MAGIC

2012-04-26

It's been over a month since the last MAGIC update, but the wheels are certainly in motion and much has been going on behind the scenes. Options for communication to and from the ship are being discussed, specification and redesign of instruments is occurring, and plans for how the raw data will be processed into usable form are already underway. I have also been discussing with collaborators how auxiliary instruments that are not part of ARM can be integrated, and other proposals are being submitted to ARM for measurements that will be associated with MAGIC.

Radar calibration was a topic I mentioned in the last update, and one type of instrument that is sometimes used for this purpose is a disdrometer, which is an instrument that measures the sizes and number of raindrops that fall at ground level. If it is assumed that these drops are the same ones that the radar is "seeing" aloft (i.e., no evaporation occurs during fall, etc.), then the expected radar signal can be calculated and compared with the actual radar signal, thus providing calibration of the radar. There are several types of disdrometers that operate by exploiting different physical mechanisms. Impact disdrometers convert the imact of a falling raindrop into an electrical pulse or acoustic signal, the size of which can be correlated to the size of a raindrop. Optical disdrometers view raindrops as they fall through a horizontal beam (often a laser beam) and can determine size directly and/or fall speed, for which the relationship to raindrop size is known.

Of course, there are subtleties and nuances that must be taken into account. Different systems have different range of drop sizes they can measure. Raindrops oscillate and distort as they fall, and raindrops that are sufficiently large fall with approximately the same speed, all of which complicate matters. Also, some of these systems don't work well on moving platforms, such as the ship on which MAGIC will be deployed. For instance, if an impact disdrometer is rapidly moving upward (due to ship motion) when it encounters a raindrop, the drop will have a greater impact, and will be inferred to be larger than it is. Similarly, if an optical disdrometer is rapidly moving upward, the measured fall speed will be greater, and the drop will be inferred to be larger than it is. None of these issues are insurmountable, and they present the type of challenge that scientists and engineers like.

Ernie Lewis
2012-04-26
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.