Committee on Earth Observation Satellites

WGDisasters

NASA Chair 2019-2021 Priorities

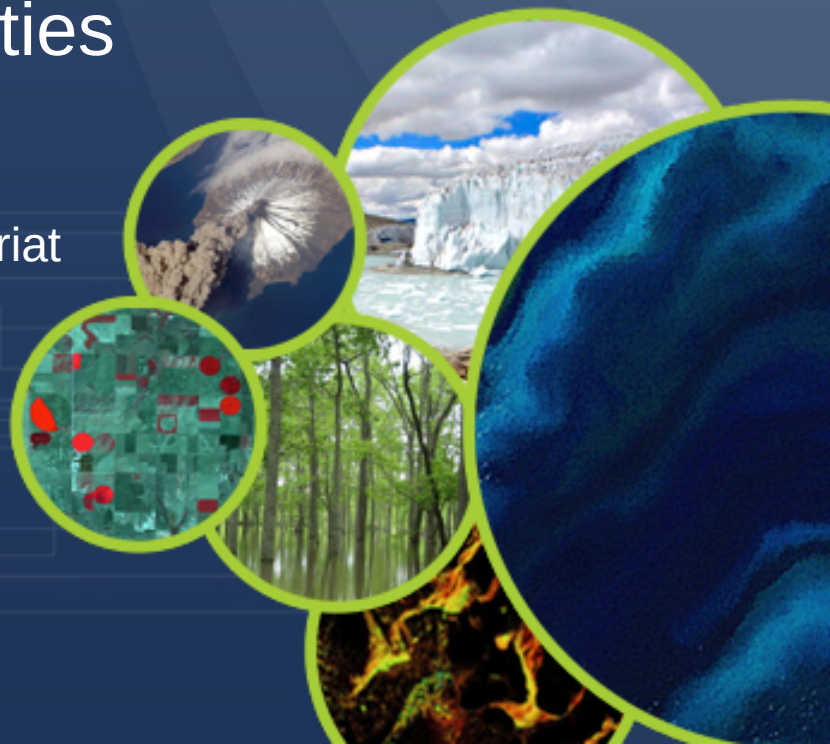
David Green, Incoming WGDisasters Chair

Dave Borges, Incoming WGDisasters Secretariat

WGDisasters-12

Reykjavik, Iceland

24-26 September 2019



2019-2021 Chair Priorities

- WGDisasters Flood Pilot Implementation
- WGDisasters Holistic Value Chain Reporting
- CEOS Analysis Ready Data (ARD) Strategy Support

Priority One

WGDisasters Flood Pilot Implementation

- GEO/LEO/SAR Data Integration
  - Continuation of SIT Chair (NOAA) GEO/LEO Flood Initiative
- Potential Coastal Flood Emphasis
- Aligned with 2020 CEOS Chair (ISRO) Priorities

CGMS Flood Pilot Study Background

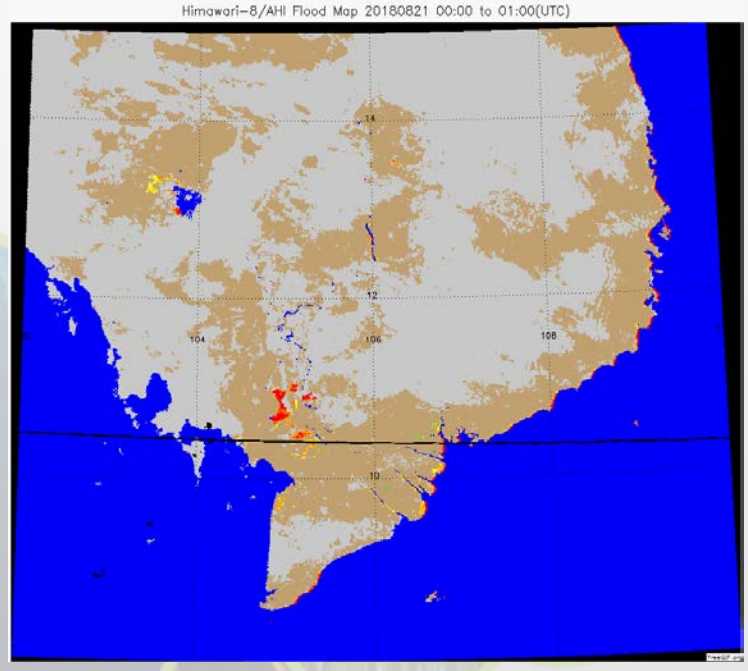
1. NOAA demonstrated new flood mapping capabilities from JPSS and GOES-R – now used routinely by NWS and FEMA and a new NOAA requirement

