SWOT HACKTION PLAN-2022: EXERCISE/ TASKS FOR EARLY ADOPTERS

1- TEXAS WATER DEVELOPMENT BOARD (TWDB)

HACKATHON OBJECTIVES:

a. Learn to set up CNES SWOT simulator over 1-2 TWDB Lakes/reservoirs.
b. Understand the potential improvement due to SWOT in estimating lake area in the context of current pre-SWOT multi-sensor area estimation tool for TWDB.
c. Understand the codes/scripts and processing chain required to get the multi-sensor area estimation tool ready to operationally ingest SWOT L2 lake area data product and improve TWDB's evaporation estimation. Specifically – L2_HR_LakeSP, L2_HR_LakeAvg, L2_HR_Raster.

TASKS:

1. Select 1 or 2 TWDB lakes/reservoirs (that are also modeled in Multi-sensor Texas Reservoir Area Estimation for TWDB). TWDB suggests Lake Buchanan as one of the lakes.
2. Use a 1 year time series of reference/in-situ elevation data measured by TWDB to generate reference water level shapefiles, using the area-elevation/bathymetry relationships.
3. Feed the time series of lake area shapefiles into CNES SWOT simulator to generate SWOT simulated Lake area.
4. Compare that time series of area by plotting it with the non-SWOT generated lake area estimated from the multi-sensor tool with the range of uncertainty (based on Sentinel-1, 2 and Landsat).
5. Quantify improvement due to SWOT for area (and evaporation estimation) in the context of non-SWOT (pre-SWOT) area estimation uncertainty.

Helper/Hacker: Sanchit Minocha (UW Team)

2- INDIAN INSTITUTE OF TECHNOLOGY BOMBAY (IIT BOMBAY)

HACKATHON OBJECTIVES:

a. Promote the use of SIMS to participating Early Adopters for generating time series of surface area from Sentinel-1.
b. Explore the applicability of SIMS for preparing surface area time series for Texas Water Development Board and other EAs to run the CNES SWOT simulator.
c. Share potential ideas on how SWOT Simulated data over Mahanadi river/reservoir could be applied to develop an operational SWOT-assimilated flood forecasting system.

TASKS:

1. Provide a hands-on demo to Early Adopters on how to use SIMS for generating time series of area for potential use in CNES SWOT Simulator.
2. Assist TWDB team in generating SIMS-based area for 1-2 Texas lakes are also modeled in multi-sensor area tool for TWDB (Texas).
3. Provide a presentation on potential ideas for developing an operational flood forecasting system for Mahanadi river system that integrates SWOT data.

Helper/Hacker: IITB Team is a trainer team that will be helping other EA Teams

PO.DAAC and UW team will be on standby in the main room of zoom

3- ASIAN DISASTER PREPAREDNESS CENTER (ADPC)

HACKATHON OBJECTIVES:

a) Explore how best to integrate, co-visualize or assimilate SWOT L2 data (L2_HR_LakeSP, L2_HR_LakeAvg, L2_HR_Raster, L2_HR_RiverSP and L2_HR_RiverAvg) in Reservoir Assessment Tool for Mekong (RAT-Mekong)

TASKS

1. Explore thoroughly how the current ADPC/SERVIR RAT-Mekong systems works
2. Create a 'wishlist' itemizing for each ADPC/SERVIR tool the following: i) key scenarios for using SWOT data ii) how to visualize/interpret SWOT data in the tool iii) links/examples of user case scenario for decision making.
3. Apply the ADPC-provided wish list on how ADPC desires to see SWOT L2 data co-visualized, integrated or assimilated in SERVIR-MEKONG tools using test SWOT L2 data (mission-sanctioned simulated data). This dataset is not over Southeast Asian region.
4. If time permits, run SWOT CNES simulator over one of ADPC's 'test' basin to generate SWOT-simulated L2 data on lake/river for exploring integration in RAT-Mekong. Otherwise, ADPC will use existing simulated data from Mahanadi river by IIT-Bombay to explore and build the necessary literacy.

