

Proposal: Joint Modeling Activity over the Caribbean

December 2017

In early 2020 (Jan/Feb) a large field experiment (EUREC⁴A, see link below) East of Barbados is planned with the objective to elucidate the couplings between (low) clouds, convection and circulation. EUREC⁴A will be able to simultaneously measure the large scale forcing as well as the cloud macrophysical properties of the trade wind cumuli that are subjected to these forcings. In that respect EUREC⁴A, along with the Barbados Cloud Observatory (BCO), will provide a unique opportunity to spin up a joint modeling activity that can make optimal use of this campaign.

Such a modeling activity could help answering many of the open questions we have concerning the role of trade wind cumulus in weather and climate such as: *what controls the convective mass flux, convective mixing, cloud depth and cloud fraction of shallow cumulus clouds? What is the role of the wind and vertical momentum transport? What is the role of meso-scale organisation? What is the impact on the radiation field? How important is the atmosphere and ocean surface interaction at the meso-scale?* This will directly touch upon the question how well we are able to parameterize these processes in current models across the many scales of interest and what is needed to improve the representation of these processes in models.

In addition to these questions that will require a more process-oriented modelling approach, we can also consider setting up a more extended period in which we can evaluate those models (both global and limited area models) that run operationally over the Caribbean for longer periods. It will allow us to assess their predicting capability over the maritime sub-tropics, not only for shallow clouds that are predominant in the winter season, but also extending the scope to deeper convection and associated high impact weather (heavy precipitation, tropical cyclones and flooding).

We envision a modelling activity that will include a hierarchy of models ranging from global weather and climate models to high resolution mesoscale models, but also more process oriented Large Eddy Simulation (LES) models and Single Column Models (SCM).

We are planning a breakout session during the upcoming Pan-GASS meeting in February to further shape these ideas. If you are interested to get involved please let us know by email and we will put you on the email list. In addition, we would like to ask all of you to prepare your ideas and present them during the pan-GASS meeting. In case you can not make it to this meeting, please let us know your ideas and suggestions by email.

Best wishes,

Pier Siebesma, Daniel Klocke, Sandrine Bony and Bjorn Stevens

Further reading and dates:

EUREC⁴A campaign paper:

<https://link.springer.com/article/10.1007/s10712-017-9428-0>

EUREC⁴A website: <http://eurec4a.eu/>

Related meetings at Pan-GASS meeting 26.02.2018 - 02.03.2018:

Open session to present ideas: Tuesday 27.02.2018 17:00-18:30

Open session to plan modeling activities: Wednesday 28.02.2018 11:00-12:30

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