

# ASSESSING AND IMPROVING FLUVIAL FLOOD FORECAST PERFORMANCE USING SENTINEL-1 DERIVED FLOOD EXTENT MAPS

H44E-05

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**AGU** FALL  
MEETING

floodDAM 

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CLS  
COLLECTE LOCALISATION SATELLITES



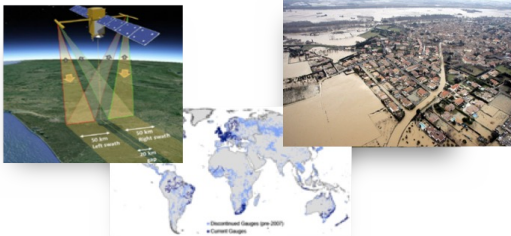




## CHALLENGES IN HYDRODYNAMICS

### Operational issue

How to predict river discharge for flood forecasting and water balance estimation?

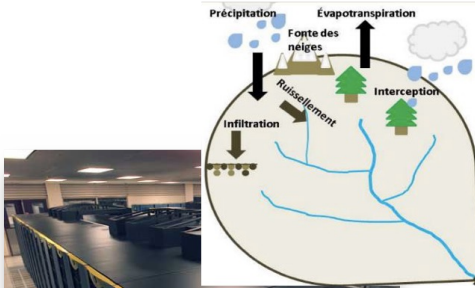
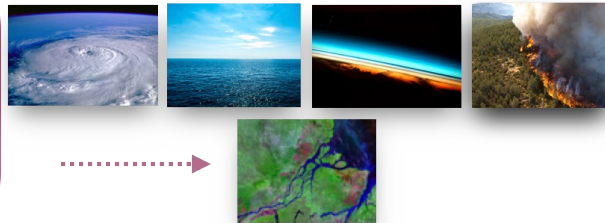


### Observations

- in-situ : high frequency but sparse
- remote sensing : spatial coverage (SWOT) but low temporal coverage
- Various nature of errors



### Data assimilation

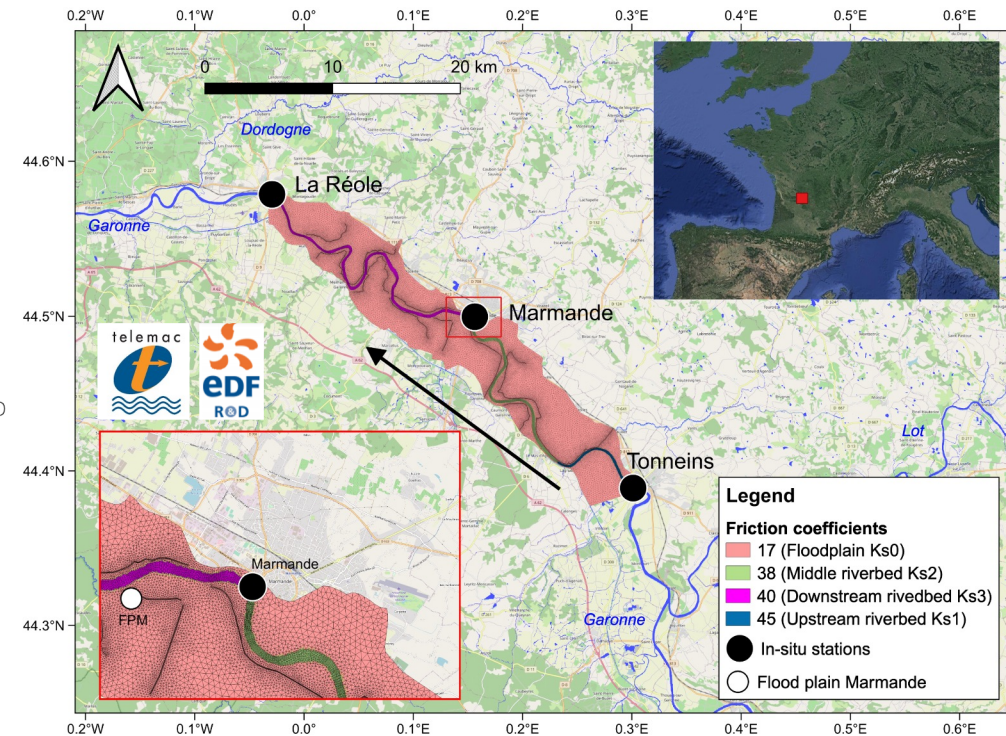


### Numerical simulations

- Simplified Navier Stokes equations 1D, 2D, 3D
- Limited information on bathymetry, topography, friction, hydrology, rainfall and maritime forcing



### Study Area and Model



**OBJECTIVE: MERITS OF USING REMOTE SENSING-DERIVED FLOOD OBSERVATIONS TO OVERCOME LIMITATIONS OF CAL/VAL PROCESSES RELYING ON IN-SITU DATA.**

