MAGIC

The Marine ARM GPCI Investigation of Clouds

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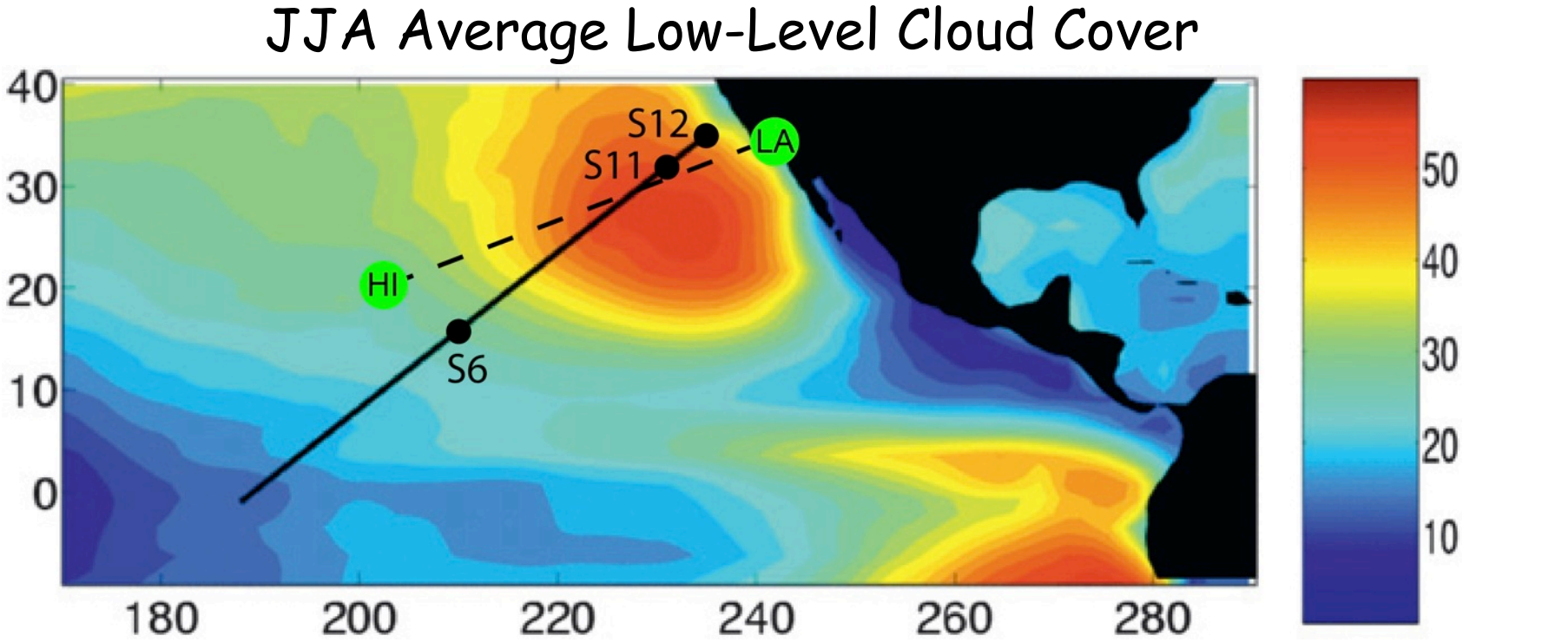
Joint CFMIP/EUCLIPSE Meeting
Hamburg, Germany
Wednesday, June 12, 2013, 11:00 am

