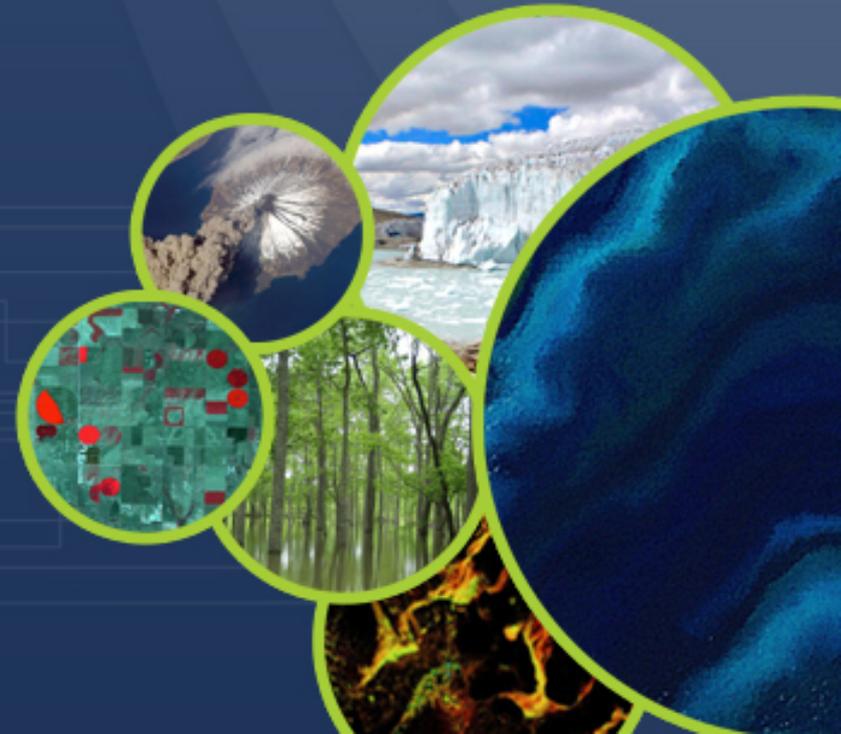


Viewing Earth
Serving Society

The Committee on Earth Observation Satellites

November, 2018





- Established under the auspices of the G-7 Economic Summit of Industrialized Nations (1984)
- Operates through the best efforts & voluntary contributions of 34 Members (space agencies) & 28 Associates (UN Agencies, Phase A programs, or supporting ground facility programs)
- Delivers on high priority objectives in support of the Group on Earth Observation (GEO) Tasks as the space component of the Global Earth Observation System of Systems (GEOSS)

Mission: CEOS ensures international coordination of civil space-based Earth observation programs and promotes exchange of data to optimize societal benefit and inform decision making for securing a prosperous and sustainable future for humankind.



- Serve as a focal point for coordinating international satellite Earth Observation (EO) activities
- Optimize EO benefits via cooperation on mission planning & the development of compatible data products, formats, services, applications, & policies
- Exchange policy & technical information to encourage complementarity & compatibility among space-based EO systems & their data
- Address issues of common interest across the spectrum of EO satellite missions



Viewing Earth, serving society

The Committee on Earth Observation Satellites (CEOS) ensures international coordination of civil space-based Earth observation programmes

- **62** members and associates
- **151** missions currently operating
- **177** missions under development



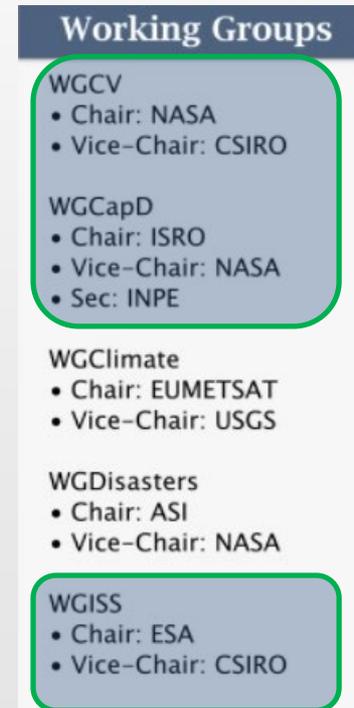
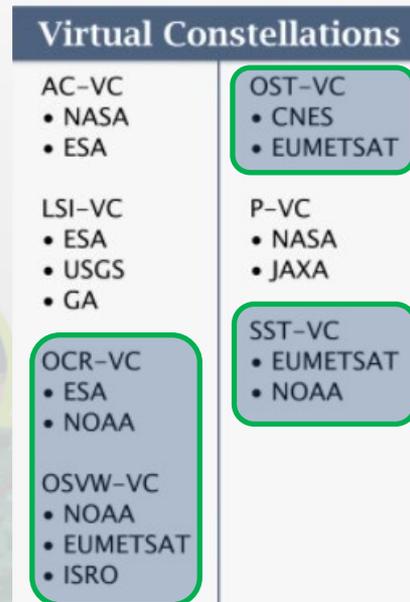
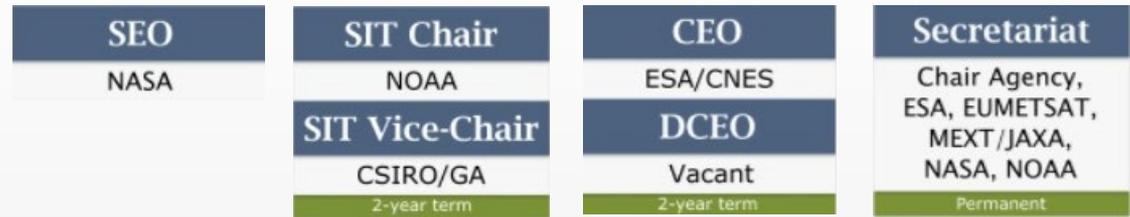
CEOS Leadership

