

Wave Atlas PF: Modelling Wave Resource in French Polynesia

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Introduction

The primary aim of the Wave Atlas PF program is to understand the quality of French Polynesia's wave resources, to enable the country and its stakeholders to form an opinion and a strategy for the future.

Beneficiaries

- Making maps available to territory decision-makers in French Polynesia
- OpenData time series available to funders, scientists, consultancies, etc.

Method

Modelling sea states with MFWAM:

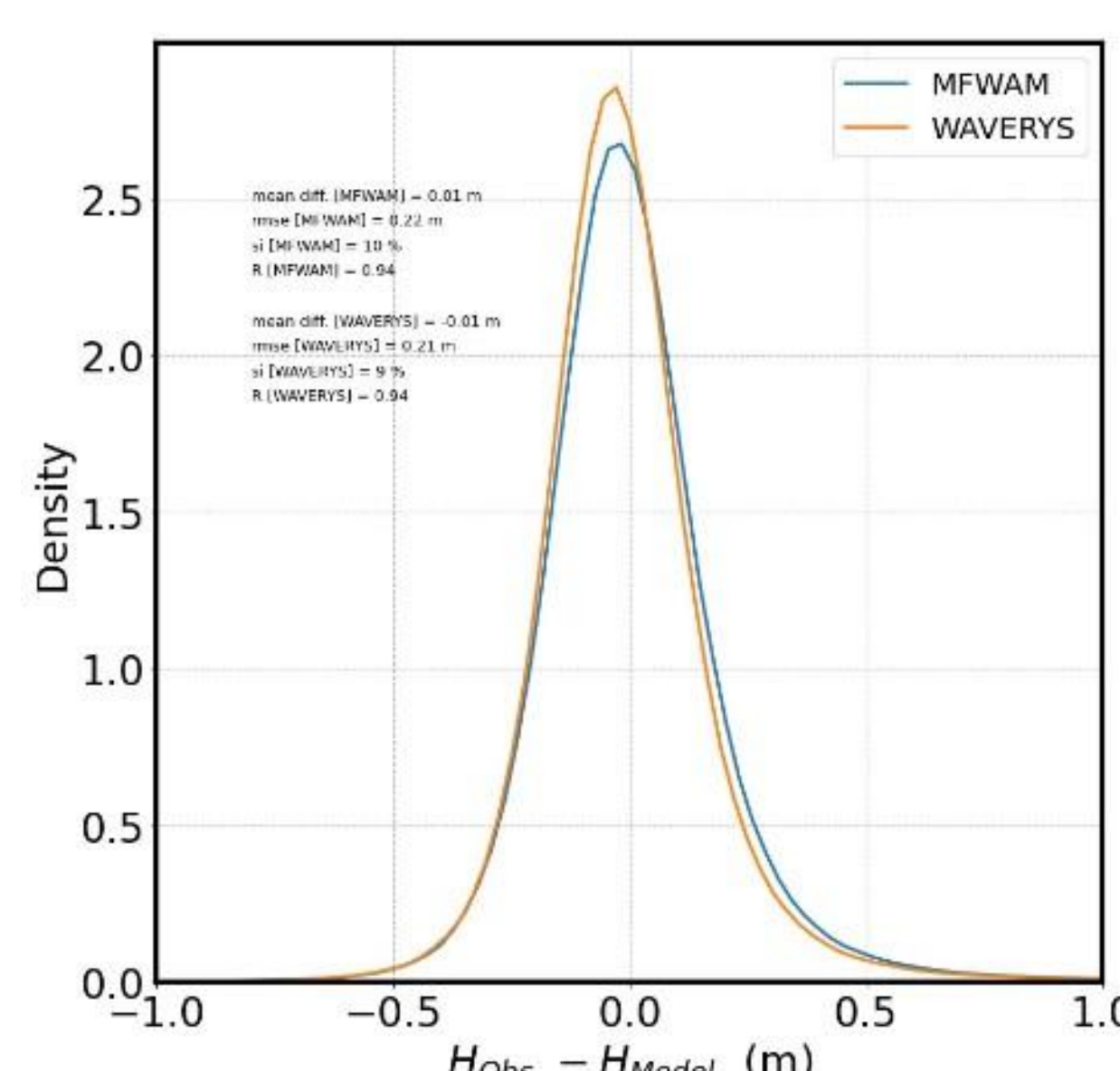
- 5 km x 5 km
- Every 3 hours during 30 years

