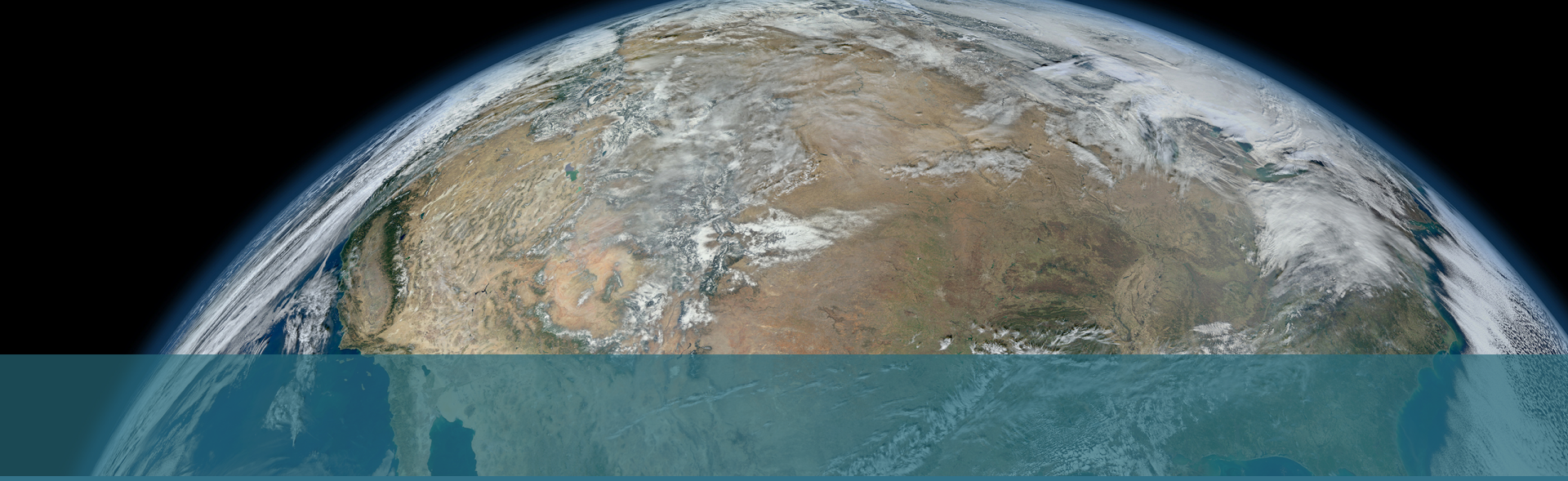


Global Framework for Climate Services – Role of Satellites

John Bates
Principal Scientist, Center for Weather and Climate
NOAA's National Centers for Environmental Information

5 August 2015

Global Framework for Climate Services

- World Climate Conferences (WCC)
  - WCC-1 in 1979 established the World Climate **RESEARCH** Program (WCRP)
  - WCC-2 in 1990 established the Global Climate **OBSERVING** System (GCOS)
  - WCC-3 in 2009 established the Global Framework for Climate **SERVICES** (GFCS)
- Global Framework for Climate Services (GFCS) is a UN-led initiative spearheaded by WMO to guide the development and application of science-based climate information and services in support of decision-making in climate sensitive sectors