MAGIC Transect, GPCI Transect, CGILS Points



Adapted from Teixeira et al., J. Climate, 2011

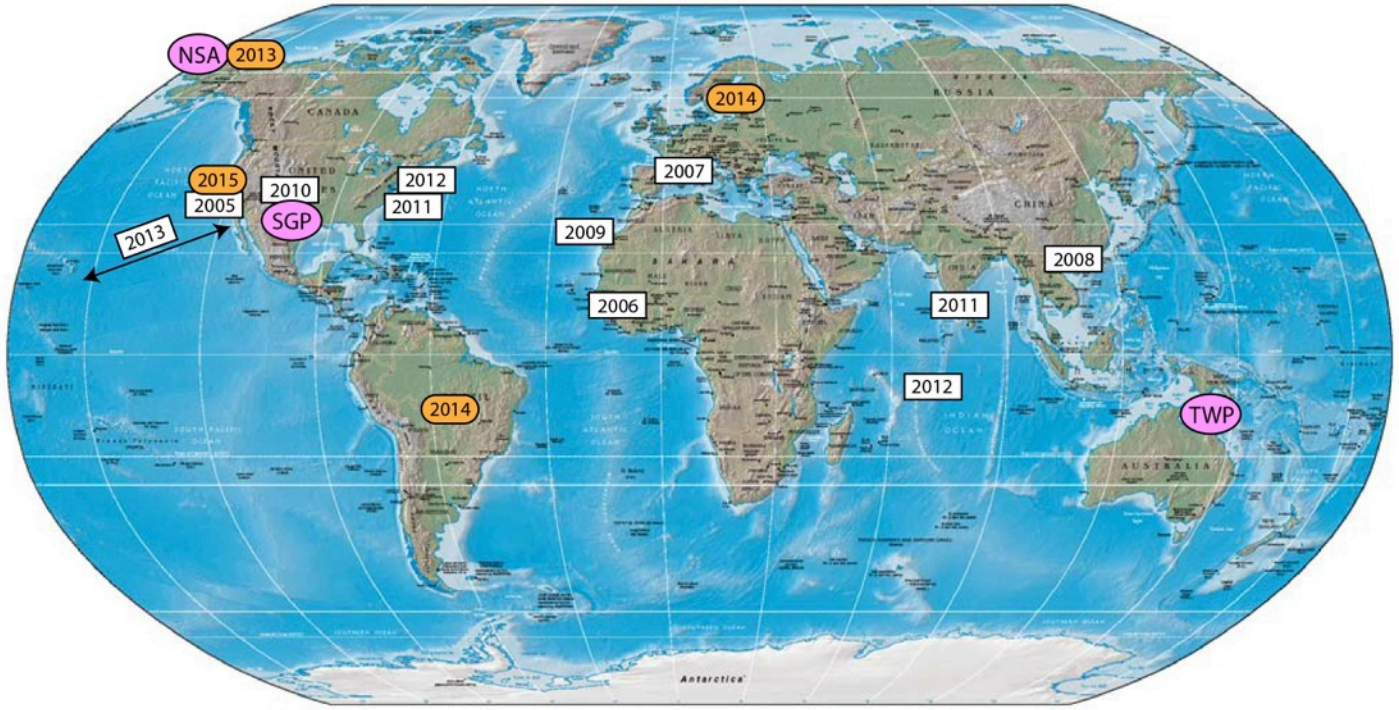
MAGIC traverses same stratocumulus to cumulus transition as GPCI does.

MAGIC will make repeated transects between LA and Honolulu (15-20 round trips).

MAGIC's goal is to improve understanding of this transition.

MAGIC will measure properties of clouds, aerosol, radiation, atmospheric structure.

MAGIC Is Funded and Operated by the ARM Climate Research Facility



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 Shouxian, China
2009 Graciosa Island, Azores
2010 Steamboat Springs, CO
2011 Long Island, NY
2011 Ganges Valley, India
2012 Gan Island, Maldives

