Questions & Answers Session 3

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 Amita Mehta (amita.v.mehta@nasa.gov) or Africa Flores (africa.flores@nasa.gov).

Link to the OceanColor forum: https://oceancolor.gsfc.nasa.gov/forum/oceancolor/topic_show.pl?tid=9292

Question 1: What are the values of the variables a, a1, a2 etc. in the algorithm?
Answer 1: Algorithm coefficients that are generated in the regression statistical analysis. We saw this during the demo - the way the algorithm was generated was doing this generation. You can recalibrate based on your own in situ measurements. Ocean Color has gone to different versions of chl-a algorithms - they had been using different coefficients every time they add more data to in situ dataset, they recalibrate. They're updating these coefficients.

Question 2: for calibration purposes, can i use in situ chl-a data from different dates but with co-registered satellite images?
Answer 2: as long as in situ observations are collocated with satellite derived observations, yes it is possible

Question 3: can we use SeaDAS to analyze salinity in the estuary?
Answer 3: If you have an image of salinity, you can open it with SeaDAS and analyze - if I understand correctly. Yes - if the image is already created - but don't know if you can create salinity information derived from satellite images. It's hard to say. SeaDAS can open any file, but we officially support the missions we officially support - when you install the processors, those are what we support. If we haven't written a specific reader for a specific mission, we may not support it fully. SeaDAS can open any file, it's up to what the parameters of the file can understand. The only one (Daniel) is aware of is Aquarius that has a salinity product.
Aquarius has salinity product, but that mission has ended.

Question 4: Is MSI available through the GUI or does it need command line work?
Answer 4: Not in GUI that (Daniel) knows of. Don't know much about that particular one (Sentinel-2). We'll check and get back to you (We'll post the answer in the Q&A before it's published on the website.) Have to do it command line - and definitely not Sentinel-3. But not the GUI. Command line on both: probably on both, but don't know how good the documentation is on Sentinel-3 since it isn't *officially* supported. If you go to the GUI,

no Sentinel data is there, so it has to be done through command line. If it's L2-gen - the help - you may see something in there. The code is all available ,so you can look at the source code to see.

Question 5: Can we do sediment analysis of river using SeaDAS?
Answer 5: If you have in situ data for sedimentation - you can use officially available sensors through SeaDAS. What Africa showed for chl-a concentration, you can derive an algorithm based on satellite and in situ data. As long as your satellite data you're using has enough spatial resolution, it would be possible. I think Landsat-8 can be used, and, again, the algorithms need to be different than the ones we saw here. There's a lot of literature using Landsat data to monitor sedimentation. They use different bands - mostly a combo of Red, IR, and green sometimes for that.

Question 6: How can I know if any lakes (and bays) in my city are monitored by a Nasa Satellite? Just checking at each site?
Answer 6: All satellites would be going over - we're talking about polar orbiting satellites. So it's likely they go over the lakes and bays in your city. However, the resolution of the lakes/areas that you're viewing will decide what satellite is most useful. We talked about different tools: OceanColor web will tell you about MODIS/VIIRS, USGS Earth Explorer - just point to your area and you'll see Landsat data. MSI data is also available through USGS EarthExplorer.

Question 7: Instead of generating L2 data in SEDAS, why can't we directly use Landsat Level 2 data from EarthExplorer?
Answer 7: Landsat L2 data available in EarthExplorer - more useful for land remote sensing. The atmospheric correction is more accurate if you do it in SeaDAS. You can try and see how you get different results when using L2 data from EarthExplorer vs. if you convert using SeaDAS. SeaDAS's atmospheric correction is specifically for water bodies. And SeaDAS doesn't officially support L2 data from EarthExplorer since it was generated there and not by SeaDAS, so it may not know all the nuances within the data structure. When SeaDAS opens our L2 file, it *knows* how to handle it.

