

# Climatological Features of the Vento Norte Phenomenon in the Extreme South of Brazil

August 19, 2022

## Answer to Reviewer 1

### General comments

We thank the Reviewer for the useful comments and suggestions that improved the interpretation of the obtained results and the clarity of the manuscript. In the following are detailed responses to specific comments. The modifications and new text insertions on the manuscript are presented in “Track changes” tool of “MS Word”.

The period analyzed 2004 to 2020 is seventeen years, not sixteen. We agree with the reviewer’s comment. In the new version of the manuscript, we adjust the period analyzed to seventeen years.

Describe if the winter period was defined from 06/21 to 09/21 or all 4 months. Thanks for the comment. The winter period refers to 21/06 to 21/09. In the new version of the manuscript we have added this information to the following sentence: “[...].*Hourly meteorological data used in this study were obtained from INMET stations at 10 m above the ground for velocity and 2 m for temperature measurements during seventeen consecutive winters between 2004 and 2020 (from 21/06 to 21/09).*”.

Justify why the period of 2004 to 2020. In choosing this period, the main concern was to cover as large a number of years as possible. In this sense, the analysis began in the winter of 2004, which coincides with the start of hourly measurements by the INMET tower at SM.

Discuss about the atmospheric circulation and systems that can be associated with VNOR.

In the new version of the manuscript, the following sentence was added to the introduction: “[...]. *The large-scale synoptic environmental conditions responsible for the development of the VNOR flow can be associated with a cyclogenesis in the La Plata Basin and a high-pressure system near the coast of southern*

*Brazil, as shown by Stefanello et al. (2020)."*

There is some hypothesis why 2006 has the higher frequency of occurrence? This is a very good point, thank you! We did not find any possible explanation for the high number of cases in 2006. However, with an analysis based on meteorological data from INMET we prefer not to make inferences, which would be highly speculative. We intend to investigate further in future work!

The third paragraph of introduction needs a reference. We agree with the reviewer. In the new version of the manuscript we add references.

There is something missing in the first sentence of Methodology. The referee is right! We have rephrased that sentence that now reads: *"The geographical location of the meteorological data used in this study refers to South America, east of the Andes. [...]"*

## Specific comments

1. line 219: How does the heat waves were defined and analyzed? This needs to be described in Methodology.  
In the new version of the manuscript, the following paragraph was added to section 2.1: *"Heat wave episodes in southern Brazil are identified using the methodology proposed by dos Reis et al. (2019). Briefly, this methodology defines a heat wave as an interval of more than four days in which the daily maximum temperature is above the percentile (P90) of daily temperature anomalies. The authors determined the P90 for the 1981-2010 reference period."*
2. Line 256-258: The VNOR causes the decrease of atmospheric pressure and RH or It's a consequence of low pressure system?  
The VNOR is a consequence of a low-pressure system and is associated with cyclogenesis in the La Plata Basin and a high-pressure system near the coast of southern Brazil, as discussed by Stefanello et al. (2020). In the new version of the manuscript, a sentence has been added to explain the large-scale synoptic environment that may be associated with VNOR.
3. Line 298: change "great" to "higher"  
Changed!
4. Line 301: Change to "The results of this study suggest that VNOR wind-storm intensification at SM is influenced..."  
Changed!

## References

- [1] Michel Stefanello, Ernani de Lima Nascimento, Cinara Ewerling da Rosa, Gervasio Degrazia, Luca Mortarini, and Daniela Cava. A micrometeorological analysis of the vento norte phenomenon in southern brazil. *Boundary-Layer Meteorology*, pages 1–25, 2020.