

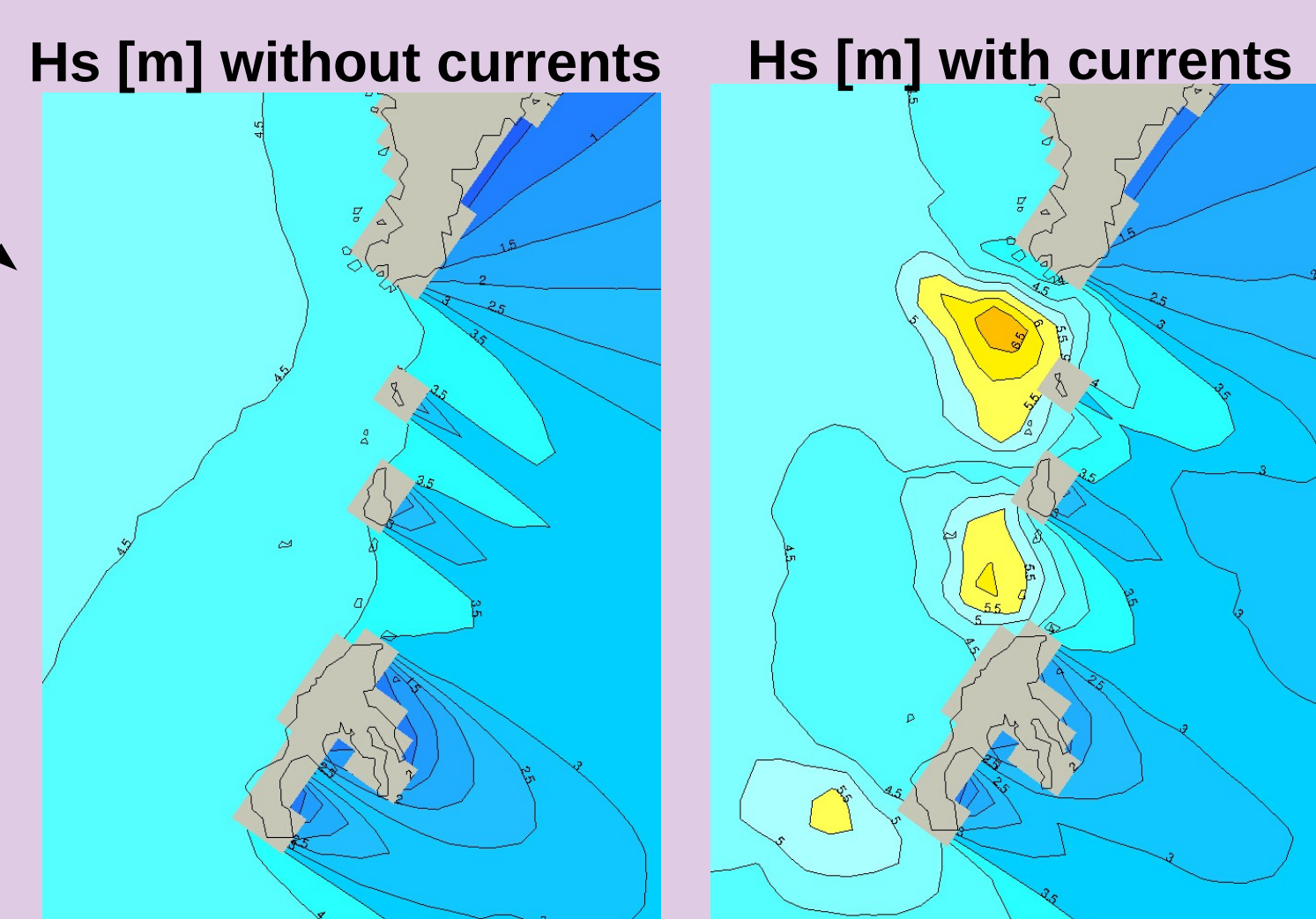
Wave-Current Interaction in the Lofoten Maelstrom Area Northern Norway

Ana Carrasco and Øyvind Saetra
Norwegian Meteorological Institute, Oslo, Norway.



The maelstrom off Norway, as illustrated by Olaus Magnus on the Carta Marina, 1539

