MAGIC Breakout Session

2013 Atmospheric System Research (ASR)
Fall Working Group Meeting

Rockville, MD
Wednesday, November 6, 2013
8:30-10:00 am

Agenda

MAGIC Overview

Ernie Lewis (Brookhaven National Laboratory)

Marine Boundary Layer Cloud Observations using AMF2 during MAGIC

Xiaoli Zhou (McGill University)

Retrieving Liquid Water Contents of Boundary-Layer Clouds at MAGIC using Dual-frequency Cloud Radars

Courtney Laughlin (Penn State)

HSRL-KAZR Retrievals of Liquid Water, Particle Size, and Precipitation during MAGIC

Ed Eloranta (University of Wisconsin)

Cloud Observations during MAGIC with the Solar Spectral Flux Radiometer

Patrick McBride (NASA)

Cloud System Evolution in the Trades (CSET)

Rob Wood (University of Washington)

MAGIC Data Needs and Desires

Mary Jane Bartholomew (Brookhaven National Laboratory)

Discussion on Future Plans and Further Data Processing Requirements

MAGIC

Overview and Status

Ernie R. Lewis
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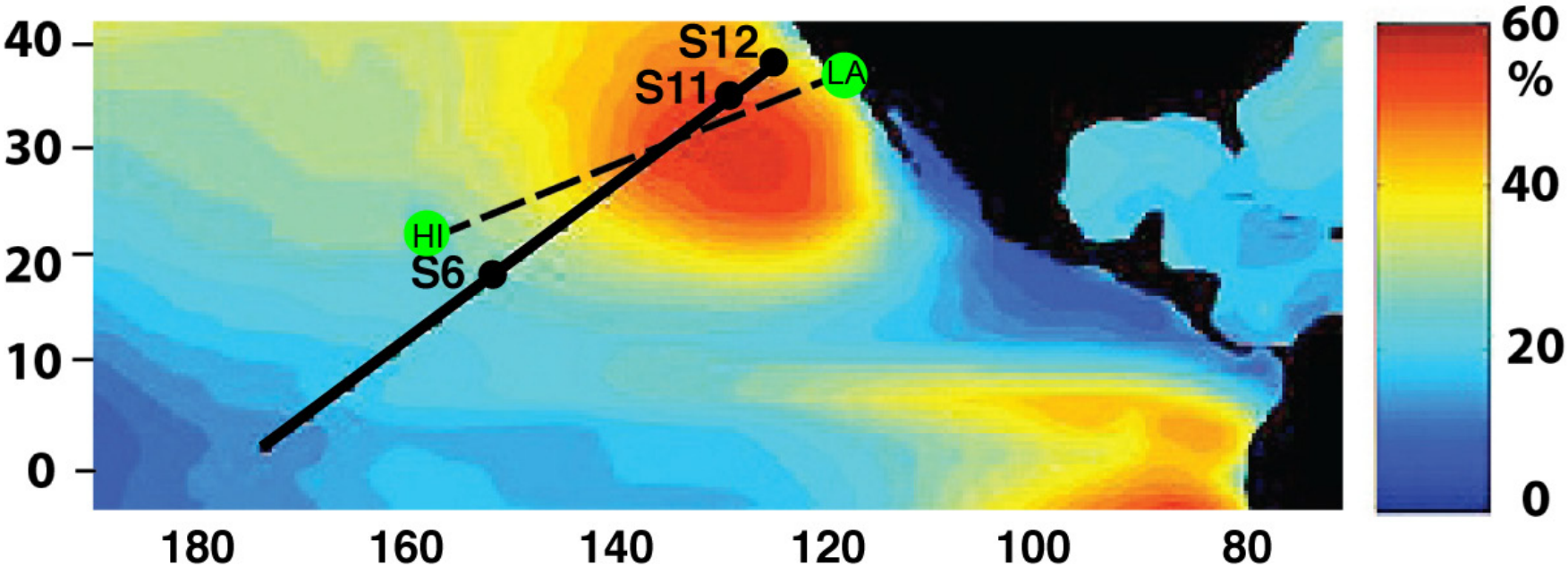
Brookhaven National Laboratory