Support roles

Working Groups

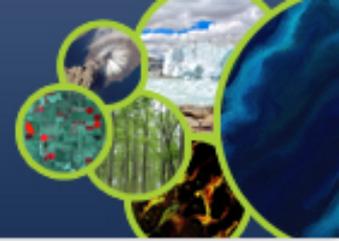
Virtual Constellations

Ad-hoc Teams





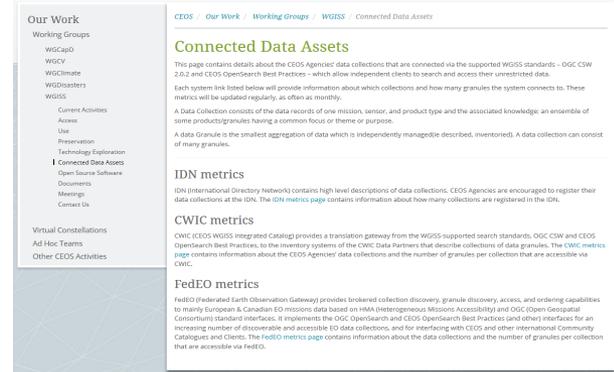
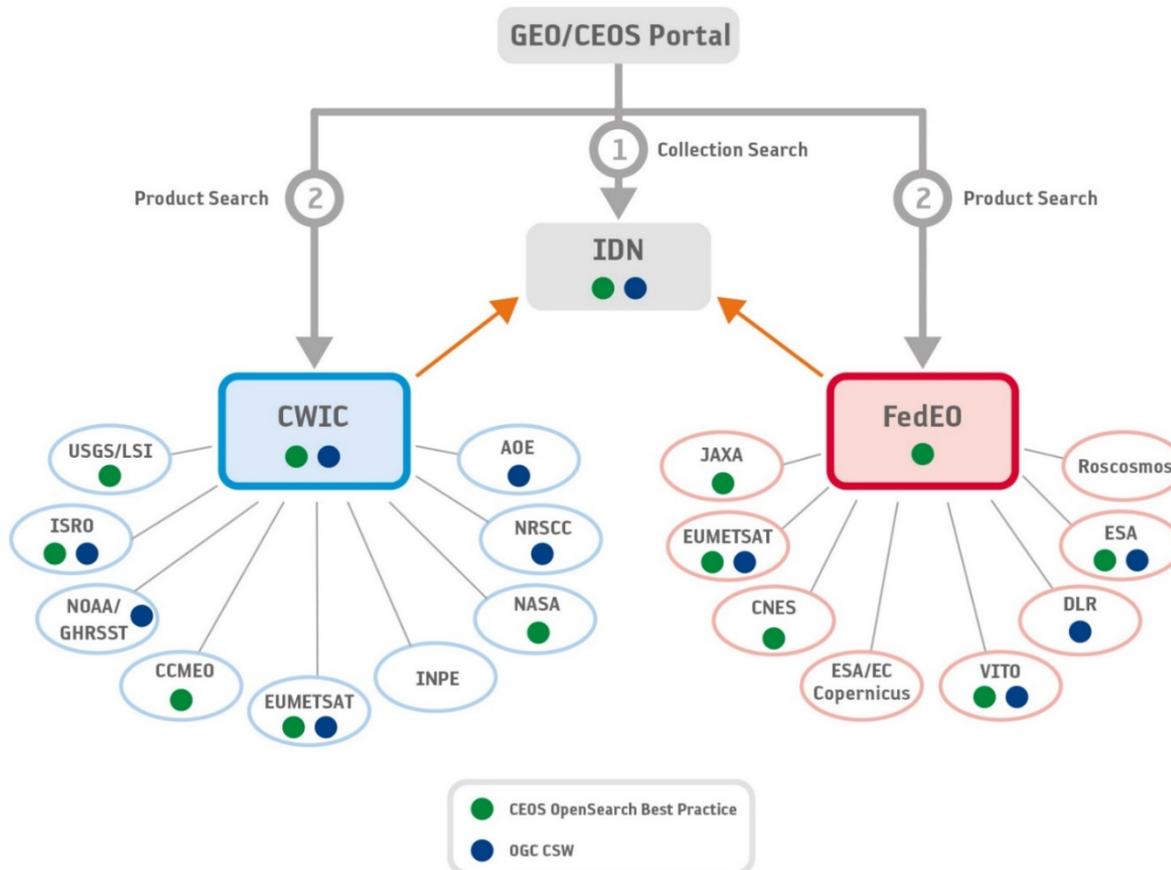
<p>Working Group on Calibration & Validation</p>	<p>Ensure long-term confidence in the accuracy & quality of EO data & products</p>
<p>Working Group on Capacity Building & Data Democracy</p>	<p>Increase the capacity of institutions in less developed countries for effective use of EO data for the benefit of society & to achieve sustainable development</p>
<p>CEOS/CGMS Working Group on Climate</p>	<p>Facilitate the use of Essential Climate Variable time-series through coordination of Member initiatives & activities</p>
<p>Working Group on Disasters</p>	<p>Increase & strengthen the contribution of EO satellites to the various disaster risk management phases & raise the awareness on the benefits of using satellite EO in all phases of disasters.</p>
<p>Working Group on Information Systems & Services</p>	<p>Coordinate the development of systems & services that manage & supply the data & information from Member missions</p>



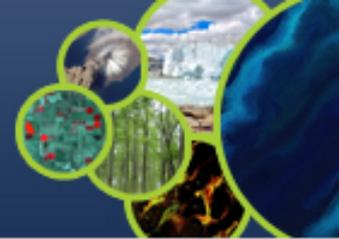
Relying on **IDN/CWIC/FedEO components**, provides a single entry point for external clients to discover and access CEOS agencies data

