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Summer School on Effective HPC for Climate and Weather
Department of Computer Science, University of Reading, UK

Dear Programme Committee members,

I write to apply for the "Summer School on Effective HPC for Climate and Weather".

I am a Brazilian PhD student, now in Germany, working on modelling Arctic coastal erosion and its feedback effect on climate change. To do so, I use observations and climate reanalysis to develop empirical models, which are then implemented in the Max Planck Institute Earth system model (MPI-ESM). This will allows us to quantify how Arctic coastal erosion responds to climate change, and to assess the impact of the eroded carbon on increasing atmospheric CO_2 concentrations, potentially contributing to further warming.

Before I started my PhD, I worked on developing a statistical model to identify the South Atlantic convergence zone (SACZ) – an important meteorological system responsible for about 25% of the rainfall in Southeast Brazil during our rainy season. The developed model is applied to weather model outputs, allowing us to objectively predict the SACZ and its associated rainfall.

In the two projects above, machine learning techniques are used to develop models, which are then implemented or applied to weather and climate model outputs. In the attached CV, I list peer-reviewed publications related to both topics. In the future, I intend to continue working as a researcher in climate science in Europe and, ultimately, back in my home country. I will thus most likely continue relying on HPC facilities for data analysis and model simulations. Moreover, I have experienced that the computational skills necessary for high-level climate science are often neglected in the education of geoscience students, especially in Brazil. Therefore, I am very interested in taking part of the summer school, both to my personal development, and also to learn more on how to effectively spread this knowledge to peer students and young researchers.

Academic Group Project

I would be interested in working on developing a parallel application, to exchange information between a module written in Fortran and another module written in Python, for example, representing the implementation of an additional process to an existing a climate model. The Python module would perform machine-learning based calculations and save NetCDF files. In this project, participants could exercise, for example: a) parallel software development and Agile methods, at designing the interface between the two modules; b) efficient I/O and storage; c) usage of machine learning tools.

Keywords: Python, software engineering, parallel application, machine learning.

At last, thank you for reading and considering my application. I would also be open to work on other projects apart from the suggested above. I look forward to meeting you in August, in person or online.

Sincerely,

David Marcolino Nielsen