Calculation of the sea surface wave energy flux:
 $J = 0,49 H_s^2 T_e$

Statistical treatment

- Internal qualification by Météo – France
 - 2 external validations: comparison with an existing database and counter-validation with SWAN on 5 islands
- RMSE, bias, R and R² score calculations

Internal qualification results:



Comparison with SWAN counter-validation:

R ²	From 0,82 to 0,86 following the islands
RMSE	From 0,24m to 0,26m following the islands
Bias	From -0,04m to 0,13m following the islands

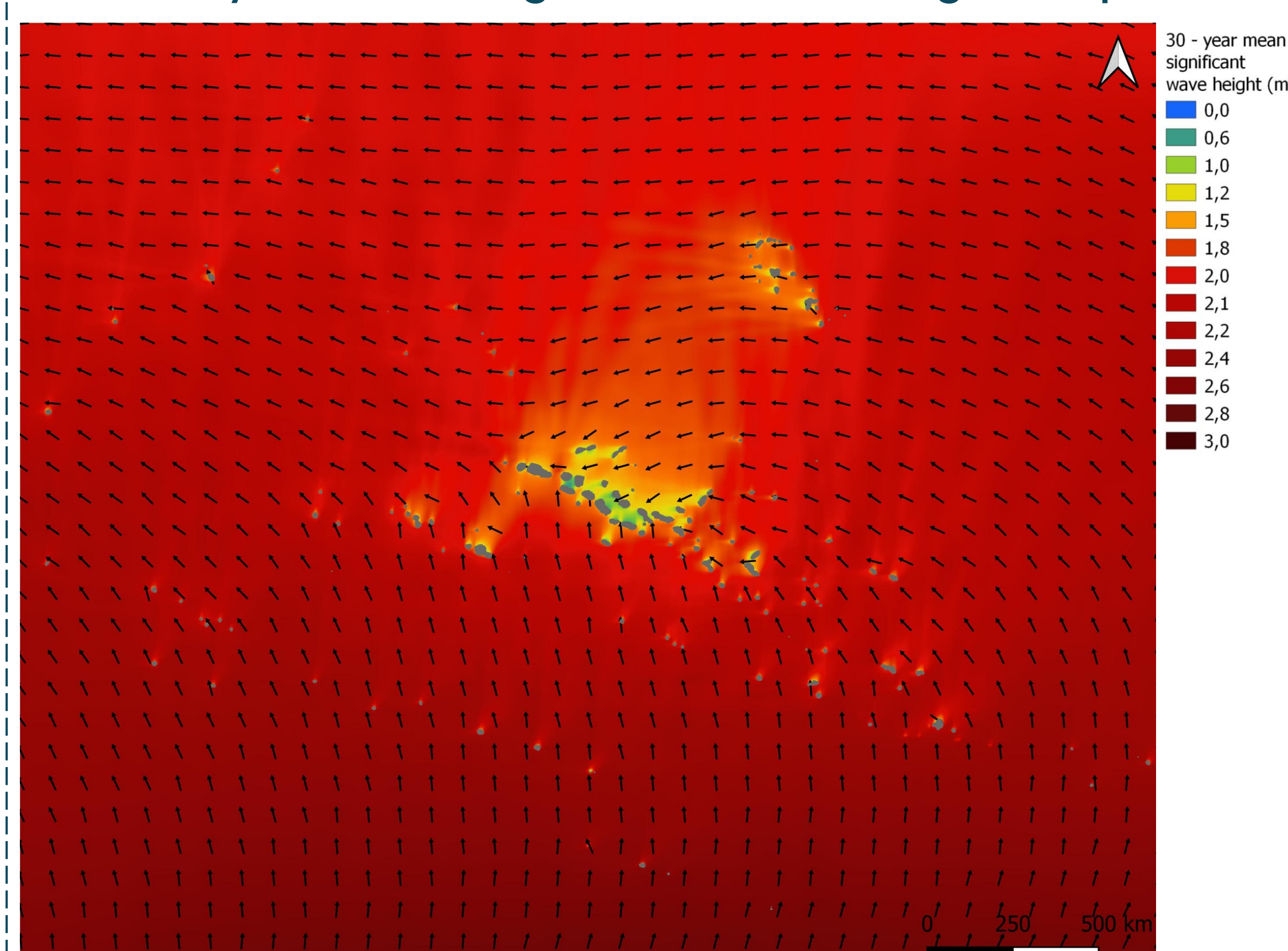
Comparison with IFREMER WW3-POLYNESIE-3MIN: (Nota: database created in forecast mode)

