

EGU2020-13233

<https://doi.org/10.5194/egusphere-egu2020-13233>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



## Rossby wave packets associated with extreme precipitation events over Northern-Italy

**Federico Grazzini**<sup>1,3</sup>, Georgios Fragkoulidis<sup>2</sup>, Franziska Teubler<sup>2</sup>, Volkmar Wirth<sup>2</sup>, and George Craig<sup>1</sup>

<sup>1</sup>LMU, Meteorologisches Institut, Atmosphärische Dynamik, München, Germany (federico.grazzini@lmu.de)

<sup>2</sup>Institute for Atmospheric Physics, Johannes Gutenberg University Mainz, Mainz, Germany

<sup>3</sup>ARPAE SIMC Emilia-Romagna, Italy

Several studies on extreme precipitation events (EPEs) in the alpine area reported, as the main triggering factor, a meridionally elongated upper-level trough (i.e., a breaking Rossby wave) as part of an incoming Rossby wave packet (RWP). In this work, we investigate a vast number of EPEs occurring between 1979 and 2015 in northern-central Italy. The EPEs are subdivided into three categories (Cat1, Cat2, Cat3) according to thermodynamic conditions over the affected region. The three categories do not only differ locally but also in the evolution of precursor RWPs. These differences cannot be solely explained by the apparent seasonality of the flow; therefore, the relevant physical processes in the RWP propagation of each case are further investigated. In particular, we show that RWPs associated with the strongest EPEs, namely the ones falling in Cat2, undergo a substantial amplification over the western N. Atlantic due to anomalous ridge-building two days before the event; arguably due to diabatic heating sources. This type of development induces a downstream trough which is highly effective in focusing water vapour transport towards the main orographic barriers of the Apennines and the Alps. Finally, we identify an increasing trend of water vapour transport over the western N. Atlantic which is likely associated with the observed increase in Cat2 and Cat3 events