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Convection-Permitting simulations over South America: a look at the uncertainty sources at the sub-daily time scale

Francesca Raffaele¹, Erika Coppola¹, Leidinice Silva¹, Maria Laura Bettolli², Josefina Blasquez³, Jesus Fernandez⁴, Josipa Milovac⁴, Rosmeri Porfirio da Rocha⁵, and Silvina Solman⁶

¹The Abdus Salam International Centre for Theoretical Physics, Earth System Physics, Trieste, Italy (fraffael@ictp.it)

²University of Buenos Aires-CONICET, Buenos Aires, Argentina

³UNational University of La Plata-CIMA/CONICET, La PlataBuenos Aires, Argentina

⁴Instituto de Física de Cantabria (IFCA), CSIC-Universidad de Cantabria, Santander, Spain

⁵Universidade de São Paulo, São Paulo, Brazil

⁶University of Buenos Aires-CIMA/CONICET, Buenos Aires, Argentina

A set of high resolution simulations have been performed over the La Plata region in South America, and a multi-model ensemble of Convection-Permitting simulations has been produced for a 3-years period (2018-2021). We have used this new high resolution ensemble to investigate more in depth the daily and hourly timescales.

The available satellite and gridded observational datasets show a clear uncertainty when going to sub-daily timescale, therefore the validation of the model ensemble mean and extreme precipitation is performed by including also a station based observational dataset at both daily and hourly time scale, to assess the model uncertainty within the context of the aforementioned observational uncertainty.

Moreover, a cluster analysis of the diurnal cycle precipitation has been used as a starting point for a spatial characterization of the precipitation in a region of heterogeneous topography. The ensemble models' performance has been validated inside five different regions in order to spatially homogenize the precipitation regimes at hourly timescales.

The results underlined a good agreement in the model ensemble especially in those areas where the homogenization of the stations is more pronounced.

On the other hand, the spread among models grow when looking at areas characterized by complex orography, thus highlighting the importance of having available a set of simulations as big as possible so that complexity can be represented within the model uncertainty.