Geophysical Research Abstracts
Vol. 19, EGU2017-4824, 2017
EGU General Assembly 2017

Towards the Adriatic meteotsunami early warning system: modelling strategy and validation

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Destructive meteotsunamis are known to occur along the eastern Adriatic coastal areas and islands (Vilibić and Šepić, 2009). The temporal lag between the offshore generation of meteotsunamis due to specific atmospheric conditions and the arrival of a dangerous nearshore propagating wave at known locations is of the order of tens of minutes to a couple of hours. In order to reduce the coastal risk for the coastal communities, an early warning system must rely on the ability to detect these extreme storms offshore with in-situ measurements and to predict the hydrodynamic response nearshore via numerical models within this short time lag.

However, the numerical modelling of meteotsunamis requires both temporal and spatial high-resolution atmospheric and ocean models which are highly demanding concerning time and computer resources. Furthermore, both a multi-model approach and an ensemble modelling strategy should be used to better forecast the distribution of the nearshore impact of meteotsunamis.

The modelling strategy used in this study thus rely on the development of an operational atmosphere-ocean model of the Adriatic Sea at 1km spatial resolution based on the state-of-the-art fully coupled COAWST model (Warner et al., 2010). The model allows for generation of meteotsunamis offshore, while various high-resolution (up to 5m) nearshore hydrodynamic models (such as ADCIRC - Luettich and Westerink, 1991; SELFE - Zhang et al., 2008 and GeoClaw – LeVeque, 2012) are setup to properly reproduce meteotsunami dynamics of the entire Croatian coastal areas, which are characterized by a great number of islands, channels and bays.

The implementation and validation of each component of this modelling system is first undertaken for the well documented meteotsunami event (Šepić et al., 2016), which was recorded along the Croatian Adriatic coast on the 25th and the 26th of June 2014. The validation of the modelling strategy as well as the model results is presented and discussed in this study.

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