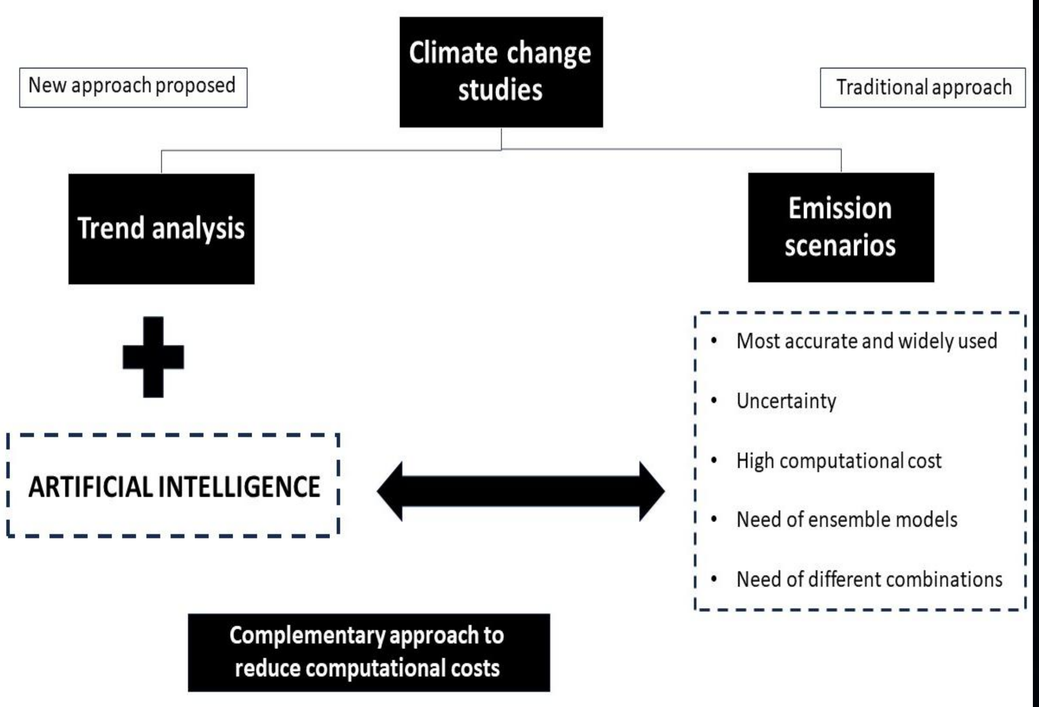
SYMPOSIUM OP'24 ADVANCING OCEAN PREDICTION SCIENCE FOR SOCIETAL BENEFITS

Artificial Intelligence for wave climate predictions

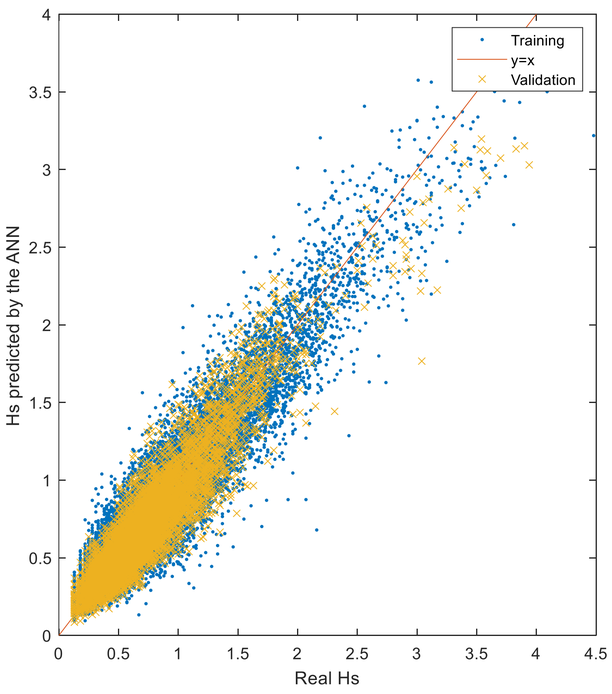
Nerea Portillo Juan and Vicente Negro Valdecantos