Question 8: is it possible to estimate lake depth from remote sensing data?
Answer 8: Right now - remote sensing cannot provide depth, but in the upcoming SWOT mission, it will help in that direction. What can be derived is height with JASON - water level height can be derived, but not depth.

Question 9: Where would one get more information about the in-situ measurements of chlorophyll from SeaDAS? What instruments were used etc? Thank you!

Answer 9: Seabass is the one you're talking about - website (https://seabass.gsfc.nasa.gov/) the information about instruments would be there. Earlier we received a comment about the Chesapeake Bay. Because some are collected at depth, it can be important to know how and where the data is collected. Many data files have description of how the measurements were made in the metadata. It varies file by file. Not all files have that information. But there is info in the original seabass file downloaded from the website.

Question 10: We are estimating Chl_A concentration for each pixel. how about the variability of chl_A concentrations according to depth for the pixel? Do we suppose it to be nearly constant along the vertical?
Answer 10: Depends on where you're collecting your in situ data - at what depth. In most cases, they're collected at the same depth. You're getting chl-a concentration at that depth. Wherever the in situ data - at that height, this would be most representative. Usually we use the closest surface level measurement, and as Amita mentioned - sometimes the algorithms were created with a measurement from a different level. But we don't have information about what that concentration is in that column of water. It would be very hard to derive that from the satellite image. You can do that with in situ measurements when measuring chl or any other water quality parameter at different depths. But otherwise with satellite data, it's just a snapshot of information.

Question 11: Is it possible to downscale MODIS/SeaDAS L2 chl-a with Landsat-8 or Sentinel-2 to obtain high spatial and temporal resolution image?
Answer 11: Not aware of chl-a concentration, but for some other parameters, it has been done. Especially like vegetation index or ET. MODIS and Landsat combined data are used. Also, Landsat and MSI combined data are also available from NASA. It has been done where multiple sensors are used together. But I believe that, again, there has to be some statistical analysis done to do downscaling if you want to. When you have co-located Landsat or MODIS for a number of days, you can derive some kind of relationship between low res and high res chl concentration and that may be of use - to downscale it.
In SeaDAS that would be some kind of mapping of the two and co-locating them together.

Question 12: Is there any improvements in Kd 490 in seadas?
Answer 12: Should be available on the website on specifics of the algorithm. If (Amita) understands correctly, if you're talking about MODIS, it's the same as in OceanColorWeb. That data is - when you open the file you get the same data in SeaDAS, so I don't know if there's improvement since it's the same dataset. SeaDAS

matches - replicates the data we provide and uses that algorithm. Don't know if that algorithm changes over the years.

Question 13: Why there is huge variations of in situ and satellite derived chlorophyll a?
Answer 13: I think it varies depending on the area we're looking at. Chl-a algorithm that OceanColor generates is v accurate in deep waters, but as you move closer to the coast, there might be discrepancies. It's because the large dataset that's used to calibrate the algorithm has more data in deep, ocean water. If you want more info on coastal areas, it may not be that good sometimes. There's a lot of implications in the complexity of the water. The color is not only impacted by chl-a, but other constituents. It's hard to have higher accuracy there because the algorithm has been developed with data that has more representation of deep, oceanic waters.

The only thing (Daniel) would add is that the satellite footprint may not match in situ measurements. Satellite is a full footprint, and if you don't have anyone measuring the full footprint in situ, it can be hard to match. We usually think 30% match is a good match. But it depends on what you're measuring. Usually when we match, we use a 5x5 box - so you're measuring a big area because you're trying to beat down satellite noise. There's papers on this process. You're matching a large surface area with a point however you slice it.

Question 14: what algorithm was used to generate the l2 chl-a products in modis
Answer 14: If you review last week's presentation - the first week provides link to algorithm page where you have all the info about how the algorithm was developed and what the algorithm is.

Question 15: Where would one get more information about the in-situ measurements of chlorophyll from SeaDAS? What instruments were used etc? Thank you!
Answer 15: See answer 9. (https://seabass.gsfc.nasa.gov/).