2. CEOS Chair (from Australia CSIRO) initiated a study of Non-Meteorological Applications from Geostationary Satellites e.g. floods, fires, aerosols.

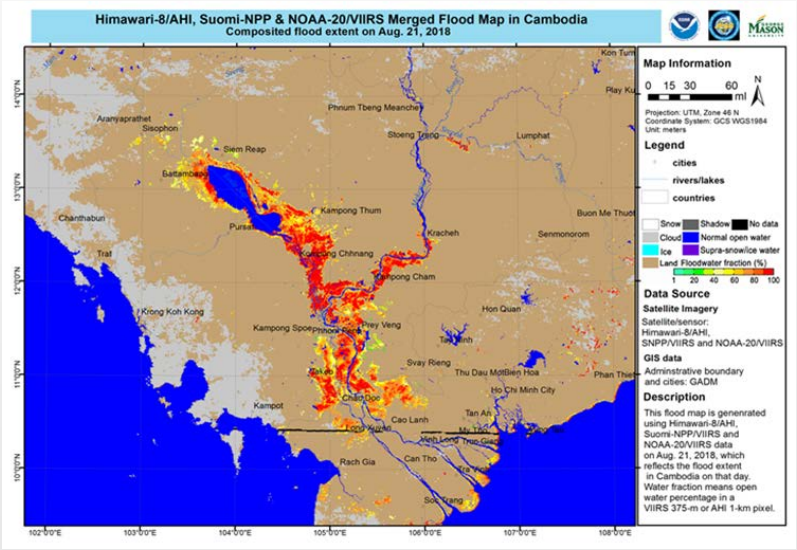
3. The CEOS report emphasized the importance of GEO and LEO synergy

4. CGMS reinforced the importance to integrate GEO into existing LEO NMA activities

5. CGMS pilot study with NOAA and CMA leading demonstration of operational satellites



Aggregation of Flood “pixels” using AHI



JPSS + AHI Composite Flood Map

Progress Since CEOS SIT-34

- NOAA updated their Flood Mapping website to include GEO/LEO for both JMA- AHI and NOAA- ABI
  - Supports NOAA users (operational requirements)
  - Supports the CGMS pilot study which includes WMO coordinated evaluation stage by National Meteorological and Hydrological Services (NMHSs) with anticipated outcome to include in WMO Satellite Data Requirements and access via GEONETCAST
  - Supports CGMS WMO VLAB training
  - Supports WGDisasters and WGCAPD activities

Flood Pilot Alignment with CEOS Chair (ISRO) 2020 Objectives

- ISRO would like to pursue the following initiatives:

1. Build Real Constellation (RC) of EO satellites continuity of observation for global studies
2. **Geoprocessing tool for disasters (flood)**
3. Data Cube for BIMSTEC Region
4. Renewable energy assessment from Space

CEOS Chair (ISRO) 2020 Objectives

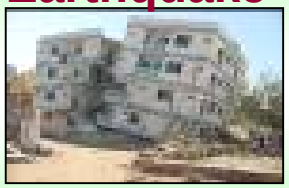
Geoprocessing tool for disaster

ISRO – DMS Programme – Present Services

Floods

- Flood Inundation Maps
- Damage Assessment
- Hazard Zonation
- Bank Erosion Studies

Earthquake



- Damage Assessment

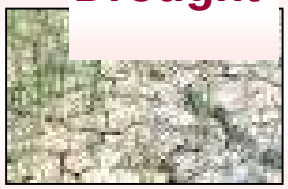
Cyclone

- Inundation Maps
- Recession Maps
- Damage Assessment

Landslide

- Damage Assessment
- Hazard zonation

Drought



- Monthly Agril. Drought Report
- End-of-the-Season Agril. Drought Report

Forest Fire

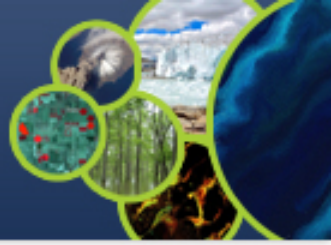
- Active Fire Detection
- Damage Assessment

