Questions & Answers Session 1

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Sherry Palacios (sherry.palacios@gmail.com) or Amita Mehta (amita.v.mehta@nasa.gov).

Question 1: With windows SeaDAS installer, how can you activate OCSSW remote server?
Answer 1: We refer you to the instructions on the SeaDAS-OCSSW Client Server Configuration page https://seadas.gsfc.nasa.gov/client_server/ This method assumes that you have access to a Linux or UNIX machine that this method can link to for using the OCSSW processors

Question 2: I tried to install OCSSW on windows 7 but it gives server error. I try to apply the instructions provided on SeaDAS website but unfortunately, I cannot do it. I want to ask if there is availability to present video instructions during this webina r or future webinars.
Answer 2: in today's webinar, we will not be providing video instructions for the installation. We refer the participant to the installation instructions website (https://s eadas.gsfc.nasa.gov/client_server/) for details about the client - server configuration to use the OCSSW processors.

Question 3: How suspended dust in the air effect open waters quality? What are different satellites to detect this phenomenon? I mean the interaction of dust with open waters.
Answer 3: It is possible to observe dust in the atmosphere using a number of satellite sensors and methods. For dust still in the atmosphere, Aerosol Optical Thickness (AOT) is one measure of small particles in the atmosphere and can be sensed using MODIS, it is also possible to detect particles in the atmospheric column using active sensing technology such as lidar on CALIPSO. These are not the only satellite sensors, but the ones commonly used for this purpose - to observe the phenomenon of dust in the atmosphere. (ARSET covers AOT and CALIPSO in a number of our air quality trainings: https://arset.gsfc.nasa.gov/airquality/webinars)

Dust often contains the macronutrient Phosphorus and other trace metals, which limit phytoplankton growth. When dust settles and mixes into the open ocean waters, these nutrients become bio-available. For the metals, via reactions with organic compounds named ligands, released into the water by bacteria. These reduced metal-ligand complexes are used by eutrophic phytoplankton as a nutrient source. So, in regions such as the north Atlantic, dust is an important source of nutrients for phytoplankton blooms.

Question 4: Regarding Sentinel 3 B: Is it working yet? I hear the revisit time now is better, is that true?
Answer 4: Sentinel 3B OLCI is working, but with periodic downtimes. It is true that OLCI now has a more frequent re-visit rate than the originally published 27 days. The revisit rate is now every 1-2 days globally. For more information, the reader is referred to this link:
https://sentinel.esa.int/web/sentinel/user -guides/sentinel-3-olci/coverage

Question 5: Does the sensor capture only the water parameters, while the reflectance from the rocks in the water areas is ignored?
Answer 5: The sensor captures the top of atmosphere radiance for the entire field of view. Processing steps can selectively remove pixels based on information such as land masks, cloud masks, data product failure, particular thresholds set in the data processing scheme, etc. If the rocks are emergent, and large enough for the pixel size, then processing may flag the pixel(s) as land, and when using SeaDAS, land pixels are typically flagged and removed and set as 'no data.'

Question 6: Is there a safe sun glint removal method?
Answer 6: There are a number of methods used for sun glint removal. One commonly adopted by the aquatic remote sensing community is the one developed by:
Hedley, JD, AR Harborne, and PJ Mumby. 2005. Technical Note: Simple and robust removal of sun glint for mapping shallow-water benthos. International Journal of Remote Sensing. Vol 26, No. 10, p. 2107 - 2112

Question 7: Will there be case studies covered in the series where the freshwater body bottom can be seen? (shallow water bodies) such as Lake Abitibi in Ontario/Quebec?

This 930 km^2 lake has an average depth of only 3m, and appears different that surrounding lakes when viewed from Landsat.

Answer 7: Yes, our guest speaker Dr. Daniela Gurlin with talk about her work looking at water clarity in shallow water lakes. We will be using data from her work during Part 3. We are very grateful to Dr. Gurlin for sharing her work and data with us.

Question 8: It is evident that there exists a trade-off between parameters while selecting suitable satellite data. Then what would be the basis for selection of satellite data for different water bodies for example, Indian Ocean and Arctic Ocean?

Answer 8: This is how I (Sherry) would go about addressing this, because the answer is really determined on each individual's need.

First, what data products am I interested in understanding? The spectral resolution of your sensor drives which data products are possible to be derived from the surface reflectance data. Let's say it is the commonly used chlorophyll-a concentration (chl-a).

Next, I'd ask how dynamic is the water and the change in chl-a over a particular period? Where I live near Monterey Bay, California, USA, phytoplankton respond on a 5-7 day time scale. So, in my case, I'd want a sensor that can capture that change. Daily or almost-daily overpasses would work for me. The next issue related to temporal scale is how cloudy is my region? How likely am I to get an image of the surface on any given day? If you have a cloudy region, you might want a sensor with frequent overpasses so your likelihood of getting data increases.

The third parameter I'd consider is what kind of spatial scale do I need to consider for the processes I'm trying to observe. For my work, I'm mostly interested in sub-mesoscale processes (10's of kilometers), but that may be too coarse for other oceanographic processes. For me, MODIS is an appropriate sensor because it has the spectral, temporal, spatial, and radiometric resolution that I need. You would need to assess your needs (like I did above) to determine which sensor would be best for you.

