



# **The potential of high-rate Sentinel-3 altimetry for small river monitoring**

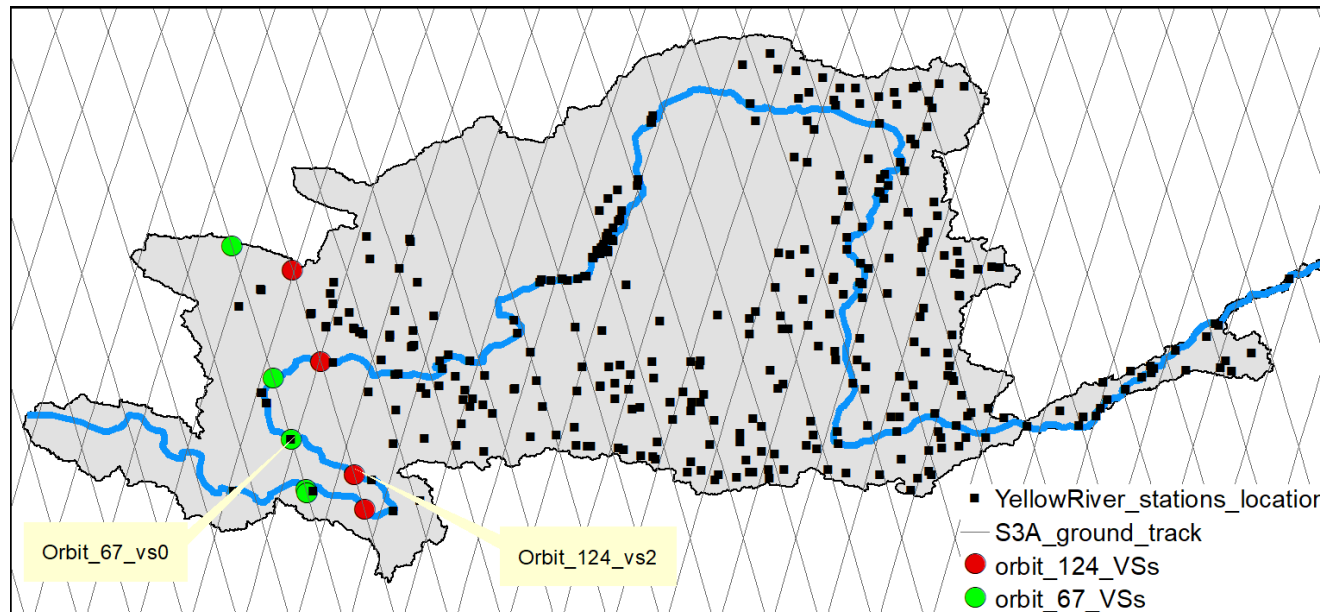
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# Objectives

- Due to the large footprint of radar altimeter, signal reflected from narrow rivers will be likely very weak and prone to be contaminated by other subjects. Certainly, different altimetry missions are of varying capability to register the information into the waveform.
- First of all, a comparison of different data types, such as LRM, SAR, 20Hz, 80Hz and FF-SAR will be investigated to have a picture of current ready-use products. Especially, the FF-SAR and high-rate data, i.e. 80Hz will be explored for varying conditions.
- Further, different algorithms should be applied or developed to retrieve useful water level data for these rivers.
- To retrieve WSE of VSs in the Yellow River Basin via the Earth Console P-PRO.

# Study area and settings

- The Yellow River Basin has a total of 235 VSs (Virtual Station) within the range of 50 to 300 meters in width, including 112 VSs for S3A and 123 for S3B.
- In this early stage, we only processed data of two stations as shown below.