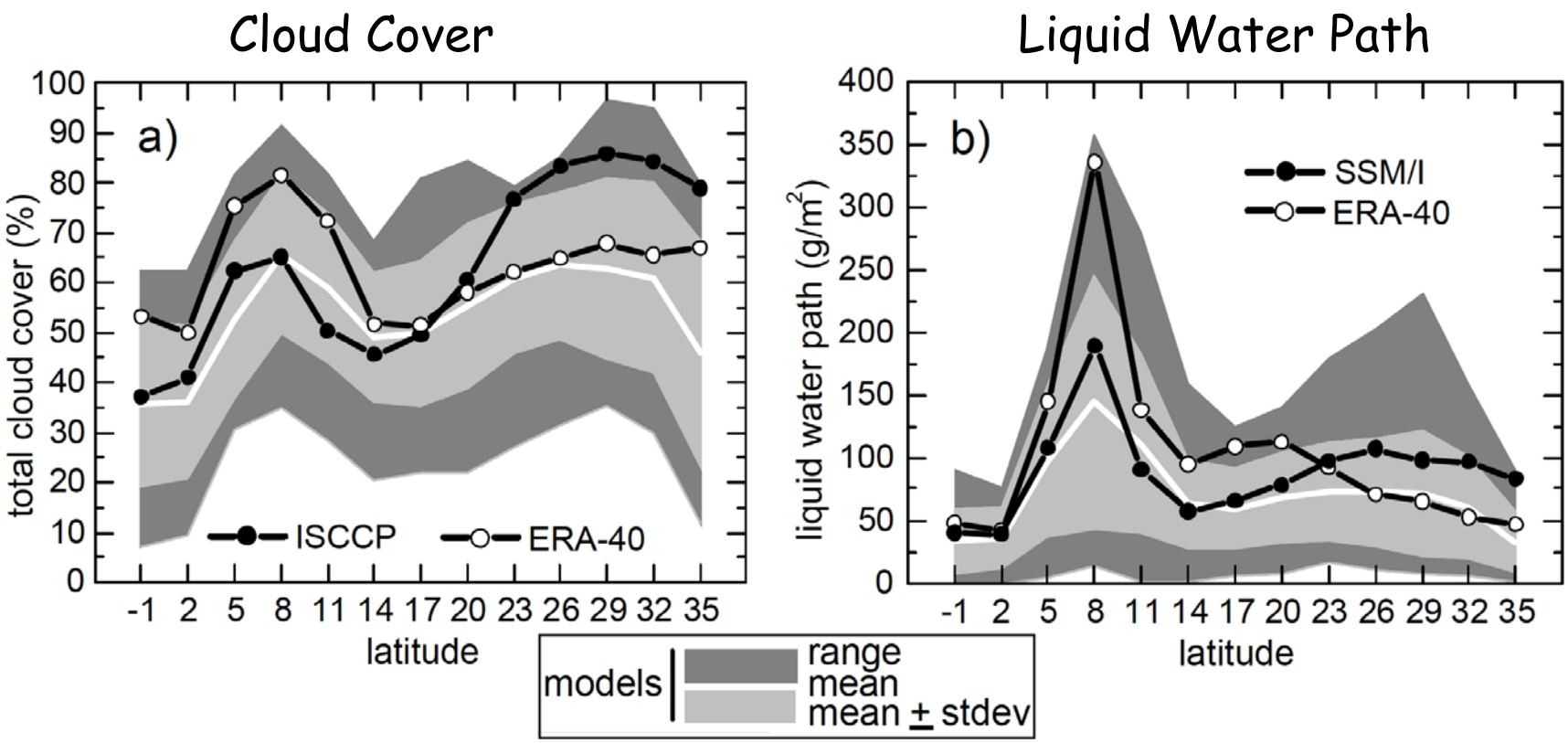
MAGIC: Marine ARM GPCI Investigation of Clouds



MAGIC route with annual average low-level cloud cover,
GPCI transect, & CGILS points.