2012 Cape Cod, MA
2013 Eastern North Pacific

Upcoming

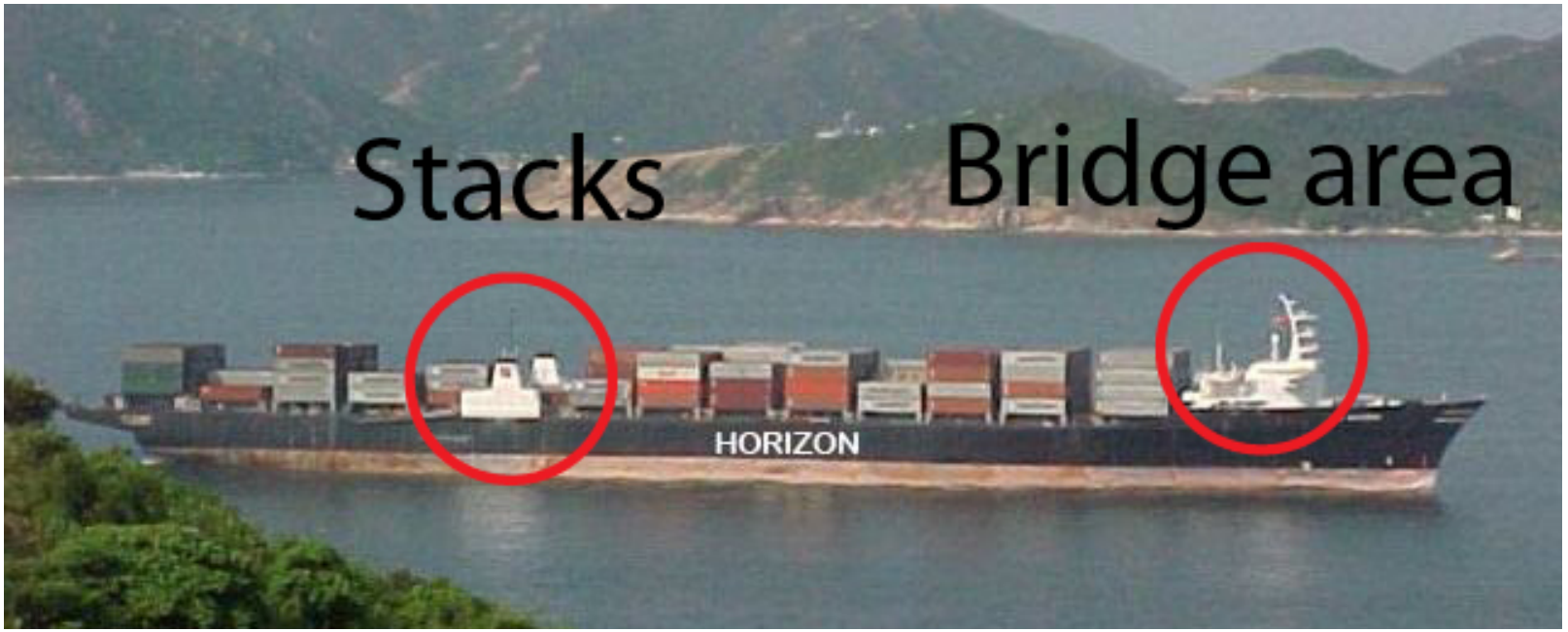
2013 Oliktok Point, Alaska
2014 Amazon, Brazil
2014 Hyytil, Finland
2015 California Coast

MAGIC Deploys the Second ARM Mobile Facility (AMF2)