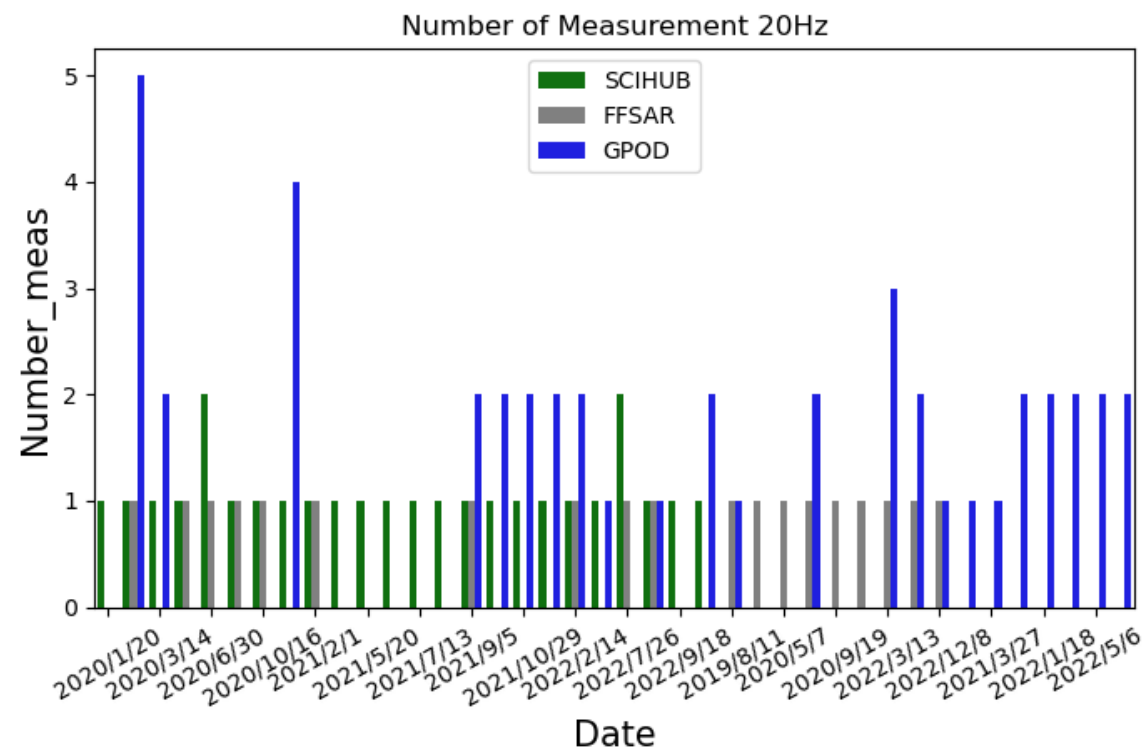
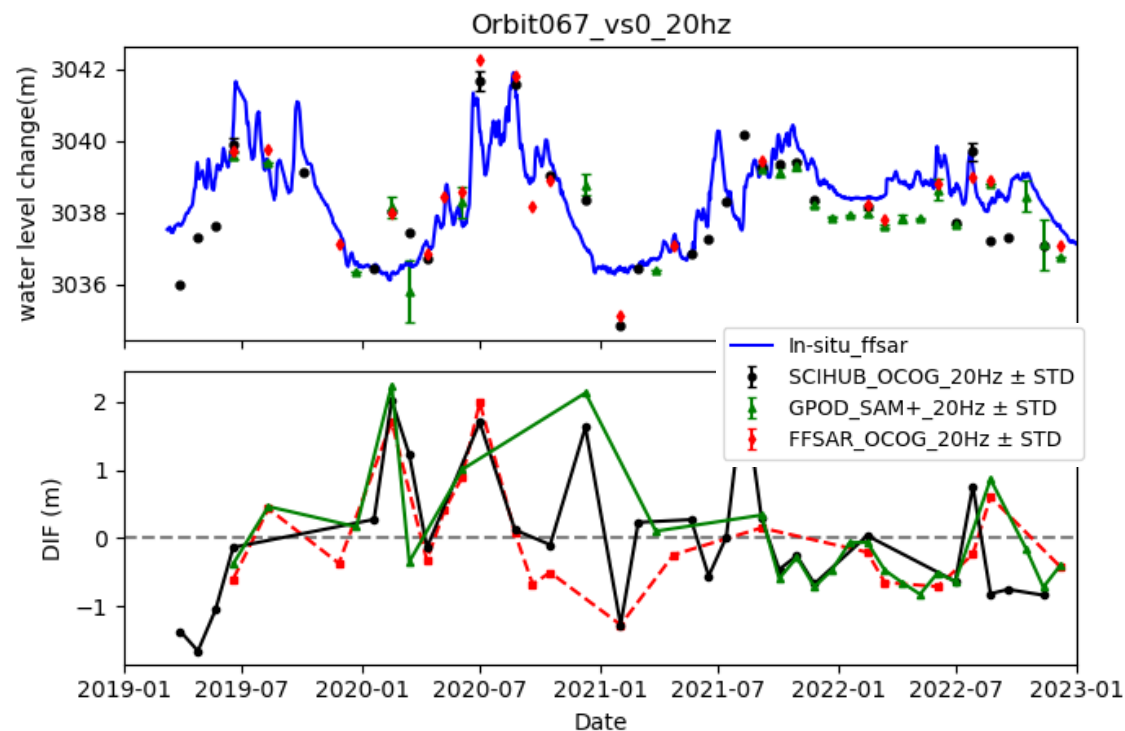