From Teixeira et al., J. Climate, 2011

Models Exhibit *Some* Disagreement



from Teixeira et al., 2011

For JJA 1998 along GPCI

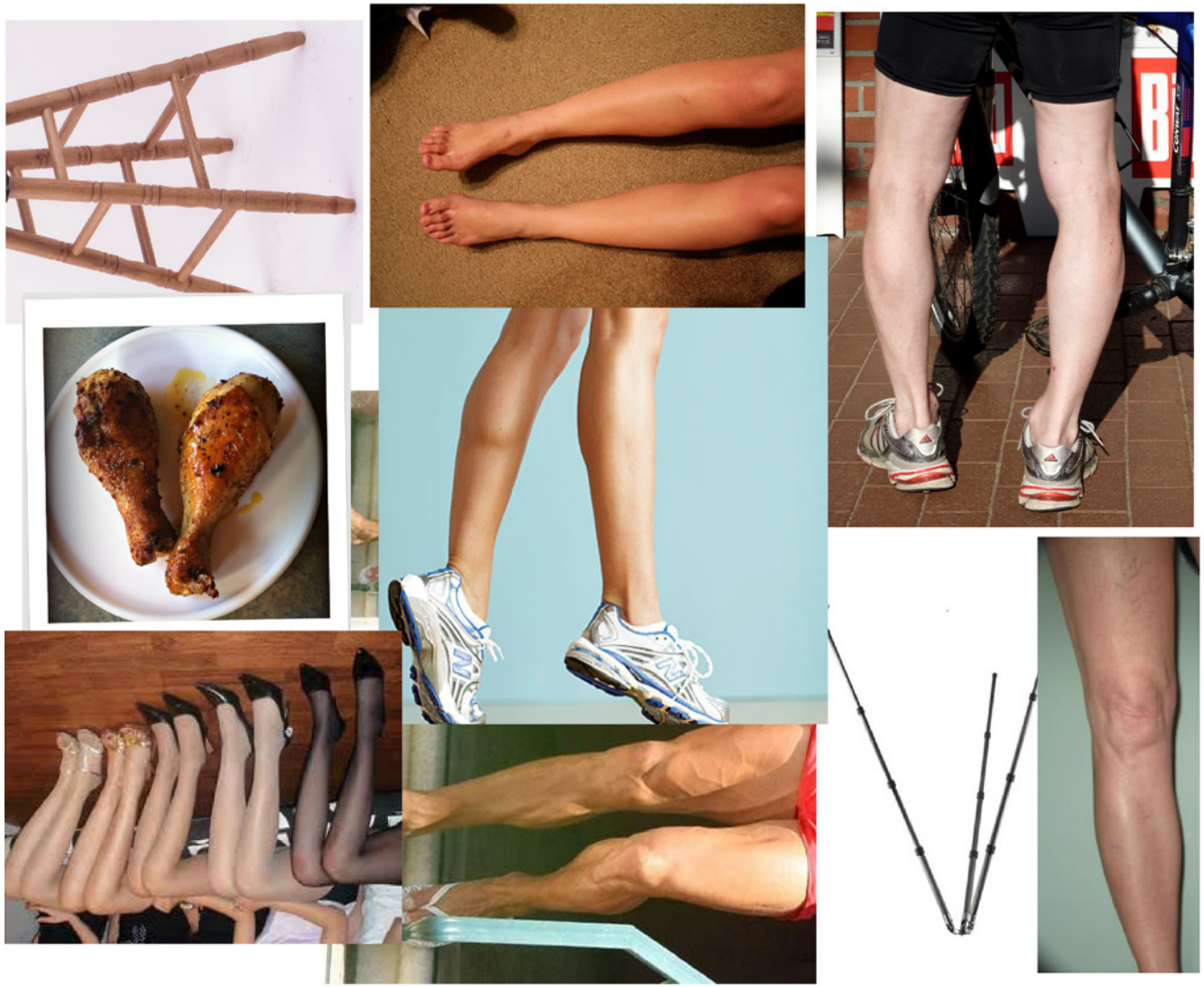
Ensemble results from 23 models; mean plus or minus standard deviation

Range extends from minimum to maximum values.