Search over 32,000 collections in the IDN

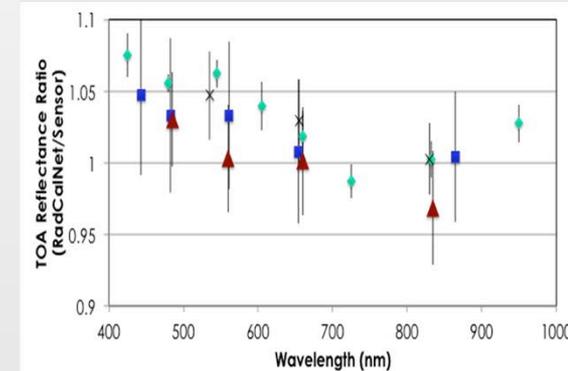
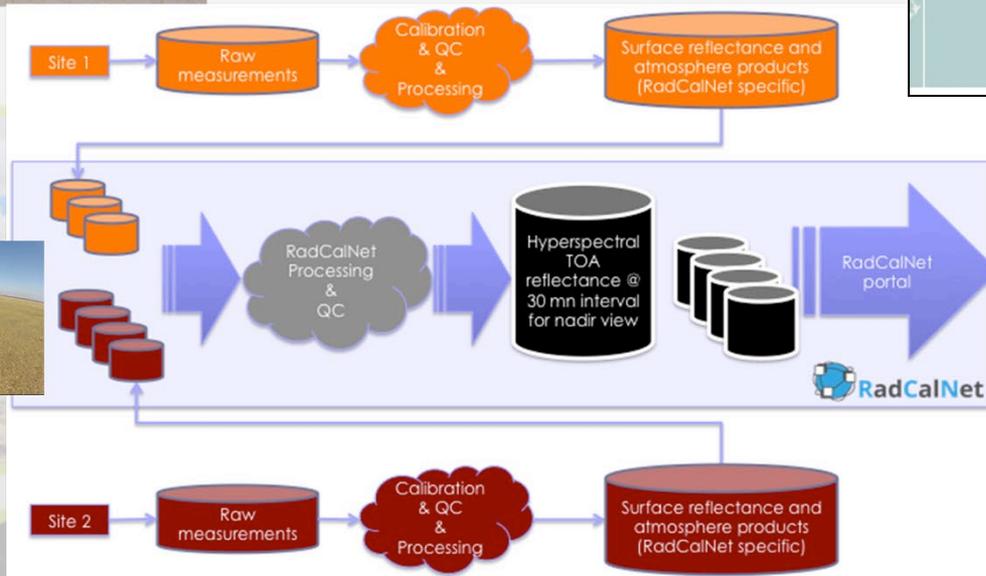
Access over 5000 collections with associated over 300+ million granules (granule search)



DATA-2: Full representation of CEOS Agency datasets in the IDN and accessibility via supported WGISS systems and standards



- **CV-9 (Radiometric Calibration Network (RADCALNET)) is complete**
- Network of instrumented sites for radiometric calibration of optical sensors
- Opening of RadCalNet portal (<https://www.radcalnet.org>) on July 24, 2018
- Method developed for admitting new sites





A set of space & ground segment capabilities operating in a coordinated manner to meet a combined/common set of EO requirements, aiming to:

- Demonstrate the value of collaborative partnerships in addressing key observational gaps & bridge multiple GEO Societal Benefit Areas while maintaining the independence of individual contributions
- Focus dialogue from “all topics, all agencies” to small, specialized groups
- Provide guidance on the design & development of future systems to meet the broad spectrum of EO requirements:
 - Avoiding duplication & overlap in EO efforts
 - Closing information gaps for GEO SBAs
 - Establishing & sustaining global EO coverage & data availability



Current CEOS Virtual Constellations include:

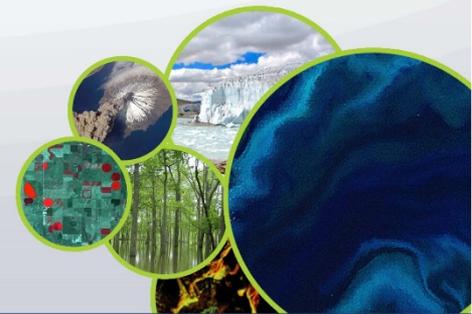
- [Atmospheric Composition](#) (AC-VC)
- [Land Surface Imaging](#) (LSI-VC)
- [Ocean Colour Radiometry](#) (OCR-VC)
- [Ocean Surface Topography](#) (OST-VC)
- [Ocean Surface Vector Wind](#) (OSVW-VC)
- [Precipitation](#) (P-VC)
- [Sea Surface Temperature](#) (SST-VC)



The CEOS [Work Plan](#) Expected Outcomes defines the organisation's work for the coming 3 years in the following thematic areas:

- Climate Monitoring, Research, & Services
- Carbon Observations, Including Forested Regions
- Observations for Agriculture
- Observations for Disasters
- Observations for Water
- Capacity Building, Data Access, Availability & Quality
- Advancement of the CEOS Virtual Constellations
- Support to Other Key Stakeholder Initiatives
- Outreach to Key Stakeholders
- Organizational Issues

The CEOS Work Plan is defined for 3 years and Updated annually.





