

# ***Grand Science Challenge on Clouds, Circulation and Climate Sensitivity***

**Report to JSC-39**

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# Clouds, Circulation and Climate Sensitivity

## **The Four Questions:**

- 1. How will storm tracks change in the future?**
- 2. What controls the position and strength of tropical rain belts?**
- 3. Is convective aggregation important for climate?**
- 4. How does convection contribute to cloud feedbacks?**

## **One Assertion:**

*Focusing on the four questions will accelerate progress by spurring model development, by inspiring new observations, by stimulating new analysis and by expanding and exploiting the paleoclimate proxy record – but to be successful we need to work together.*



What our GSC tries to do

Parallel Play



Cooperative Play



Unlike children who can be organized around activities, we try to focus the community on specific questions or ideas.



# ***The Grand Challenge is Thriving***

## ***Major community activities taking place around each question***

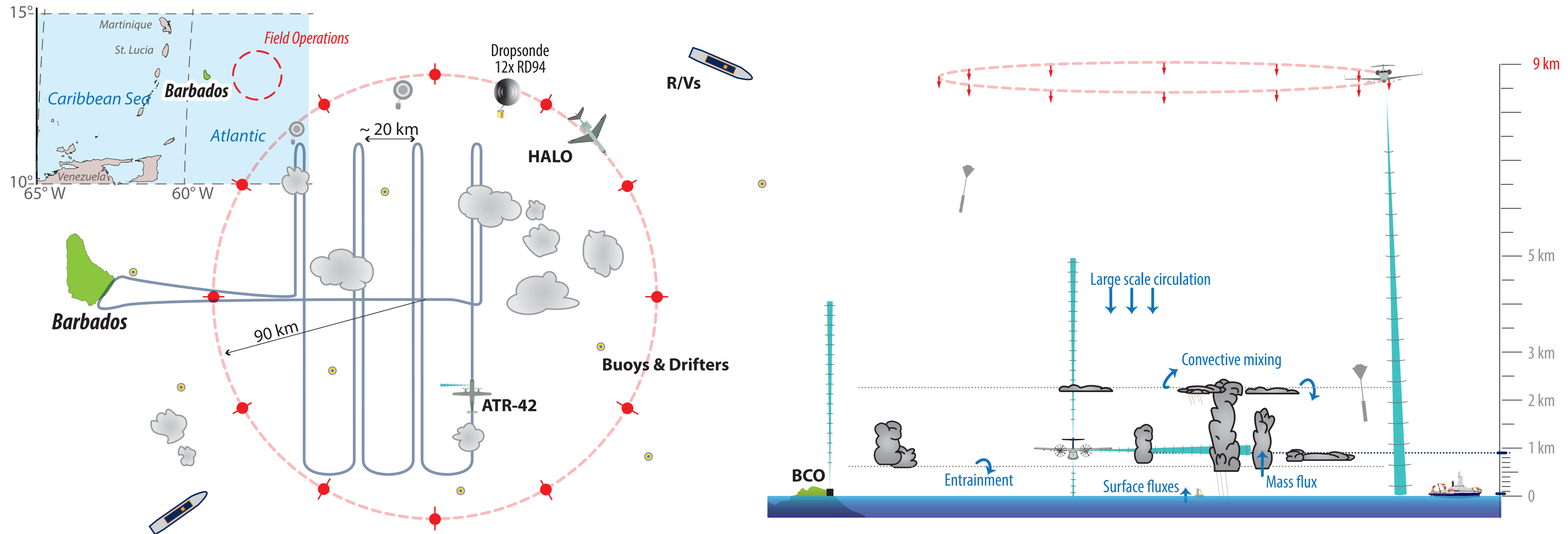
- 1. Workshops***
- 2. Intercomparison activities***
- 3. Joint publications, reviews, assessments.***
- 4. New major field experiments***

