

# CP44D-1418 High-Resolution Metocean Forecasting and Hazard Assessment in a Mediterranean Gulf: Thermaikos Gulf



Thursday, 26 February 2026



16:00 - 18:00

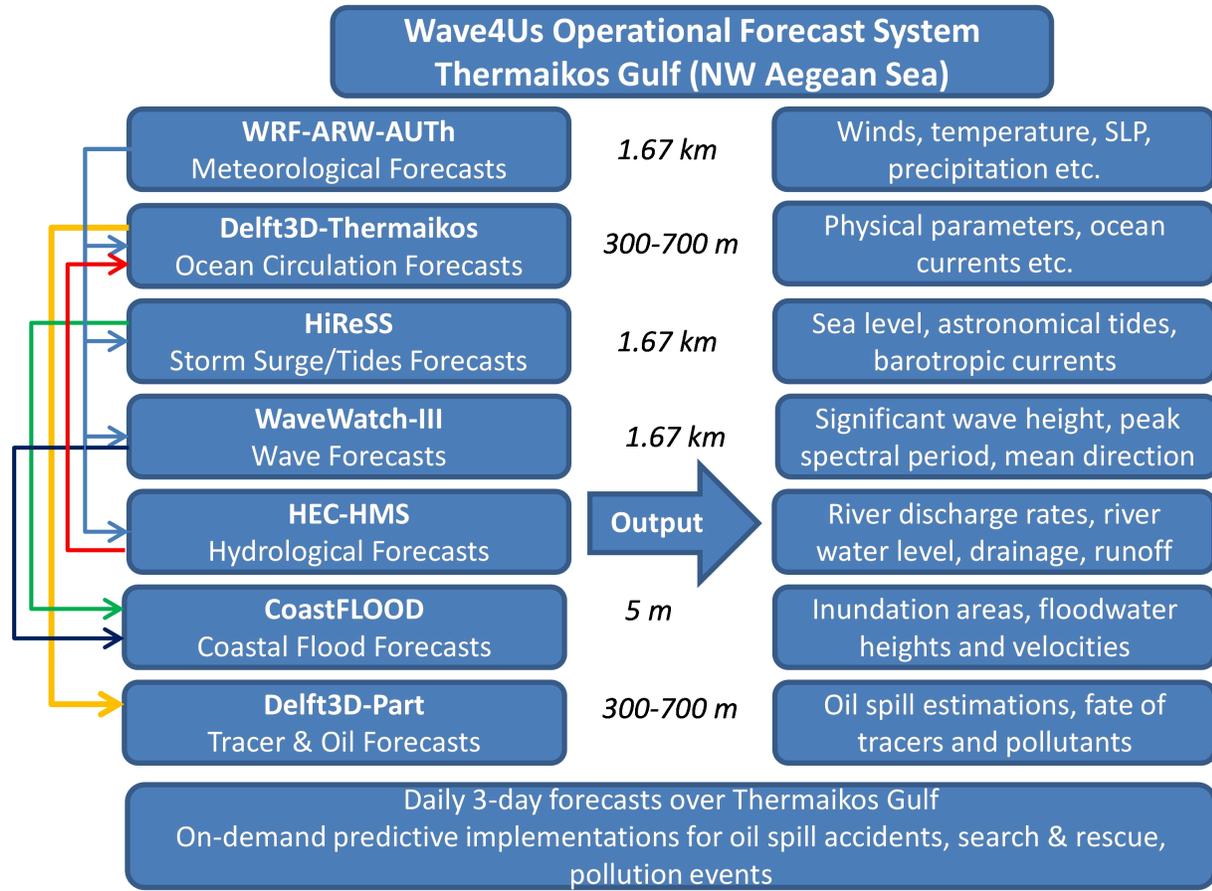


Hall 4 (Poster Hall) (SEC)

## Abstract

The Thermaikos Gulf is a naturally protected embayment in the northwestern Aegean Sea (northeastern Mediterranean). The gulf is subject to multiple anthropogenic pressures (e.g., ports and high marine traffic, the metropolitan area of Thessaloniki with more than 1.5 million residents, extensive aquaculture and fishery activities, discharges of agricultural, urban, and industrial polluted waters) and natural influences (e.g., marine heatwaves hotspot, prevailing river plume dynamics). Therefore it is essential to have reliable metocean forecasts for weather, ocean circulation, sea level, wave dynamics, and hazard-related events such as pollutant dispersion, coastal flooding, and freshwater discharges. The Wave4Us operational platform addresses these needs by providing daily, high-resolution, short-term forecasts, accessible to local authorities, researchers, and the public. Additionally, on-demand predictions for marine pollution, coastal inundation, and heatwaves offer real-time insights to emergency responders and coastal authorities during hazardous events. This study presents the platform's structure, modelling advancements, and predictive skill for specific hazards. Forecast efficiency is evaluated against satellite and field observations: (i) the simulated oil spill spreading is verified by satellite data; (ii) the modelled freshwater discharges are validated against field measurements; (iii) a pronounced river plume spreading is confirmed by ocean/tracer simulations and satellite imagery; (iv) the prediction of sea level, wave conditions, and coastal flooding under a severe low-pressure system is validated against measurements and documented events; (v) the marine heatwave predictions are confirmed by comparing simulated and satellite sea temperatures (error < 1%). These evaluations demonstrate the platform's reliability in forecasting key environmental risks, aiding

decision-making and response efforts in the Thermaikos Gulf region.



## Plain-language Summary

Thermaikos Gulf is located in the northwestern Aegean Sea (NE Mediterranean Sea) faces intense human pressures—ports, heavy marine traffic, Thessaloniki’s >1.5 M residents, aquaculture, fisheries, and polluted inflows from the land—alongside natural influences like marine heatwaves and river plumes. Reliable forecasts of weather (winds, precipitation etc.), ocean currents, sea level, waves, and hazards such as pollution, coastal flooding, and freshwater discharges are vital. The Wave4Us platform provides daily high-resolution metocean forecasts and on-demand predictions for pollution, inundation, and heatwaves, supporting authorities and public. Its performance is validated against satellite and field data: oil spill spread, freshwater discharges, plume dynamics, sea level/waves/flooding under storms, and marine heatwaves. Results show high reliability, aiding decision-making and rapid response in this sensitive coastal area.

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