Priority areas

Agriculture and food security

Disaster risk reduction

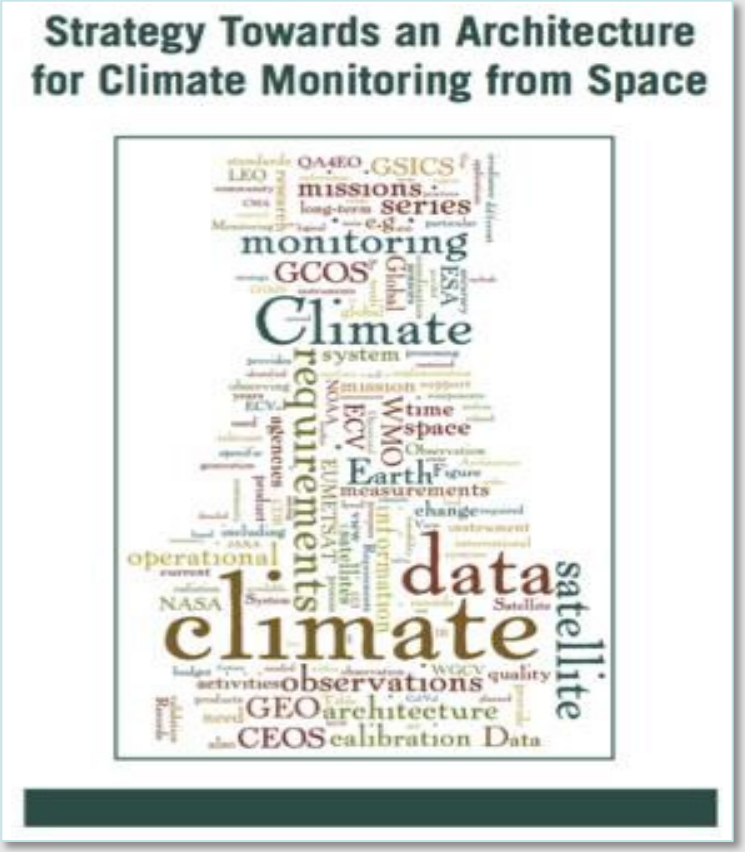
Energy

Health

Water

Role of Observations in GFCS

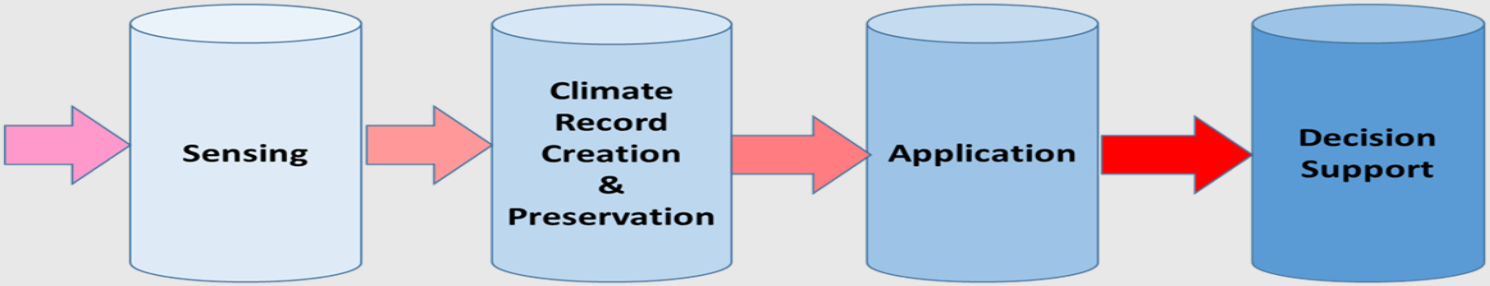
- WMO Congress in 2011 **Decides** that **an architecture for climate monitoring from space should be developed,** to provide a framework for the sustained & coordinated monitoring of the Earth's climate from space and to support GFSC end-to-end;
- **Invites** CEOS, CGMS, GCOS, GEO & WCRP to collaborate with the WMO Space Programme on the development



Why do we need a Climate Observing Architecture?

- To provide a structured and comprehensive view as to what Climate Data Records are available from Earth Observation satellites
- To create the conditions for delivering further Climate Data Records through best use of existing data holdings
- To optimize the planning of future satellite missions and constellations in order to expand existing and planned Climate Data Records, in terms of both coverage and record length, and address possible gaps