AMF2 on Gan Island in the Maldives during AMIE

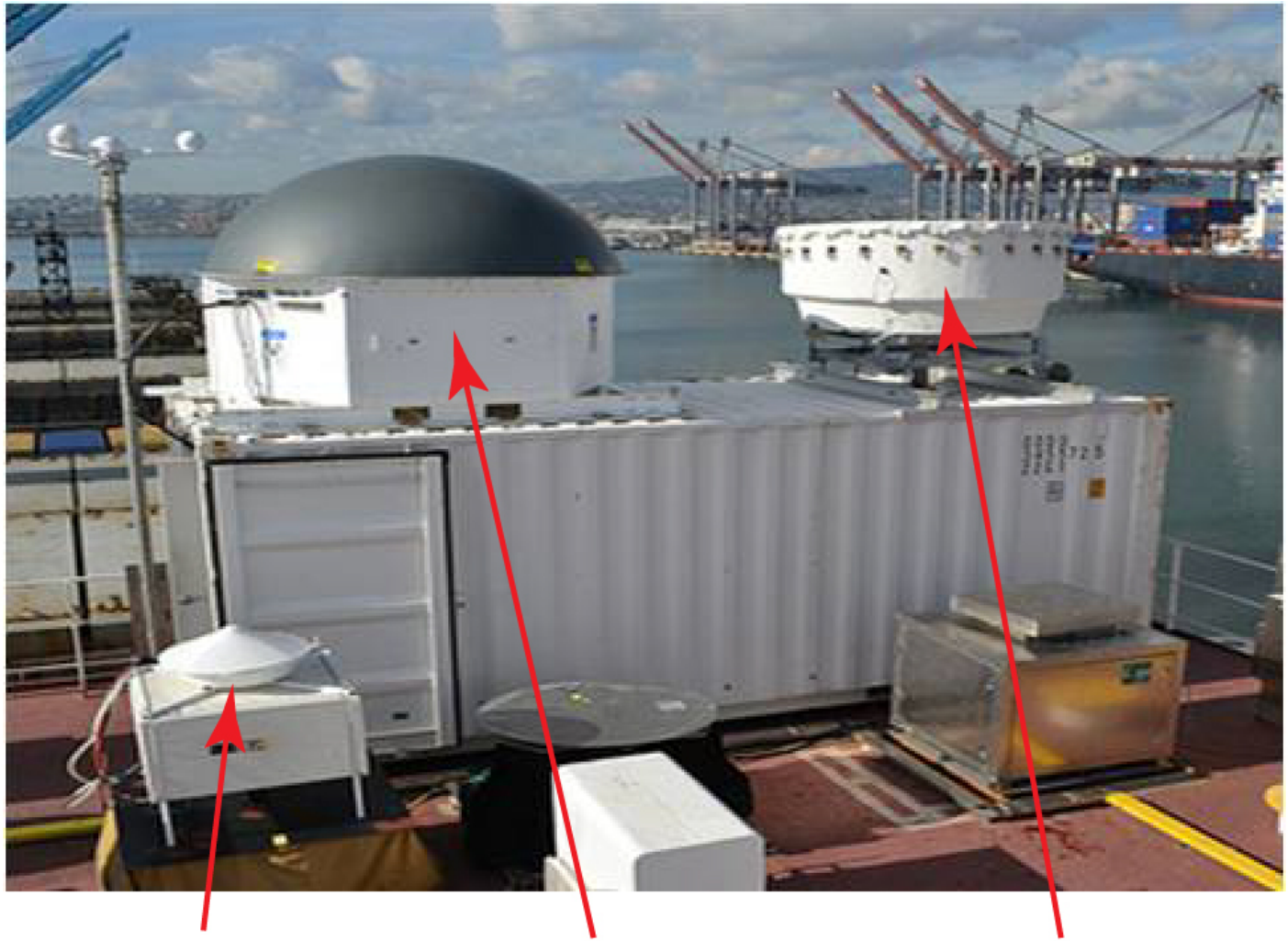
MAGIC has three 20-foot vans (radar van, aerosol van, operations van), other instruments (ceilometers, μwave radiometers, total sky imager, lidars, IR thermometers, disdrometers, etc.), and a mast met system.

MAGIC Platform is the Horizon *Spirit*



- *Spirit* is 272 m long and has maximum speed of ~11 m s^{-1}
- One round trip LA-Honolulu (4100 km) every two weeks
- All MAGIC instruments located near the bridge area (white on right), far ahead of the stacks (generally no influence of ship exhaust)
- Two ARM technicians are always on the ship to run the instruments.

