



Committee on Earth Observation Satellites

CEOS MIM support to WGDisasters Activities

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WGDisasters-16 Meeting

Virtual Meeting

21 – 23 September 2021



New target: Community of users that are less familiar with satellite missions and instruments, but that have a good knowledge of specific phenomena (e.g. volcanoes) and/or measurements.

Objective:

- Increase the awareness of non-EO specialists.
- Show that remote sensing is a valuable and reliable additional source of information, that can benefit multiple domains

Today, there is no indication of types of hazards 

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CEOS EO HANDBOOK – MEASUREMENTS

Earth observation satellites provide important data about the Earth and its environment, helping develop our understanding of the basic Earth System and human influences on it. These data cover measurements of a very wide range of geophysical parameters, spanning the whole spectrum of the environment – atmosphere, land, oceans, ice and snow. You can read more about these measurements in the Earth Observation Handbook.

The CEOS Missions, Instruments, and Measurements database contains information on many key measurements of interest to the main user groups of Earth observation satellite data. The table below includes links to further information on broader measurement categories (left), more detailed measurements (centre), and measurement timelines (right).

<p>Atmosphere</p>	<ul style="list-style-type: none"> ♦ Aerosols ♦ Atmospheric Humidity Fields ♦ Atmospheric Temperature Fields ♦ Atmospheric Winds ♦ Cloud particle properties and profile ♦ Cloud type, amount and cloud top temperature 	<ul style="list-style-type: none"> ♦ Lightning Detection ♦ Liquid water and precipitation rate ♦ Ozone ♦ Radiation budget ♦ Trace gases (excluding ozone) 	<p>Timelines</p>
<p>Land</p>	<ul style="list-style-type: none"> ♦ Albedo and reflectance ♦ Inland Waters ♦ Landscape topography ♦ Multi-purpose imagery (land) 	<ul style="list-style-type: none"> ♦ Soil moisture ♦ Surface temperature (land) ♦ Vegetation 	<p>Timelines</p>
<p>Ocean</p>	<ul style="list-style-type: none"> ♦ Multi-purpose imagery (ocean) ♦ Ocean colour/biology ♦ Ocean Salinity ♦ Ocean surface winds 	<ul style="list-style-type: none"> ♦ Ocean topography/currents ♦ Ocean wave height and spectrum ♦ Surface temperature (ocean) 	<p>Timelines</p>
<p>Snow and Ice</p>	<ul style="list-style-type: none"> ♦ Ice sheet topography ♦ Sea ice cover, edge and thickness ♦ Snow cover, edge and depth 		<p>Timelines</p>
<p>Gravity and Magnetic Fields</p>	<ul style="list-style-type: none"> ♦ Gravity, Magnetic and Geodynamic measurements 		<p>Timelines</p>



- Currently, CEOS MIM has no dedicated “Applications” tab
 - only “Missions”, “Instruments”, “measurements”
- “Applications” query field gives limited results e.g.
 - Floods: 1 mission, 3 instruments !!!
 - Volcanoes: 3 missions, 3 instruments !!!



.... due to insufficient information attached to individual mission and instrument

CEOS EO HANDBOOK – CATALOGUE OF SATELLITE INSTRUMENTS

Agency: All | Mission Status: Current+Future | Instrument Status: Operational+Future | Type: All | Technology: All | Waveband: All | Display: 10 Results Per Page

Keyword Filtering (max 20 char): Applications: volcano

Instrument	Agency	Missions	Status	Type	Measurements & applications	Technical characteristics
HSRS (FireBIRD 1 (TET-1)) Hot Spot Recognition System (FireBIRD 1 (TET-1))	DLR	Current: FireBIRD 1 (TET-1) Future: - Complete: -	Operational	Imaging multi-spectral radiometers (vis/IR)	Used to collect data regarding high temperature events on Earth's surface, including heat irregularities such as volcanoes, burning ships, industry hotspots, gas flares, chemical heat generation and smouldering fires.	Waveband: Spatial resolution: Swath width: Accuracy: Data Access: Data Format:
L-band SAR (NISAR) L-band Synthetic Aperture Radar (SAR) (NISAR)	NASA (ISRO)	Current: - Future: NISAR Complete: -	Approved	Imaging microwave radars	3-year mission to study solid earth deformation (earthquakes, volcanoes, landslides), changes in ice (glaciers, sea ice) and changes in vegetation biomass	Waveband: Microwave: 1.25 GHz MW, L-Band Spatial resolution: 10m resolution Best resolution: 10 m Swath width: 240 km (12-day repeat and global coverage) Accuracy: TBD Data Access: Open Access Data Format: HDF-5, GeoTIFF
S-band SAR (NISAR) S-band Synthetic Aperture Radar (SAR) (NISAR)	ISRO	Current: - Future: NISAR Complete: -	Approved	Imaging microwave radars	3-year mission to study solid earth deformation (earthquakes, volcanoes, landslides), changes in ice (glaciers, sea ice) and changes in vegetation biomass	Waveband: Microwave: 3.2 GHz MW, S-Band Spatial resolution: 4 - 24m resolution Best resolution: 4 m Swath width: 230 km min Accuracy: TBD Data Access: Open Access Data Format: TBD

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1. WGD disasters to work with CEOS MIM team (ESA, Symbios) to define the improvements to be brought to CEOS MIM to better serve the Disaster Risk Management community (*decision-makers, practitioners, scientists, disaster experts, organisations...*)


- “Applications” tab ? Other ?



