Motivational letter for the
Summer School on Effective HPC for Climate and Weather 2020

Dear Organizer Commitee,

My name is Matías Olmo, and I'm currently doing my PhD at the University of Buenos Aires with a fellowship granted by the National Council of Scientific and Technical Research (CONICET) of Argentina. I am part of two research projects of the University of Buenos Aires and the National Agency of Scientific and Technical Research of Argentina, and a CORDEX Flagship Pilot Study about dynamical and statistical downscaling of daily extreme precipitation events in southeastern South America. My PhD studies focus on the statistical modeling of such events with machine learning techiniques, in analyzing their temporal changes in multiple datasets over the region in a context of climate change, and in the generation of associated circulation patterns with neural networks. Finally, I will study how this patterns are projected to change by the end of the century based on the projecions by global and regional climate models.

Moreover, it is still a challenge to better identify the factors and mechanisms that determine the location, intensity and frequency of the precipitation extremes and their large impacts. To carry out climate studies of spatial and temporal variability of daily precipitation extremes, it is necessary to count on long records of high-quality and high-resolution observational datasets. In some areas of SESA, the density of rain gauges may be very low and/or their temporal coverage may also be limited. Therefore, the characterization and study of extreme precipitation events over the region should consider as much available information as possible. For these reasons, I usually work with big data, including daily gridded observational datasets, statistical model outputs, GCMs and RCMs. This amount of information sometimes becomes difficult to manage and to statistically analyse with the computational capacities available in my institute.

Therefore, I consider that this summer school would be extremely important to me since it would provide me with the necessary data-science skills in order to optimize research data management, coding and data visualization, among other things, and it would result beneficial for the research projects I work on. My project idea for the school mainly consists in developing a program based on machine learning for statistical analysis and downscaling of climate data, in relation with my PhD studies. I hope to spread this knowledge in my community in order to improve the efficiency in our simulation runs and data processing.