

EGU24-19086

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



## Evaluation of atmospheric forces induced by extreme Bora wind on a high-rise hospital in the coastal city of Trieste, Italy

**Petros Ampatzidis<sup>1</sup>**, Carlo Cintolesi<sup>1</sup>, Andrea Petronio<sup>2</sup>, and Silvana Di Sabatino<sup>1</sup>

<sup>1</sup>University of Bologna, Department of Physics and Astronomy, via Irnerio 46, 40126, Bologna, Italy

<sup>2</sup>Optimad srl, Development Center, Località Padriciano, 99 c/o Area Science Park 34149, Trieste, Italy

Extreme weather events dominate the disaster landscape of the 21<sup>st</sup> century and disaster risk is becoming systemic with one event overlapping and influencing another in ways that are testing our resilience to the limit. This is particularly true for critical infrastructure, such as hospitals, that are vital to the functioning of society but have received limited attention in terms of investment in prevention, climate change adaptation and risk reduction. One of the most severe weather events, present in mountainous coastal areas is the Bora wind, a strong and often gusty regional katabatic wind generated by cold and dry air spilling down from a mountain range. The Bora wind has been studied extensively from a meteorological point of view. However, there is limited research on its consequences on the critical infrastructure of coastal urban areas, particularly tall buildings that are susceptible to high wind and wind-driven rain. In Europe, strong Bora winds are encountered on the east coast of the Adriatic Sea. The scope of this study is to assess the Bora-wind-induced atmospheric forces exerted on the high-rise Cattinara hospital in Trieste, Italy, a location where strong Bora winds often occur during the autumn and winter seasons and an increased risk of functionality loss is present. High-resolution RANS simulations are performed for the hospital and the surrounding buildings over the complex and mountainous topography of the area. The imposed boundary conditions approximate the extreme February 2012 Bora wind event that saw gusts of more than 40 m/s in the region. The results provide an evaluation of the methodological framework, assess the inherent complexities of atmospheric simulations over intricate landscapes and demonstrate that a comprehensive understanding of the aerodynamic loads is imperative for mitigating potential vulnerabilities in critical infrastructure subjected to such extreme meteorological phenomena. The study is conducted within the remit of the HORIZON-EU project RISKADAPT (Asset Level Modelling of RISks in the Face of Climate-Induced Extreme Events and ADAPtation) that seeks to provide solutions to support systemic, risk-informed decisions regarding adaptation to climate change induced compound events at the asset level.