- CEOS is GEO's "space arm" coordinating the provision of space data to the Global Earth Observation System of Systems
- CEOS seeks to benefit from GEO's "convening power"
- Strong institutional relationship on all levels
- Annual bilateral meeting arranged with GEO Secretariat to align work



- CEOS Climate work feeds into the UN Framework Convention on Climate Change through the Subsidiary Body for Scientific and Technical Advice (SBSTA)
- SBSTA is one of two SBs which supports the work of the COP



UN International Strategy for Disaster Reduction – Sendai framework



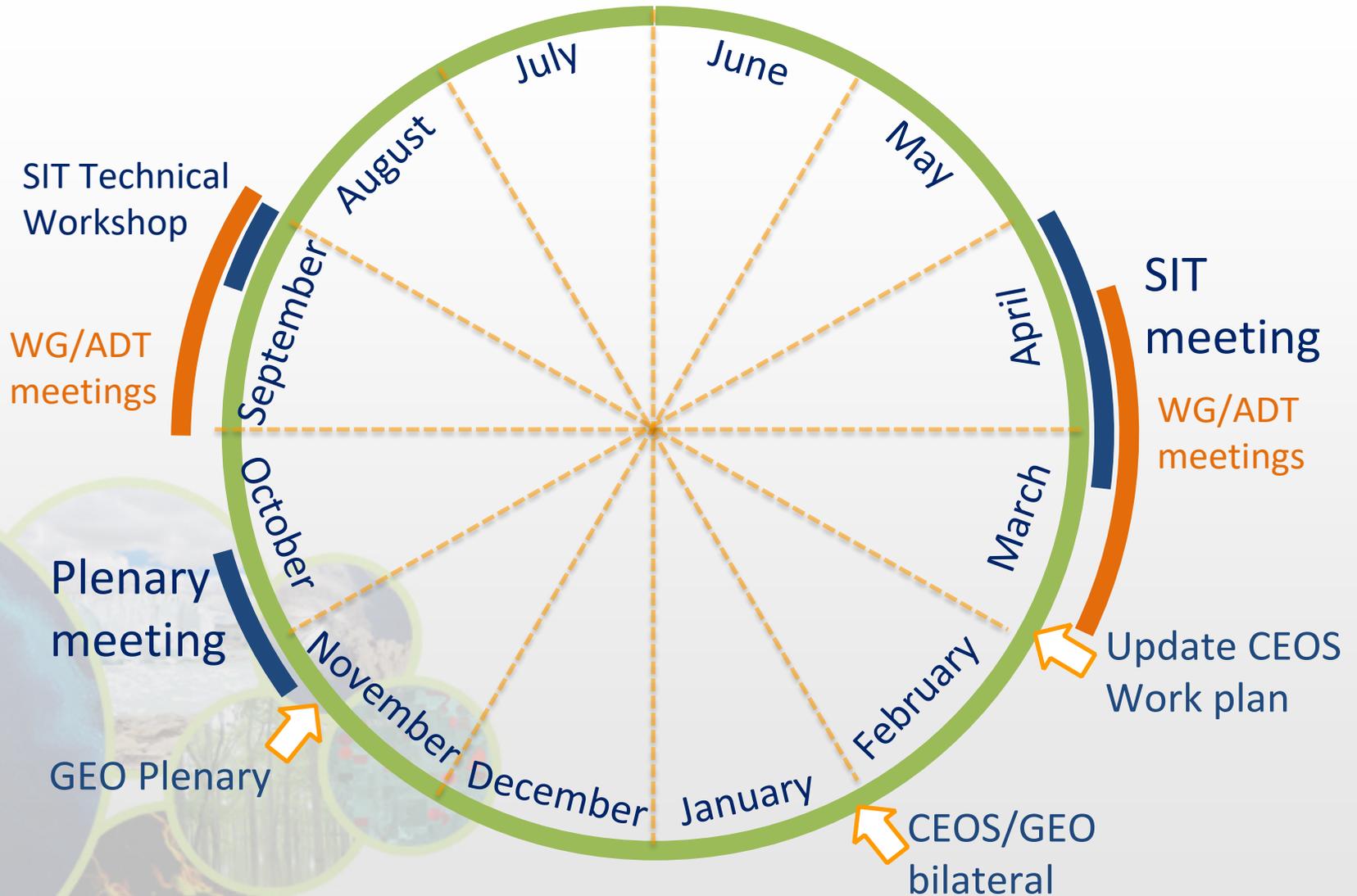
UN World Conference on
Disaster Risk Reduction
2015 Sendai Japan

