

Ultra-high resolution wind forecasting for the sailing events at the Rio de Janeiro 2016 Summer Olympic Games

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ABSTRACT: The current study presents AEOLUS-RIO2016, an ultra-high resolution wind forecasting system that was developed and implemented operationally for supporting the Hellenic Olympic Sailing Team during the sailing events at the Rio de Janeiro 2016 Summer Olympic Games. The forecasting system was built around the state-of-the-art numerical weather prediction Weather Research and Forecasting model, ported to a high performance computing infrastructure that ensured the reliability and timeliness of the provided service. Advanced web mapping tools were employed for communicating forecasts effectively to the athletes and coaches throughout the period of the sailing events. Prior to the operational deployment of AEOLUS-RIO2016, sensitivity experiments were carried out, focusing on the representation of topography and land use and aiming at improving wind forecasts. The results suggest that the employment of very high resolution and up-to-date terrestrial data allowed model performance to be improved, especially in terms of the wind direction guidance provided. Considering the period of the sailing events, the evaluation of AEOLUS-RIO2016 revealed an overall satisfactory performance. Notably, however, it was found that the system failed to provide reliable wind guidance on specific days. *A posteriori* implementation of the model using an alternative source for providing initial and lateral boundary conditions showed notable improvements in model performance.

KEY WORDS Rio 2016 Olympic Games; wind; sailing; ultra-high resolution; WRF; high performance computing

Received 28 November 2016; Revised 21 March 2017; Accepted 29 March 2017