Radars on MAGIC



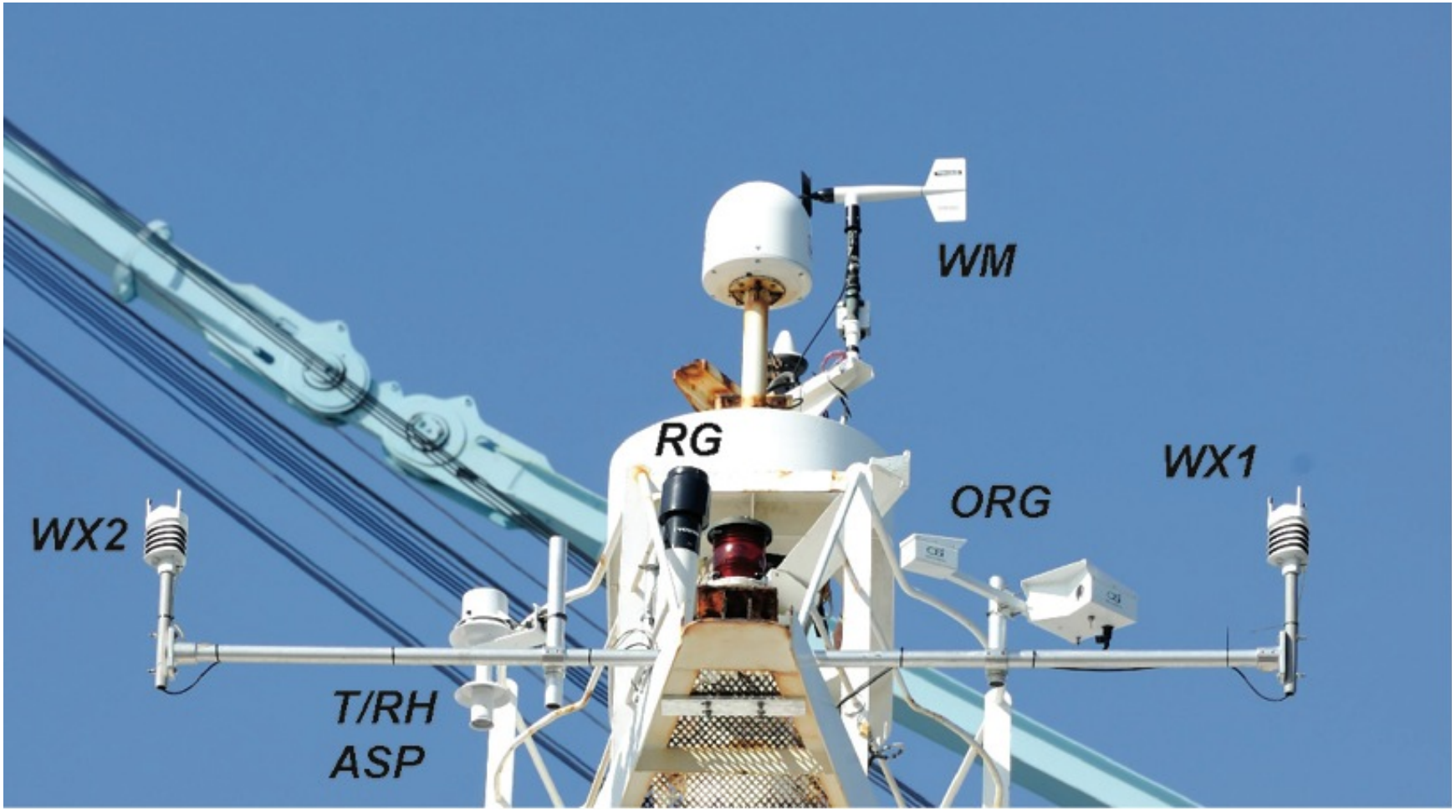
zenith-pointing W-band (95 GHz) on stable table

beam-steerable wind profiler (1290 MHz)