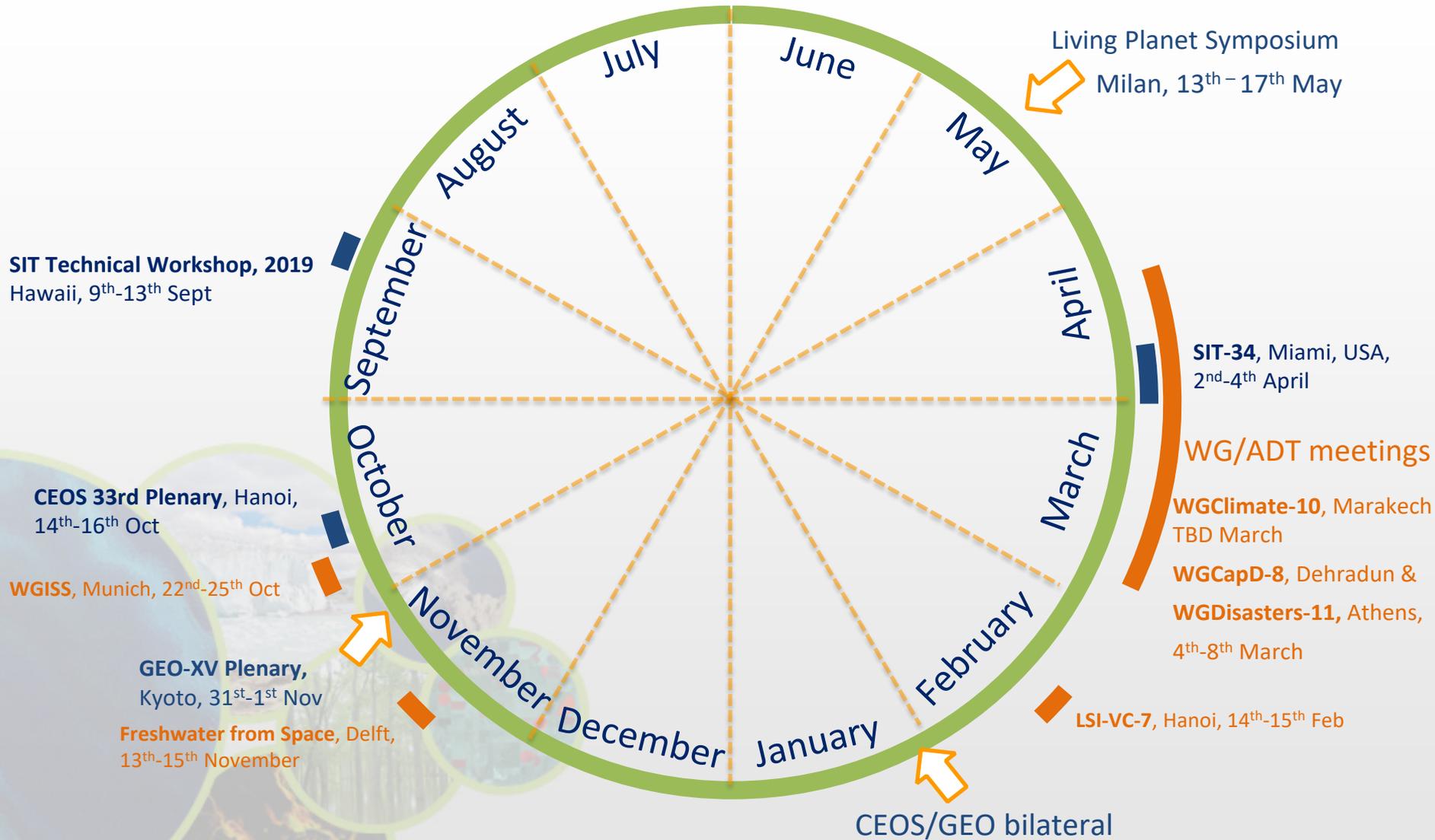
- CEOS contribution through activities from the WG on Disasters, since 2011 in order to promote & enhance the use of EO data in all phases of Disaster Risk Management, with focus on Disaster Risk Reduction.
 - Use of EO satellite data is recognized as key for DRR in “*Sendai Framework for Disaster Risk Reduction 2015-2030*”
- Several activities with strong involvement of user communities and major non-space stakeholders e.g. World Bank GFDRR.

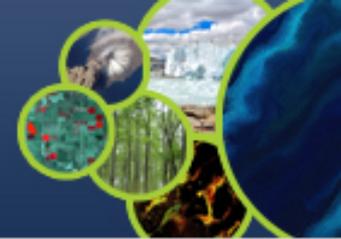
UN Sustainable Development Goals

- EO can support several of the 17 SDG goals (2, 6, 11, 14 and 15) and associated targets and indicators.
 - On indicators, cooperation with UN agencies and National Statistical Agencies
- Dedicated CEOS Ad Hoc Team on SDG