VS	Distance from in-situ station (km)	River width (m)
Orbit_67_vs0	0.51	138
Orbit_124_vs2	32.1	240

# Preliminary results

## 20 Hz data at Orbit\_67\_vs0 (width of 138 m):

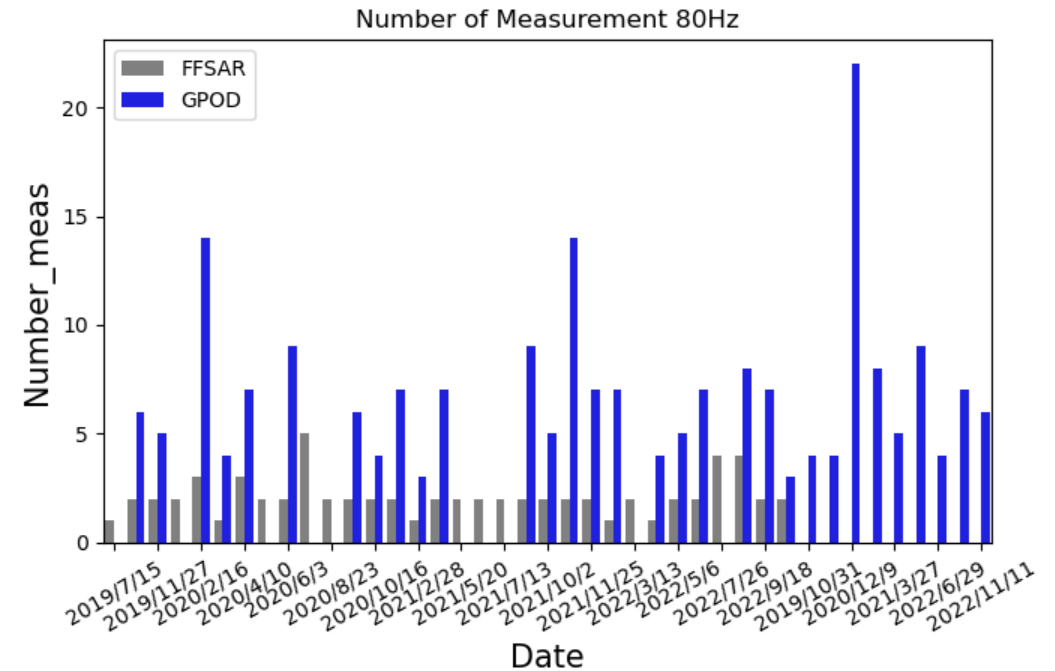
