THE ESSENTIAL CLIMATE VARIABLES (ECV) DATA ACCESS MATRIX
A Quick and Convenient Method to Access Global Climate Datasets

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“Protecting the Past, Revealing the Future.”
The GOSIC Portal can be accessed at: http://GOSIC.ORG
The GOSIC:

• was established in 1997 by the GCOS Joint Data and Information Management Panel (JDIMP)

• was developed at the University of Delaware

• was twice reviewed by independent panels (2001 and 2003)

• has been operational since 2007 at NOAA’s National Climatic Data Center (NCDC) in Asheville, NC
What does GOSIC offer:

• users can find data and information about the GCOS, GOOS and GTOS and subsystems without having to navigate the hundreds of complex and vastly different web sites of the myriad of organizations in these global observing systems

• allows users to determine the type and quality of the data through documentation provided by the participating data centers

• provides access to data and data download regardless of data format
What does GOSIC offer (continued):

• provides quick and user-friendly cross-system access to data and information

• provides a comprehensive inventory of datasets

• links and information are kept up to date and are quality controlled with input from the secretariats and the various World Data Centers
What does GOSIC offer (continued):

• provides documentation of datasets and program elements:
  • Observing Requirements
  • Planning Documents
  • Data Management Plans
  • Publications

• value added products:
  • Data Matrices
  • Data Flow Diagrams
  • GOOS National Summaries

• provides several search mechanisms (e.g., text, matrix-based)
The Essential Climate Variables (ECV) Data Access Matrix:

- **URL:**

- provides access to data, metadata and information for 50 ECVs

- ECVs are required to support the work of the UNFCCC and IPCC

- gives access to authoritative datasets identified by experts developing standards for the ECVs
Atmospheric ECVs (over land, sea and ice)

- **Upper-Air**: Cloud properties, Earth Radiation Budget, Temperature, Water Vapor, Wind Speed and Direction.

- **Composition**: Carbon Dioxide, Methane and other Long-Lived Green House Gases (Nitrous Oxide (N₂O), Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrofluorocarbons (HFCs), Sulphur Hexafluoride (SF₆), and Perfluorocarbons (PFCs)), Ozone, Aerosol Properties, Precursors supporting the Aerosols and Ozone ECVs (NO₂, SO₂, HCHO, CO).

- **Surface**: Pressure, Air Temperature, precipitation, Surface Radiation Budget, Water Vapor, Wind Speed and Direction.
Oceanic ECVs

- **Surface**: Carbon Dioxide Partial Pressure, Current, Ocean Color (for Biological Activity), Sea Ice, Sea Level, Sea State, Sea Surface Salinity (SSS), Sea Surface Temperature (SST), Ocean Acidity, Phytoplankton.

- **Sub-surface**: Temperature, Salinity, Current, Nutrients, Carbon, Ocean Tracers, Phytoplankton, Ocean Acidity, Oxygen.
Terrestrial ECVs

River Discharge (T1), Water Use (T2), Ground Water (T3), Lakes Levels (EVC T4), Snow Cover (T5), Glaciers and Ice Caps (T6), Permafrost and Seasonally-Frozen Ground (T7), Albedo (T8), Land Cover (including Vegetation Type) (T9), Fraction of Absorbed Photosynthetically Active Radiation (FAPAR) (T10), Leaf Area Index (LAI) (T11), Above Ground Biomass (T12), Fire disturbance (T13), Soil moisture, Ice Sheets, Soil Carbon.
# GCOS Essential Climate Variables (ECV) Data & Information Access Matrix

The ECV Data Access Matrix provides easy access to data download, metadata and information for each of the ECVs. Data access has been divided into 2 categories: 1) Earth Observation and 2) Satellite. The selection of the data sets are based on information from Scientific Steering Committee reports and the supporting documentation they provide and publish such as the recent WMO-TDC release "Implementation Plan for the Global Observing Systems for Climate in Support of the UNFCCC, August Update 2018 (GOOS, GTOS, 2018)."