R ²	0,87
RMSE	0,16m
Bias	-0,006m

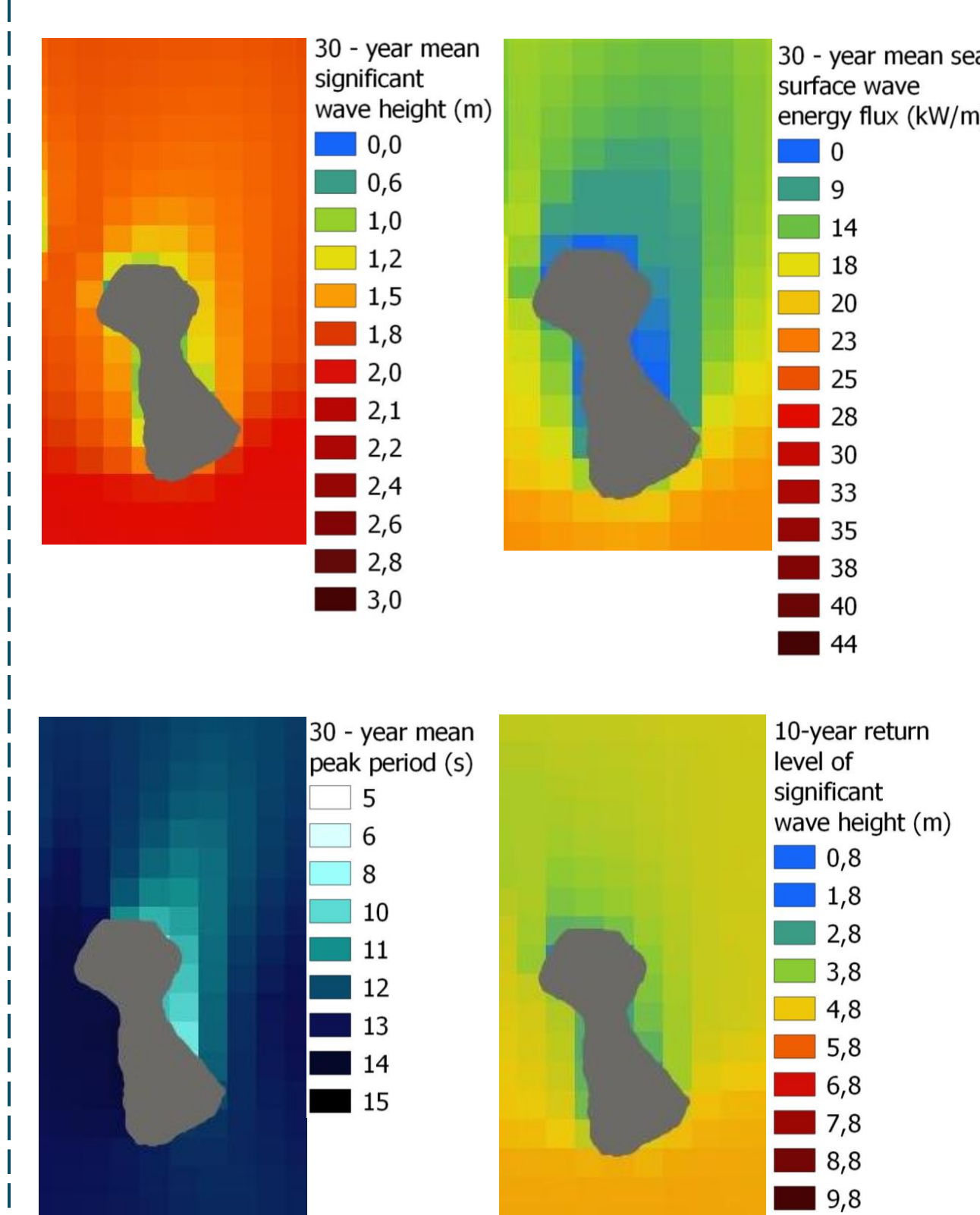
✓ Good scores for the qualification and the comparisons

