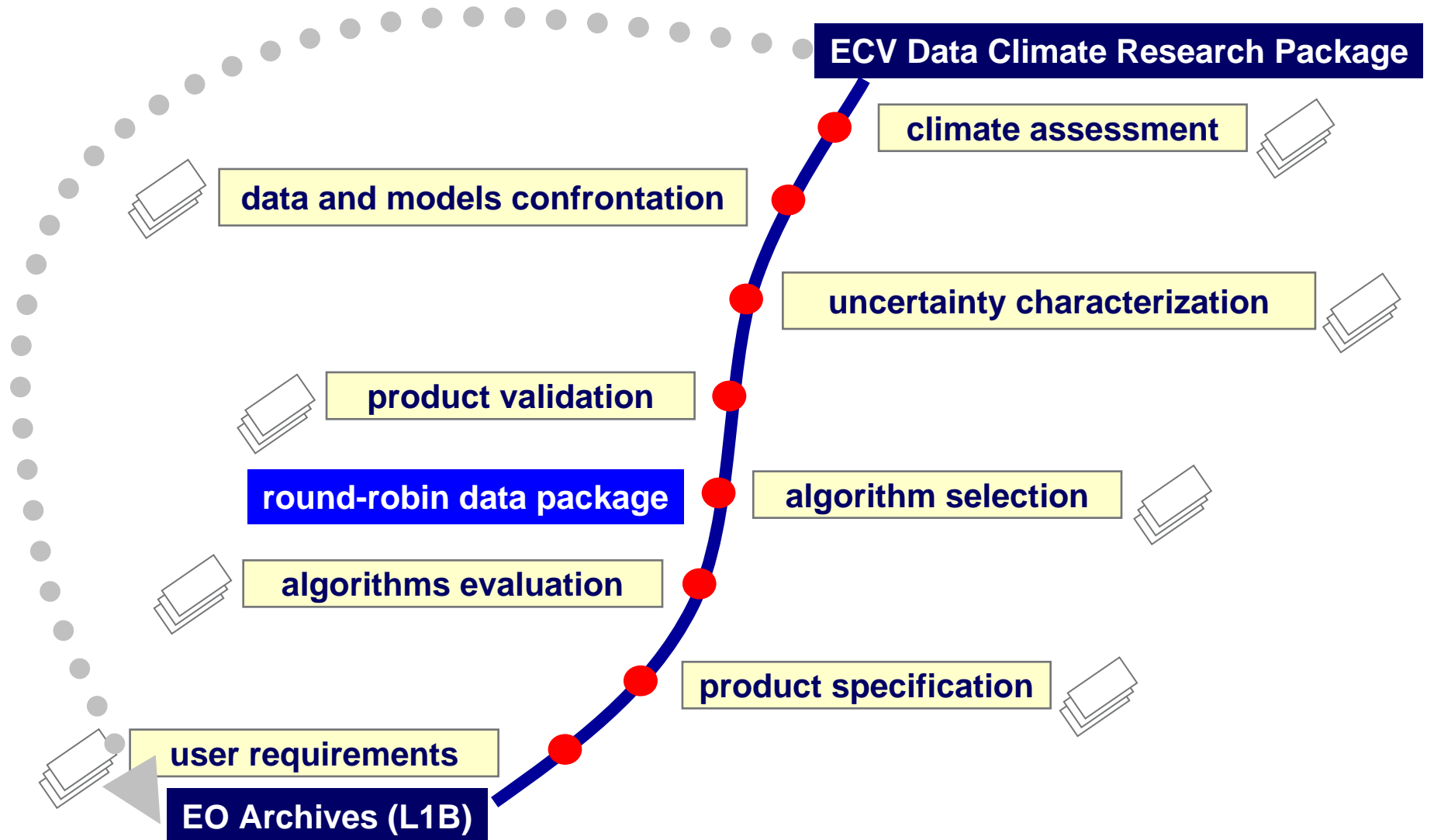


confronting observations and models



*knowledge exchange ...
to better quantify climate change*

achieving climate data quality ...