A comment for you on satellite observations near the equator - Some of the polar orbiting sensors do not make daily overpasses, there are gaps from one day to the next. Be sure to check on the overpass predictor to determine if you would really get the revisit rate that you need.

Overpass predictor: https://oceandata.sci.gsfc.nasa.gov/cgi/overpass_pred

Easily viewing data quickly: https://worldview.earthdata.nasa.gov/

You need to be able to have 3 pixels in any direction for the resolution you're looking at. For MODIS, you need 3 pixels across with no mixed pixels. For Landsat, if you're looking at 30m pixels, your body of water can be smaller, but Landsat's revisit is 16 days, and that may or may not be the temporal range you're looking for.

Question 9: Where can I find a time schedule for when the satellite flies over the water body I'm evaluating? How do we gain access to the satellite imagery for a given satellite?
Answer 9: Schedule: We look at a website in Part 3 that finds satellite overpass times, for certain satellites used for aquatic remote sensing. For a sneak peak, here is the link https://oceandata.sci.gsfc.nasa.gov/cgi/overpass_pred

Data Access: We talk about data access using the Level 1 & 2 browser during today's demo and exercise. This accesses MODIS, VIIRS, OLCI sensors, and a few others, but not Landsat data. We also point you to USGS's Earth Explorer for access to Landsat 8 data.

Question 10: What is the smallest size of river or lake appropriate for Remote sensing for WQ?
Answer 10: We generally apply the 3-pixel rule for assessing spatial resolution for the body of water size. If the body of water is large enough to fill 3 pixels in all directions, then it is large enough. So, for Landsat 8 with 30 m/pixel size, this would mean a body of water that is at minimum 90 m wide in all directions (with no mixed pixels in these 3 - across). We touch on this in Part 3.

Question 11 : Is there any radar data is available for water quality monitoring? Any active remote sensor data?
Answer 11 : Active sensors such as radar and lidar are used for water quantity (radar) and to estimate some parameters that can be linked to water quality (marine lidar). Synthetic Aperture Radar (SAR) has been used for oil spill detection (More information in our 2016 Disasters Sample training: https://arset.gsfc.nasa.gov/disasters/webinars/disaster-overview-2016). Typically SAR is used for water quantity, but it can be used for oil slicks.

Marine lidar is gaining popularity in estimating particle load and size distribution in aquatic systems. NASA has a number of satellite and airborne lidar sensors that are employed for atmospheric observations and it may be possible to use these for aquatic applications as well. The use of active sensors such as radar and lidar are still in the research stage, and not widely used for operational water quality monitoring. There are also some multispectral lidar approaches used to get at optically active pigments in the particles to get at phytoplankton functional type (PFT) descrimination. We are not aware of operational efforts - it's used more for water quantity than water quality.

Question 12 : If I want to calibrate the SeaDAS output with the field level data, What will be the procedure? is it possible to extract the pixel value of different locations in SeaDAS?
Answer 12 : We are really excited that this question is being asked as it means you will be ready for our demonstrations and exercises in Part 3 where Dr. Amita Mehta will cover this skill.

Question 13 : Any suggestions if during Exercise 1, I got error reprojecting : "A problem occurred during processing the target product. Type: OperatorException, Message: Cannot construct DataBuffer"?
Answer 13 : I had this problem too. I fixed it by closing other applications so that SeaDAS was the only thing I was running at the time so that I would have the memory space to run it. If this does not solve the problem, it may mean that the computer you are using may not have the memory to run this operation. It is possible to re -order the steps in this exercise to crop the image prio r to reprojection in order to avoid this DataBuffer problem.

Question 14 : Can reprojecting be made at the beginning? or has to be made after all processing?
Answer 14 : It can be done at the beginning.

Question 15 : Is it possible to export to work with Ar cGIS?
Answer 15 : It is possible in SeaDAS to export an image as a GeoTIFF and then open that in ArcGIS. We refer the questioner to these links for further information
https://seadas.gsfc.nasa.gov/help/beam -geotiff/ExportGeoTIFF.html
https://oceancolor.gsfc.nasa.gov/forum/oceancolor/topic_show.pl?tid=6553

Question 16 : Is it possible to find the amount of toxic matters in the water bodies using qgis swat analysis?
Answer 16 : It is not possible to directly sense toxins in the water using remote sensing. It is possible to incorporate remote sensing observations into a larger modeling effort using hydrological models like SWAT.

Question 17 : While I know a lot of ocean plastics are microscopic, do you know if there are any applications of using remote sensing to calculate plastic concentrations?
Answer 17 : There are a number of research programs currently underway to detect microplastics in the marine environment. These are at the research level, and not yet at the operational level. Plastics can sit at the surface or be within the water column. They are made of hydrocarbons which have distinct spectral signatures. A brief literature review for this question shows projects that use synthetic aperture radar (SAR) to detect surface plastics, projects that use hyperspectral imagery to detect hydrocarbon spectral signatures, projects that us e information in the short-wave infrared (SWIR), and others. We refer the questioner to the following link for a short but helpful recent review of the topic:
https://www.gislounge.com/monitoring -mapping-microplastics-marine-ecosystems/

Question 18 : Would open dust be accounted as a part of TSS (total suspended sediments) once it settles into the water column?
Answer 18 : If enough dust settles into the water co lumn from a dust event, it would be possible to detect it using remote sensing. There are a number of algorithms developed, regionally, to estimate total suspended matter (TSM) in aquatic systems.