## ***Signature Activities***

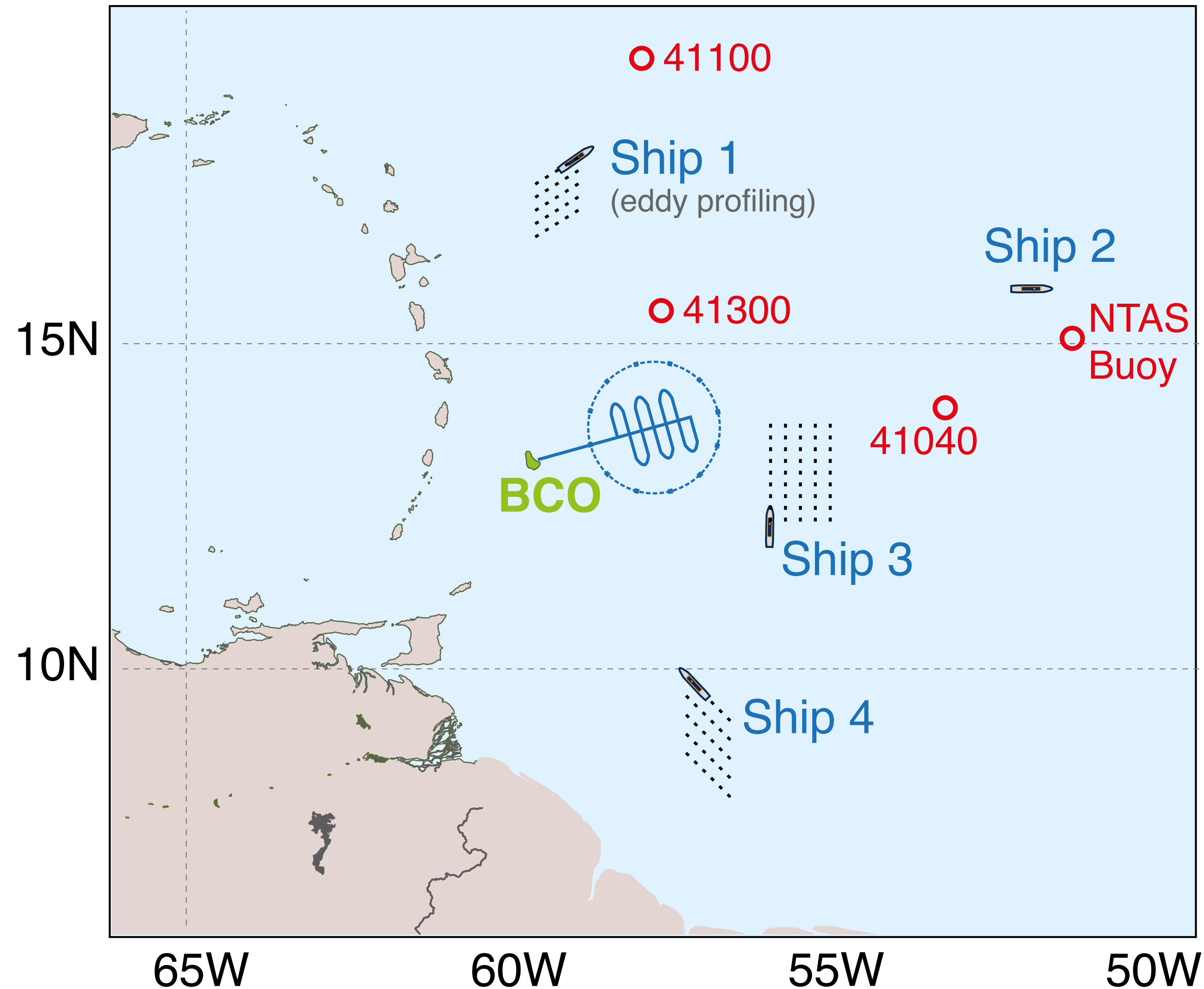
- 1. Climate Sensitivity Assessment — going out to review***
- 2. Aerosol Forcing Assessment — in drafting stage***
- 3. EUREC4A field study — growing in scope and importance***

***... but it will end, see timeline document***

# EUREC4A (20 Jan to 20 Feb, 2020)



- ~300 Flight Hours (HALO: 50 h MPG, 50 h DFG. ATR: 100 h ERC. hoping for 50 h each additionally from ESA)
- Time window is chosen to optimize meteorological conditions, coordination with other platforms especially EarthCARE/ADM-Aeolus and Ships.



- Additional aircraft with wind lidar (Falcon, NASA); microphysics (BAE146) and dropsondes (Global Hawk) are being discussed.
- Pending proposals for ship time (Germany: Merian. France:); Ron Brown and one German ship secured.
- We will fly a HeliKite from one or two of the ships (with the MPI for complex systems in Göttingen) to augment measurements of cloud microphysical properties.
- Ships are adding an additional component related to the question of how ocean eddies influence atmosphere-ocean coupling and air sea interaction.

# Issues

- 1. WCRP is requested to endorse and adopt the Aerosol Forcing Assessment as an official WCRP activity, with report, similar to what it is doing for the Climate Sensitivity Assessment*
- 2. Support from the core projects in the form of coordinated activities in support of EUREC<sup>4</sup>A will increase its impact (ESA, EUMETNET).*
- 3. WCRP is requested to become more active, also with national governments, to create funding mechanisms, around the use of space-borne infrastructure in Europe*
- 4. WCRP, and the take up of what we are doing after our GSC comes to an end, will be more effective if it is more question and idea, and less activity, driven ... here we see untapped possibilities on questions pertaining to Palaeo Climate*