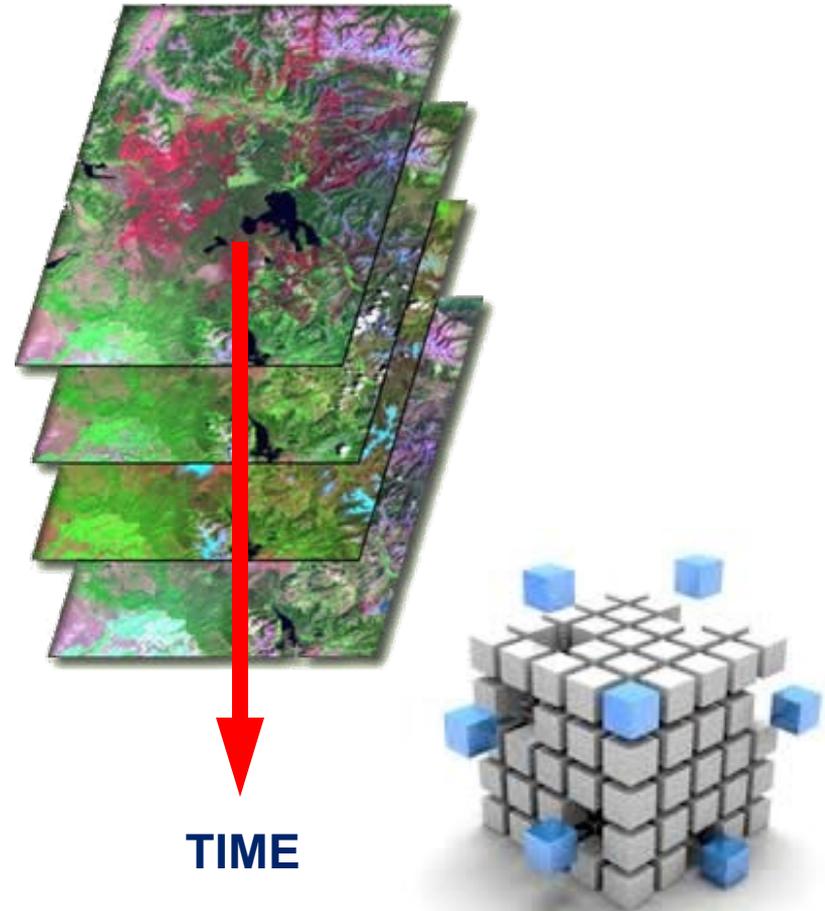


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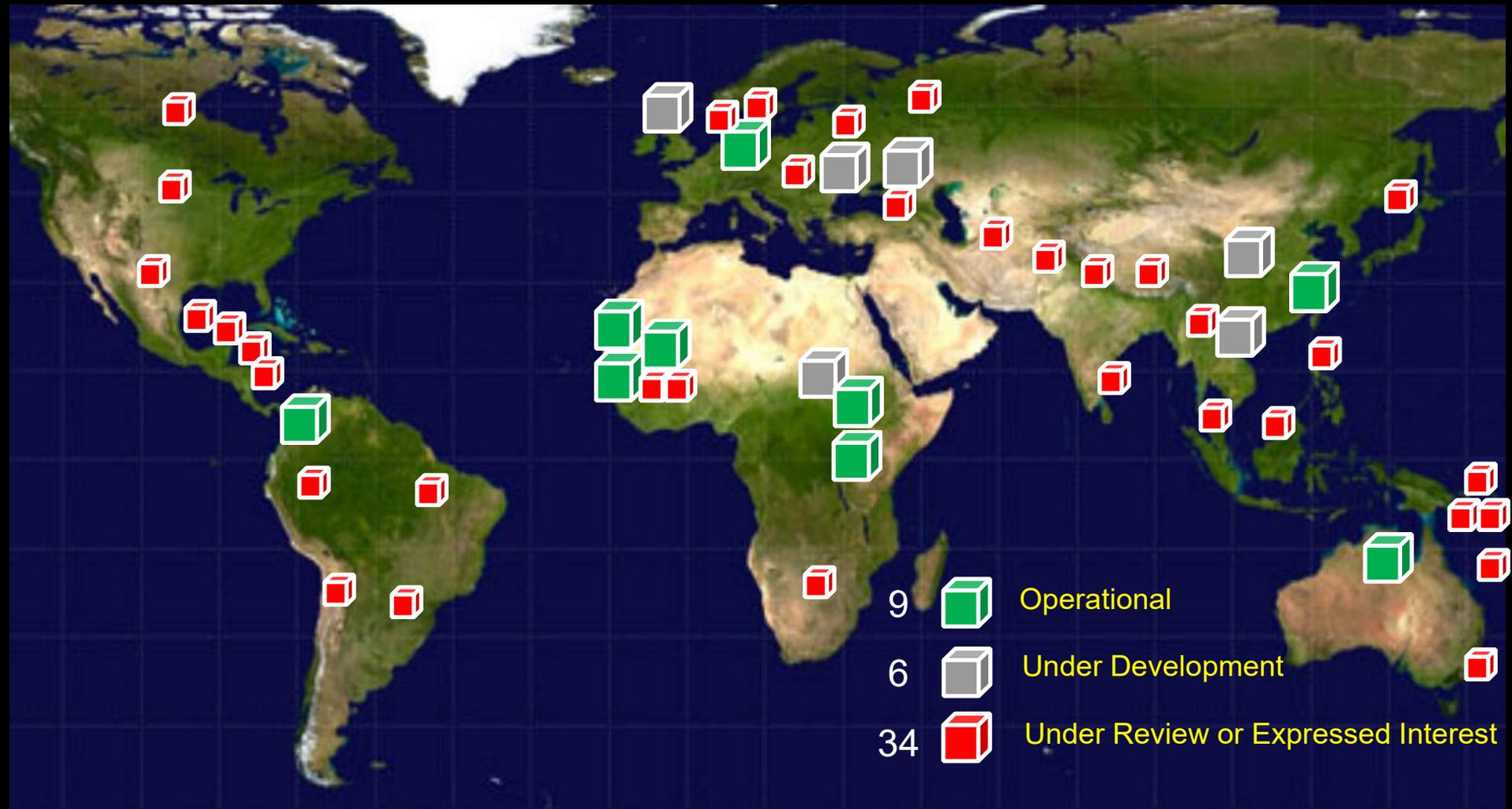




- **Data Cube** = Time-series multi-dimensional (space, time, data type) stack of spatially aligned pixels ready for analysis
- **Analysis Ready Data (ARD)** ... Dependent on processed products to reduce processing burden on users
- **Open source** software approach allows free access, promotes expanded capabilities, and increases data usage.
- **Provides a “ready-to-use” environment for users** which facilitates time series exploitation and supports the development of applications



Open Data Cube: 49 countries in 20 months



Operational: Australia, Colombia, Switzerland, Taiwan, Kenya, Tanzania, Ghana, Sierra Leone, Senegal

CEOS EO Handbook on SDGs



Part I Role of EO data in support to the SDGs



Part II Stakeholders' perspectives on EO for the SDGs

Part II: Perspectives on EO for the SDGs

The UN System

- 1. UN-GGIM: The Role of Geospatial Information and Earth Observations in the SDGs: A Policy Perspective
- 2. UNSD: Earth Observation for Ecosystem Accounting

National Statistical Organisations and Their Use of EO

- 3. Australia: Forging Close Collaboration Between EO Scientists and Official Statisticians – An Australian Case Study
- 4. Mexico: Monitoring the 2030 Agenda in Mexico: Institutional Coordination and the Integration of Information

Custodian Agencies and Their Use of EO

- 5. FAO: Perspectives from a Custodian Agency for Agriculture, Forestry and Fisheries
- 6. UN-Habitat: The 'Urban' SDG and the Role for Satellite Earth Observations

EO Data Providers and Coordination Bodies

- 7. GEO: EO4SDG: Earth Observations in Service of the 2030 Agenda for Sustainable Development
- 8. Pan-European Space Data Providers and Industry Working in Support of the SDGs

Non-Governmental Organisations

- 9. Radiant Earth: The Rise of Data Philanthropy and Open Data in Support of the 2030 Agenda
- 10. GPSDD: Building a Demand-Driven Approach to the Data Revolution for Sustainable Development