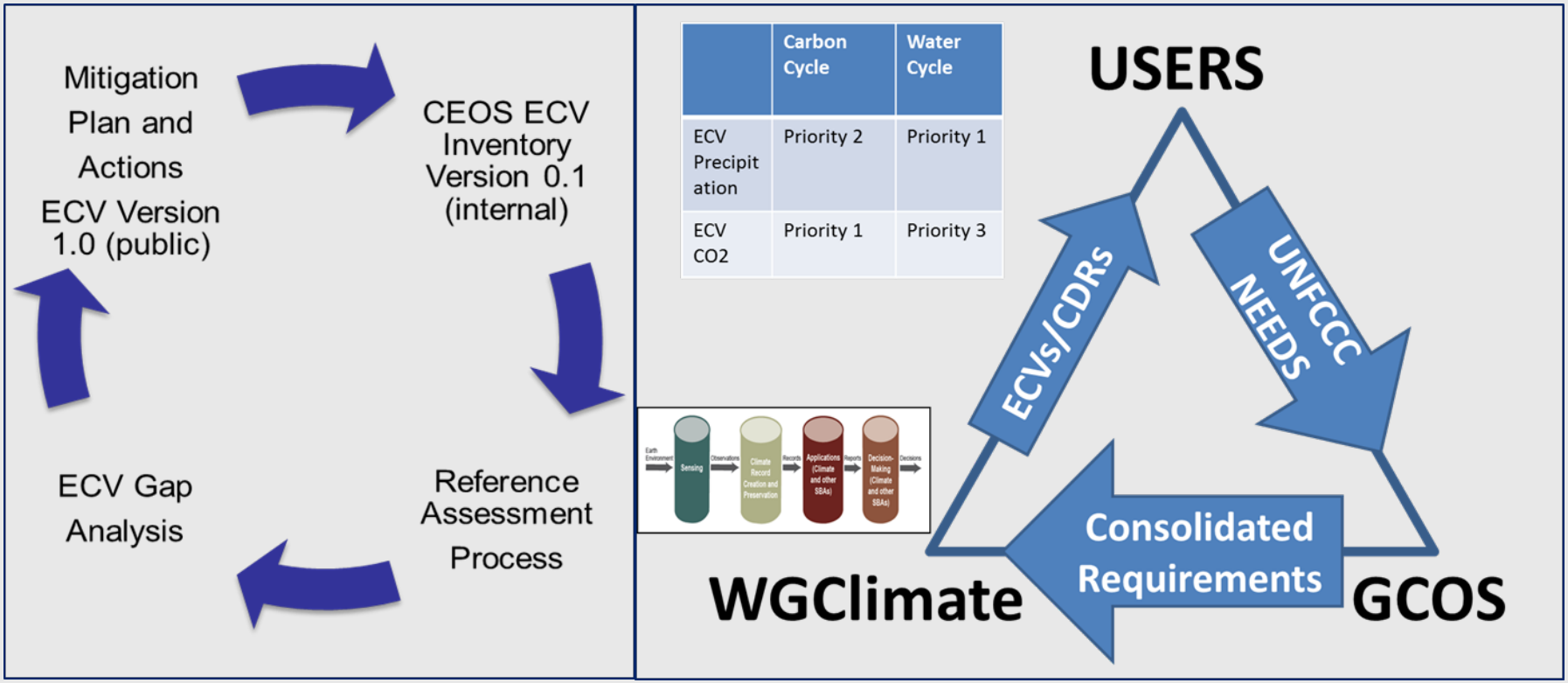
Architecture of Climate Observations From Space



Space Agencies Supporting Climate

- ***Monitoring***
- ***Research***
- ***Services***

The Architecture is Being Implemented by the CEOS-CGMS Working Group on Climate



UNFCCC – UN Framework Convention on Climate Change
CEOS – Committee on Earth Observation Satellites
CGMS – Coordination Group for Meteorological Satellites
ECV – Essential Climate Variables of GCOS

What are Climate Services?

