



Questions & Answers Part 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 email Juan Torres-Pérez (juan.i.torres-perez@nasa.gov) or Amber McCullum (amberjean.mccullum@nasa.gov).

Question 1: Can sargassum be found in the Mediterranean Sea?

Answer 1: As far as we know only benthic *Sargassum* species are found there. Some species are native and have become locally extinct. Some are invasive in coastal areas. See the paper by Thibaut et al (2015): The *Sargassum* conundrum: very rare, threatened or locally extinct in the NW Mediterranean and still lacking protection. *Hydrobiologia*. 781: 3-23.

During the 2010 winter some of the pelagic *Sargassum* reached some parts of the Mediterranean but this is not a typical case.

Question 2: I made a field visit and I took advantage of the very low tide to look for different animal and plant species that colonize the study area for an application of this training. All species are small and are all present in the same place. How can we distinguish them? Is the characteristic spectral signature practical in this case?

Answer 2: Cnidarians (corals, fire corals, zoanthids, anemones, etc.) and plant species with different pigment composition can be distinguished in some cases by specific spectral features but in most cases it is very hard to separate most benthic species based only on spectral signatures. Here are two of our papers on the use of coral reflectance and HPLC pigment analysis to separate species:

<https://www.mdpi.com/2072-4292/4/12/3813>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0143709>

Question 3: Which variables is the AFAI Algae Index based on? What information can you provide?

Answer 3: Here's the link to the Wang and Hu (2016) paper that describes the AFAI:

<https://www.sciencedirect.com/science/article/pii/S0034425716301833?via%3Dihub>

This paper shows the algorithm. You can also download the Level 2 data and then process in SeaDAS. There is an ARSET training on MODIS to VIIRS with step by step instructions on how to download and do basic processing using SeaDAS:



<https://appliedsciences.nasa.gov/join-mission/training/english/arset-monitoring-coastal-and-estuarine-water-quality-transitioning>

Question 4: Is VIIRS data freely available?

Answer 4: Yes. VIIRS data can be obtained through the OceanColorWeb site. [NASA Ocean Color](#)

Question 5: Could you please show how to calculate AFAI index? Is it applicable to drone images too? Also, the differences between FAI and AFAI?

Answer 5: The Wang and Hu (2016) paper will describe it in detail. If the drone is equipped with a multispectral camera that includes the spectral bands used in the index it will work. Both FAI and AFAI use bands in the red, NIR and SWIR. The RGB of drone cameras may not have the NIR and SWIR bands needed to calculate the index. You will need to cloud and land mask these images in the preprocessing before applying the algorithm. Sun glint and other factors should be addressed too.

Question 6: Are Sargassum blooms a natural barrier against the wave action and reduce the energy of the swell, also, can I use NDAVI index for mapping the repartition of sargassum bloom such as posidonia in the Mediterranean sea for studying the coastal refraction and diffraction of the swell in the coastal area?

Answer 6: In the ocean we have seen large *Sargassum* patches attenuating some of the wave energy. In beaches with high energy wave action, *Sargassum* has been used mixed with sand to stabilize the slope of the beach to minimize erosion in some islands in the Caribbean, but we have not seen published articles or reports on this. NDAVI (vs the NDVI) uses the blue band and is useful for detecting seagrass beds if these are exposed.

Question 7: Are these satellites with these resolutions available for free or for sale? I speak for example of worldview (0.33m) and Planet Scope (3m).

Answer 7: Those two are commercial satellites and are for sale. It will depend on the size of your ROI that will determine the cost. For research, you can make requests to these providers.

Question 8: Slide "Impact of Large Sargassum Patch on the Underwater Light Field": why does PAR with sargassum increase attenuation with depth, opposite to that observed for blue water?

Answer 8: In both cases light attenuation decreases with depth. However, the Sargassum patch was so large and thick that the first few meters had no value since



the sensor was within the thick Sargassum mass. After it cleared that, small amounts of light were detected coming from outside the Sargassum shadow from light scattered from outside the patch. No measurable light could be detected directly under the patch.

Question 9: Does Eutrophication promote rapid Propagation of Sargassum?

Answer 9: If it includes a constant supply of nutrients, yes it could.

Question 10: How do I differentiate the floating dead and decayed plant matter from Sargassum species?

Answer 10: As soon as it starts decaying it loses the pneumatocysts and it sinks. Yet, here's a paper from Dierssen and Russell (2015) which used hyperspectral data from airborne remote sensing to separate dead seagrass from Sargassum in Florida:

<https://www.sciencedirect.com/science/article/pii/S0034425715000450>

Question 11: With regard to floating mat Sargassum, how is it detected when it's submerged in water after one year of its formation? What do the spatial data sets look like for such submerged Sargassum?

Answer 11: Submerged Sargassum can be distinguished from floating Sargassum mats by again using the FAI and AFAI, since they used the NIR bands, and these do not penetrate the water column. However, old accumulated Sargassum can be confused with mud or other unconsolidated sediments from satellite imagery, so field validation is required.

Question 12: Could the use of SAR data also be useful in identifying large concentrations of Sargassum (and other SAV) in locations that have high cloud cover?

Answer 12: You should be able to use it for floating vegetation. But likely not for submerged vegetation due to the limitations of SAR.

Question 13: How do we estimate the biomass of sargassum?

Answer 13: You will need to know the area and volume. Volume is more difficult and will need field validation. Collection and dry weighting of samples will be needed to calculate biomass. Biological and ecological implications of carbon content and biomass is an emerging area of research.

Question 14: Is there any seasonal variation in the pattern of sargassum distribution?



Answer 14: Peaks in the summer months. During peak years we have seen it extending to December. After the summer it reduces and indicates the end of the season. Sargassum is present in the Caribbean and depends on the orientation of land and wind patterns.

Question 15: Is the 2018 Sargassum bloom somehow related to changes in the North Equatorial Counter Current? Can satellite altimetry (ocean currents) be used simultaneously to study sargassum interannual variability?

Answer 15: The blooms we have seen in the Caribbean are affected by the currents. In 2013 there was no Sargassum event in the area. In 2018 there was a large Sargassum event due to nutrient supply from the coast of Africa.

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Monitoring Aquatic Vegetation with Remote Sensing
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