



Overview of SeaDAS 8.4.1 for the Processing, Analysis, and Visualization of Optical Remote Sensing Data for Water Quality Monitoring  
February 13, 2024

## Questions & Answers - Session A

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, please submit your questions through the [Earthdata Forum](#).

### **Question 1: How can we get help installing SeaDAS on a Windows machine?**

Answer 1: Please ask questions on the Earthdata Forum:

<https://forum.earthdata.nasa.gov/viewforum.php?f=7>.

### **Question 2: Does the latest version of SeaDAS can work on a Windows environment?**

Answer 2: Yes. Analysis and Visualization works on Windows. Processing works on Windows with Docker.

### **Question 3: OCM3?**

Answer 3: SeaDAS does not support OCM3 processing.

### **Question 4: What are the possible applications of SeaDAS for atmospheric analysis?**

Answer 4: SeaDAS can do atmospheric correction for optical images. SeaDAS can also open NetCDF files as well.

### **Question 5: What is meant by Level-1 Data?**

Answer 5: Level 1A (L1A) data are reconstructed, unprocessed instrument data at full resolution, time-referenced, and annotated with ancillary information, including radiometric and geometric calibration coefficients and georeferencing parameters (e.g., platform ephemeris) computed and appended but not applied to L0 data.

[https://www.earthdata.nasa.gov/engage/open-data-services-and-software/data-information-policy/data-levels#:~:text=Level%201A%20\(L1A\)%20data%20are.not%20applied%20to%20L0%20data](https://www.earthdata.nasa.gov/engage/open-data-services-and-software/data-information-policy/data-levels#:~:text=Level%201A%20(L1A)%20data%20are.not%20applied%20to%20L0%20data). Also, see [Fundamentals of Remote Sensing](#).

### **Question 6: How many control points are required for vicarious calibrations?**



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Answer 6: [https://oceancolor.gsfc.nasa.gov/staff/jeremy/bailey\\_et\\_al\\_2008\\_ao.pdf](https://oceancolor.gsfc.nasa.gov/staff/jeremy/bailey_et_al_2008_ao.pdf). As many points as needed are used for calibration.

**Question 7: What is the advantage of using binned products compared to mapped?**

Answer 7: You bin files together, and then you map them at different resolutions.

**Question 8: I got as far as slide 47. When trying to install/update SeaDAS processors, I get "Remote server is down. OCSSW is not accessible. Please start OCSSW remote server." How do I do that?**

Answer 8: After you install the SeaDAS processors through the docker image or virtual machine, you need to make sure that the remote server is running.

**Question 9: Is it possible to run the SeaDAS on a remote server (Ubuntu)?**

Answer 9: The SeaDAS processors can be installed on a remote server and SeaDAS GUI can access them. We haven't tested running the whole SeaDAS application, the GUI part and the processors, on a remote server.

**Question 10: How do you input the lat/long for the area?**

Answer 10: Please provide for what tool and for what purpose. Many tools use lat/long like the extractor and mosaic tools. You can also make masks as well. You can also use shapefiles as well.

**Question 11: What are the specifications needed for the flagship step?**

Answer 11: We will look into this further.

**Question 12: SeaDAS Installation in Windows 10 platform is asking some credentials? What Shall I do, please help.**

Answer 12: Please be more specific and let us know the exact message. Administrator privileges?

**Question 13: What does it mean by Level 1\_B file for MSI? Right now only L1C files are downloadable for Sentinel.**

Answer 13: You do l2gen on MSI L1C files.

<https://forum.earthdata.nasa.gov/viewtopic.php?t=3721>



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**Question 14: When choosing products in the I2gen screen, how do I know which products might be conflicting?**

Answer 14: A very tough and complicated question. It is a deeper concept where users could look into the mission hierarchical OCSSW directories to find suites containing the products and see what are the requirements. For instance, product ndvi is in the LAND suite and product CI\_cyano is in the CYAN suite. Posting this question in the forum for more detail would be helpful: <https://forum.earthdata.nasa.gov/viewtopic.php?t=3721>.

