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Stockholm, Sweden

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

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Dear all,

I want to express my interest in participating in the "Summer School on Effective HPC for Climate and Weather". Currently, I am a PhD candidate at the meteorological institute of Stockholm University. I am working on understanding clouds and convection and how they affect the earth energy balance of the earth. For this, I am using a Global Ciruculation Model at high resolution (up 5 km), specifically the Icosahedral non-hydrostatic model (ICON). Several studies using Radiative Convective Equilibrium setups have found a relation between surface temperature and convective self-aggregation, which in fact can alter the energy balance of the earth and affect the global climate. They have also found relations between increases of self-aggregation and extreme precipitation when using surface temperature close to those in the tropics.

Using ICON at different resolutions in rotating aquaplanets frames with meridional gradient of temperature I found increases of extreme precipitation in the tropics beyond the thermodynamic prediction given by the Clausius-Clapeyron relation. Are those increases of extreme precipitation related to self-aggregation in the model?. To answer this question I plan to perform an analysis based on clustering of convective cells given certain criteria and then using the cumulative distribution function of the distances between the clusters I will be able to check the state of convective organization and its change with warming. To carry out such idea, I expect to apply two machine learning techniques for both clustering and nearest neighbour distance. In the other hand, given the size of the data the analysis will run into memory errors, for which HPC becomes relevant.

This is the project I would like to develop under the **Machine Learning** Topic during the summer school.

Sincerely,

Alejandro Uribe
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