- **uncertainty characterization**
- **openness, traceability, repeatability**
- **data standards**
- **scientific cooperation**



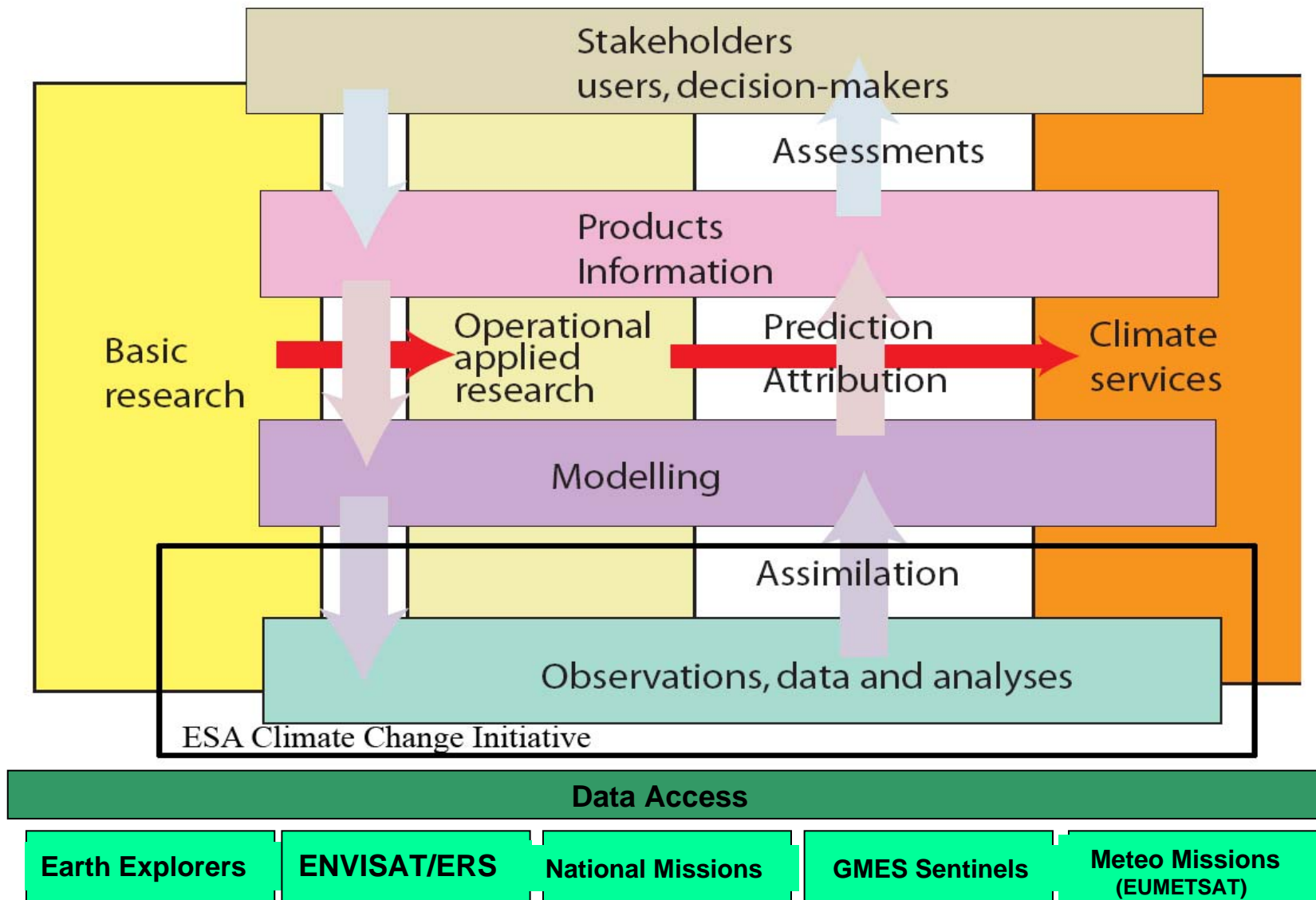
new in 2011...



- ***sea_ice_cci***
- ***ice_sheets_cci***
- ***soil_moisture_cci***



enabling climate services...







GMES

sentinels for services



Sentinel 1 – SAR imaging

All weather, day/night applications, interferometry

2012 (A), 2014 (B) TBD



Sentinel 2 – Multispectral imaging

Land applications: urban, forest, agriculture,..
Continuity of Landsat, SPOT

2013 (A), 2014 (B) TBD



Sentinel 3 – Ocean and global land monitoring

Wide-swath ocean colour, vegetation, sea/land
surface temperature, altimetry

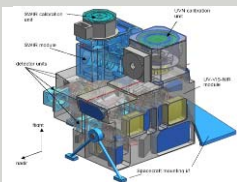
2013 (A), 2014 (B) TBD



Sentinel 4 – Geostationary atmospheric

Atmospheric composition monitoring, trans-
boundary pollution

2018



Sentinel 5 and Precursor – Low-orbit atmospheric

Atmospheric composition monitoring

2014 (5P), 2019



thank you