vertically-pointing Ka-band (35 GHz)

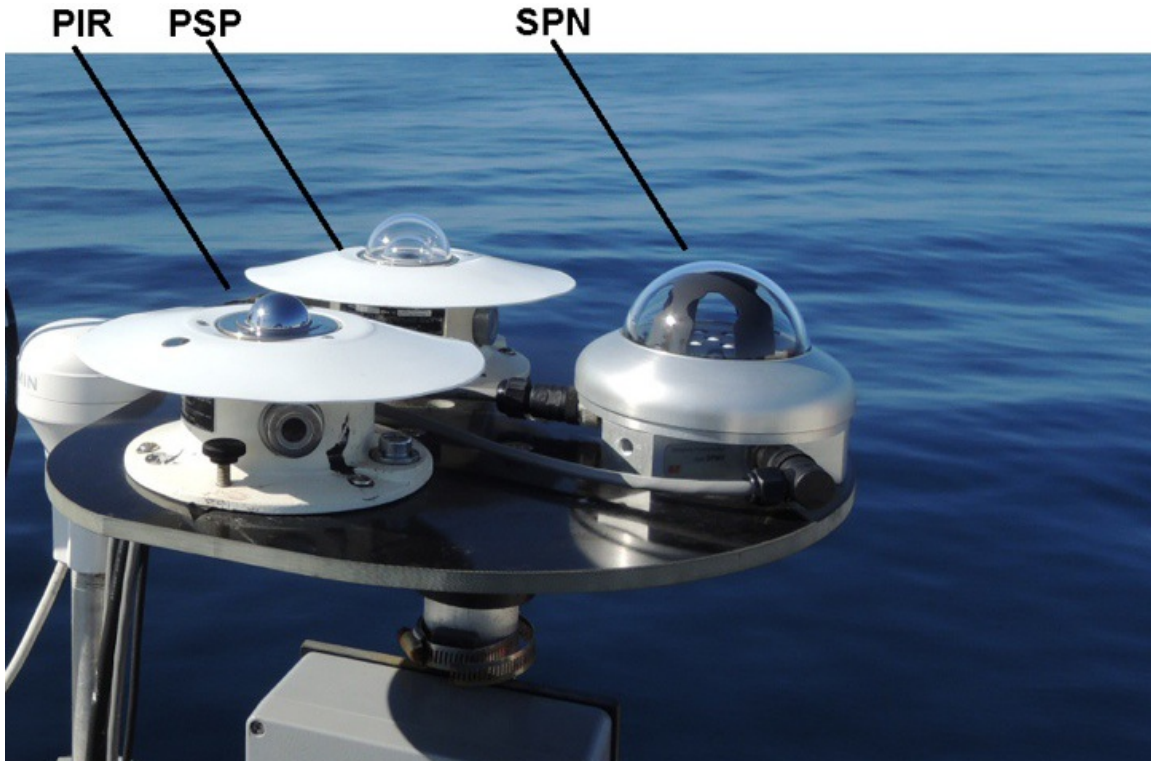
Corrections for ship motion are under development.

