

EO for water quality monitoring – the global perspective and future opportunities

The GEO AquaWatch Initiative

Steven Greb, Director

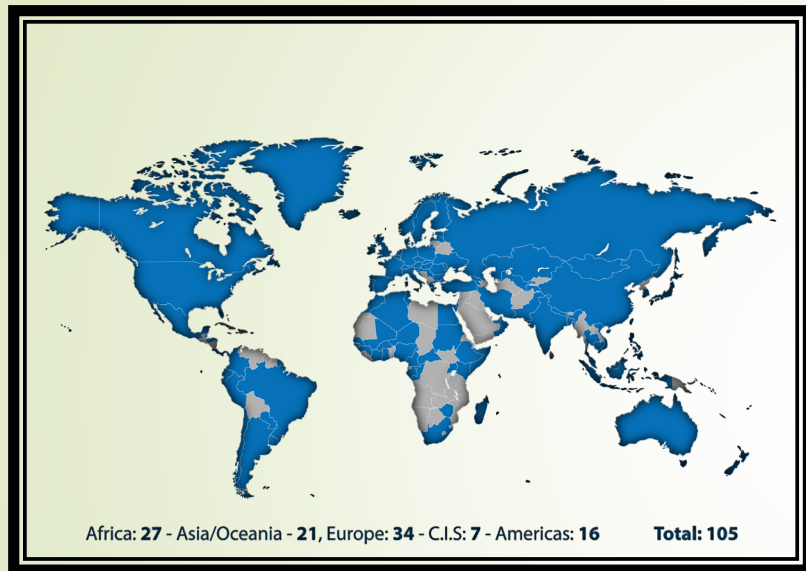
**Using Earth Observation for
Water Quality Monitoring**

13-14th October, 2020



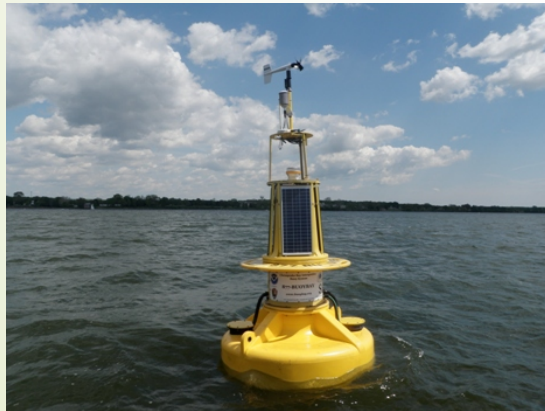
Group on Earth Observation

GEO is an intergovernmental organization working to improve the availability, access and use of Earth observations for the benefit of society



GEO AquaWatch Goal

AquaWatch aims to develop and build the global capacity and utility of Earth Observation-derived water quality data, products and information to support water resources management and decision making.



Chesapeake Bay Buoy – NOAA Image



Lakes Mendota & Monona -University of Wisconsin SSEC image

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The AquaWatch Impetus

- Clean water is critical for human and ecosystem health
- Important to livelihood security and economic growth
- Waterborne diseases remain one of the most significant threats to human health worldwide- WHO estimates 1.7 million human deaths a year
- Water quality status in developing countries is highly variable, reflects social, economic and physical factors, as well as development pressures
- Monitoring is the critical first step for proper management. Monitoring makes management transparent and sustainable
- Many regions of the world lack needed resources for systematic monitoring