The Essential Climate Variables (ECVs) are required to support the work of the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC). All ECVs are technically and economically feasible for systematic observation. It is these variables for which international exchange is required for both current and historical observations. It is emphasized that the ordering within the table is simply for convenience and is not an indicator of relative priority. Currently, there are 50 ECVs. (More About the ECV Matrix)

Please note that this matrix is in development. If you would like to contribute data sets please contact gosic@noaa.gov

**ECV Matrix Main Page | About the ECV Matrix | Main Reference Document | Contact Information | Updated February 16, 2019**

<table>
<thead>
<tr>
<th>ATMOSPHERIC (over Land, Sea &amp; Ice)</th>
<th>OCEANIC</th>
<th>TERRESTRIAL (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface [T]</td>
<td>Surface [T]</td>
<td>Bulk Discharge (ECV T7)</td>
</tr>
<tr>
<td>Pressure</td>
<td>Carbon Dioxide Partial Pressure</td>
<td>Water Ice (ECV T2)</td>
</tr>
<tr>
<td>Air Temperature***</td>
<td>Current</td>
<td>Ground Water (ECV T3)</td>
</tr>
<tr>
<td>Precipitation</td>
<td>Ocean Activity</td>
<td>Lakes (ECV T8)****</td>
</tr>
<tr>
<td>Surface Radiative Budget</td>
<td>Ocean Color (for Biological Activity)</td>
<td>Snow Cover (ECV T9)***</td>
</tr>
<tr>
<td>Water Vapor</td>
<td>Photosynthesis</td>
<td>Glacier and Ice Caps (ECV T9)****</td>
</tr>
<tr>
<td>Wind Speed and Direction</td>
<td>Sea Ice</td>
<td>Polynya (ECV T7)</td>
</tr>
<tr>
<td>Upper Air [T]</td>
<td>Sea Level***</td>
<td>Atlantic (ECV T6)</td>
</tr>
<tr>
<td>Cloud Properties</td>
<td>Sea State</td>
<td>Land Cover (including Vegetation Type) (ECV T9)</td>
</tr>
<tr>
<td>Earth Radiation Budget (including Solar Irradiance)*******</td>
<td>Sea Surface Salinity (SSS)</td>
<td>Long-term Absorption/Photoproduction Active Radiation (RAPAR) (ECV T11)</td>
</tr>
<tr>
<td>Temperature</td>
<td>Sea Surface Temperature (SST)</td>
<td>Leaf Area Index (LAI) (ECV T11)</td>
</tr>
<tr>
<td>Water Vapor</td>
<td>Sub-Surface</td>
<td>Above Ground Biomass (ECV T12)</td>
</tr>
<tr>
<td>Wind Speed and Direction</td>
<td>Carbon</td>
<td>Fire Disturbance (ECV T13)</td>
</tr>
<tr>
<td>Composition</td>
<td>Current</td>
<td>Soil Moisture</td>
</tr>
<tr>
<td>Aerosol Properties</td>
<td>Rubblestone</td>
<td>Salt Carbon</td>
</tr>
<tr>
<td>Carbon Dioxide***</td>
<td>Ocean Activity</td>
<td>Sea Shells</td>
</tr>
<tr>
<td>Methane and other Long-Lived Green House Gases [T]***</td>
<td>Oxygen</td>
<td></td>
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<tr>
<td>Ozone</td>
<td>Salinity</td>
<td></td>
</tr>
<tr>
<td>Processes supporting the Aerosols and Ozone ECV [T]**</td>
<td>Temperature</td>
<td></td>
</tr>
<tr>
<td>Trace gas</td>
<td>Tracers</td>
<td>Global Ocean Heat Content****</td>
</tr>
</tbody>
</table>