Mast Meteorological System



Multiple measurements of T, P, RH, wind speed and direction, precipitation.

Radiometric Instruments



Portable Radiation Package

Two Portable Radiation Packages (PRP) – one on each side of ship
Fast Rotating Shadowband Radiometer (FRSR)
Solar Array Spectrometer, Zenith-pointing, SAS-Ze
Solar Spectrum Flux Radiometer (SSFR)
CIMEL Sunphotometer in cloud mode for cloud optical depth

Four Radiosonde Launches/Day (> 80% Success)

In July for one round trip there will be 8 radiosonde launches per day.

Sample Cu and Sc profiles from Nov. 2012

magsondewnpnM1.b1.20121111.181300.cdf

Skew-T, Log(P)

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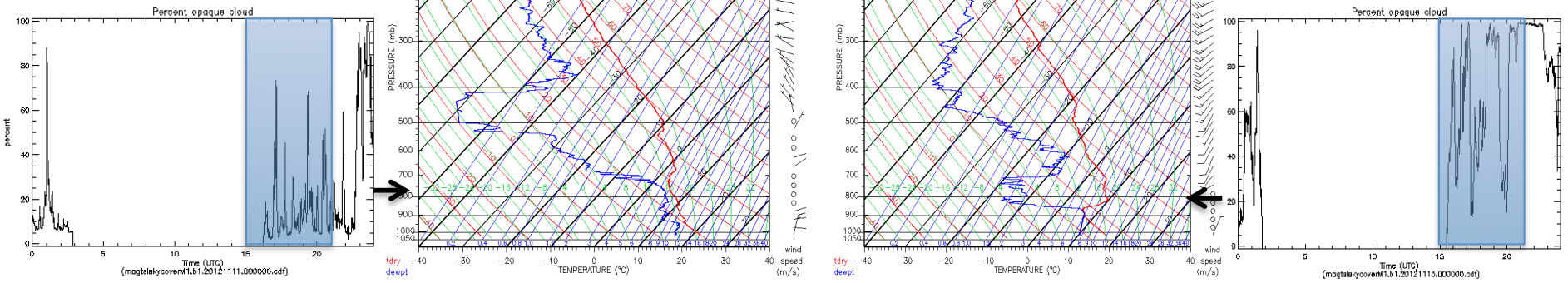
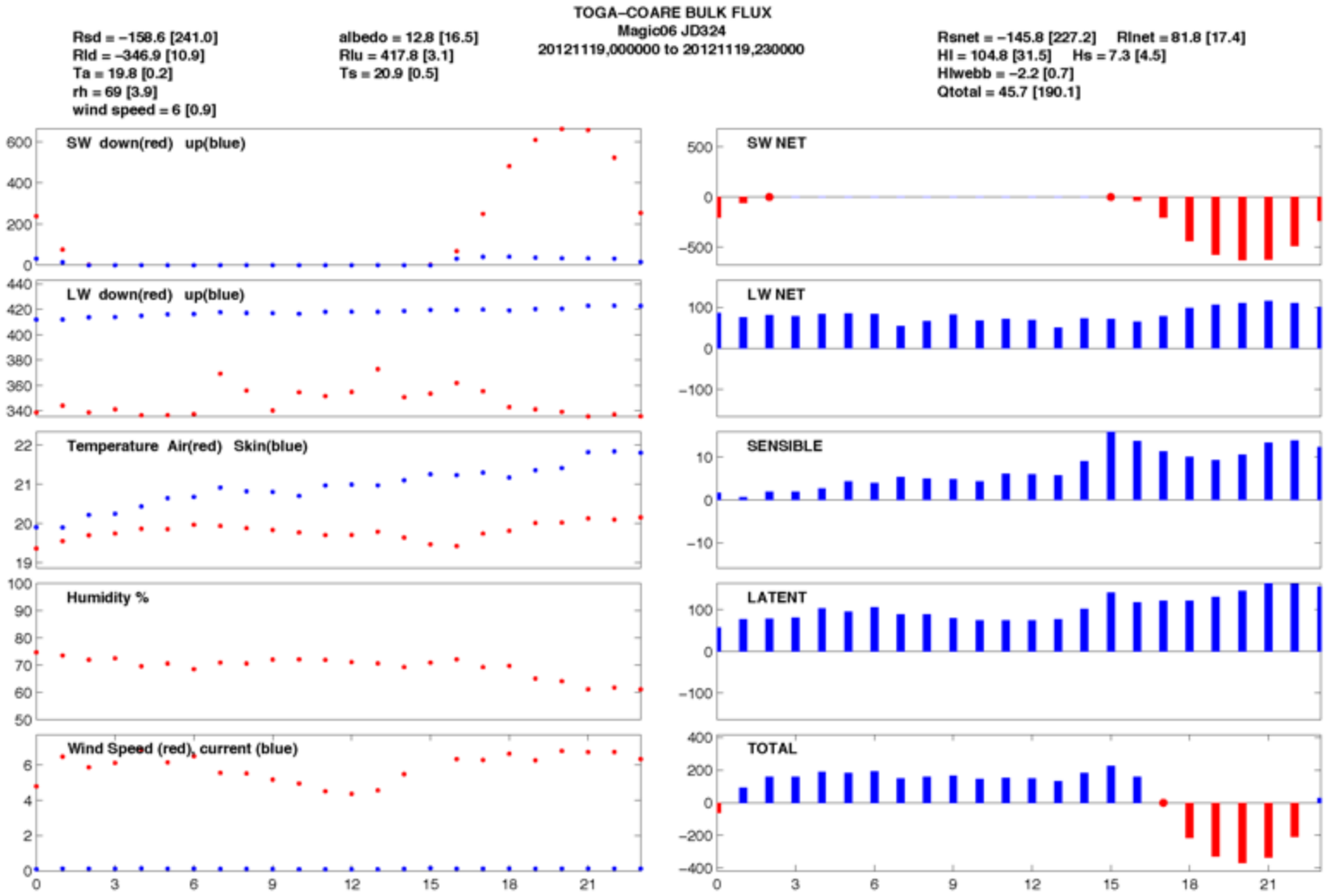
Skew-T, Log(P)