Helper/Hacker: Pritam Das (UW Team)

4- PAKISTAN COUNCIL OF RESEARCH IN WATER RESOURCES (PCRWR)

HACKATHON OBJECTIVES:

a. Learn to use SWOT L2 data to detect and quantify the volume change in suddenly appearing wetlands in Sindh province of Pakistan.
b. Learn to use SWOT L2 data for Mangla reservoir and other Transboundary reservoirs.
c. Prepare scripts/codes/tools that will be needed to use SWOT L2 data operationally.

TASKS:

1. Explore mission-sanctioned SWOT L2 data L2_HR_LakeSP, L2_HR_LakeAvg, L2_HR_Raster and understand its data structure and learn to visualize and 'analyze' the data.
2. Apply SIMS (a Sentinel-1 water area map creating tool by IIT Bombay) over a test wetland in Sindh and Mangla reservoir.

Helper/Hacker: Shahzaib Khan (UW Team)

5- INDIAN INSTITUTE OF TECHNOLOGY-DELHI (IIT-DELHI)

HACKATHON OBJECTIVES:

a. Explore how best to assimilate SWOT L2 data in the MIKE-based hydrologic-hydraulic modeling system set up for Godavari river basin.

TASKS:

1. Apply CNES SWOT Simulator over Godavari River basin to generate simulated L2 data on river width, slope, and reservoir area. Use help from SIMS (and IIT Bombay) if necessary.

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2. Explore how to apply SWOT simulated L2 data in the MIKE suite of systems for flood forecasting.

Helper/Hacker: Nitish K (IIT Bombay)

6- ALEXANDRIA UNIVERSITY (AU-EGYPT)

HACKATHON OBJECTIVES:

a. Explore how SWOT L2 data L2_HR_LakeSP, L2_HR_LakeAvg, L2_HR_Raster can be integrated in the operational NiBRAS reservoir monitoring system to better manage operations of High Aswan Dam

TASKS:

1. Set up SWOT CNES simulator over Lake Nasser (High Aswan Dam) and GERD for a 1 year period. Use SIMS tool of IIT Bombay if needed.
2. Explore volume changes for HAD and GERD and compare it with existing pre-SWOT estimates provided by NiBRAS
3. Prepare scripts/codes for the processing chain to operationally use SWOT L2 data in NiBRAS system.

Helper/Hacker: Matthew Bonnema (JPL)

7- UNITED STATES GEOLOGICAL SURVEY (USGS)

HACKATHON OBJECTIVES:

a. Build familiarity with the SWOT L2 products and with workflows for working with those products.

TASKS:

1. Explore mission-sanctioned sample L2 data in hands-on manner (potentially with help from PO.DAAC) to build familiarity with data structure, processing and analysis of river hydraulic parameters.
2. Set up CNES SWOT simulator over USGS-studied Alaskan river, or prepare already-shared SWOT simulated data over Alaska prepared by NASA SPoRT.
3. Apply SWOT simulated data in existing remote-sensing based discharge algorithms used by USGS.

Helper/Hacker: Ted Langhorst (UNC Team)

8- UNIBONN

HACKATHON OBJECTIVES:

a. Explore how SWOT data can improve discharge estimation in River Rhine ~~Estuary~~
b. Revise the use of the SWOT simulator at Uni-Bonn to include dynamic maps of water extent for rivers
c. Apply the SWOT simulator to lakes and reservoirs to study water storage change
d. Investigate the options of errors simulated by the SWOT simulator (in height, width, etc.)
e. Discuss possibility of using the JPL simulator

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TASKS:

1. Identify steps and coding requirement to automate processing/analysis of SWOT data.
2. Have discussion/exploration of error simulation.

Helper/Hacker: Rui Wei (OSU Team)

9- CWRDM

HACKATHON OBJECTIVES:

a. Further the use of satellite altimetry for citizen science lake monitoring of height.
b. Explore how to use SWOT simulator over a lake in Kerala to understand the data product structure for Lakes (L2_HR_Lake)

TASKS:

1. Build on previous hackathon for altimeter data processing.
2. Explore the application of SIMS to a Kerala Lake and prepare inputs for SWOT CNES Simulator

Helper/Hacker: Manu Soman (IIT Bombay)

Other potential EAs with hack sessions:

a. **Stantec. Helper:** Alain Dib/Ed Beighley (FMGLOBAL)

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