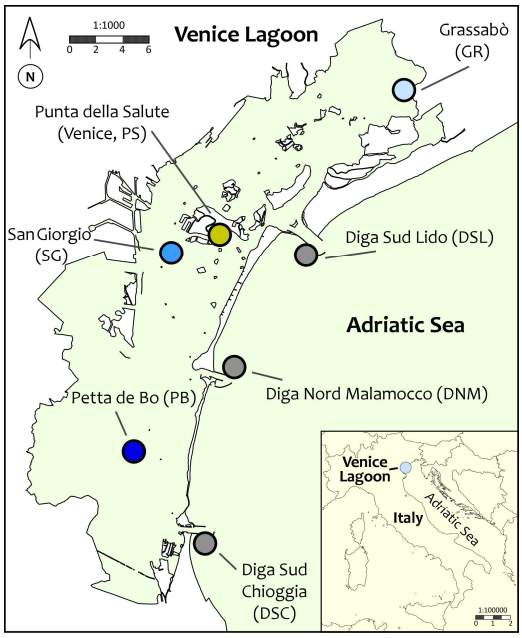
SYMPOSIUM OP'24 ADVANCING OCEAN PREDICTION SCIENCE FOR SOCIETAL BENEFITS

The crucial role of monitoring and forecasting the small-scale meteorological processes in the Venice Lagoon

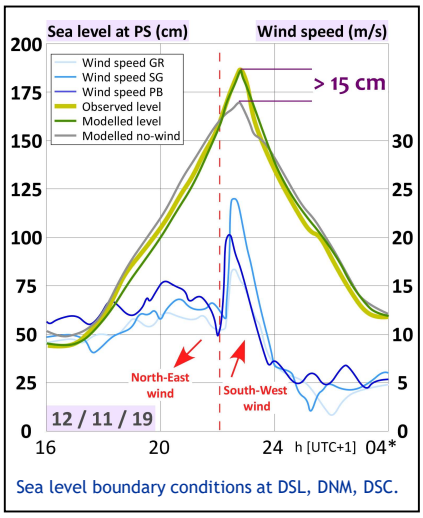


INTRODUCTION AND TARGET

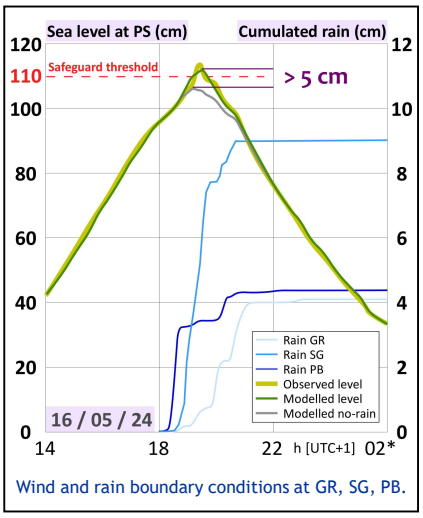
Sea storms represent a major threat for the Venice Lagoon, North Adriatic Sea, Italy, where sea level forecast is of paramount importance for the safeguard of its settlements.

Although the forecast capability has improved significantly in the last decades, allowing reliable descriptions of meteorological patterns in the North Adriatic Sea a few days in advance, it is still very complex to identify and predict magnitude, trajectory, and effects on water levels of the small-scale local depressions traveling alongshore the lagoon.

Here we analyzed the effects of the strong and short-lived winds, as it happened on 12 November 2019, and the sudden and violent rain directly falling into the lagoon, as it happened on 16 May 2024.



Sea level boundary conditions at DSL, DNM, DSC.



Wind and rain boundary conditions at GR, SG, PB.

OUTCOMES

We carried out the simulations by means of a two-dimensional coupled wind-wave tidal model developed at the University of Padova (WWTM).

Results highlight a contribute of the local wind >15cm on 12 November 2019, and a contribute of the local rain >5cm on 16 May 2024, producing the overcome of the Venice safeguard threshold.

CONCLUSIONS

The Italian Institute for Environmental Protection and Research (ISPRA) manages a dense network of meteorological and oceanographic stations located within the lagoon and offshore. These data, coupled with detailed numerical simulations, allowed a keen analysis of the local physical processes driven by the storms. Insights from the above mentioned storm events show that, under peculiar meteorological conditions, the sea level may be very sensitive to small scale details of the three-dimensional meteorological fields, which are not always available or properly represented in the present resolution of the main meteorological models and that are intrinsically less predictable.

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