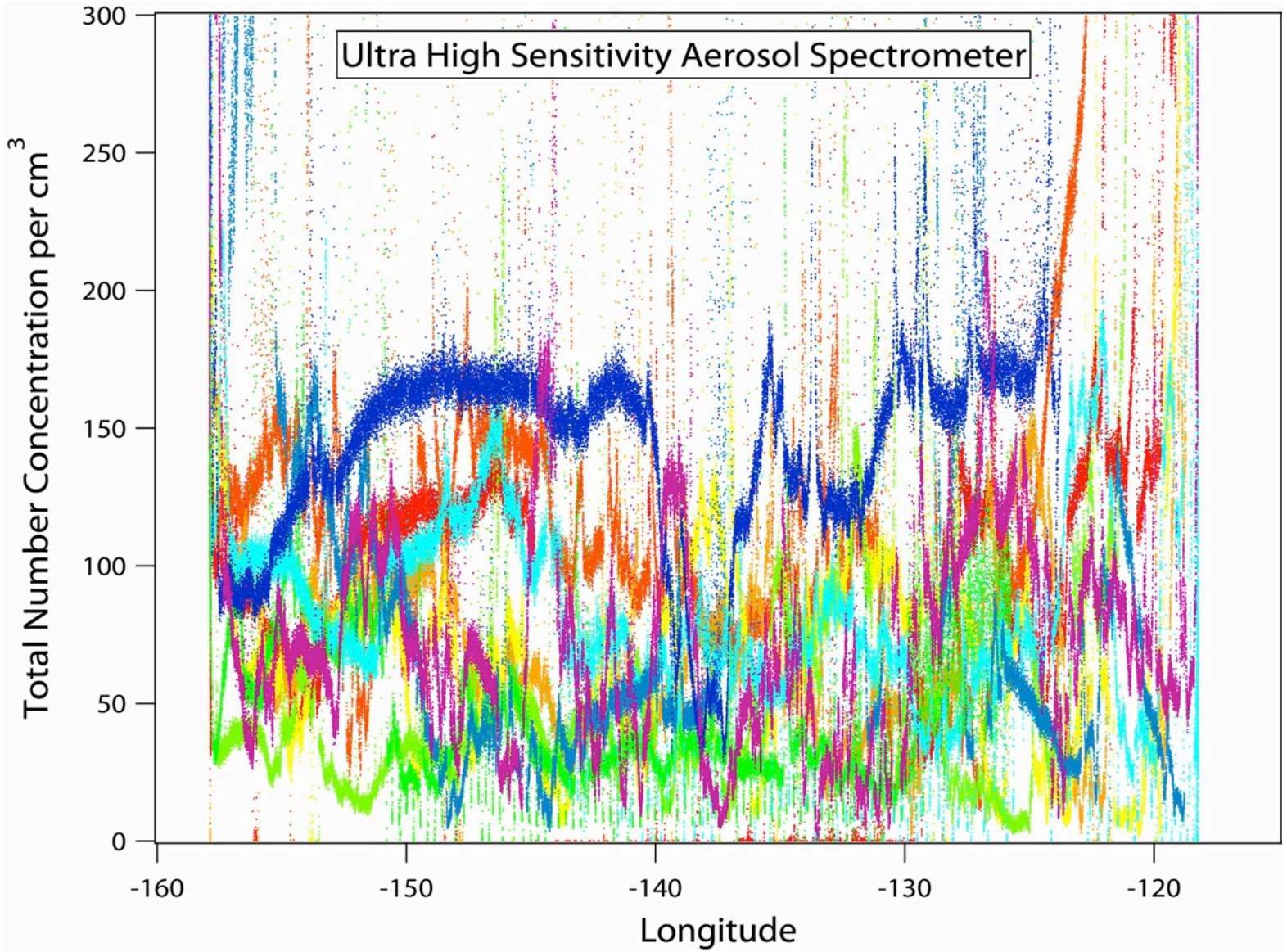


Fluxes



Include SW, LW, sensible and latent heat

Aerosol Concentrations Measured by UHSAS



Graph courtesy of Gunnar Senum

MAGIC Timetable

Sept, 2012	started setup on *Spirit*	
Oct-Dec, 2012	MAGIC running	(3 months of data)
Jan, 2013	uninstall	
Jan-May, 2013	*Spirit* in dry dock	
May, 2013	re-install	
June-Sept, 2013	MAGIC running	(4 months of data)
July, 2013	IOP (sonde launches every 3 hrs for one round trip)	
Oct, 2013	MAGIC deployment finishes	
Oct, 2013 onward	**MAGIC-Lite**?	
2015 or later	**MAGIC-2**?	

MAGIC-Lite

MAGIC-Lite has been proposed.

MAGIC-Lite would provide continuous measurements on the Horizon *Spirit* after MAGIC ends in October, 2013 using robust instruments that can run autonomously and provide meaningful data streams:

- Mast Meteorological System (T, P, RH, wind speed & direction, precip.)
- Portable Radiation Package, consists of PSP, PIR, SPN, FRSR
- Ceilometer (cloud base)
- Microwave radiometer (liquid and vapor water column amounts)
- Total sky imager (cloud fraction)
- Infrared Scanning Autonomous Radiometer, ISAR (SSST)
- CIMEL sunphotometer in cloud mode (cloud optical depth)

Sonde launches every 3 hours for one round trip every three months.

MAGIC-2 Has Also Been Proposed

This would consist of another deployment of AMF2 aboard the Horizon *Spirit* for one full year, similar to MAGIC.
This will not occur before 2015.

Additional Information

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Updates (~bi-weekly)

Websites:

http://www.bnl.gov/envsci/ARM/MAGIC

http://www.arm.gov/campaigns/amf2012magic

http://www.rmrco.com/cruise/magic/

MAGIC data website: forthcoming