2019 CEOS SIT TW Outcomes

8.4 Incoming CEOS Chair Objectives

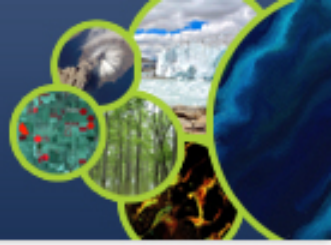
- Outcomes / Actions
  - Real Constellations, Disaster Tools, BIMSTEC Data Cube, renewable energy assessment are potential themes
    - **ISRO to invite specific requests/contributions from agencies**

Next Steps: Using Existing Mechanisms and Structures



- Within CGMS and WMO, Flood Mapping evaluation by NMHSs and WMO Region Satellite Data Requirements Working Groups
- WGDisasters interest in GEO-LEO SAR Integration Pilot requested
- WGCapD capacity building and training
- SIT Chair interest in continuing focus with dedicated pilots and demonstration projects
  - Possible Coastal Mapping in Pacific Region

Flood Pilot Initial Framing



Preliminary Pilot Details

- Areas / Regions of Interest – Determine multiple AOIs; suggestions welcome
  - U.S. Mid-Atlantic – Recent major hurricane events with known, significant SAR coverage (e.g. Harvey, Florence)
  - SE Asia, India, ?
- Interested/Participating Agencies
  - NASA, NOAA, ISRO?, ESA?, CSA?, CSIRO / GA?, Others?
- Available Data Sources
  - Geostationary: GOES-East/West, Himawari
  - Low-Earth Orbit: Suomi-NPP/NOAA-20, Sentinel 2 / 3, Landsat
  - Aerial: UAVSAR NOAA Aerial
  - Require additional data provision: Radarsat/RCM, NovaSAR, ALOS-2, TerraSAR-X contributions for past events (many already provided to Charter)
  - High Resolution (Optical/SAR): Maxar, Planet, Pleiades, SPOT, ICEYE, etc.
- **Success Criteria**
  - Determine best practices for combining GEO/LEO optical and SAR for mapping evolution of flood events over multiple days
  - Explore how flood depth information can be incorporated to assist with decision-making

Priority Two

WGDisasters Holistic Value Chain Reporting

- Create holistic reporting mechanism to capture thematic Disasters "Data → End User" value chain across all WGDisasters Work Plan Elements
- New WGDisasters ToR Mission Statement
  - The Committee on Earth Observation Satellites (CEOS) Working Group on Disasters (WGDisasters) ensures the sustained coordination of disaster-related activities undertaken by the **CEOS Agencies** and acts as an interface between CEOS and the **community of stakeholders and users** involved in risk management and disaster reduction.
- Define the 'Why' and 'Value' of WGD / DCT Activities

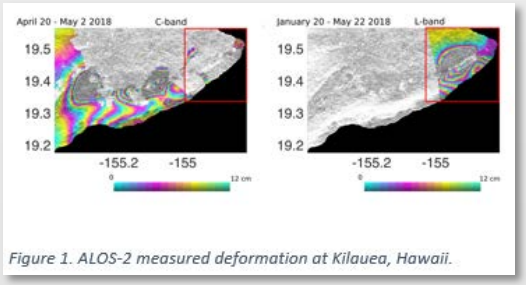
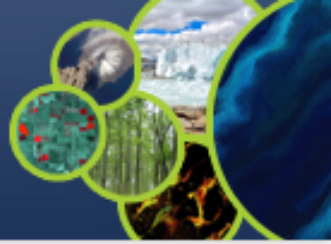


Figure 1. ALOS-2 measured deformation at Kilauea, Hawaii.

