

MAGIC update 2011-12-15

The last update (2011-11-30) discussed the process of how the MAGIC proposal was chosen and how it would be implemented. I noted that “the field is rather acronym intensive, and it has taken me quite some time to navigate through the mazes of letters.” As it turns out, I didn’t navigate as well as I had hoped. I had stated that the organization within the U. S. Department of Energy that will be deploying the instrumentation and carrying out the measurements is the Atmospheric Radiation Measurement (ARM) Climate Research Facility, or ACRF. However, ACRF is no longer used as the representative acronym, which has changed back to ARM. In many ways this is preferable, as ARM, which has been around since ~1990, is much better known than ACRF.

The one acronym that hasn’t been defined yet is MAGIC itself. MAGIC is a rather deeply nested acronym (an acronym that contains other acronyms) that stands for Marine ARM GPCI Investigation of Clouds. The “marine” part is straightforward, as is ARM, but the GPCI is a bit involved. GPCI stands for GCSS Pacific Cross-section Intercomparison, where GCSS stands for the GEWEX Cloud Systems Study, and GEWEX is the Global Energy and Water Cycle Experiment, a core project of the World Climate Research Programme. The mission of GEWEX is “*to observe, understand, and model the hydrological [water] cycle and energy fluxes in the Earth’s atmosphere and at the surface.*” By “model” is meant to attempt to describe using computer programs that take into account the various scientific processes that are involved. GCSS is an international group of cloud modelers (scientists who write and use these computer programs) working within the GEWEX framework whose mission is to “*develop better parameterizations of cloud systems for climate models by improving our understanding of the physical processes at work within several types of cloud systems.*” By “parameterizations” is meant mathematical descriptions that are used in the computer programs, or models, that describe the climate (“climate models”). GPCI is a working group within GCSS which has chosen a cross-section (an imaginary line) that runs from the west coast of the U.S. southwest to the equator along which to compare the results of different models (i.e., computer programs) that describe and predict cloud properties.

Thus a group of cloud modelers within GCSS want to compare the results of computer programs along a line that goes from near Los Angeles past Hawaii to the equator – thus the “GCSS Pacific Cross-section Intercomparison.”. However, without actual measurements (data!) it is impossible to evaluate and improve these models. Data of the sort that are necessary are generally difficult to collect over the ocean for long periods. Satellites can provide some results, but they require validation which also requires measurements taken at sea to show that the results are correct. This is where MAGIC comes in. The figure below shows the GPCI transect as a solid line and the MAGIC route as a dashed line, from which it can be seen that they are very near each other (the three points shown are locations where yet other model intercomparisons will occur). Thus the data taken during MAGIC over an entire year will be extremely valuable for GPCI and other climate model intercomparisons. This is also a very interesting transect along which to study clouds. The false color map shows the frequency of low level clouds, with red being the highest occurrence. Just off the west coast of the U.S. there is a large region that typically has a high coverage of stratocumulus clouds (a type of low cloud), but closer to Hawaii the dominant cloud type is cumulus, a different type, and the coverage is much less. The transition among these cloud types is poorly understood and one of the main goals of MAGIC is to develop a better understanding of this transition.

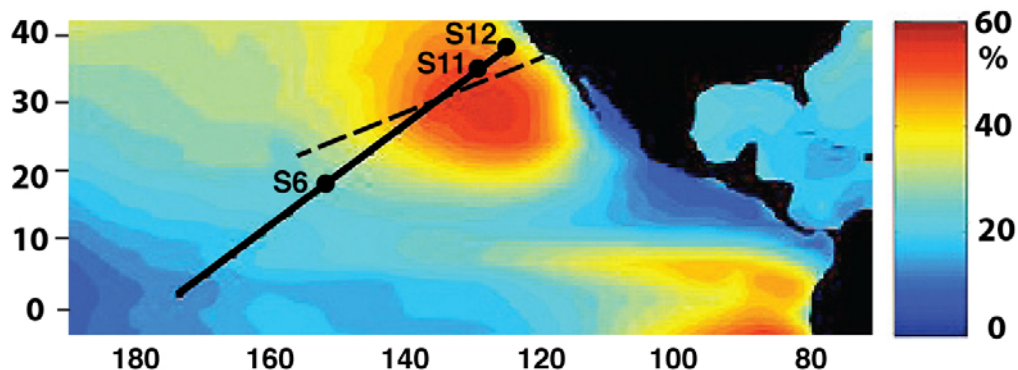


Fig. 3. Annual average low level cloud cover, with the MAGIC route (dashed) from Los Angeles to Honolulu and GPCI transect (solid).

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Please address any questions or comments to elewis@bnl.gov.

All updates and other MAGIC information can be found at <http://www.ecd.bnl.gov/MAGIC.html>