Climate Services Typology

Supply of climate information

- Observing infrastructure
- Historic data
- Data management
- Climate research
- Capacity building for NMS

Tailored information

- Engagement of sector technical communities
- Value-added climate information
- Research on translating climate information for user needs
- Research on climate services good practice

Delivery of climate information

- Institutional communications channels
- ICT and media-based communications channels
- Capacity building for communications intermediaries

Use of climate services

- Capacity building for users
- Pilot implementation/demonstration

Governance

- Governance across stakeholders
- Policies to support climate services development and use
- Evaluation and feedback processes
- Sustainable business models
- Boundary institutions

Knowledge sharing and coordination

- Knowledge management on good practice
- Knowledge management on research needs
- Knowledge management on training

* Courtesy, L. Goddard 2014

Role of Systematic Observations in Climate Services, Mitigation, and Adaptation

- GCOS, IPCC, UNFCCC Workshop - Enhancing Observations to Support Preparedness and Adaptation in a Changing Climate (Feb 2015)
- Brought together observation, adaptation, and service user communities
- Reviewed 2014 IPCC Assessment Report 5 Working Group 2 – Impacts, Adaptation, and Vulnerability

Enhancing Observations Meeting – Working Group 2 – Impacts, Adaptation, and Vulnerability

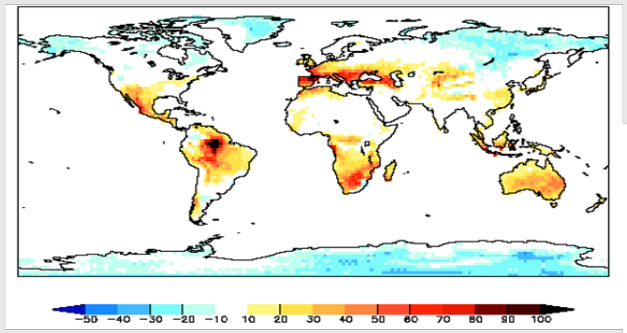
- Roger Pulwarty summarized AR5 progress:
- **Adoption of a risk paradigm:** In which climate change is described as increasing or decreasing the risk associated with various outcomes.

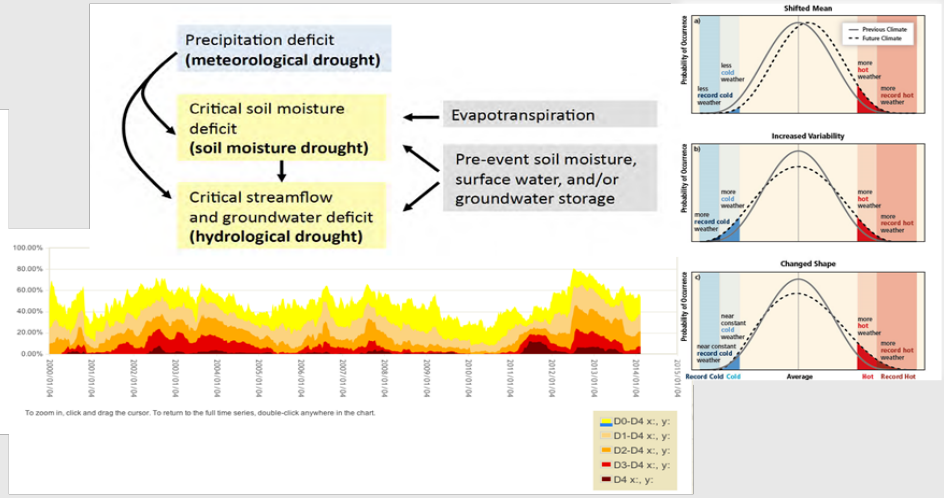
- **Greater emphasis on practice and on social science inputs:** Emphasis on adaptation theory, techniques, and adaptation experience to date, as well as to *"the decision-making context"*

- **Addressing detection and attribution:** Begins to tackle the issue of rigorous attribution of observed societal impacts to climate change (but not to *anthropogenic* climate change, specifically). Scientifically this is very immature

Enhancing Observations Meeting – Context for Climate Services

The Weather-climate continuum……..
……..and Adaptation deficits





4

Atmospheric chemistry

Marine Ecosystems

Ocean surface upper full

Land

Atmosphere region global

SEASON

Cyclones

Blocking

MJO NAO

ENSO QBO

Courtesy R. Pulwarty

Enhancing Observations Meeting –
Climate Information Products vs. Services Needed

Historical Data | Climatologies | Special Publication | Indices | Analyses for CC | Metadata | Status reports | Reviews | Near real time data/ analysis | Web accessible statistics, visualization