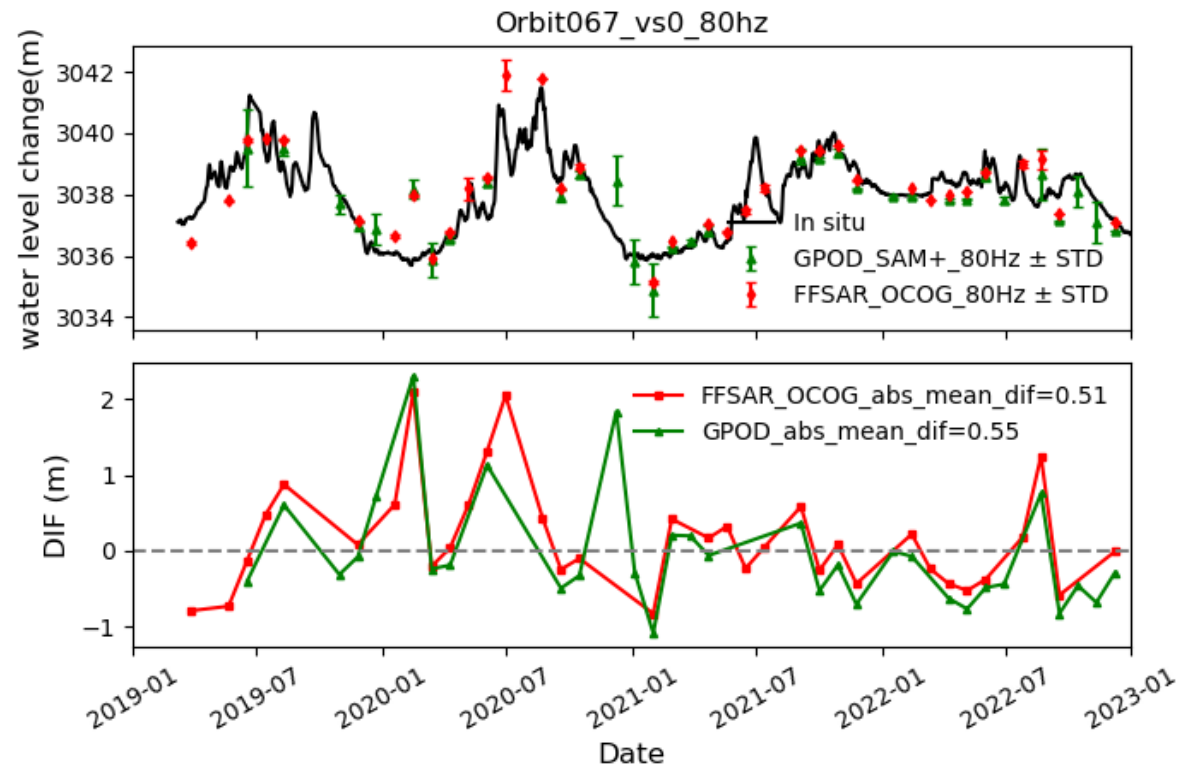
- The average of the absolute value of the difference: GPOD(0.59 m) < SCIHUB(0.76 m)
- The average of the observations: SCIHUB(1)=FFSAR(1) < GPOD(2)