Results

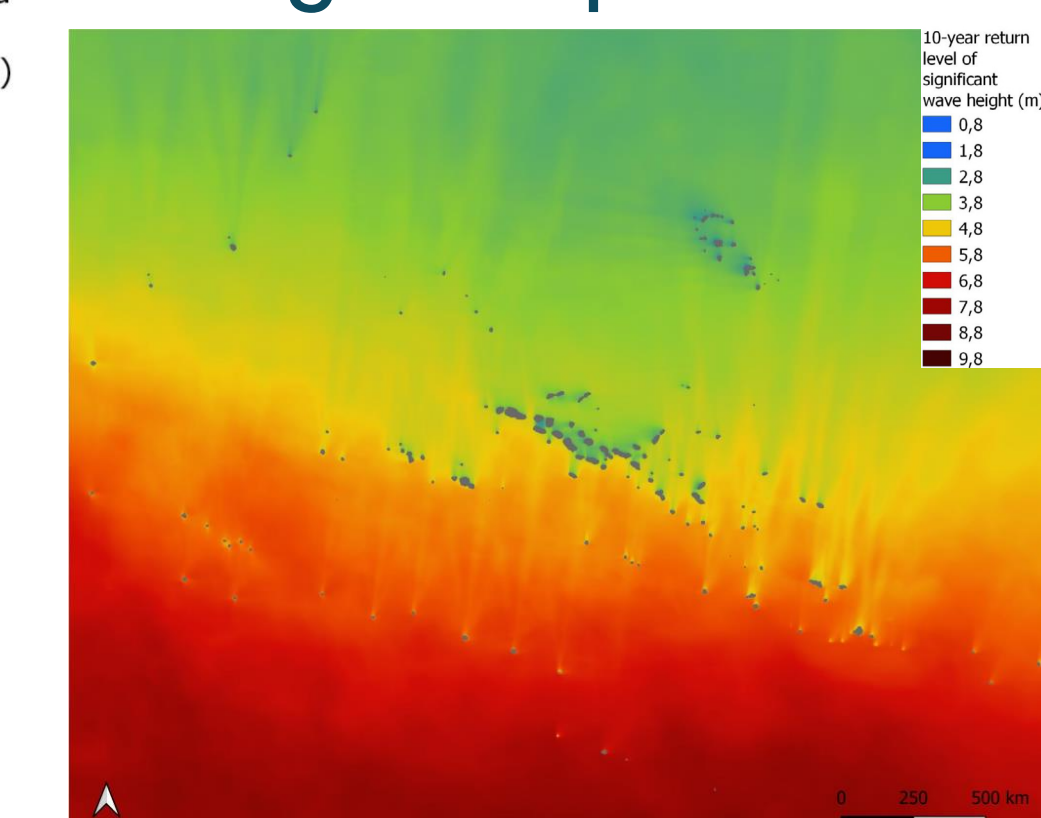
➤ 30 – year mean significant wave height map:



➤ Focus on Raiatea for 4 indicators:



➤ 10 –year return level of significant wave height map:



Conclusion and perspectives

Maps and time series are available in Open Data

Atlas will be updated on annual basis

Short-term forecast to be deployed by taking advantage of the model set up for the Atlas

References

Axel Roy, Victoire Laurent (2023). Réanalyse du modèle de vagues MFWAM sur la Polynésie française (MFWAM_FR-POLYNESIA_005).
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