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* Added or modified per Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC - August 2018, GOOS-138 (GOOS-138, GTOS-76, WMO-TDC No. 552]), page 71 [inf]
** Not an official GCOS ECV

*** Holds data sets that are used in the NOAA Climate Services Portal, Global Climate Dashboard, Climate Change tab. Please note that the Dashboard is in development. To access the Climate Portal and the Dashboard go to [http://www.climate.gov](http://www.climate.gov) [Database data access]

[1] The ‘Other long-lived greenhouse gases’ ECV includes Nitrous Oxide (N2O), Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrofluorocarbons (HFCs), Sulphur hexafluoride (SF6), and Perfluorocarbons (PFCs).
**GCOS Atmospheric Surface ECV**

**Pressure**

* (over Land, Sea and Ice)

- Definition
- Introduction
- Atmospheric Surface Domain ECVs
- Contributing Networks & Status
- Observations over Land and Ocean

**News:** The NOAA/NCC Climate Analysis Branch is pleased to announce the release of the Global Historical Climatology Network - Monthly (GHCNM) version 3.0 (beta). The public is encouraged to provide feedback during this beta phase to help improve and enhance the database. To direct questions, comments, or feedback, specific to the GHCNM please e-mail at NCC_Climates@noaa.gov. See below for more information.

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### Data, Product, Metadata and Information Access

<table>
<thead>
<tr>
<th>Non-Satellite or In-situ</th>
<th>Satellite</th>
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<tbody>
<tr>
<td>GCOS Surface Network (GSN) Monthly Data (GSONMH) (NOAA/NCC) is a global network of approximately 2,000 stations selected from the network of many thousands of existing meteorological stations. The GSN is intended to comprise the best possible set of land stations with a spacing of 2.5 to 5 degrees of latitude, thereby allowing coarse-mesh horizontal analysis for some basic parameters. These data are archived at NCDC, after QC of the GSN, temperature and precipitation data have been completed in general about 2 months after the end of the observation month (see GCOSM data sets below (data access) (metadata) (data documentation) (program information) learned).</td>
<td>GCOS Surface Network (GSN) Monitoring Centre Monthly Data (GSONMH) (GCD) is intended to provide access to the GSN data, at an earlier stage. &quot;GSONMH&quot; data set is provided as soon as it becomes available (about 23 of the following month). This data set is made by a QC in the table (less data access below and does NOT include any information about data quality). The quality flags included are all set by default to &quot;F&quot;. The final GSONMH data set, marked as &quot;F&quot; is sent on a monthly basis to the WMO for Meteorology in Asheville, NC, USA, after the QC of the GSONMH temperature and precipitation data has been completed (in general about 2 months after the end of the observation month). See the GSONMH data set above. The GSN is a global network of approximately 2,000 stations selected from the network of many thousands of existing meteorological stations. The GSN is intended to comprise the best possible set of land stations with a spacing of 2.5 to 5 degrees of latitude, thereby allowing coarse-mesh horizontal analysis for some basic parameters. (data access) (products) (metadata) (data documentation) (program information) learned).</td>
</tr>
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</table>
The GOSIC Portal is providing ECV data links for the Climate Dashboard.

The Climate Services Portal can be accessed at:
http://www.climate.gov
Global Climate Dashboard

News

75 Percent of Coral Reefs Under Threat: New Analysis Released by the World Resources Institute

Tuesday, April 25, 2011

Sixty-five percent of the world’s coral reefs are currently threatened by local and global pressures, according to a comprehensive analysis released by the World Resources Institute, along with the Nature Conservancy, the WorldFish Center, the International Coral Reef Action Network, Global Coral Reef Monitoring Network, the UNEP World Conservation Monitoring Center, and a network of more than 25 partner organizations, including NOAA.

Inspector General’s Review of Stolen Emails Confirms No Evidence of Wrong-Doing by NOAA Climate Scientists

Tuesday, April 26, 2011

Report is the latest independent analysis to clear climate scientists of allegations of mishandling of climate information.