# Preliminary results

## 80 Hz data at Orbit\_67\_vs0 (width of 138 m):

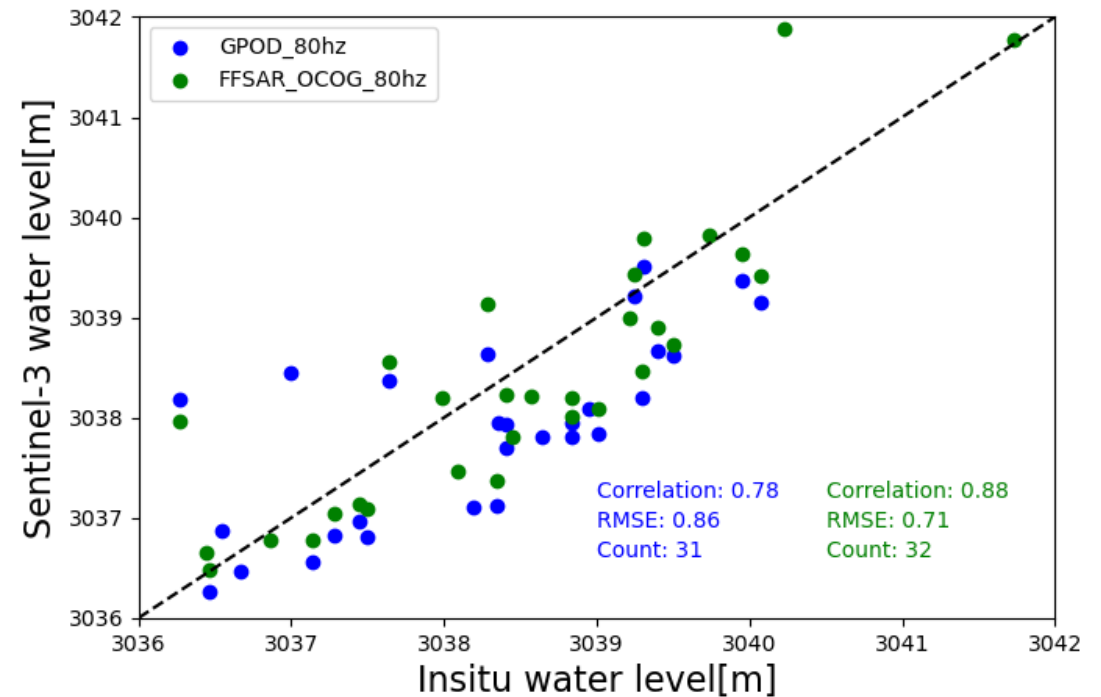
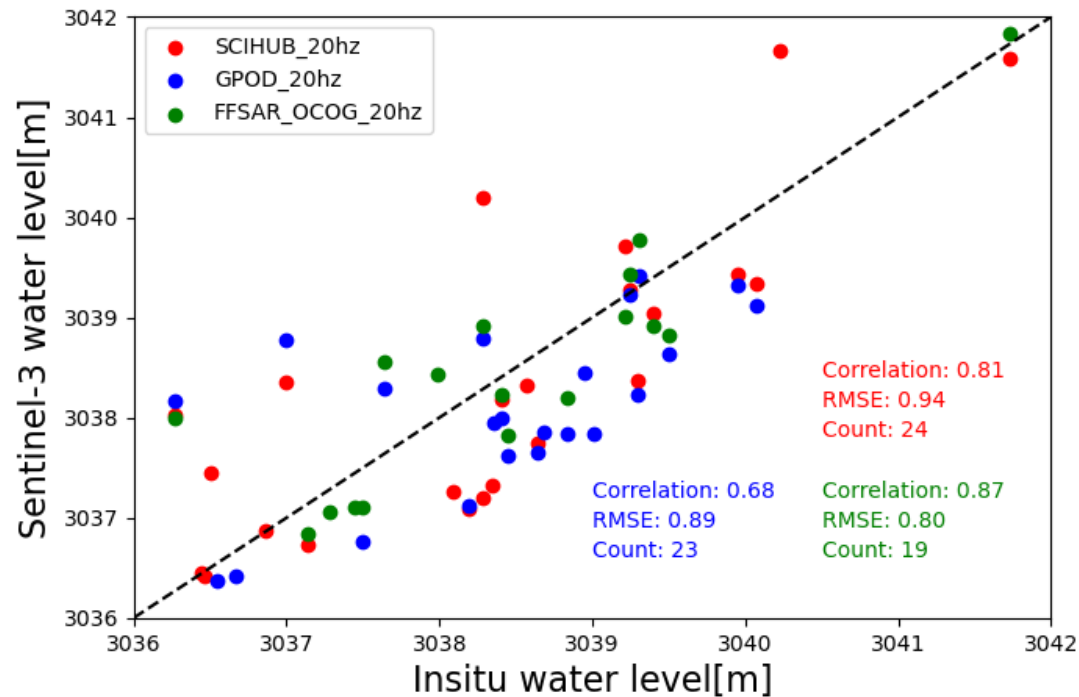
- The average of the absolute value of the difference: FFSAR(0.51 m) < GPOD(0.55 m)
- The average of the observations: FFSAR(2.2) < GPOD(7)



