

PRESS RELEASE

The Science of EUREC⁴A

Bridgetown, Barbados, August 23, 2021 – Understanding the dynamics of cumulus clouds in the tropics and accounting for their influence in climate models is important for quantifying climate change. Advancing such an understanding was one of the key drivers of the recently concluded integrated, multinational scientific approach guiding the EUREC⁴A field campaign, conducted to the east of the Eastern Caribbean, and its measurements (<http://EUREC4A.eu>) presented in a recent publication by Prof. Bjorn Stevens, of the Max Planck Institute for Meteorology (MPI-M) in Hamburg, Dr. Sandrine Bony, of the Laboratoire de Meteorologie Dynamique in Paris, Dr. David Farrell of the Caribbean Institute of Meteorology and Hydrology, Barbados, and an international team of nearly three hundred co-authors.

Stevens, B., Bony, S., Farrell, D., et al. (2021) EUREC4A. *Earth Syst. Sci. Data*, 13, 4067–4119, <https://essd.copernicus.org/articles/13/4067/2021/>

In this publication documenting the EUREC⁴A measurements, the authors demonstrate the successful application of new measurement techniques designed to test hypothesized mechanisms through which clouds could amplify global warming. The measurements are establishing the basis for better understanding how the spatial organization of shallow trade-wind clouds influences their ability to reflect sunlight or more effectively produce precipitation, how small scale eddies and ocean features influence the atmosphere above. They are also proving fundamental for the development of a new generation of storm-resolving global climate models and for testing concepts for future space-based observing systems.

From the point of view of theories of climate, 2 km to 200 km (or small to intermediate) scale atmospheric and oceanic circulation systems are both omnipresent and demonstrably impactful. Unfortunately, these intermediate scales are not incorporated into our standard models of climate. Measurements from EUREC⁴A are the first to shine a light on the climatic role of these intermediate scale circulations, and are helping EUREC⁴A's scientists to assess their role in crucial climate processes such as radiant energy transfer, ocean carbon uptake, as well as in mediating the effects of the human aerosol, or the distribution and intensity of precipitation.

The EUREC⁴A measurements were made possible through an international collaboration that enabled unprecedented sampling of the vertical structure of the atmosphere and ocean. This included 2500 balloon and parachute borne soundings of the atmosphere, and nearly 10,000 profiles of the ocean. These along with cloud properties, and particulate matter were performed by the continuous operation of four heavily instrumented research aircraft, four global-class research vessels, an advanced ground-based cloud observatory, and scores of autonomous or semi-autonomous observing platforms, many operated for the first time and heralding a new era in environmental sensing.

In addition to providing an outline of the novel measurements and their composition into a unified and coordinated campaign, EUREC⁴A supported a rich palette of outreach, capacity

building, and knowledge transfer activities. These linked scientists from across the Caribbean to their counterparts throughout Europe and North America in an effort to better understand the processes that are pacing the rate of Earth's warming, and the changes in weather patterns that this may entail.

The EUREC⁴A team wishes to express its gratitude to the Government of Barbados for its overwhelming support facilitating all aspects of the measurement campaign. The team also expresses its gratitude to the Governments of Trinidad and Tobago, Guyana and Suriname for facilitating various aspects of the measurement campaign in their airspace and territorial waters. Finally, the team wishes to express its gratitude to the Regional CARICOM Institutions such as the Regional Security System for facilitating and participating in the measurement campaign.

More information:

Project website EUREC⁴A: <http://eurec4a.eu>
EUREC⁴A Film (<https://dai.ly/x7wxqsz>)

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