**Question 15: I am a little confused. Are SR MODIS L2 data Surface Reflectance or Remote Surface Reflectance data (since they are L2 and L1)? Could you share a relevant publication?**

Answer 15: They are surface reflectance after atmospheric correction. Please see <https://modis.gsfc.nasa.gov/data/dataproduct/mod09.php>.

Also see <https://www.oceanopticsbook.info/> for the definitions of SR and Rrs.

**Question 16: What is Bin data and I2gen? Could you explain in detail please?**

Answer 16: I2gen produces an L2 file, I2bin bins I2 files together, and I3mapgen maps the binned files. Refer to the presentation.

**Question 17: How can I import satellite images into SeaDas?**

Answer 17: Just File -> Open Product.

**Question 18: Is it necessary to be connected to the internet for using ancillary files as an input?**

Answer 18: Yes. Or you can get the ancillary earlier when you do have the internet access.

**Question 19: What's the difference between I2gen and C2RCC? Which would be more appropriate over larger lakes, like Lake Erie/the Great Lakes? Is the chlor\_a product generated in I2gen from S3 OLCI appropriate for large inland lakes, like Lake Erie?**

Answer 19: As long as you can resolve pixels in any big lakes, you can use chlor\_a. SNAP and the SNAP forum share a lot of the same tools and information as SeaDAS and can be a good reference as well. We will look into this further.



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**Question 20: I followed the video, which was sent through this course email. I installed Docker and SeaDAS in the window. I started to import the HawkEye data in SeaDAS, but I couldn't do this. I was stuck here, and I couldn't import any other images either, so I couldn't go for further steps. Kindly help me with this.**

Answer 20: You do not need docker to import data in SeaDAS. Please share the name of a Hawkeye file that you'd like to import.

**Question 21: Is Docker required for Mac or Linux users only?**

Answer 21: No, the docker image is optional for Mac and Linux. It's only required for Windows.

**Question 22: Can we use this platform for wetland water quality analysis?**

Answer 22: There is a NDVI product that can conduct this type of analysis, but other products may be limited.

**Question 23: Is there any option to import our study area as a shapefile (.shp) file?**

Answer 23: Menu > File > Import > Vector Data > ESRI Shapefile.

**Question 24: This might be out-of-scope for this seminar, but I'm having trouble finding a good answer in the documentation I can find online. There are two S3 OLCI products for each scene over Lake Erie - In1 (land processing center), and mr1 (marine reprocessing center). These are specified in the file name, but are there any functional differences between the files? And, if so, which would be more appropriate to use over Lake Erie?**

Answer 24: For Lake Erie you will use LN1 data, but now LN is replaced by PS1 (for S3A) and PS2 (.for S3B). Please see [Copernicus Sentinel-3 User News](#). If you download data from the [NASA Ocean Color website](#), you can select Lake Erie in 'Select one or more regions' and order data. You will get appropriate Level-1 data (PS1 and PS2).

**Question 25: Is there a way to check for sun glint contamination in scenes, other than through visual inspection? And is there a way to correct for sun glint prior to modeling chl-a concentration?**



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Answer 25: At Level 2 you have a sun glint mask and there are thresholds that can be adjusted when the glint gets triggered. It does not have to be masked out since there are glint corrections in place.

**Question 26: Is TSM an option as a derived geophysical parameter?**

Answer 26: No, TSM is not available as a derived geophysical parameter.

**Question 27: Does the coastline still overlay a raster, or is GSHHG vector data used? Same question for bathymetry and GEBCO data.**

Answer 27: The bathymetry tool creates topography data, but no vector data.

**Question 28: Which is related to distortion in the image while combining different images for a region (which means the data looks like non-continuous). Is it because of no geometric correction?**

Answer 28: It may likely depend on which images are combined. Non-continuous data could also result from inability to retrieve geophysical data in the presence of clouds or other failed atmospheric correction. If you have a specific merged image that looks distorted, please post this question along with the image on the [forum](#).

**Question 29: Can you give more explanation of atmospheric correction and sun glint and data processing of Sentinel-3 data of A and B sensors?**

Answer 29: Please see:

<https://oceancolor.gsfc.nasa.gov/resources/docs/technical/NASA-TM-2016-217551.pdf>  
f. Some OLCI-specific information can be found here:  
<https://oceancolor.gsfc.nasa.gov/about/missions/s3a/>.