Tracing Data to Decisions
WGDisasters EO Process Vision



Policy & Programs	**Sustainable Decisions** Informed, Timely
WGD End Users	**Knowledge** Sendai: EO/Statistical Integration Early Warning, Response, Capture Use
WGD User Interface	**Platforms / Portals** GEO Knowledge Hub ESA TEP, Etc.
WGD WP Elements	**Applications Ready Data** InSAR, Derived Products Intercomparable time series
WGD DCT	**Commercial / Proprietary** Data Provision Coordination & Tracking
CEOS Agencies	**Data & Observations** Analysis Ready Data (ARD) L0-L3 Raw and Pre-Processed Data

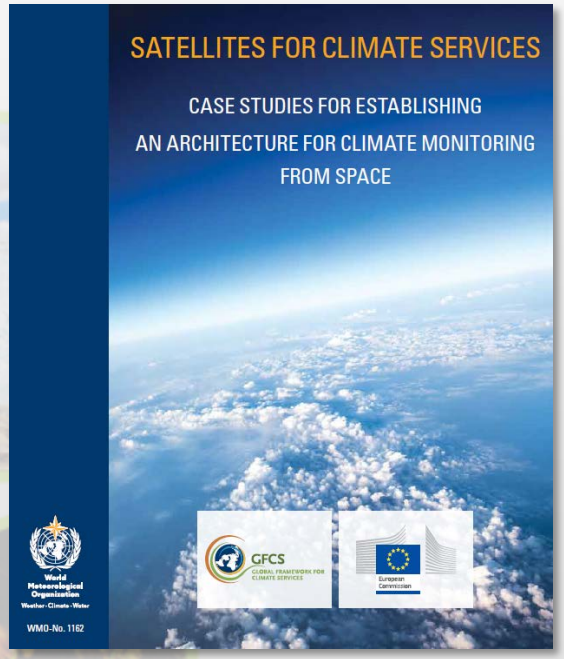
Data Feeding Decisions
Decisions Driving Needs

Value Chain Reporting – First Steps

- Define WGDisasters Stakeholder and End User Current Community
- Create End User Tracker Living Document
- Formulate requirements questionnaire; distribute to community
- Aggregate into Needs Assessment
- Determine CEOS Agency actions to meet Needs Assessment
  - Increased temporal processing of available data…
  - Increased sharing of data currently not free and open…
  - Etc.
- Provide feedback directly to CEOS Chair / SIT Chair with recommendations

Value Chain Reporting – First Steps

- WGClimate request for WGDisasters content for “use case studies”
- Each case study will use a standard template, and is generally 4-6 pages long. The first page is the summary providing information on the title, service, end users, satellite observation used, etc. The summary is followed by a diagram on information flow using the four pillars from climate monitoring architecture. The report ends with a brief description of the case.



EXECUTIVE SUMMARY

The report describes case studies that demonstrate the direct or indirect value of Earth observation satellites for climate services. Climate services (climate information prepared and delivered to meet a user's needs (WMO, 2011)) are recognized as vital for decisionmaking in climate-sensitive societal sectors, such as food security, water management, disaster risk reduction and health. Against a backdrop of human-induced climate change and the need for adaptation and mitigation, reliable, quality-controlled climate information at a global level is essential to inform decisions. Satellites are uniquely placed to provide a global perspective on the climate system, to contribute to the monitoring of the 26 Essential Climate Variables (ECV) (GCOS, 2011), and to inform regional and local climate analyses.

The 13 case studies in this report start from a wide range of end users' perspectives and their needs for climate services, including those of farmers, house owners, ecosystem managers, agriculture and health authorities, river basin managers, coastal protection agencies, energy companies, the finance and insurance industry, development fund agencies, and government and other policy decisionmakers. The case studies then demonstrate the importance of satellites for preparing the climate services needed by these communities. Satellite-based climate data records provide both a critical baseline and new input into the reanalyses that underpin climate services. In many examples, climate services are generated using a combination of data records from satellites, surface-based observing systems and other sources of information (models, socioeconomic data). The importance to climate services of near-real-time satellite data that do not, or only partially, meet climate standards is also shown.

The coordination of climate observing and modelling systems, the integrated use of climate data and effective user-provider feedback mechanisms in all climate-sensitive sectors are therefore essential for advancing the development of climate services.