HORIZON LINES

It all happens here.

What Do These Pictures Have in Common?



MAGIC Timetable

Leg0 — Leg01 to Leg09 — Leg10 to Leg20

2012/01 — 2013/01 — 2014/01

Leg0	Feb, 2012
Leg01B	Sept, 2012
Leg09B	Jan, 2013

Spirit in dry dock

Leg10A	May, 2013
Leg20B	Oct, 2013

~35 transects, nearly 200 days at sea

MEASUREMENTS

Clouds, Precip	Radiation	Aerosols	Other
Ka-band radar	PSP	CPC	Radiosondes
W-band radar	PIR	CCN	ISAR
Radar wind profiler	SPN	UHSAS	IRT
MWR- 2λ	FRSR	Neph	Meteorology
MWR – 3λ	SAS-Ze	PSAP	Navigation
TSI	ASSIST	HTDMA	
MultiPulse Lidar	CIMEL (cloud)	Ozone	
HSRL	FSSR		
Ceilometer	MicroTops	Samples!	
Disdrometers			

Instrument Status Table – Legs 01-09

Instrument Status by Leg #

				Instrument Status by Leg #									
Instruments	Leg03A	Leg03B	Leg04A	Leg04B	Leg05A	Leg05B	Leg06A	Leg06B	Leg07A	Leg07B	Leg08A	Leg08B	Leg09A
1290rwp									Installed				
aosccn100							CM		CM				
aoscpc3772									CM				
aoshtdma	CM	Comms					CM		CM				
aoshumidgr	CM	CM								CM			
aosmet													
aosozone							CM						
aospsap3w	CM							CM	CM				
aosuhsas	CM	Comms							CM				
assist	Installed												
csphot													
irt													
kazr													
kazrspec	offline	??DATA??						CM	CM	CM			
MWACR													
MWACR Spec							CM	CM					
met													
mplpols													
mwr													
mwr3c							CM						
nav			No/Go				No/Go	No/Go	No/Go				
prp	Comms	Comms											
rph													
rpy													
sasze	Installed												
sonde													
tsi									CM				
vceil25k													
Parsivals													
ISAR									CM				

Instrument Status Table - Legs 10-20

				Instrument Status by Leg #				code:														
																at end of cruise please email to elewis@bnl.gov						
Instruments	Leg10A	Leg10B	Leg11A	Leg11B	Leg12A	Leg12B	Leg13A	Leg13B	Leg14A	Leg14B	Leg15A	Leg15B	Leg16A	Leg16B	Leg17A	Leg17B	Leg18A	Leg18B	Leg19A	Leg19B	Leg20A	Leg20B
1290rwp		mentor	vendor	vendor																		
aosccn100												CM										
aoscpc3772				CM																		
aoshtdma																						
aoshumidgr	Nephs on/ Humidity off/ data																					
aosmet																						
aosozone												CM										
aospsap3w																						
aosuhsas																						
assist									CM	CM												
csphot																						
irt																						
kazr			mentor																			
kazrspec			mentor	CM														CM				
MWACR			mentor							CM												
MWACR Spec			mentor	CM						CM												
met											CM						CM	CM				
mplpols					mentor																	
mwr																	CM					
mwr3c																						
nav									CM												CM	
prp																	CM	CM				
rph				CM						CM						CM						
rpy																						
sasze																						
sonde																						
tsi																						
vceil25k																						
Parsivals																						
ISAR																						

Large fraction of up-time with most instruments working well!

Radiosonde Launches

565 out of 695 attempts => more than 80% success!