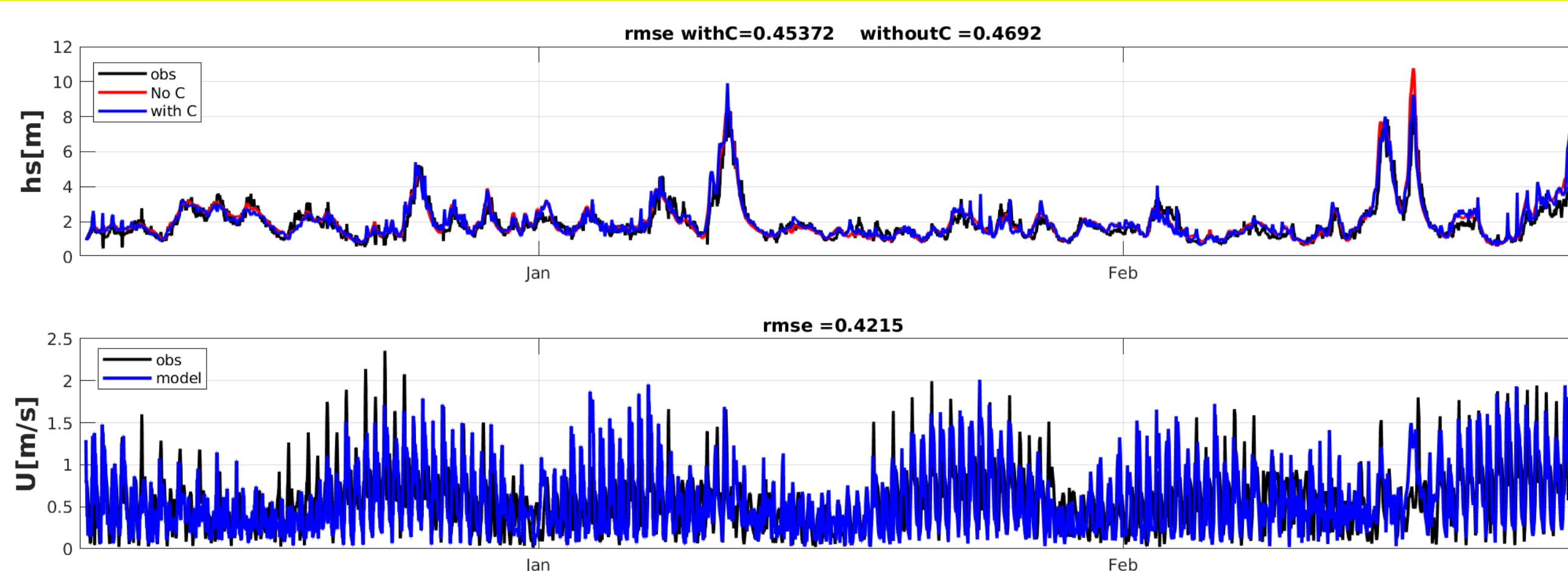
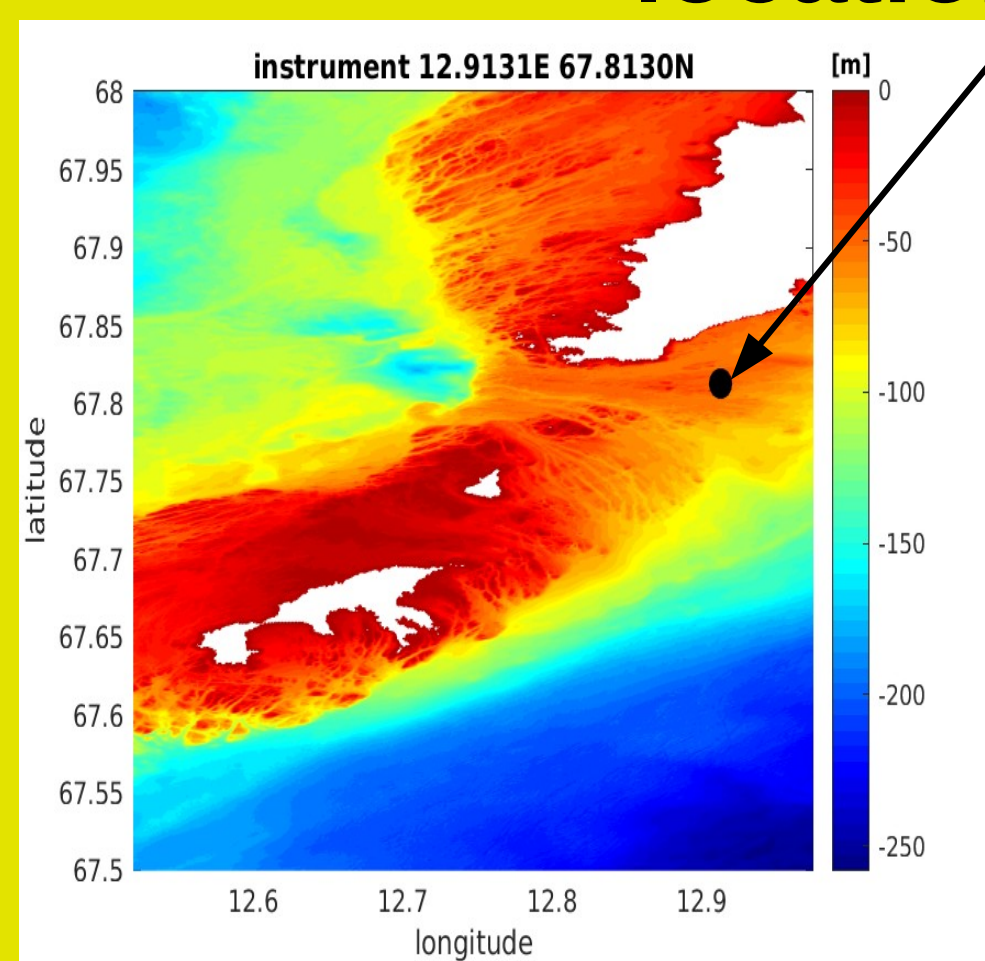
2.- WAM is run with winds from Harmoni-Arome and currents from ROMS. The wave field changes when including currents.



1.- The Lofoten Maelstrom is a strong tidal current on the southern tip of the Lofoten peninsula in Northern Norway (~12.7°E, 67.8°N). Its speed can reach up to 3 ms⁻¹. The strength of this current and its dangerous whirlpools are legendary, featuring in works of art and literature e.g. Edgar Allan Poe's "A Descent into the Maelstrom". This strong tidal current interacting with surface wave makes this region dangerous for navigation.

3.- Observations were taken by an ADCP Nortek instrument mounted on the sea floor for almost three months. Including currents in the wave model improves the variability of Hs though the RMSE is almost the same.

Instrument location



4.- From an index of "bad detects" in the instrument we were able to localized short periods of wave breaking occurring with an accelerating opposing current. These events were undetectable from the wave model.

During the breaking events:

- The significant wave high drops.
- The component of the surface current opposite to the wave direction (3th panel) increases.
- The surface temperature decreases.
- Energy at specific high frequencies dramatically decreases.