The objectives of this report are (i) to demonstrate the value of satellite-enabled climate services to decision-makers, funding agencies and climate service users; (ii) to demonstrate to satellite agencies the need for an enhanced coordination within the Architecture for Climate Monitoring from Space (ACMS) that will address the thematic breadth of climate services.

This report supplements the *Strategy Towards an Architecture for Climate Monitoring from Space* (Dowell et al., 2013), a joint coordination effort by space agencies and the World Meteorological Organization (WMO) in support of the Global Framework for Climate Services (GFCS), and provides a basis for validating the logic of the proposed end-to-end Architecture.

Priority Three

CEOS Analysis Ready Data (ARD) Strategy Support

- Could be framed as sub-priority of Priority #2
- Aligned with incoming CEOS SIT Chair Objectives
- Has potential to improve interoperability of EO on a global scale, reducing level of effort to aggregate Disaster EO in times of crisis.
- Focus on few specific components of the larger strategy.

SIT Chair Prospectus

2020-2021 CSIRO/GA Australian SIT Chair Priorities Timelines

CEOS ARD

- **SIT TW 2019**
  - Draft CEOS ARD Strategy
  - CARD4L Exemplars Being Produced & Promoted
- **2019 CEOS Plenary**
  - Seek Development of Additional CEOS ARD Specifications
  - CEOS ARD Strategy v1.0
  - Report on Initial CARD4L Pilots
  - **GEO2019:** ARD Showcase & Side Event (CEOS ARD Strategy #4.1)
- **SIT-35**
  - Agency engagement on ARD Strategy Tasks & Production of CEOS ARD
  - CEOS Interoperability Terminology Report
  - Commitment from CEOS Agencies for a Dedicated CEOS–Industry ARD Workshop
  - CEOS Position Paper on the Interplay of Industry and CEOS ARD
- **2020 CEOS Plenary**
  - Seek support for production of new CEOS ARD Products
  - CEOS–Industry ARD Workshop (late 2020)
  - Contributions to Support New ARD Pilots
  - Assessment of CEOS ARD Production and Availability
  - Agree to Progress CEOS ARD Discussion with Standards Organisations
- **SIT-36**
  - Seek agency support for ARD Pilots for new PFS (e.g., Geostationary, LIDAR, Inland and Coastal Water Surface Reflectance, SDGs, Others)
  - Assessment of CEOS ARD Production & Availability and actions agreed to address obstacles
- **2021 CEOS Plenary**
  - CEOS ARD Strategy v2.0

Key Outcomes

1. A comprehensive ARD strategy for CEOS.
2. An agreed CEOS position on multiple aspects of the interplay between industry and CEOS ARD.
3. Demonstrated real world benefits of CEOS ARD for both data providers and data users.
4. A variety of CEOS ARD products being actively produced by numerous CEOS missions.
5. Data hosts/aggregators hosting and promoting CEOS ARD on their platforms.
6. CEOS ARD Specifications used as the basis for community standards.
7. Additional CEOS ARD Specifications for new applications, greatly increasing the user base for and impact of CEOS Agency data.

Carbon & Biomass

- **SIT TW 2019**
  - CEOS Biomass Primer for SBSTA
  - Convention Engagement Paper & Notice of 2020 Workshop
- **2019 CEOS Plenary**
  - CEOS Biomass Protocol Published by WGCV LPV
  - Decide Actions to Support Biomass Protocol
  - Consensus on Engagement of Conventions by CEOS
  - CEOS Review Draft Update to GCOS Requirements
- **SIT-35**
  - Debate 2023 Stocktake Prototype & Assign Actions inc. for GHG prototype products
  - Biomass Validation Workshop 2020 (Australia)
  - JRC Workshop on Convention Engagement Spanning GHG, Land Use & Forestry
- **2020 CEOS Plenary**
  - Update Contributions to Prototype Global GHG System
  - Review Progress on Uptake for Biomass Missions
  - Review Convention Engagement Progress
- **SIT-36**
  - **SIT TW:** Prototype Atmospheric CO_2 and CH_4 Flux Inventory to Inform Bottom-up Inventories for 2023 Global Stocktake
  - Policy Applications of Biomass Datasets and Measures to Address Lessons to Date
  - Strategy for Space Agency and CEOS Support to the 2023 Global Stocktake
- **2021 CEOS Plenary**
  - 4th GCOS Status Report
  - Review Prototype GHG System

