



## Questions & Answers Session 2

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 contact Amita Mehta ([amita.v.mehta@nasa.gov](mailto:amita.v.mehta@nasa.gov)).

Question 1: Can you please review the differences between level 1, 2 and 3 data?

Answer 1: We talked about this last week. Level 1 data is the raw satellite data that's how satellite measures - when you go to Level 2, those are geophysical parameters derived from satellite data. They're geolocated, but still on satellite swath & pixel resolution. That's Level 2 data we looked at in OceanColor last week. Level 3 data are the uniformly gridded data based on Level 2 data. More composite in spacetime (sometime) sometime just space. Done so you have regularly gridded data. We saw that using Giovanni last week. That data was 4 km grids, so these are the differences. Level 2: geophysical data, but geolocated at swath/pixel resolution. Level 3: lower resolution compared to L2, gridded, composite data. Both have their limitations and advantages. L2 are, of course, data that's directly what the satellite sees. L3 is easy to use because it's uniformly gridded. Easy to visualize and compare to modeling data. If you go on oceancolor website, there's a list of definitions under Docs > Products, and the first link is Level 1, 2, and 3 definitions.

Question 2: Does SeaDAS feature atmospheric correction for Sentinel 2A/B?

Answer 2: What (Africa) understands that there is atmospheric correction for Sentinel 2, but it's in the command line of SeaDAS. Not in the GUI. Sentinel 3 is also available through command line. Not sure about Sentinel 2.

Daniel: Probably - you can definitely do atmospheric correction in SeaDAS, so it should be supported for Sentinel 2, but don't want to commit to it.

Amita: Know that for OCI, you have to have it through the command line, but it might be true for Sentinel. We'll have to check. (Posted Q&A will have updated information)

Question 3: Delteic coastlines, like Louisiana are very dynamic. How current are the coastline masks available in the software? Also, how detailed are they?

Answer 3: Different resolutions are available. (Daniel) can't remember sources, but there's 1 km that comes with SeaDAS and 50 m and 150 m you can install from within SeaDAS. They're basically land masks that we then create coastlines around. (Amita) Documentation is there - and we saw how to install that.

(Daniel) For coastlines, if you click on the Italy boot, it's grayed out, but it'll give you the option to install. Don't update the coastlines - they come from an external source - not



sure where they're coming from. At 50 m they're probably not changing that quickly. But they're land masks, and SeaDAS makes a coastline based on that.

Question 4: Which atmospheric algorithms is used how do we do that in seadas graphically

Answer 4: You're talking about atmospheric correction, I believe, the algorithm was in last week's presentation. This is the ocean color biological processing group that uses atmospheric correction. That link was in week 1. We talked about atmospheric correction. So, MODIS and VIIRS data, they are corrected and we have L2 data. Next week when we look at Landsat data, you can use this algorithm to generate L2 data. That is available through SeaDAS GUI. You have to install that software, but that is possible for a few sensors. You won't be able to do that for OCI, say, but you have this algorithm available. As we talked last week, other atmospheric correction algorithms are available, and you can use those in command line or different software.

Question 5: how do we estimate the chlorophyll a values in missing pixels

Answer 5: Obviously, when satellite data is not available (clouds, algorithm failure), if you don't see value - you can interpolate from surrounding pixels. That's an estimation, guesswork - do bilinear interpretation. But that's all you can do if there's missing data. (Daniel) you can also change algorithm or change thresholds that are throwing away your data. Your data is missing because it's missing, or it was considered not to meet the quality criteria. You can also adjust the masking thresholds and what gets masked out, things like that. You can also adjust - it's a little more bold - adjust so the earth no longer has any land and you can get more retrieval results, but then you'd have to mask out the land. But then you wouldn't have coastal removals. Anything you do outside of the norm is okay for imagery, but can be worrisome if you want to talk about quality science data.

Question 6: Where do we get the Lake Victoria surface temperature data?

Answer 6: OceanColor web. Same place where you downloaded chlorophyll concentration data, there's a file for SST, too. If you go to exercise 1 for ocean color, there's instructions on downloading SST. Wherever you got chlorophyll concentration, SST is there too.

