Poster Abstracts

Poster 1: Withdrawn

Poster 2: Alice Fabretto, Early Career, March 22nd Poster Session IIb

Using of new generation PRISMA and DESIS data for water quality mapping in PrimeWater project study areas

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Global climate change is increasingly affecting marine and freshwater ecosystems, food security, economies and culture, as reported in the IPCC 2022 report. In this context, there is an expanding use of modern technologies to implement monitoring activities to preserve aquatic and terrestrial ecosystems. Particularly, the aim of this study is to highlight the capabilities of PRISMA and DESIS hyperspectral sensors, in the four study areas included in the EU H2020 PrimeWater project: Lake Mulargia (IT), Lake Hume (AU), Lake Harsha (US) and Western Treatment Plant (WTP) Melbourne (AU). PRISMA and DESIS sensors, with hundreds of narrow contiguous bands and a spatial resolution of 30 metres, allow the presence of different constituents within a waterbody to be investigated. After assessing the accuracy of PRISMA and DESIS data by comparison with in-situ measurements, water quality maps were generated, including aquatic vegetation for a specific case, and a chromaticity analysis was performed for WTP site. For the generation of water quality maps in terms of Chlorophyll-a and Total Suspended Matter, it was run the bio-optical model "BOMBER", which is already widely validated for aquatic applications; instead, aquatic vegetation maps were generated by applying semi-empirical band-ratios algorithms. Finally, chromaticity analysis, which provided as output the dominant wavelength divided into water colour categories using the Forel-Ule scale, was performed with the aim to generate water colour maps. The results obtained from PRISMA and DESIS data showed that hyperspectral sensors can be used in synergy with the well-established multispectral sensors (e.g., Sentinel-2 and Landsat 8) as they provide a significant improvement in quantitative value-added products reflecting the state and the changes of various terrestrial and aquatic ecosystems.

Poster 3: Merrie Beth Neely, Poster Session IIIb

Introduction to CEOS COAST

Merrie Beth Neely*, Global Science and Technology (GST), Paul DiGiacomo, National Oceanic and Atmospheric Administration (NOAA); Raj Kumar, Indian Space Research Organisation (ISRO; Emily Smail, GEO Blue Planet, Steve Greb, GEO AquaWatch; Rashmi Sharma, ISRO; Steven Sagar, Geoscience Australia; Nicole Bartlett, NOAA; Prasanjit Dash, NOAA; Sean Helfrich, NOAA; Guangming Zheng, NOAA; Nikolay Nezlin, NOAA, and Rachel Lazzaro, GST.

The Committee on Earth Observation Satellites (CEOS) formed an Ad Hoc Team in 2019 to coordinate the focus of space agency resources on providing information solutions to coastal issues impacting society. The name of the Ad Hoc Team is Coastal Observations Applications Services and Tools, or CEOS COAST. In June 2021, COAST was endorsed by the Intergovernmental Oceanographic Commission as a United Nations Ocean Decade Contribution.

One goal of COAST is to help CEOS leverage it's Earth Analytics Interoperability Laboratory (EAIL)- a datacube environment for analysis ready data in the cloud - to foster collaboration and common dataset usage among space agencies who are members of the COAST. This approach eliminates siloed land or ocean work and leverages the multi-agency multidisciplinary SMExpertise within CEOS. Regional stakeholders are to be engaged in the co-design/co-development process as well - to ensure user needs are met.

Two pilots were selected for data product development or improvements: Land Impacts to Sea and Sea Impacts to Land. Within those two pilots 5 thematic areas were selected for the initial work 2019-2022: Coastal/Inland Flooding, Coastline mapping, Bathymetry, Coastal Eutrophication and Coastal Sediments/Turbidity. Results from this work to date will be presented for these 5 thematic areas for selected high-impact geographical areas. Stakeholder engagement workshops are planned for 2022 to move products and information to the next level and to integrate the products in the EAIL for user access and through a user interface we call a Knowledge Hub.

Poster 4: Kelly Luis, Early Career, Poster Session IIc, March 22nd

GEO AquaWatch - Google Earth Engine Update

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Abstract:
The goal of this project is to provide a global-scale, open access, freely available fit-for-purpose weekly chlorophyll-a, total suspended solids, and colored dissolved organic matter 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. The team is currently focused on testing atmospheric correction methods and implementing a total suspended solids model within Google Earth Engine.

Poster 5: Anna Spinosa, Student, Poster Session IIIa, March 23rd

Deriving chlorophyll-a concentration from Sentinel-2 data using Gaussian Process Regression

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The derivation of water quality parameters like the chlorophyll-a concentration for monitoring oceans and coastal areas is of extreme importance, especially in coastal areas, since most of the economic activities are here located. Passive remote sensing (RS) has proven unique capabilities to obtain large scale understanding and monitoring of the Earth system at relatively high temporal frequencies and support water quality parameters derivation. Increasingly higher resolution satellite data are becoming available, especially for terrestrial environment monitoring. Therefore, higher resolution products often need to be optimized for aquatic environment. To this end, a large amount of in situ measurements is required to calibrate the state-of-art algorithms, as neural networks models. To deal with the lack of in situ measurements, we propose the Gaussian Process Regression (GPR) for chlorophyll-a estimation. Sentinel-2 and in situ data of chlorophyll-a are used as input. GPR shows promising results,

even with a limited number of in situ data, both in terms of accuracy and chlorophyll-a maps are made for different areas and depths. Moreover, GPR thanks to its Bayesian framework, also provides uncertainty quantification

Keywords: Gaussian process regression (GPR); chlorophyll-a; satellite data; covariance functions