International Financing Institutions

- 11. Environmental Information from Satellites in Support of Development Aid

Part III Examples of EO contribution to SDG Targets and Indicators





CEOS Chair priorities for 2019



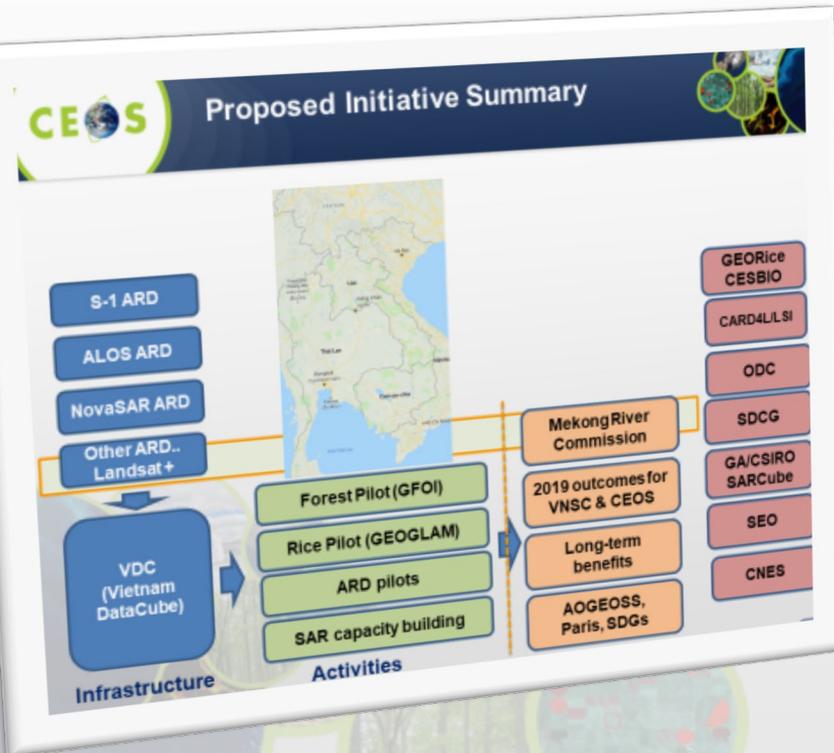
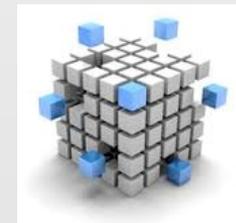
Priority #1:

Carbon Observations (forested regions)

Priority #2:

Observations for Agriculture (rice)

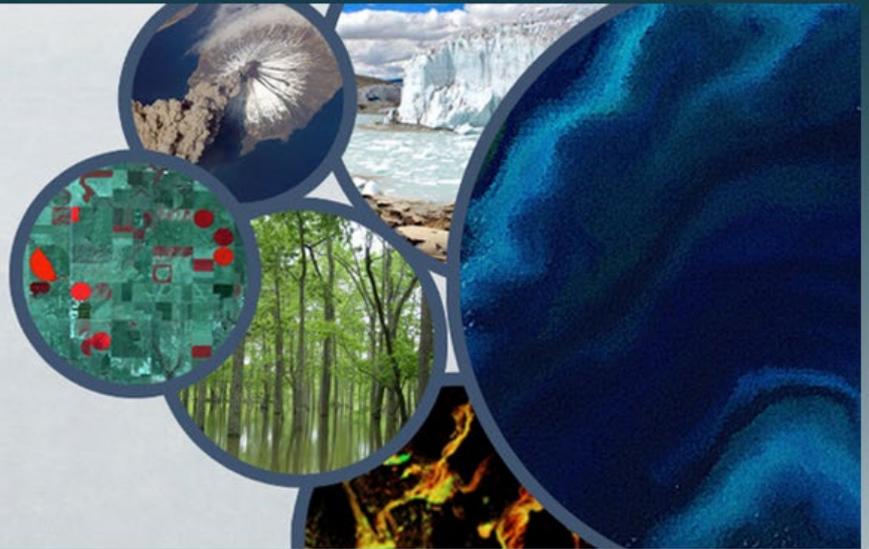
Including the development of a Mekong Delta datacube.





Viewing Earth Serving Society

[Learn More](#) >

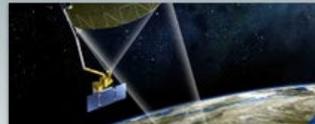


Viewing Earth Serving Society

Satellite Earth Observations to
Serve Science & Society



Faces of CEOS: NASA's Brian
Killough Talks CEOS Tools



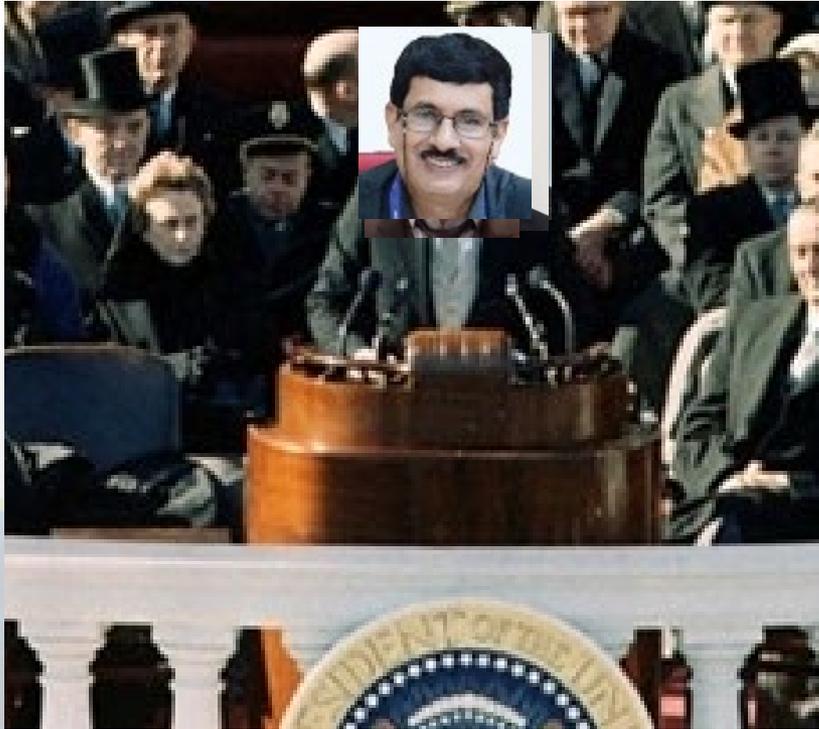
Successful Launch for Soil
Moisture Observatory: SMAP