‘Reefs at Risk: Global Threats Require Global Action’ (Opening Keynote Address)

Tuesday, April 26, 2011

On behalf of Commerce Secretary Gary Locke and the 12,800 employees of NOAA, it is my pleasure to stand with the World Resources Institute and partners to launch ‘Reefs at Risk Revisited’. With this important report, WRI continues its trend of using expert knowledge to inform, inspire, empower action, and implement transformative solutions that address global environmental challenges.

Climate Projections Show Human Health Impacts Possible Within 30 Years

Friday, February 18, 2011

A panel of scientists speaking today at the annual meeting of the American Association for the Advancement of Science (AAAS) unveiled new research and models demonstrating how climate change could increase exposure and risk of human illnesses originating from ocean, coastal and Great Lakes ecosystems, with some studies projecting impacts to be felt within 30 years.
The unique value that the GOSIC offers its users is the ability to search, using a variety of tools, and quickly link users to a wide range of downloadable datasets that reside at multiple data centers around the world via a consistent and user friendly interface.

The newly developed ECV Matrix provides another data access tool that allows users to search for datasets based on the 50 ECVs. Users can efficiently view all of the ECVs by domain (atmosphere, ocean and land), and with the fewest number of clicks access individual web pages for each of the ECVs listing trusted data sets with links to data download, metadata, and other relevant information.
A Comprehensive Data Portal for Global Climate Information

The Global Observing Systems Information Center (GOSIC), initiated in 1997 at the request of the Global Climate Observing System (GCOS) Steering Committee (see http://www.wmo.int/pages/prog/gcos/Publications/gcos-311.pdf), responds to a need identified by the global climate observing community for easier and more effective access to observational climate data and information. GOSIC manages an online portal providing an entry point for users of climate-related global observing systems data and information systems.

Following its initial development and implementation at the University of Delaware from 1997 to 2006, the U.S. National Oceanic and Atmospheric Administration, U.S. Department of Commerce, joined other participating institutions and sponsored GOSIC's continued development. This portal represents a comprehensive data services approach that is supported by multiple observing systems and that provides a robust metadata infrastructure.

The Global Climate Observing System (GCOS) is an international initiative that promotes the standardization of climate observing systems, which comprise coastal, oceanic, atmospheric, land, and cryospheric observing systems that together form the global climate observing system (GCOS). By serving as the data portal to GCOS, GOSIC provides a single point of access to all of the major observing systems and their data.

Improving Stream Studies With a Small-Footprint Green Lidar

Technology is changing how scientists and natural resource managers describe and study streams and rivers. A new generation of airborne aquatic-terrestrial lidar is being developed that can penetrate water and map the submerged topography inside a stream as well as the adjacent subaerial terrain and vegetation in one integrated mission. A leading example of these new cross-environment instruments is the Experimental Advanced Airborne Research Lidar (EAARL), a NASA-built sensor now operated by the U.S. Geological Survey (USGS) [Wright and Brock, 2002]. Standard airborne terrestrial lidars, which currently produce the highest-resolution maps of extensive land areas, are reflected but these may require some local calibration [Frazier et al., 2008; Goos, 2009]. EAARL offers an unusual combination of attributes: aquatic and terrestrial mapping at up to watershed scales (hundreds of kilometers of channel length), done with relatively high precision, accuracy, and spatial resolution [Konzel et al., 2007; McKean et al., 2008].

**EAARL Performance and Applications**

One test of the performance of EAARL is how well it maps in-channel topographic forms relative to traditional wading surveys. For example, does the EAARL accurately define the location and extent of a stream's sinuosity?
The GOSIC staff invites persons to become actively involved in the site by providing us feedback and additional datasets at <gosic@noaa.gov>; the staff is quite responsive and their goal is to provide the easiest and most convenient access to global climate observing datasets from the atmospheric, oceanic, & terrestrial observing domains.