**Question 30: How can I isolate Higlnt mask values?**

Answer 30: Clarification is perhaps needed. What tool? But short of knowing the specific tool, HIGLINT flag/mask is available when working with a level-2 file.

**Question 31: Does the coastline/land mask demonstrated work for inland lakes, like Lake Erie? Or is it just for oceanic coastlines?**

Answer 31: Yes it works for inland lakes provided the lake is big enough relative to the land file resolution. The demo shows Chesapeake Bay.



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**Question 32: How can we isolate the mask of glint, or any other mask I want?**

Answer 32: Please see question 30.

**Question 33: Can we apply these tools and techniques for wetland water quality analysis?**

Answer 33: SeaDAS can be used to calculate NDVI over wetlands to detect vegetation, but to get water quality in wetlands may not be easy.

**Question 34: I wanted to know if you had any clue about how the COASTZ mask works. I'm trying to implement an algorithm which automatically detects the shallow water pixels on my scene (pixels where the sea bottom contaminates the signal). I can see that the products you're using have such a mask.**

Answer 34: COASTZ is set by l2gen based on the parameter: shallow\_water\_depth=30 (the default is 30 meters), so you could specify a different value if you run l2gen.

**Question 35: I will want to use the downloaded data in ArcGIS Pro, in a projection for my study area. Do the downloaded data [shapefiles and graphics] have the projection information [WKID (Well Known ID)] embedded in the data structure? Or, do I have to assign it to the downloaded file(s)?**

Answer 35: If you download data from NASA Ocean Color they will have projection information. Any ESRI shapefile will also have projection information.

**Question 36: Sorry in view screen there is another option of SeaDAS\_2024Logistic. Are we supposed to switch there also?**

Answer 36: No.

**Question 37: Maybe I missed it, but for the OC Level-2 data products, such as Chl-a, organic or inorganic carbon, is there an indication of the confidence interval for the result? And how is such an interval calculated?**

Answer 37:

**Question 38: Can this software be used only using Docker or on an Oracle virtual machine too?**

Answer 38: You don't need Docker for SeaDAS application. You only need docker if you need the science processors (OCSSW) on your Windows computer.



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**Question 39: Can we use SeaDAS for reprojecting bulk data from one projection to another projection?**

Answer 39: Yes, using appropriate batch scripts you can reproject a lot of files. Please see: <https://seadas.gsfc.nasa.gov/help-8.4.0/GptCookbook/gptCookbook.html>.

**Question 40: SeaDAS seems to depend on many additional data sets like the bathymetry. Are those in the main installer branch? I cannot see them there. How do I get them and integrate them in SeaDAS?**

Answer 40: SeaDAS does not depend on bathymetry. You can calculate bathymetry using SeaDAS.

**Question 41: Is it possible to detect surface quality parameters, including suspended sediment and turbidity, with SeaDAS in a particular river?**

Answer 41: That will depend on 1) the width of the river, and 2) availability of in situ measurements of these parameters to develop algorithms using remote sensing reflectance and the in situ data.

**Question 42: Is there an estimated date of when SeaDAS 9 will be available?**

Answer 42: Estimated before the end of March when PACE data will be available to the public.

**Question 43: Where can we get turbidity data?**

Answer 43: [SeaBAS](#) has in situ data measurements and some include turbidity. Standard Ocean Color products do not include turbidity. Available products are [listed here](#).

**Question 44: What is SNAP?**

Answer 44: Here is the forum for SNAP software: <https://forum.step.esa.int/>.



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## Questions & Answers - Session B

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### **Question 1: Can SeaDAS deal with a drone data compatible format?**

Answer 1: SeaDAS can read files in many forms (e.g., NetCDF, hdf, png, etc.).

### **Question 2: Do any of the geophysical products produce total suspended solid concentrations?**

Answer 2: You have to use remote sensing reflectances and in situ data to produce TSS concentrations.

### **Question 3: How accurate is this sensory dataset?**

Answer 3: Accuracy is dependent not only on algorithms and flag states, but is dependent on a particular sensor's characteristics, its bandwidth, SNR, calibration, geolocation accuracy, etc.