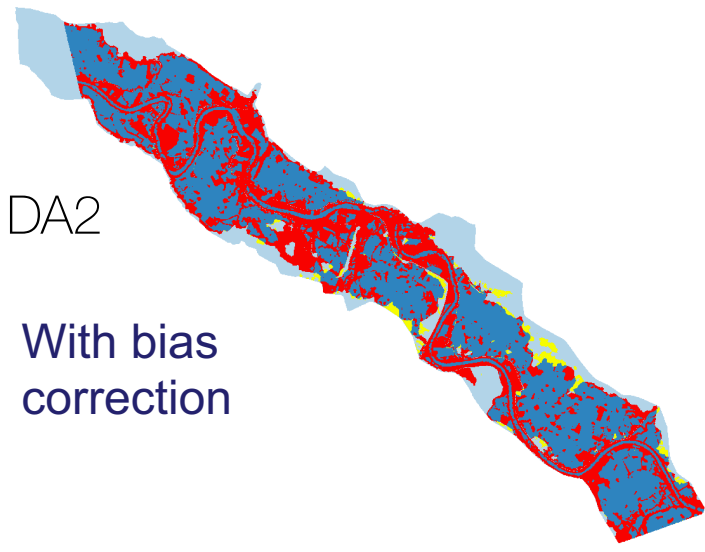
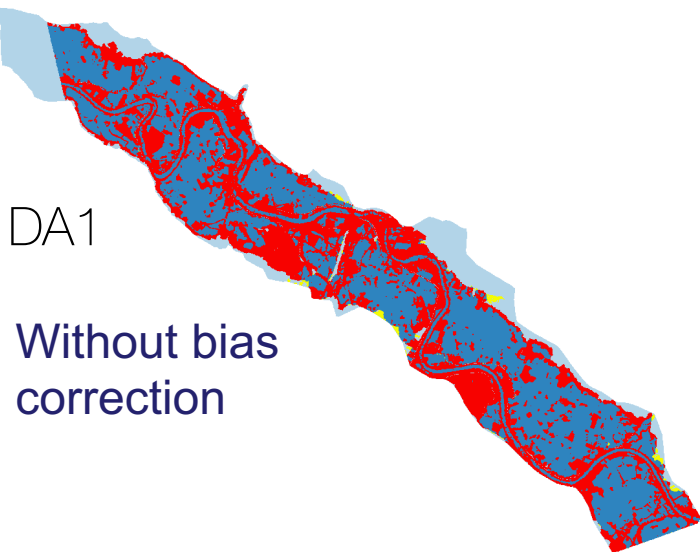
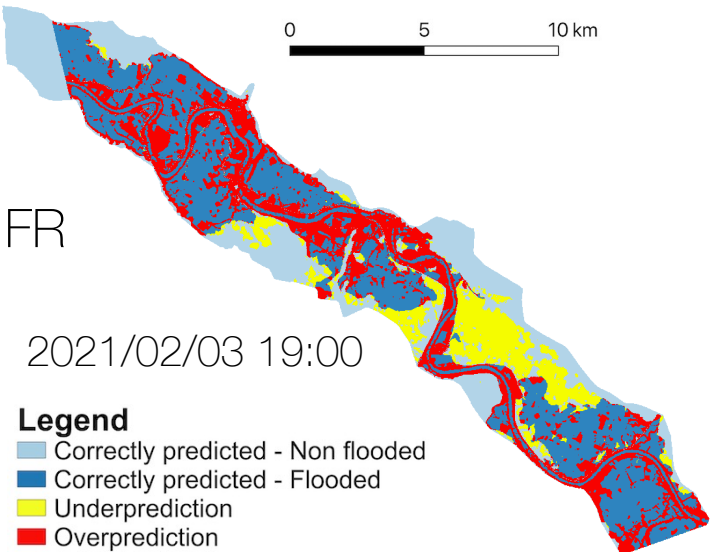


# VALIDATING FLOOD EXTENTS W.R.T. SENTINEL-1 DATA

ENSEMBLE-BASED DATA ASSIMILATION ALLOWS TIME-VARYING CORRECTION OF FRICTION COEFFICIENTS AND INFLOW DISCHARGE  
→ IMPROVED SIMULATION AND FORECAST IN THE RIVERBED AND FLOODPLAIN

Exp. name	1D Water level RMSE [m]			2D CSI [%]
	Tonneins	Marmande	La Réole	Feb 3 <sup>rd</sup> 19:00
FR1	0.756	0.625	0.409	55.86
FR2	0.102	0.338	0.505	
DA1	0.090	0.059	0.148	61.97
DA2	<u>0.084</u>	0.104	<u>0.138</u>	<u>63.84</u>

Critical Success Index (CSI) =  $\frac{\text{Blue}}{\text{Blue} + \text{Yellow} + \text{Red}}$







## CONCLUSIONS

2D INDEPENDENT OBSERVATIONS OFFER VALUABLE TOOLS FOR VALIDATION.

EXTENSIVE ASSESSMENTS USING IN-SITU AND RS-DERIVED FLOOD EXTENT OBSERVATIONS.

- EVALUATION OF SIMULATED WATER LEVEL TIME-SERIES
- GLOBAL ASSESSMENT OVER THE WHOLE CATCHMENT
- HIGH WATER MARKS WITHIN THE FLOODPLAIN

<https://doi.org/10.1109/TGRS.2022.3147429>

<https://www.spaceclimateobservatory.org/flooddam-way-2nd-stage>

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