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Meteo-marine simulations of the November 1966 extreme event in Italy

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The extreme event of November 1966 in Italy is the subject of the present work. The analysis carried out focused on the precipitation and surge phenomena and is based on observations, NCEP and ECMWF re-analysis data, and model simulations.

Several model simulations have been performed with the coupled meteo-marine regional model MIAO (Model of Interacting Atmosphere and Ocean) that is composed of three modules: BOLAM (Limited Area atmospheric circulation model), POM (ocean circulation model) and WAM (ocean waves model), which can be coupled to each other. Different coupling modalities and schemes for air convections have been tested and distinct datasets have been used to force initial and boundary conditions on the regional model. A high resolution (0.07 deg in longitude and latitude) simulation has been performed with the atmospheric model, and its results have been used to force the wave model WAM and the ocean model POM. The synoptic situation during the simulated event has been determined by the combined action of a trough deepening over Spain and Weastern Mediterranean, which created a strong thermal contrast over the Mediterranean basin through advection of cold air from the North, and a strong anticyclone over the Balcans, which determined the conditions for strong Sirocco wind over the Adriatic. The cold front associated with the trough caused extreme precipitation and whidespread floods over Tuscany. The orographic uplift due to the Alpine barrier caused the intense precipitation over North-Eastern Italy. The Sirocco wind along the Adriatic basin, determined by the strong zonal pressure gradient and reinforced by the funnelling effect, caused the highest recorded sea level rise in Venice. Results have been compared with observations in order to reconstruct the dynamics of the event, identify the causes of its anomalous intensity and test the model capability

of simulating it. Results of the different simulations have been compared, to test their dependence on initial and boundary conditions, their resolution and the schemes used to describe the physics of the model. The aim is to identify the key factors to correctly reproduce this extreme event.