Key Outcomes

1. Prototype atmospheric CO_2 and CH_4 flux inventory to inform the bottom-up inventories for 2023 Global Stocktake.
2. CEOS input to updated GCOS Requirements (GCOS IP complete late 2022).
3. New relationships with inventories community.
4. Accelerated policy relevance of CEOS biomass datasets making best use of the GFOI and GEOGLAM frameworks.
5. Biomass datasets available and useable by GFOI and GEOGLAM. R&D activities actioned to address issues.
6. Stronger, more systematic engagement of UNFCCC & IPCC for CEOS. Recognition of EO data in Global Stocktake, national practices, etc.

SDGs

- **SIT TW 2019**
  - Draft SDG-AHT Work Plan
- **2019 CEOS Plenary**
  - 6.6.1, 11.3.1 and 15.3.1 Demonstrations Characterised. Principals to Consider Support to Demonstrations and Development of GPGs
  - Principals to Consider Endorsing SDG-AHT Work Plan. Clarity on organisational aspects.
  - Principals to Consider CEOS Mechanism to Provide Satellite Data (e.g., ARD) for SDG Purposes
- **SIT-35**
  - Agree Strategy for Engagement and Promotion of CEOS Agencies' Support to the SDG Process at a Global Level
  - SDG Demonstrations Operational on Digital Earth Africa
- **2020 CEOS Plenary**
  - Principals Review Progress on Demonstrations and GPG Development
  - Initiate Work on Long-Term Strategy for CEOS Support to SDGs
- **SIT-36**
  - **SIT TW:** Review Long-Term Strategy for CEOS Support to SDGs
  - Principals Decide Future of High-Level CEOS Engagement on SDGs
- **2021 CEOS Plenary**
  - Long-Term Strategy for CEOS Support to SDGs

Key Outcomes

1. A clear and comprehensive statement of what CEOS will do to support the SDGs over the period 2020-2021 (SDG-AHT Work Plan).
2. Demonstration of CEOS Agencies' ability to support reporting on numerous SDG Indicators.
3. Good Practice Guidelines (GPGs) for numerous SDG Indicators.
4. A clear CEOS mechanism for coordinated provision of satellite data for SDG purposes.
5. Clarity on the future of high-level CEOS engagement on the SDGs (e.g., with UN, GEO, NSOs). Clarity on working organisational aspects.
6. A long-term (post-2021) strategy for CEOS support to the SDGs.