### **Question 4: Can you export SeaDAS products into R Studio to make a more finalized map product?**

Answer 4: SeaDAS has l3mapgen/mapgen to generate many mapped products.





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**Question 5: Do you cover the pre-processing methods on those user generated data?**

Answer 5: What do you mean by pre-processing methods? Please refine this question.

**Question 6: A question on L3 data resolution. OB.DAAC provides 4 km and 9 km resolution. User generated data could have any resolution. For the finest resolution, would the data from observation or from the MERR2 model?**

Answer 6: The highest resolution is achieved by starting with a level2 file and then running L2bin and L3mapgen at a comparable resolution with the native raw satellite data (the level2 resolution at nadir). The Reproject Tool or Mosaic Tool is also an alternate general option.

**Question 7: Can I know the programming language in which l2bin is built?**

Answer 7: C++/Python.

**Question 8: Is the computing load handled by my computer/hardware with this software?**

Answer 8: Yes. In Menu > Preferences there is a Performance tab which lets you specify cache sizes and virtual memory usage.

**Question 9: Could I do a network with all these old laptops if I needed to with this software?**

Answer 9: Perhaps if it is powerful hardware on a shared network. Check with your system administrator. You may be able to run Level-2 data on a single laptop, but it depends on the application.

**Question 10: What parameters/sensor would you suggest for kelp forest aquaculture that would work within SeaDAS?**



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Answer 10: [Here is an earlier paper](#) about remote sensing of kelp forests. Additional information can be found at:

<https://www.frontiersin.org/articles/10.3389/fmars.2021.753531/full> and:  
<https://www.mdpi.com/2072-4292/12/4/694>.

**Question 11: Are bathymetry data included in SeaDAS? Do we need to provide a file? How is the depth of a retrieval known?**

Answer 11: There is a bathymetry tool in SeaDAS that calculates bathymetry for you. The bathymetry data is at 2 km resolution and the data within OCSSW is at 500 m resolution.

**Question 12: Do the algorithms effectively deal with the cloud's impact on the radiance/product values?**

Answer 12: Depends on the geophysical product. Chlor<sub>a</sub> cannot be determined if it cannot be seen underneath a cloud. STRAYLIGHT flag masking is available for dealing with cloud edges. STRAYLIGHT flagged pixels may have decent values or they may be compromised.

**Question 13: For Landsat 8 OLI, would a cloudy day be better than a data temporal gap? Or is there some cloud/atmosphere input allowable type of idea?**

Answer 13: For optical data, if clouds are present you cannot see the surface! It is possible that any water body that you are monitoring can have partial coverage (i.e., some portions may be cloud-covered but some may be clear), and that is better than a temporal gap. But for overcast pixels it will be a data gap.

**Question 14: Can data observations collected from pins plotted over the map (shown on the graphs in the tutorial) be exported as a data table from SeaDAS?**

Answer 14: See the "Pixel Extraction" Tool which takes a CSV file for exporting pixel values.

**Question 15: Is this analysis could be used for lakes as well?**

Answer 15: Yes, if the lake is big enough.



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**Question 16: If we're having trouble getting SeaDAS to even work, what is the best way to troubleshoot? I tried the Earthdata Forum. Aynur has been helpful, but not sure it will be resolved in time for the homework deadline.**

Answer 16: The exercise requires mostly analysis and the homework should be able to be completed around installation issues. We will evaluate if we need to increase the deadline. <https://forum.earthdata.nasa.gov/viewforum.php?f=7>

**Question 17: Is the software single threaded?**

Answer 17: The software is multi threaded, but we will look into this further.

**Question 18: Can I use SeaDAS to process a Sentinel-2 dataset? Plus, when will the PACE dataset be available publicly?**

Answer 18: PACE just launched last week. PACE data will be available around the end of March. We are currently having issues processing Sentinel-2 data that are newer than 2022.

**Question 19: Will there be an I2gen command line training course in the future? Or are there any official documents available?**

Answer 19: On the SeaDAS help page, there is a help link for each tool, such as I2gen <https://seadas.gsfc.nasa.gov/help/processors/ProcessL2gen.html>

The SeaDAS team will also be doing video tutorials as well.

Youtube Channel Link: <https://www.youtube.com/@NASAOceanColor>