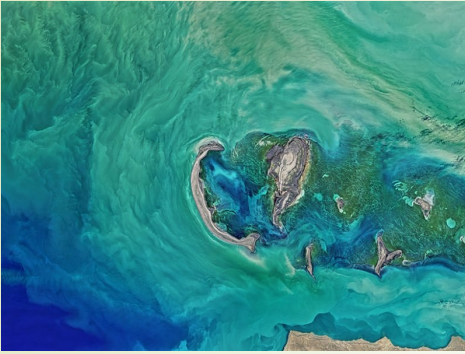
UN Environmental Program photo



US EPA Photo



Photo by REUTERS/Stringer



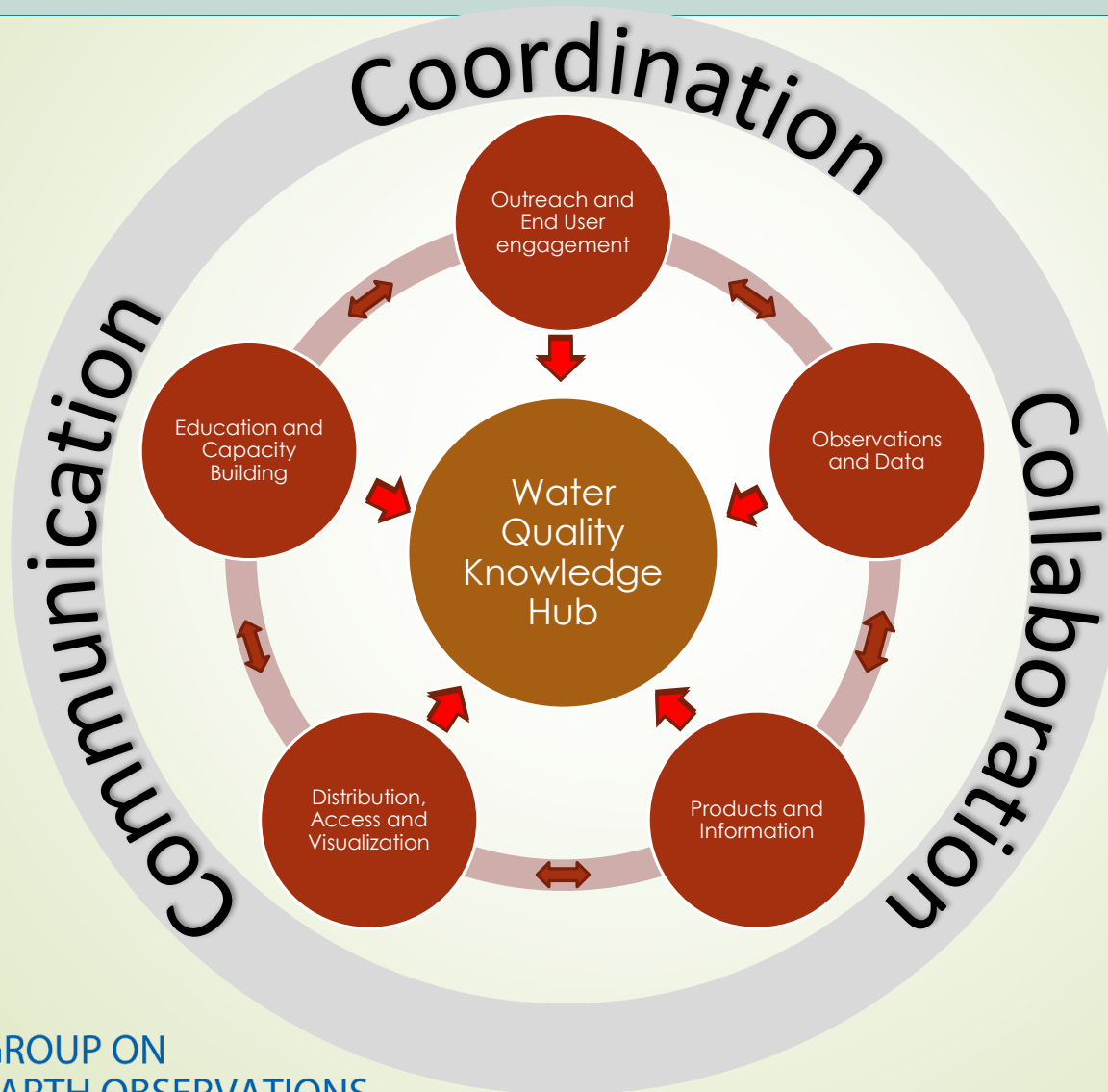
Credit: Norman Kuring, [NASA](#)

- New and improved sensor technologies, novel algorithm development, and image availability and processing capabilities have resulted in major advancements in remote sensing of coastal and inland waters
- Satellite imagery is also not restricted by political borders
- Useful for monitoring data gaps, previously under-sampled and hard-to-access areas, which are particularly severe in several low PPP countries.



ESA's satellite Sentinel-3 Photo: ESA

AquaWatch Organizational Model



Current AquaWatch Activities

To Strengthen Confidence in EO Water Quality Data

Aquatic Analysis Ready Data

Compiling Existing Data Sets (RealEarth Portal)

Generating New Data Sets (Google Earth Engine)

Coordination of Global Validation Efforts

Development of Knowledge Hub



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Analysis Ready Data satellite data that have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort and interoperability both through time and with other datasets.

Increases the use and impact of satellite data and removes the data preparation burden for less experienced data users

Promotes data quality and consistency through defined specifications

Enables improved interoperability due to consistent specifications across different datasets and time

An Aquatic ARD product for Landsat and Sentinel-2 will help the user community (SDG 6) and improve the science products.

