

MAGIC: Marine ARM GPCI Investigations of Clouds

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The logo for Horizon Lines, featuring a stylized red and white 'H' symbol followed by the text 'HORIZON LINES' in a bold, black, sans-serif font.The logo for the ARM Climate Research Facility, featuring the letters 'ARM' in a large, bold, blue, sans-serif font, with a blue curved line underneath. Below the line, the text 'CLIMATE RESEARCH FACILITY' is written in a smaller, blue, sans-serif font.

Why, When, and Where?

Low marine boundary layer clouds over the ocean exert a large influence on Earth's climate through reflection of sunlight and mediating interactions between air and sea.



These clouds are a challenge to global climate models, which have difficulty in accurately representing them and the transitions among their different types.

MAGIC will study these clouds by deploying radars and other scientific instrumentation on a container ship *Horizon Spirit* making regular transects between Los Angeles and Hawaii from **October, 2012 to September, 2013**.

The primary objective is to improve the representation of the stratocumulus-to-cumulus transition, an ever-present phenomenon along this particular transect, in climate models.

ARM's Marine Mobile Facility



The Atmospheric Radiation Measurement (ARM) Program of the U. S. Department of Energy (<http://www.arm.gov/>) was created in 1989 "to study cloud formation processes and their influence on radiative transfer."

ARM manages three fixed study sites, two mobile facilities, an aircraft facility, and a data archive, and it funds climate research and supports field programs around the world.

The second ARM Mobile Facility (AMF2) consists of three 20-foot modified "SeaTainers" and other smaller modules, which contain radars and other instrumentation.



AMF2 radar SeaTainer

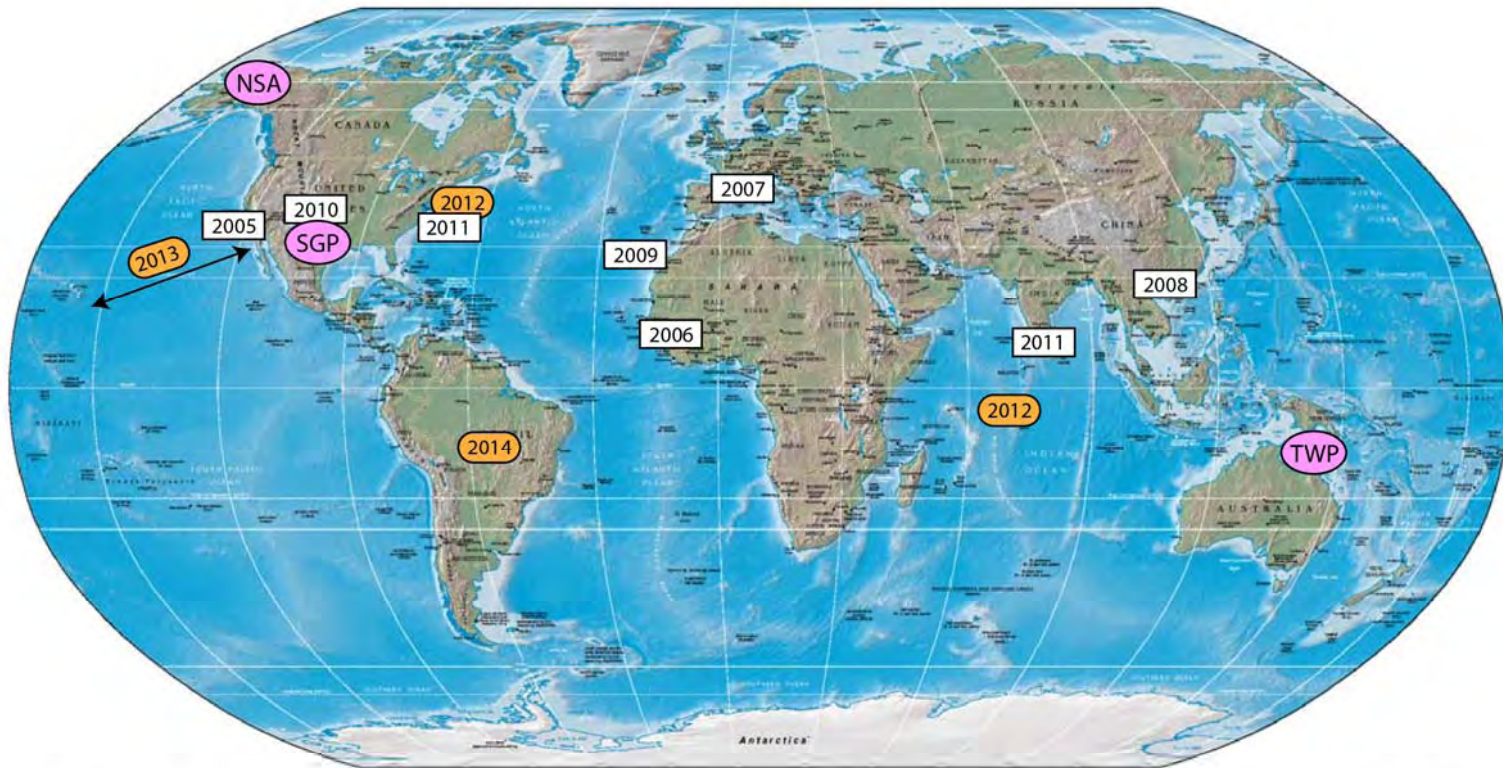


AMF2 aerosol SeaTainer



Module

Previous and Upcoming Mobile Facility Deployments



ARM Fixed Sites

SGP: Southern Great Plains (OK)
NSA: North Slope of Alaska
TWP: Tropical Western Pacific

ARM Mobile Facility (AMF) Deployments

2005 Point Reyes, CA
2006 Niamey, Niger
2007 Black Forest, Germany
2008 Shouzian, China
2009 Graciosa Island, Azores
2010 Steamboat Springs, CO
2011 Long Island, NY
2011 Ganges Valley, India

Upcoming

2012 Gan Island, Maldives
2012 Cape Cod, MA
2013 Eastern North Pacific
2014 Amazon, Brazil

Deployment Will Be Aboard the *Horizon Spirit*



Horizon Spirit

The *Spirit* is 272 m long and 30 m wide, with a maximum speed of 20 knots.

It makes the round trip from Los Angeles to Hawaii (4100 km) every two weeks.

Instruments would operate continuously while underway.



HORIZON LINES

Horizon Lines, the largest container shipping company operating under the Jones Act, accounts for 37% of total U.S. marine container shipments from the continental U.S. to Alaska, Puerto Rico, and Hawaii/Guam.

Model Intercomparisons Are Interested in MAGIC

GPCI, the GCSS Pacific Cross-section Intercomparison (GCSS: GEWEX Cloud Systems Study; GEWEX: Global Energy and Water Cycle Experiment, a core project of the World Climate Research Programme) uses a transect near the route taken by the *Spirit*.

Along this GPCI transect, cloud type and cover vary from low stratocumulus with high coverage near Los Angeles to puffy cumulus with low coverage near Hawaii.

EUCLIPSE, the European Union Cloud Intercomparison, Process Study & Evaluation Project (a collaborative effort of 12 institutes in Europe) also uses the GPCI transect.

CGILS: the CFMIP- GCSS Intercomparison of Large Eddy Models and Single Column Models compares results at locations S6, S11, and S12 along the GPCI transect.

