Mapping surface water with satellite and AI tools		
Question Details		
#	**Question**	**Answer**
1	I noticed the GIS programming tools are in Python. Is there any intention to also provide the practical guide in R studios?	For R, I recommend this book https://r.geocompx.org/
2	It seems like most of these tools are being applied to surface extent of water bodies. Can any of them be applied to studying bathymetry, especially in river channels?	In one of their videos, NASA cites this product for bathymetry https://icesat-2.gsfc.nasa.gov/mission
3	With SWOT, can we generate rating tables for eg. water surface area to volume estimate?	Yes, for lakes, this comes directly from the lake product observations, which contain water surface elevation, area, and storage anomaly
		Thanks Matthew. What is vertical and spatial accuracy of this dataset.
		The vertical accuracy is dependent on a number of factors, including size of water body. Individual pixels can have higher errors, but when averaged over larger areas (e.g. 250mx250m), errors can be on the order of centimeters to tens of centimeters.
4	has any case study been done to compare levels derived using SWOT with standard hydrologic and hydraulic approaches?	Please check this paper : “Automated River Reach Definition Strategies: Applications for the Sacramento and Po Rivers” – This paper includes 14 simulated SWOT overpasses over the Po River, comparing reach-averaged surface elevation, width, slope, and discharge estimates to those from hydraulic models.
		This may also be of interest: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2024GL114084 A number of other regional studies have been published in the past year
5	Are SWOT observations blocked by clouds? Is the data only available during clear weather (no cloud) conditions?	check this please paper : “Automated River Reach Definition Strategies: Applications for the Sacramento and Po Rivers” – This paper includes 14 simulated SWOT overpasses over the Po River, comparing reach-averaged surface elevation, width, slope, and discharge estimates to those from hydraulic models
		SWOT uses Ka band radar, which penetrates cloud cover so it can still see water bodies in cloudy conditions.
6	With US federal cuts, do you think missions like Landsat and SWOT free access might be affected.	I personally have not heard of any plans to move away from the free and open data model,but acknowledge that there is unfortunatly a lot of uncertainty about many U.S. government activities.
7	How the average water depth is estimated for calculating discharge at a point.	I recommend checking out this video on discharge estimation: https://youtu.be/UWpqwy2IZog?si=gN6nnkj5peouOeX2 Its a fairly complex process and any short answer I could give would not be sufficient. This publication is a comprehensive overview of SWOT discharge estimation: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2021WR031614
8	https://podaac.github.io/tutorials/quarto_text/SWOT.html	live answered
9	Hello, Can we use this system to monitor the health of rivers?	Yes, you could use it to monitor things like the fluvial geomorphology and water levels over time.
10	Sorry, I missed the start... where do we access the SWOT data?	Programmatic access: https://podaac.github.io/tutorials/quarto_text/SWOT.html More options here (NetCDF, shapefile): https://swot.jpl.nasa.gov/data/
		And for a web GUI, you can use earth data search: https://search.earthdata.nasa.gov/search?q=SWOT&csk=-score
11	What is the vertical resolution and absolute accuracy of swot water elevation observations?	The accuracy is dependent on a number of factors, including size of water body. Individual pixels can have higher errors, but when averaged over larger areas (e.g. 250mx250m), errors can be on the order of centimeters to tens of centimeters.
12	Could you please elaborate on how the SWOT program can be applied to flood mitigation practices	It can be used as a supplementary data source in hydraulic/hydrologic modeling, I could see the sea level and significant wave height data being quite useful for modeling coastal transition zone areas.
13	Do we have access to other surface water satellite imagery before establishment of SWOT ?	If you’re referring to measuring surface water elevation and width using satellite altimetry before the launch of SWOT, we had access through earlier missions such as ICESat and others like Envisat.
14	Can we use SWOT data for timeseries analysis using to find the surface area of the reservoir to identify the evaporation loss?	See below for an example of this application: https://swot.jpl.nasa.gov/applications/early-adopters/#:~:text=and%20impact%20assessments.-,Texas%20Water%20Development%20Board%20(TWDB)%2C%20Austin%2C%20TX,-Title%3A%20Estimation
15	Thanks ,Mathew. very informative. Can the data be used to model concept for bridges and culverts?	I’m not familiar with bridge or culvert design so my answer may ber limited, but SWOT can provide the water profile of an entire river reach, which can be helpful in understanding the hydrodynamics of the river
16	is there any results of SWOT in canadian rivers? how is the quality?	Yes, this is likely useful. See the SWOT Cal/Val orbit over the St. Lawrence River here: https://www.researchgate.net/figure/SWOT-Cal-Val-orbit-over-the-St-Lawrence-River-with-an-enlarged-section-showing-a-SWOT_fig6_334171808
		what about small rivers?
		SWOT’s performance on small rivers is still an active area of research
17	can the SWOT be applied in mountainous regions? like Nepal	This is a great question. There may be topographical effects, but the radar instrument on SWOThas very steep look angles (i.e. the sensor is looking nearly striaght down), which means there’s a better chance to get favorably observation geometry, even in mountainous regions
18	What methedology/ aspect was taken into consideration to estimate the climate change impact of the lake.	live answered
19	I I can see in the graph that the historical rainfall with the satellite image is delayed in time. When mapping surface water using satellites, how close to real-time can we actually get?	This particular system is an inland lake without tidal influence. This would certainly add an additional layer of complexity over and above the groundwater/surface water interaction analysed at Lake Mackay. We would involve our coastal team to contribute to this
20		https://maps.dea.ga.gov.au/#share=s-v6tp0yXNniNzcA7dcB9P1bEGPSg
21	Sorry where was the the list of all the links that were compiled?	https://hydroschool.org/satellite/
22	Are there any ways to indicate if it's worth doing your own processing (like done with Lake Mackay) versus just using the precanned DEA products? (I.e. prior to actually going down the possible rabbit hole / checking if it's worth the investment)	It likely depends on the size and how ephemeral the system is, as a large component of our custom processing involved retaining data that was excluded by the default DEA algorithm. A salt lake system is also far more susceptible to error in land cover classification.