# Preliminary results

## Correlation, RMSE and Count of observations at Orbit\_67\_vs0 (width of 138 m):

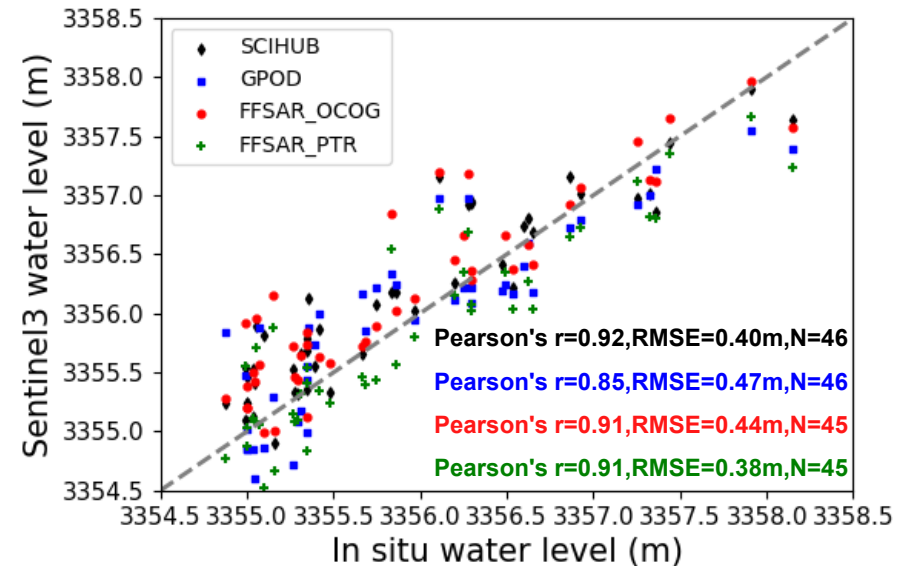
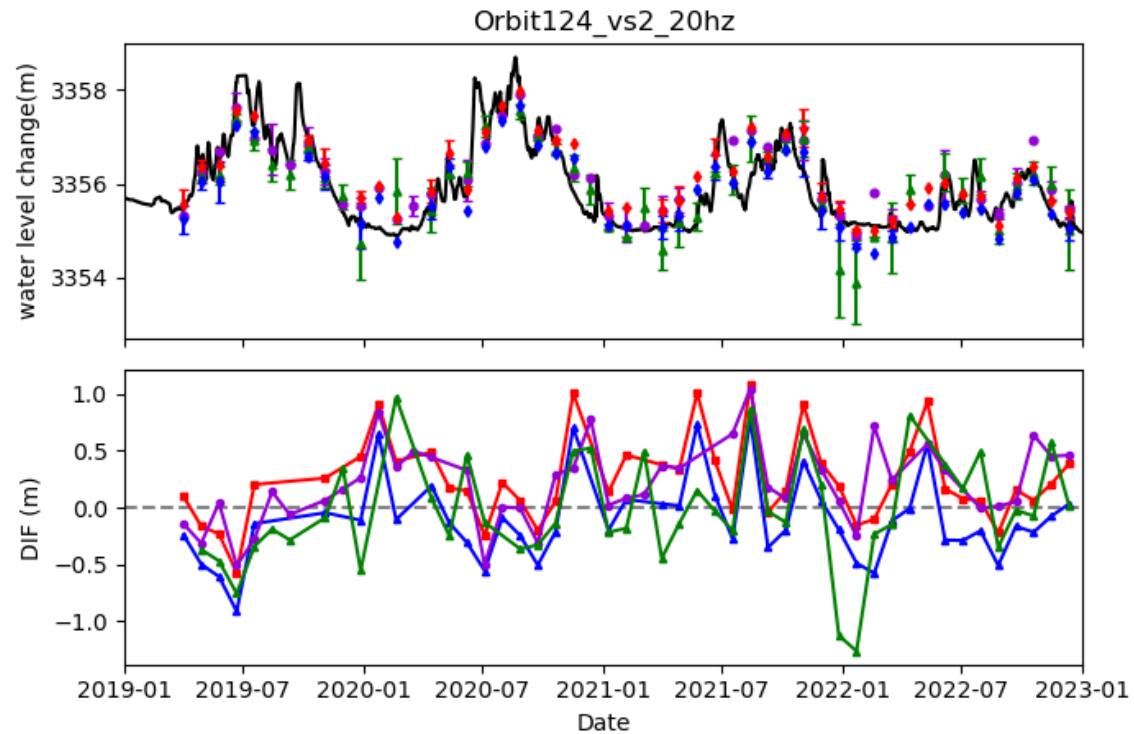
- For 20 Hz data, FFSAR( $r = 0.87$ ) > SCIHUB( $r = 0.81$ ) > GPOD( $r = 0.68$ ).
- For 80 Hz data, FFSAR( $r = 0.88$ ) > GPOD( $r = 0.78$ ).