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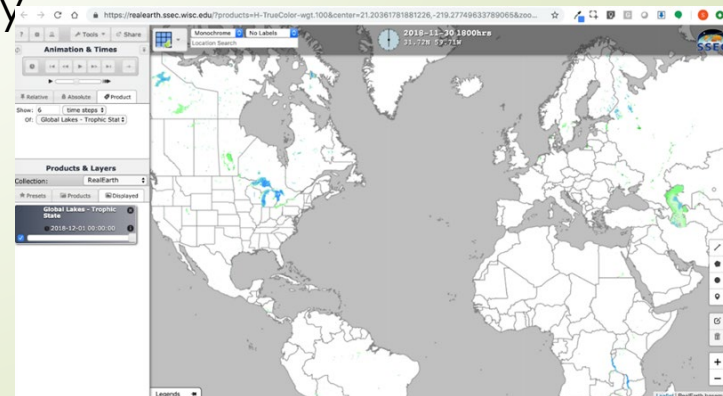
Compiling Existing Data Sets (RealEarth Portal)

Generating New Data Sets (Google Earth Engine)

Coordination of Global Validation Efforts

Development of Knowledge Hub

- Bring together data of varying file formats, naming conventions, and columns, and transforming it into one cohesive data set
- Grab samples, buoy data, satellite products
- Visual display, time series, scroll across sources for data comparison
- Embedded in AquaWatch Website and linked to GEOSS
- Updated hourly



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Development of Global Water Quality Geospatial Products and Tools

A collaborative project between GEO AquaWatch, the World Bank, Conservation International, UNESCO and Google Earth Engine

The goal of this project is to provide a global-scale, open access, freely available fit-for-purpose chlorophyll-a, total suspended solids and colored dissolved organic matter (CDOM) water quality information for inland and coastal waters to be used by multiple end users including the science community, water resource managers, industry and the general public.



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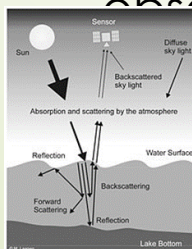
Development of Knowledge Hub

Workshop on the Validation of Satellite-derived Optical and Water Quality Parameters for Coastal and Inland Waters

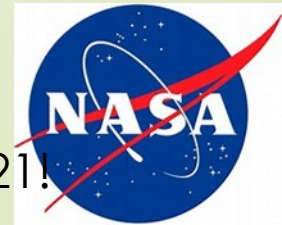
Goal: To build a global-scale validation network

The workshop will cover a number of aspects related to validation including standardization of protocols, instrumentation needs, current validation research and operational efforts, validation metrics, interoperability of validation data.

Experts within both the remote sensing and in situ observational community



Tentatively Set for June 2021!



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Development of Knowledge Hub

- Capacity Building and Training Effort
- A web-based resource where a compilation of documentation and tools are accessible and freely open to all in the water community.
- This will be a place where people from around the globe, working across this subject matter, go to exchange knowledge, experiences, ideas, and increase one's expertise.
- Seeking Funding

Fair Standards

Findable
Accessible
Interoperable
Reusable

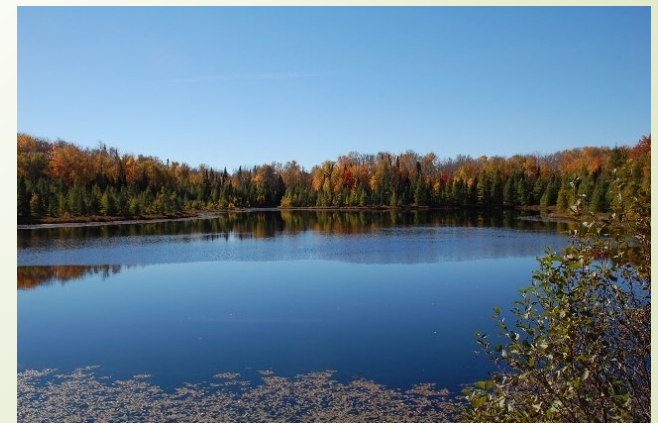
Resource types	Sources
Publications	Post-prints with DOI stored
Code, models and tools	Open source in Github with DOI. Backups.
Remote sensing data	GEOSS Platform and/or Cloud descriptions
In situ data	GEOSS Platform, Data Repository, and/or KH database
Results and products	GEOSS Platform, Data Repository, and/or KH database
Videos, Other	Directly stored in the Knowledge Hub (preferably)

Summary

- Water Quality continues to be a critical issue globally
- Multiple streams of Water Quality data products generated on a daily basis.
- GEO AquaWatch is providing an important platform and forum at a critical time to address these data quality needs
- GEO AquaWatch involved in many activities in support of developing a Water Quality Information Service



Yahara River, WI. Credits: S. Greb/U. Wisconsin



WDNR photo

Contact Information

If interested in joining a working group or getting involved in AquaWatch, please contact the AquaWatch Secretariat (Merrie-Beth Neely) at info@aquawatch.org

Or contact Steven Greb, AquaWatch Director at the University of Wisconsin at srgreb@wisc.edu

Visit our website : www.geoaquawatch.org