Question 7: questions, I change the range but keeps showing 89, not 60, then I try to get the histogram after already run the statistics (looks like it worked, I have some values, but don't know if they are right!), and shows a message "no histogram computed yet", how can I compute it?

Answer 7: If you're trying to get the color bar - every time you change the values you have to redo it. So you can try that again. For histogram, there's a reset button on top.



## Advanced Webinar: Processing Satellite Imagery for Monitoring Water Quality

You go to - if you go to the exercise, there's a refresh/reset button you have to press. (Daniel) Note: you can make histograms in the statistics tool as well. That's a newer thing. You may not need the histogram tool - it's an older one, but might have things that aren't available in the newer one.

Question 8: what is the reason to take log of band ratios only specifically here?

Answer 8: This was to follow the algorithm that oceancolor group uses. There was a review article provided last week, where different algorithms/band combinations are used for different parameters. For chlorophyll it's usually blue/green band ration and log of that that's used. That's why we used that. But, as I mentioned, there are so many operations you can use - this was just an example following the OceanColor algorithm.

Question 9: Hello, is the computed histogram based on the viewed area or on the image extent?

Answer 9: Once you crop the image, and you have the view area, if you crop to that - on SeaDAS, if you look at the central window, on the left-hand side, all the rasters you can see. Whichever raster you have highlighted, that's the raster the computed histogram is based on. If you highlight the original, that's used, if you highlight the cropped, that's used. (Daniel) In histogram and statistics, you *can* mask, you don't have to crop. Within histogram tool, there's a ROI tool, so you can select masking, you could've drawn a vector square, and select that vector square as that region of interest. In the more advanced statistics - that little sigma icon - that one you can do a lot of masking. You could essentially say, I want it in my square, I want it to be not land, water depth of X range, there's a lot of masking you can do to do the histogram over just masked data. (Amita) For Chesapeake bay, we picked a small region by drawing a square. But these features, where you can mask according to depth are very useful. (daniel) Correct, for Chesapeake Bay, the best way would be to draw a polygon around chesapeake that extends into land and do "Polygon NOT Land" and you'll get a nice shape, provided you use the 50 m land mask.

Question 10: I am not clear with it is meant by 'units of chl concentration' in the homework. Also, what do you mean by histogram peaks? just the highest ones?

Answer 10: What units are they? What are the units of chlorophyll concentration? Just to be sure you know where to look for it. Peak in histogram isn't the highest peak - in general, if you see the histogram, you'll see how many clear clusters there are. And we're looking for the peak in between those clusters. If you're using a different image, that's fine, this is just to be able to do these operations and look at the data.

Question 11: what is the reason to take log of band ratios only specifically here?

Answer 11: (See previous question)



## Advanced Webinar: Processing Satellite Imagery for Monitoring Water Quality

Question 12: How can we distinguish between the chlorophyll coming from algae and that coming from trees growing along the sea shore such as mangrove especially with the coarse resolution imagery?

Answer 12: If the pixels are clearly in the water, that's what you want to make sure, then they're chlorophyll. Land contamination near coast is an issue, depending on the spatial resolution of the sensor you're using. That's why if you look at where the pixel is clearly in the water, you can have probability of that being just water/chlorophyll because of algae high, and not looking at other vegetation.

Question 13: Homework 1 - there's a second part asked not in google form

Answer 13: Okay - just answer the questions on the form. You can note down the answer for yourself.

Question 14: I downloaded the Lake Victoria file from Aug 4, 2018 (MODIS/Aqua, Day and Night) from OceanColorWeb (A2018216112500.L2\_LAC\_OC.nc) but my concentrations/images are slightly different than yours for the Rrs chlor\_a. As a result my statistics are different than yours. I did this 3 times and continue to get the same image, what file did you use for this demonstration and why would I be getting different results?

Answer 14: If you're using the same file, I'm not sure why you're getting different results. For Statistics, it might be the cropping - that might be why you're getting different numbers. But if it's the same file, then I'm not sure why it should look different visually.