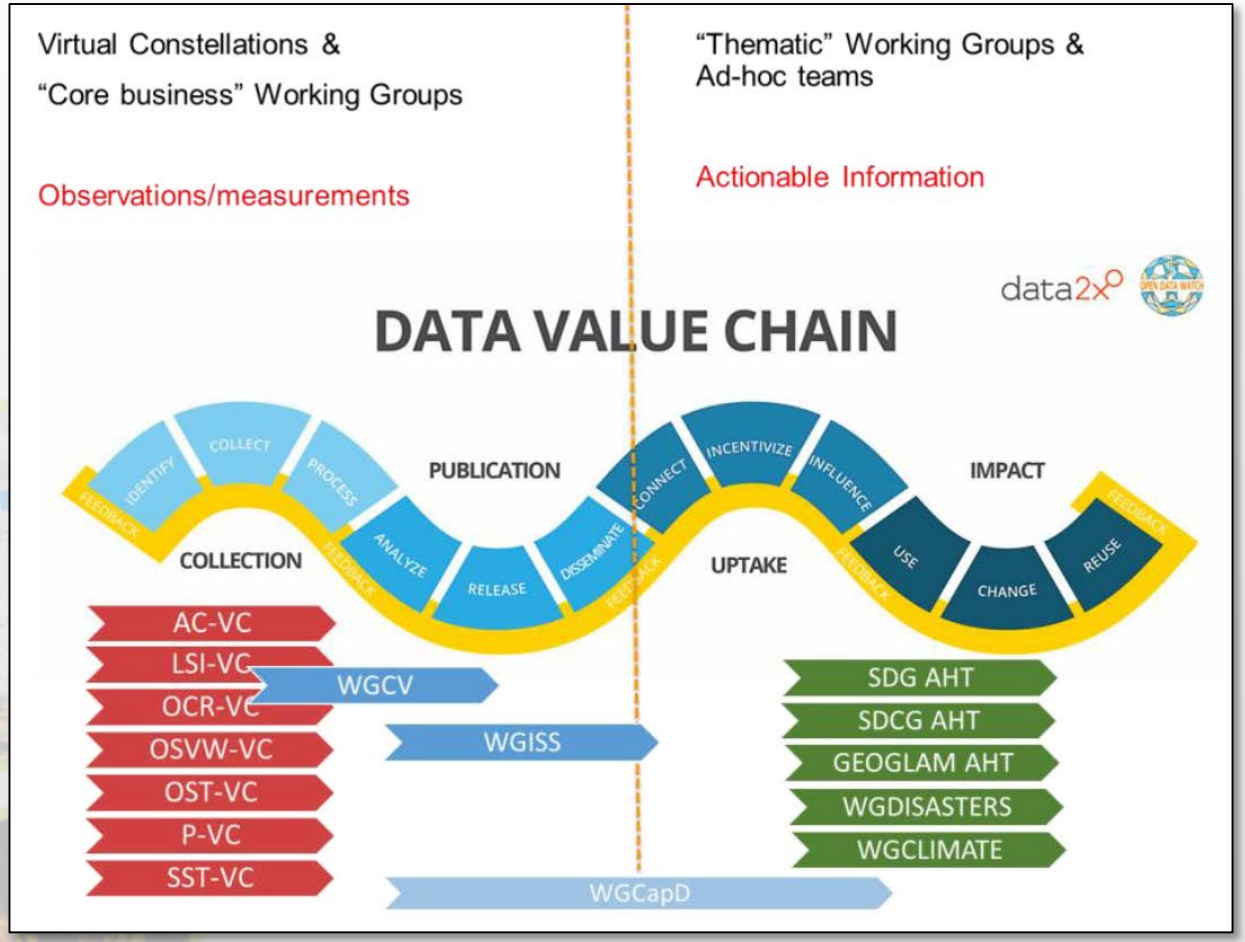
CEOS ARD Strategy Components

1. **CEOS Analysis Ready Data for Land (CARD4L)**
   - ➢ CARD4L will include: technical specifications; trial production of data; pilot programmes for stakeholder engagement and feedback; and continued refinement of the standards
2. **ARD Stocktake and outlook**
   - ➢ CEOS should define and maintain a clear statement as to the current and future availability of the different datasets produced to its ARD standards (e.g., CARD4), and how to access them. This should include a current snapshot and forecast for 1, 2, and 3 years hence
3. **Technical Specification Development and Maintenance**
   - ➢ The first steps for any new ARD standards across CEOS will be the development of the Product Family Specification
   - ➢ A systematic and effective process will be required to ensure consistency and performance across the relevant standards and datasets
   - ➢ Priorities driven by user demand (e.g. oceans or atmosphere or disasters or machine learning….)
4. **Pilots and feedback**
   - ➢ Practical experience in the production, provision and application of CEOS ARD will be essential
   - ➢ An important driver in these trials will be to ensure data discovery, access and integration is optimal
5. **Promotion**
   - ➢ Active promotion of the benefits of ARD will be an essential part of achieving that critical mass for the standards to succeed - to data providers, data hosters and aggregators, and data users

CEOS ARD Strategy

- **Noting WGDisasters position on the overall CEOS data value chain**

Still important opportunity to inform CEOS of disasters user demand



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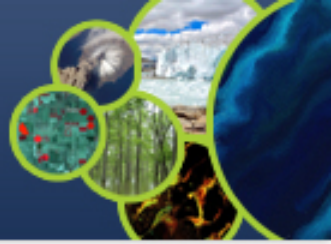

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Potential for WGDisasters to support ARD Strategy

Feedback

…. is most welcome.

We look forward to serving CEOS and advancing its important work.