Aerosol Sampling

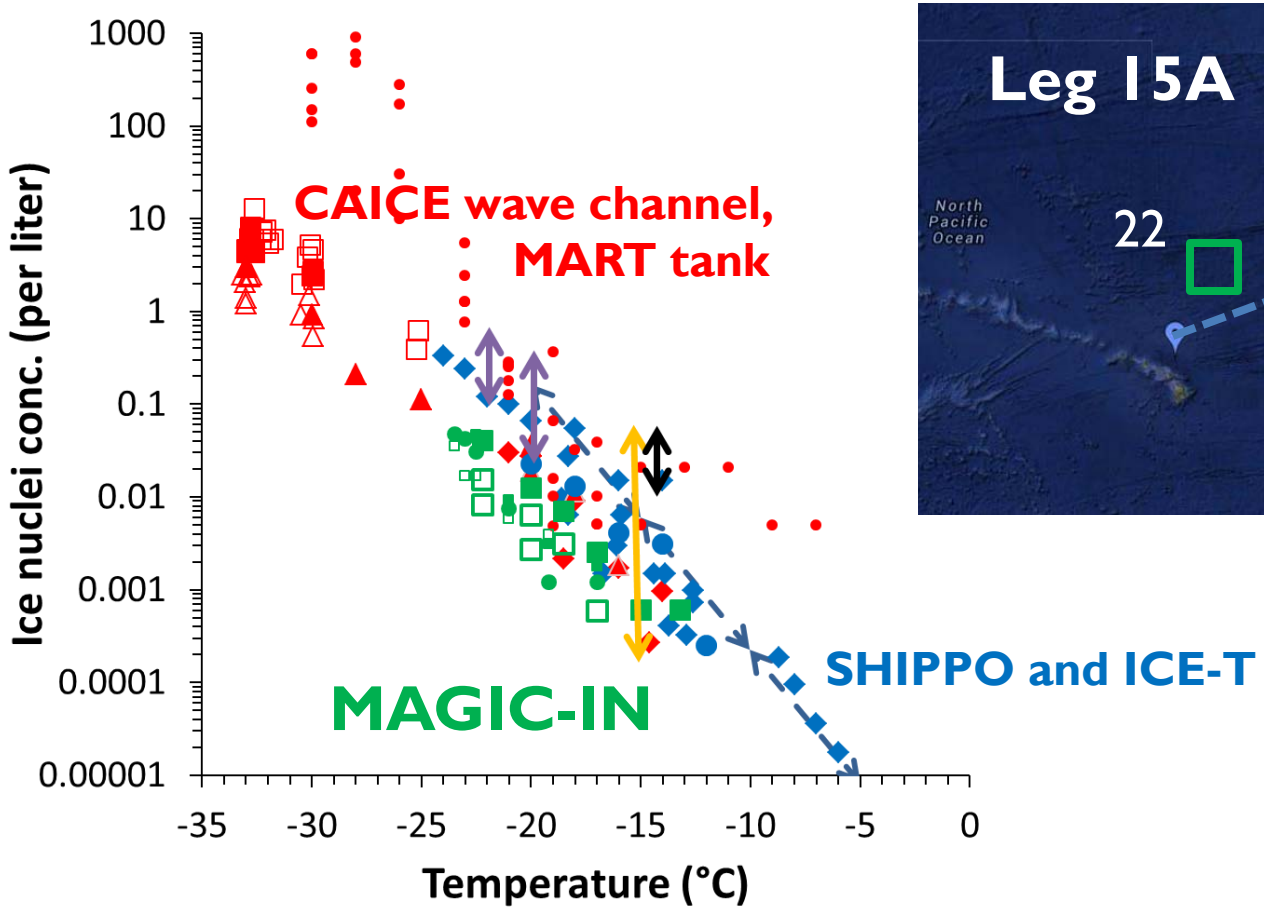
IN (ice nuclei), RNA

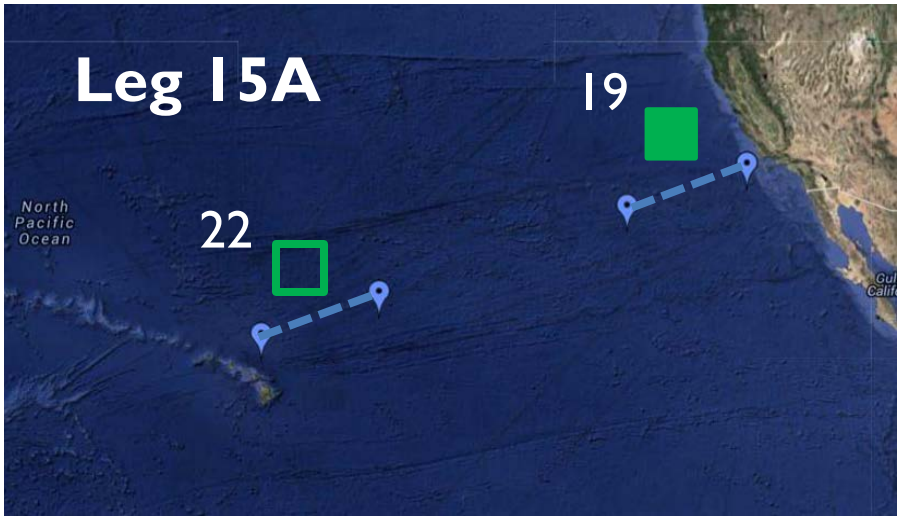
- 43 samples (24-hr)
- Paul DeMott, Colorado State (later CAPI session)