- In response to a “Disaster-Query”, results pointing to ..? Datasets, Missions, Instruments, Measurements, other, ?

- Link existing measurement types to Disasters → any instruments tagged with a disasters-related measurement could show up in a listing ?

- Introduce a “disaster categorisation” by Hazard and/or Disaster Project in the MIM database e.g. Floods; Landslides; Seismic Hazards; Volcanoes; Geohazard Supersites; RO and, Wildfires. → query would produce a listing of instruments that are relevant to each ?

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CEOS EO HANDBOOK – MEASUREMENT INSTRUMENTS

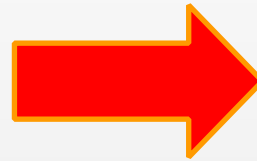
Measurements > Land > Multi-purpose imagery (land) > Land surface imagery

Measurement Definition: Level-1 product (not a geophysical parameter). High-resolution imagery covering wavelengths in the range 0.4-1 µm (cloud-affected) or 1-10 GHz (SAR, all-weather) - Accuracy expressed as Modulation Transfer Function (MTF) at the Nyquist spatial wavelength (twice the resolution). Actually [MTF-1] is used, so that smaller figures correspond to better performance, as usual.

Instrument	Status/Accuracy	Instrument Description	Measurement Technology	Timeline
Advanced MI Advanced Meteorological Imager	Operational	Continuous monitoring capability for the near real-time generation of high-resolution meteorological products and long-term change analysis of sea surface temperature and cloud coverage.	Multi-purpose imaging Vis/IR radiometer	
AEISS Advanced Electronic Image Scanning System	Operational	High resolution imager for land applications of cartography and disaster monitoring.	High resolution optical imager	
AEISS-A Advanced Electronic Image Scanning System-A	Operational	High resolution imager for land applications of cartography and disaster monitoring.	High resolution optical imager	
AGRI Advanced Geosynchronous Radiation Imager	Operational free & open	A multiple channel radiation imager, one of the primary instruments aboard FY-4. Technically featured by a precisely designed two-mirror structure, capable of accurate and flexible sensing in two dimensions, and minute-level fast sector scanning. Frequent Earth imaging over 14 bands with off-axis three reflections of the primary optic system. On-board black body available for IR calibrations at very short time intervals.	Multi-purpose imaging Vis/IR radiometer	
ASTER Advanced Spaceborne Thermal Emission and Reflection Radiometer	Operational free & open	Surface and cloud imaging with high spatial resolution, stereoscopic observation of local topography, cloud heights, volcanic plumes, and generation of local surface digital elevation maps. Surface temperature and emissivity. ASTER SWIR detectors are no longer functioning due to anomalously high SWIR detector temperatures. ASTER SWIR data acquired since April 2008 are not useable, and show saturation of values and severe striping. All attempts to bring the SWIR bands back to life have failed, and no further action is envisioned.	High resolution optical imager	



- *Results could be displayed in Custom Timelines for each of the hazards.*
- *In addition to satellites missions, this information to add links to instrument profiles*



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CUSTOM MEASUREMENT TIMELINES - #

Custom measurement timelines currently need to be generated manually by the MIM Database admin. However, they can be generated, displayed, and the data and image files can be saved using the controls below. The [Export to Excel] and [Save Timeline Image] buttons allow results to be saved locally.

Custom timeline: Low Resolution Optical

Start year: 2021 End year: 2038

Order by: Launch Date Launch Date + Series Launch Date + Series Collapsed

Total records: 9

Generate Timeline Reset Filter Export Data to Excel Save Timeline Image

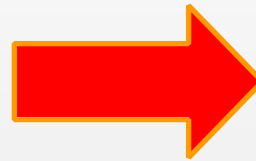
FLOODS

Planned

Instrument	Start Year	End Year
Terra and Aqua (MODIS)	2002	2025
NOAA and MetOp (AVHRR/3)	2002	2025
Suomi NPP (VIIRS)	2011	2025
NOAA and MetOp (AVHRR/3)	2011	2025
Sentinel-3 A (OLCI)	2016	2025
JPSS-1 (VIIRS)	2017	2025
Sentinel-3 B (OLCI)	2018	2025
NOAA and MetOp (AVHRR/3)	2018	2025
JPSS-2 (VIIRS)	2022	2038



- We could also create a 'disasters overview' page similar to the 'measurements overview' page.



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