New 2015 Publication

Satellite Earth Observations for
Disaster Risk Reduction



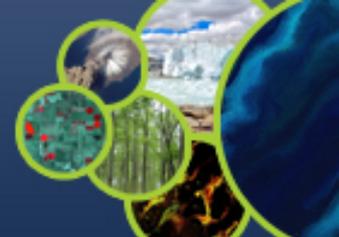
Successful Launch: KOMPSAT-3A



... as this famous CEOS
Principal once said

*" ... ask not what CEOS
can do for you, but
what you can do for
CEOS*

*... in making the planet's EO programmes
greater than the sum of their individual parts
.... "*





MEMBERS (34)

Agenzia Spaziale Italiana (ASI)
 Canadian Space Agency (CSA)
 Centre National d'Etudes Spatiales (CNES), France
 Centro para Desarrollo Tecnológico Industrial (CDTI), Spain
 China Center for Resources Satellite Data & Applications (CRESDA)
 Chinese Academy of Space Technology (CAST)
 Comisión Nacional de Actividades Espaciales (CONAE), Argentina
 Commonwealth Scientific & Industrial Research Organisation (CSIRO),
 Australia
 Deutsches Zentrum für Luft- und Raumfahrt (DLR), Germany
 European Commission (EC)
 European Organisation for the Exploitation of Meteorological Satellites
 (EUMETSAT)
 European Space Agency (ESA)
 Geo-Informatics & Space Technology Development Agency (GISTDA),
 Thailand
 Indian Space Research Organisation (ISRO)
 Instituto Nacional de Pesquisas Espaciais (INPE), Brazil
 Japan Aerospace Exploration Agency/Ministry of Education, Culture, Sports,
 Science, & Technology (JAXA/MEXT)
 Korea Aerospace Research Institute (KARI)
 Korea Meteorological Administration (KMA)
 National Aeronautics & Space Administration (NASA), USA
 National Institute of Environmental Research (NIER)
 National Oceanic & Atmospheric Administration (NOAA), USA
 National Remote Sensing Center of China (NRSCC)
 National Satellite Meteorological Center/Chinese Meteorological Administration
 (NSMC/CMA)
 National Space Agency of Ukraine (NKAU)
 National Space Research Agency of Nigeria (NASRDA)
 Netherlands Space Office (NSO)
 Russian Federal Space Agency (ROSCOSMOS)
 Russian Federal Service for Hydrometeorology & Environmental Monitoring
 (ROSHYDROMET)
 South African National Space Agency (SANSA)
 Scientific & Technological Research Council of Turkey (TÜBİTAK)
 United Arab Emirates Space Agency (UAE SA)
 United Kingdom Space Agency (UKSA)
 United States Geological Survey (USGS)
 Vietnam Academy of Science & Technology (VAST)

ASSOCIATES (28)

Australian Bureau of Meteorology
 Belgian Federal Science Policy Office (BELSPO)
 Canada Centre for Mapping & Earth Observation (CCMEO)
 Crown Research Institute (CRI), New Zealand
 Earth Systems Science Organisation (ESSO), India
 South African Council for Scientific & Industrial Research
 (CSIR)/Satellite Applications Centre (SAC)
 Gabonese Agency for Space Studies and Observations (AGEOS)
 Global Climate Observing System (GCOS)
 Geoscience Australia
 Global Geodetic Observing System (GGOS)
 Global Ocean Observing System (GOOS)
 Global Terrestrial Observing System (GTOS)
 Intergovernmental Oceanographic Commission (IOC)
 International Council for Science (ICSU)
 International Geosphere-Biosphere Programme (IGBP)
 International Ocean Colour Coordinating Group (IOCCG)
 International Society of Photogrammetry & Remote Sensing
 (ISPRS)
 Malaysian National Space Agency (ANGKASA)
 Mexican Space Agency (AEM)
 Norwegian Space Centre (NSC)
 Swedish National Space Agency (SNSA)
 United Nations Economic & Social Commission for Asia & the
 Pacific (ESCAP)
 United Nations Educational, Scientific & Cultural Organization
 (UNESCO)
 United Nations Environment Programme (UNEP)
 United Nations Food & Agriculture Organization (FAO)
 United Nations Office for Outer Space Affairs (UNOOSA)
 World Climate Research Programme (WCRP)
 World Meteorological Organization (WMO)



SIT	Strategic Implementation Team
CEO	CEOS Executive Officer
SEO	Systems Engineering Office
AC-VC	Atmospheric Composition Virtual Constellation
LSI-VC	Land Surface Imaging Virtual Constellation
OCR-VC	Ocean Colour Radiometry Virtual Constellation
OST-VC	Ocean Surface Topography Virtual Constellation
OSVW-VC	Ocean Surface Vector Wind Virtual Constellation
P-VC	Precipitation Virtual Constellation
SST-VC	Sea Surface Temperature Virtual Constellation
WGCV	Working Group on Calibration & Validation
WGCapD	Working Group on Capacity Building & Data Democracy
WGClimate	Working Group on Climate (joint CEOS & CGMS)
WGDisasters	Working Group on Disasters
WGISS	Working Group on Information Systems & Services
SDCG for GFOI	Space Data Coordination Group for Global Forest Observation Initiative
GEOGLAM	GEO Global Agricultural Monitoring