Bulk and individual particle chemical composition, morphology

- 139 samples (mostly 24-hr)
- XANES, SEM, ICPMS, IC
- Yuan Gao, Rutgers

Comparison for a few recent MAGIC samples

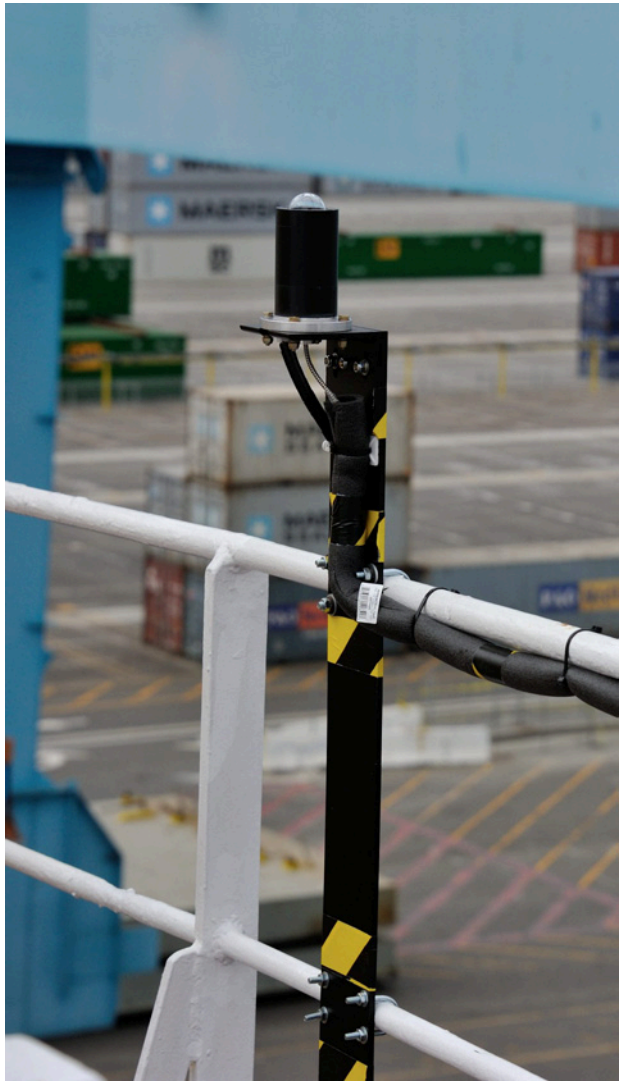




Overflight Attempt

Paul Lawson and SPEC