Relative status of information

STATIC……DYNAMIC

Structural	Management	Operations	Public information	Planning
Design Safety factors Energy	Site planning Community health and well being Climate related standards	Siting designs Hazards and health Streamflow	National drought planning Resource allocation Agriculture Hazards and health	

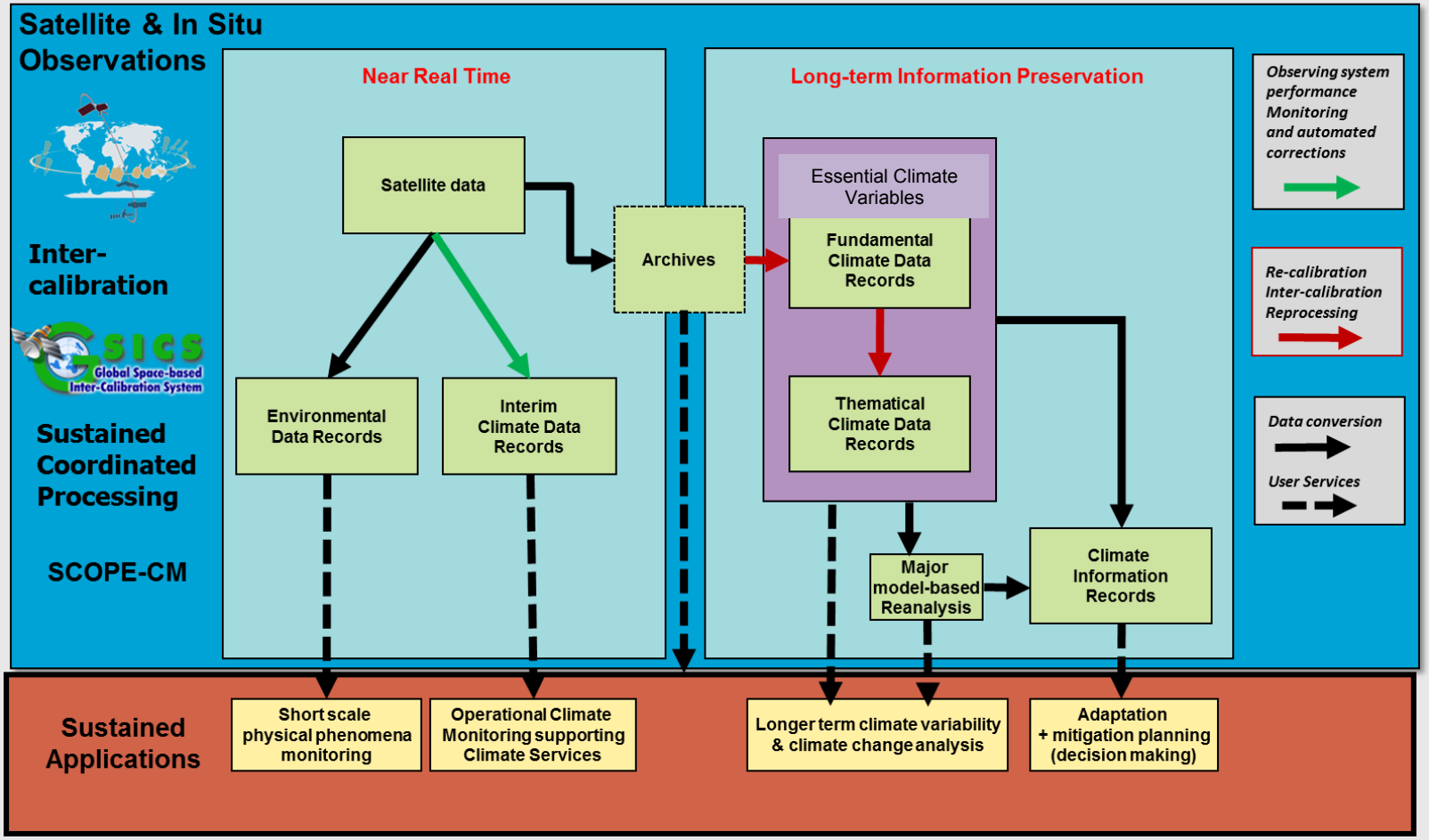
Zillman, Pulwarty others

Enhancing Observations Meeting – Conclusions

- The complete chain/cycle of observations-data-information-adaptation, and the role of GCOS and other partners, needs to be clearly described in order to deliver/inform best methods and evaluation of adaptation strategies.
  - It is essential to generate good, publicly available and standardized data, in particular at regional, national and local levels, on the vulnerability of key sectors to the impacts of climate change.
- The workshop participants agreed that GCOS:
  - Has a key role the establishment and maintenance of requirements for the collection and dissemination of national observations to specified quality standards with understood and quantified uncertainties;
  - Should facilitate the documentation of the high-resolution data required for adaption planning;
  - Identify international data centres for all Essential Climate Variables (ECVs);