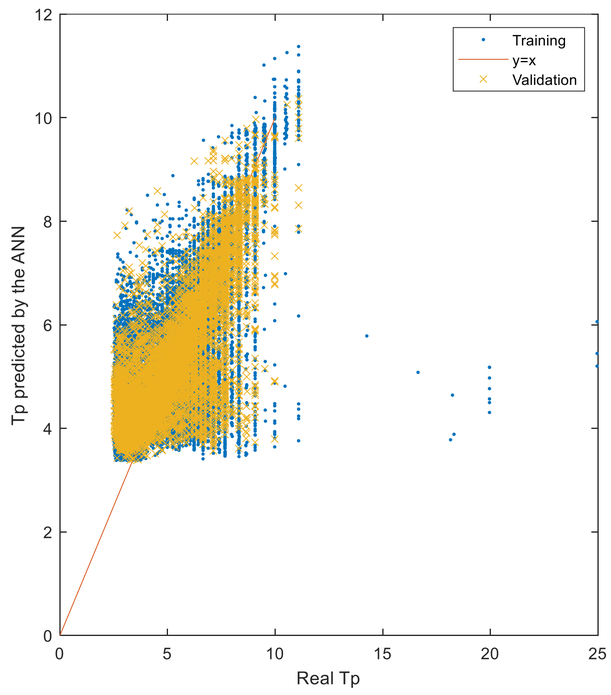
Introduction

In this study, we merge statistical methodologies with AI techniques to develop a model that enables the study of future wave climate and the propagation of waves to the coast. We employ probabilistic methods, specifically Monte Carlo simulations, to generate synthetic data series. The use of ANNs facilitates the handling of large data sets at a minimal computational cost, while Monte Carlo simulations allow for the generation of future climate change projections at a regional level. The aim of this paper is to leverage the strengths of both methodologies: the data generation capabilities of probabilistic techniques and the extensive data analysis capabilities of AI techniques. The combination of these methodologies results in a highly accurate (MSE of 0.02 m and 1 s) and computationally efficient hybrid model for projecting coastal maritime climate considering climate change.



Model performance



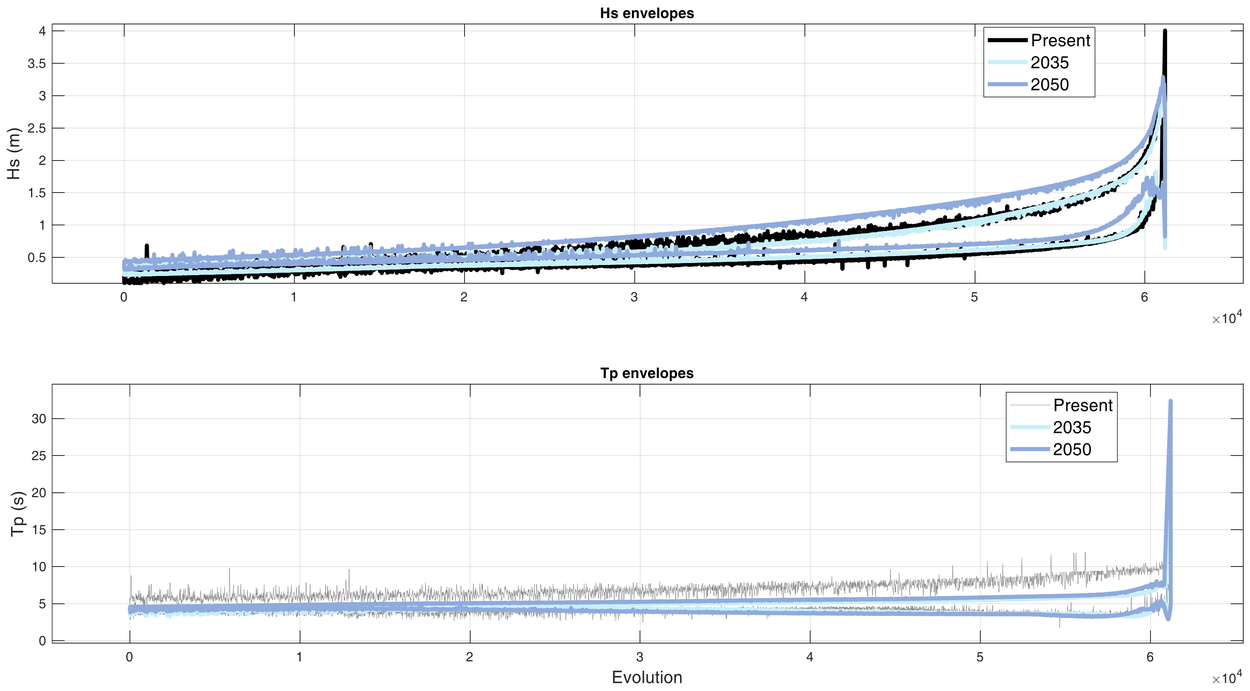


Model characteristics

	Error	Valencia	Cabo Palos
Hs	RMSE Training	0.144	0.167
	RMSE Validation	0.142	0.147
Tp	RMSE Training	1.10	0.873
	RMSE Validation	1.05	0.863

Hyper/ parameters	Value
Nº epochs	1000
Batch size	1
Validation checks	6
Algorithm	LM
Learning rate	Adaptive based on the error
Arquitecture	4-33-2 and 4-22-2
Transfer function	Hyperbolic tangent sigmoid and linear

Climate change projections in Valencia



Universidad Politécnica de Madrid. ECOREL.