# Preliminary results

## 20 Hz data at Orbit\_124\_vs2 (width of 240 m):

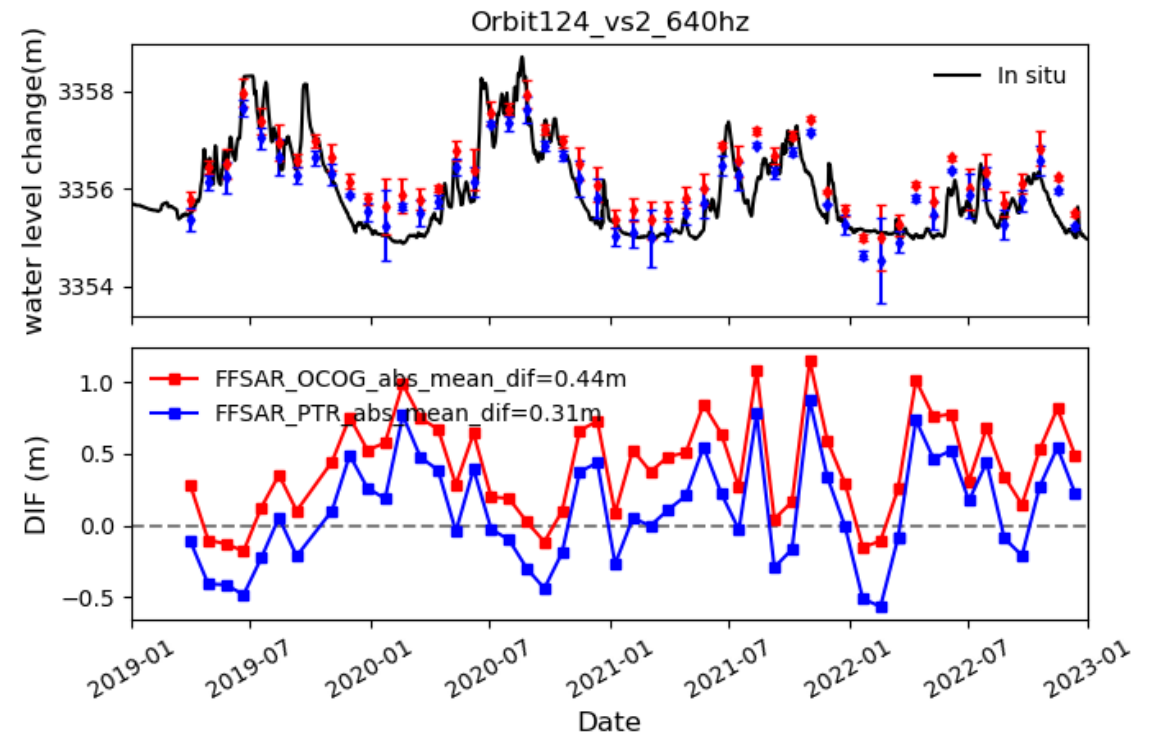
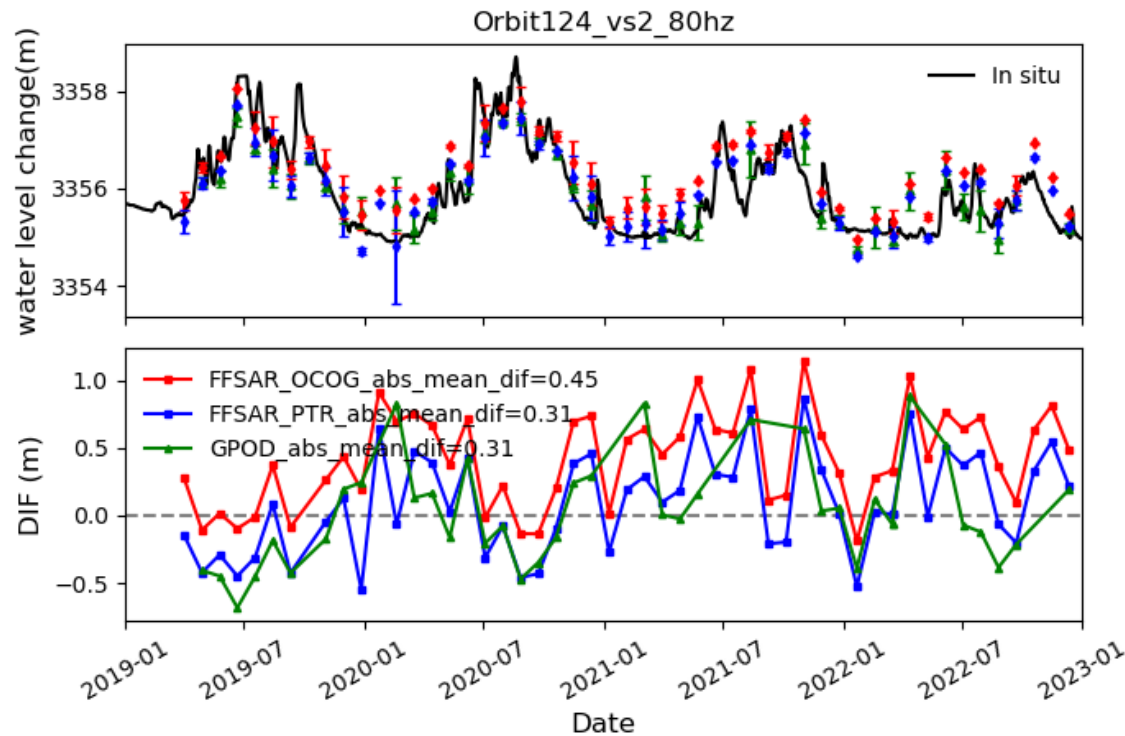
- The average of the absolute value of the difference: GPOD(0.85 m) < FFSAR(0.91 m) < SCIHUB(0.76 m)



# Preliminary results

High-rate data at Orbit\_124\_vs2 (width of 240 m), the standard deviation of along-track std (STDD):

- FFSAR\_OCOG\_640hz(0.139 m) < GPOD\_80hz(0.140 m) < FFSAR\_OCOG\_80hz(0.155 m).
- FFSAR\_PTR\_640hz(0.168 m) < FFSAR\_PTR\_80hz(0.212 m).





# Summary

- Assessments at two virtual stations are performed, partially due to the limited quota.
- It seems high-rate data are better to retrieve WSE of narrow rivers.
- The results obtained are not conclusive. More assessments are needed to reach a robust conclusion.