  - Should ensure that the critical requirements for data latency, timeliness and availability are clearly specified; and
  - Responds to the needs for climate observation identified in other work streams under the Convention through the Systematic Observation agenda item and the Sustainable Development Goals.

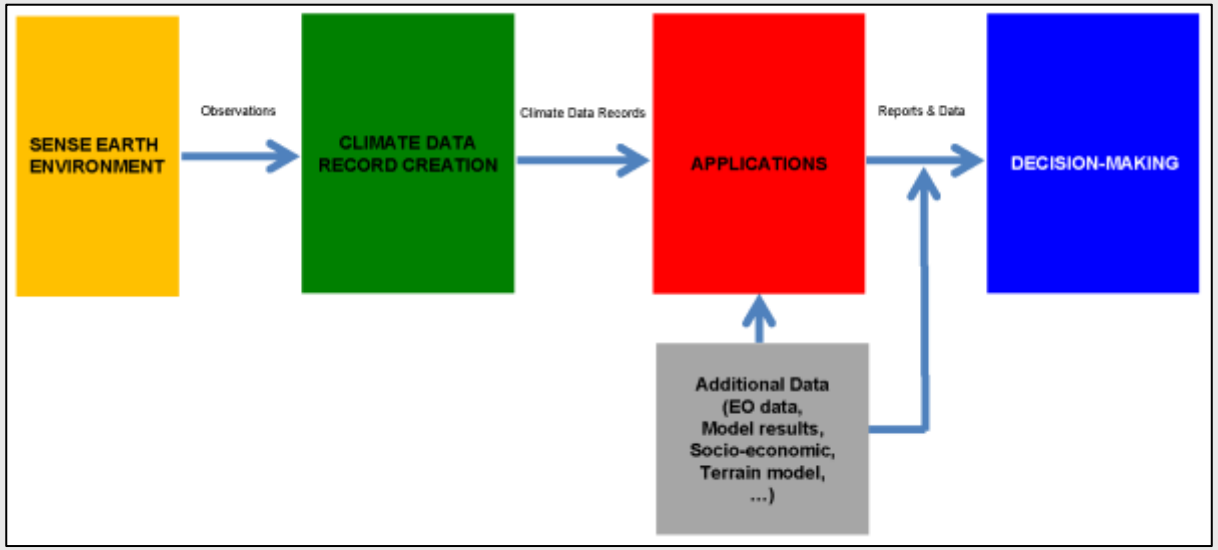
Existing International Flows are Consistent with Enhancing Observations Meeting Needs

Sustained Climate Information Flow



Space Agencies – Focus on Supply of Climate Information to Applications (i.e., ECVs)

- WMO Study - *Establishing an Architecture for Climate Monitoring from Space through Climate Service Case Studies*
- Examines how the interface might work between supply of climate information and decision making



Conclusions

- Recent meetings involving experts in Climate Services, Systematic Observations, and Mitigation, Adaptation, and Vulnerability recommend:
  - Continuing to build on the recent work on Climate Observing Architecture
  - Recognize the needs for climate services across the weather-climate continuum
  - Observational community should continue a long-term commitment to provision of ECVs
  - Observational community should partner with experts in the services and adaptation communities in focused case studies that optimize the existing talents of each community