



The Challenges and Opportunities of Analysis Ready Data For EO-Based Global Water Quality Monitoring and Assessment

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What is Analysis Ready Data?

Analysis Ready Data (ARD) from EO has many interpretations. An ARD product is generated from raw data and processed so that it can be used without the need for further processing to be applied by users.

In the context of water quality, we define it as the systematic radiometric, atmospherically, geometrically and spatially corrected full archive EO data sets of normalised water leaving radiance or reflectance. For land and oceans similar discussions are taking place (through various CEOS and GEO initiatives). The products that can be derived from this ARD data through the application of EO algorithms such as concentrations of chlorophyll, cyanobacteria, suspended matter, coloured dissolved organic matter, and values of Secchi Disk transparency, vertical attenuation of light and turbidity are "Interpretation Ready Data" (IRD). A possible next step could be interpreted data such as assessment of eutrophication or smothering of seagrass.

AquaWatch ARD Community Discussion

May 20, 2020

5-6pm EDT, 9-10pm GMT, 7-8am Sydney (21st)

<https://meeting.zoho.com/join?key=106333305>

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Why do we need to discuss ARD data for water quality?

Because there are several providers demonstrating and implementing ARD data from the same EO data sources (e.g. Landsat 8 and Sentinel-2) using differing ARD approaches and different algorithms. This will lead to situations where e.g. a US, European and an Asian provider of ARD data all provide lake water quality data over the same lake in e.g. Africa for the same EO image with different water quality concentrations or values. These variations may be due to variations in ARD processing as well as algorithms applied. In this discussion we limit ourselves to ARD aspects only. This is also an essential step before comparing effectiveness of algorithms as that will only be possible if we have consistency in ARD data. Aspects related to ARD are interoperability leading to harmonised and fused products.

What is the role of AquaWatch in this activity?

GEO AquaWatch can offer to help a proposed CEOS framework (The CEOS Earth Analytics Interoperability Lab Proposal to WGISS) in which we can compare the ARD approaches. This comparison will be about e.g. developing a CARD4L like CARD4W approach in which 1) definitions are established for all criteria, operations, functions that are applied to TOA EO data and 2) will then allow the various ARD approaches to be compared in every step they perform to produce ARD data over inland waters.

Why would we want to do this?

We want to avoid End Users (from scientific through to governmental through to industrial) being exposed to water quality information products from different ARD approaches for their water body that potentially produce significantly different results. By comparing the ARD data approaches and comparing the ARD products over the same location with the same core EO data we can begin to understand why ARD data looks similar or different. That knowledge is essential to go to the next step which is to compare algorithms for translating ARD data to water quality variables. Key will be access to proper calibration/validation data for some of these water bodies.

What's next?

GEO AquaWatch will hold a community discussion on May 20th, 2020 to initiate a thorough discussion on how to approach this issue globally for water quality. Several providers of ARD data will be asked to present their methods and solutions. CEOS experts will participate in the ensuing discussions how we can progress this necessary and complex area of development in EO of water quality to enhance the chances of providing a global assessment of water quality using EO.