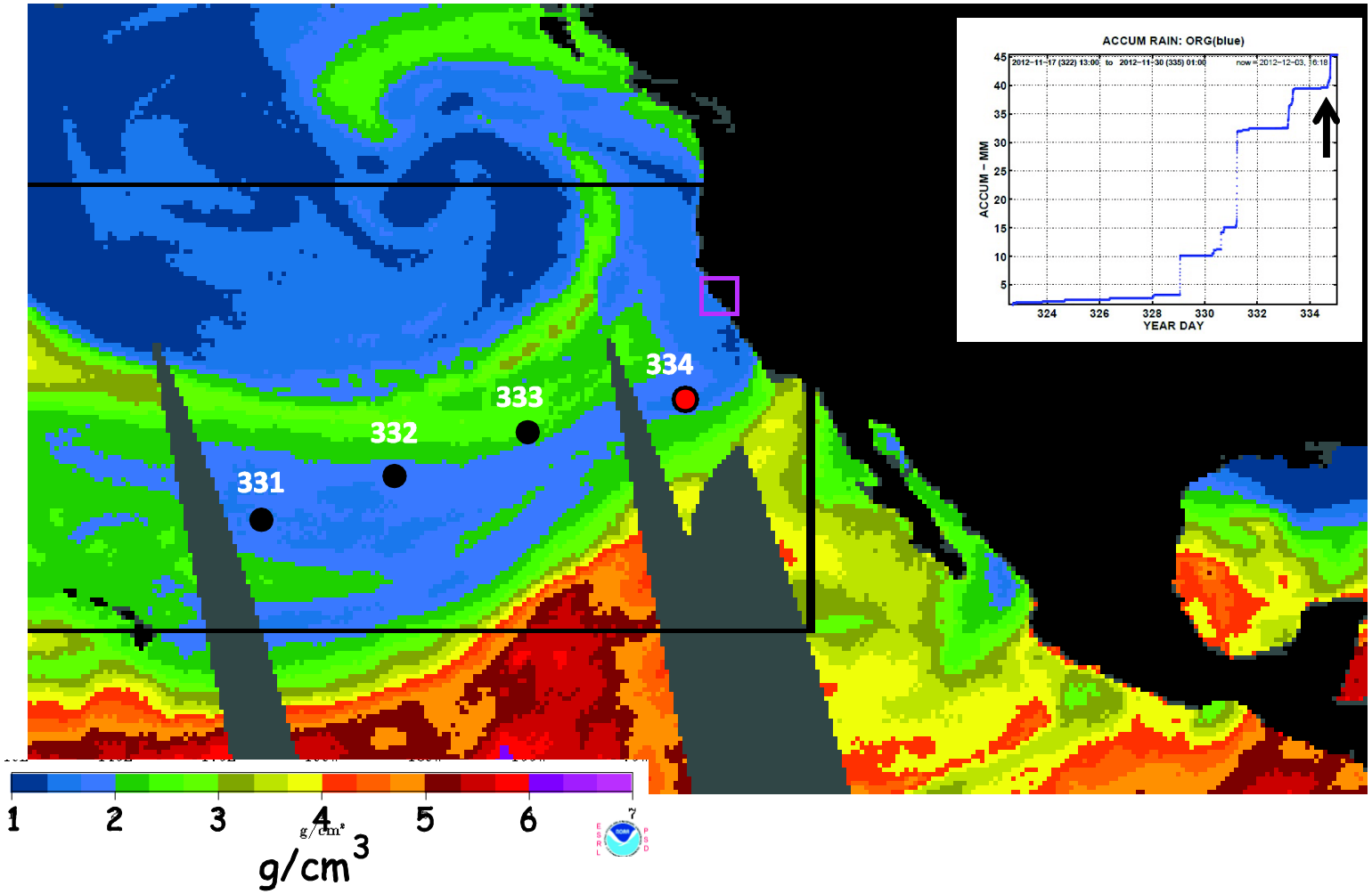
Solar Spectral Flux Radiometer



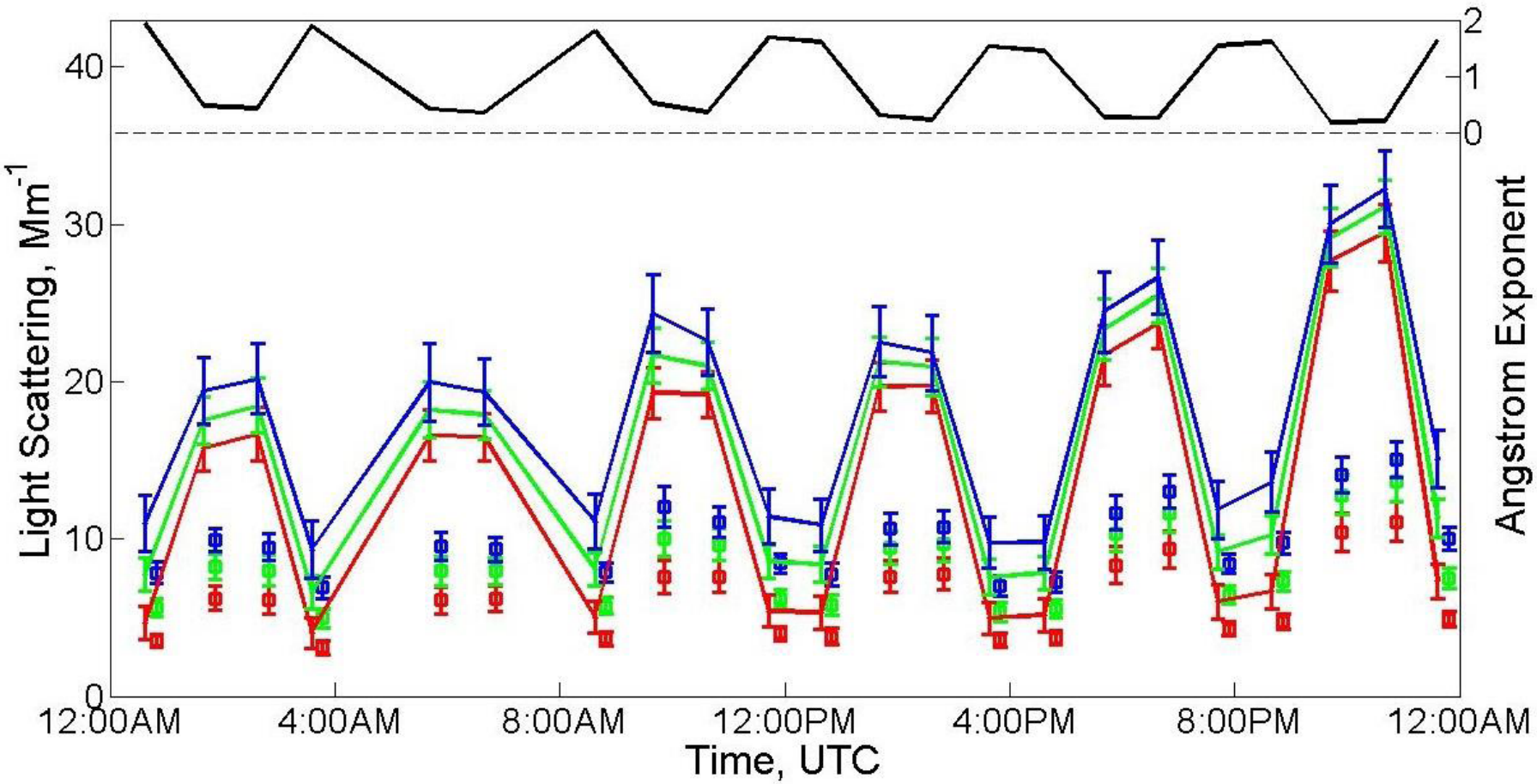
Atmospheric Rivers

Marty Ralph

Julian Day 334 (AM) – 29 Nov 2012



Nephelometer Closure



More than half of the light scattering is from D > 1 μm

Future Plans

MAGIC-2?
MAGIC-Lite?

Future Plans

~~MAGIC-2?~~

MAGIC-Lite?

Future Plans

~~MAGIC-2?~~
~~MAGIC-Lite?~~

AGU Session in December, 2013

Collaborations
Model intercomparisons
ASR proposals

Further Data Processing Requirements

Lat/lon values

Sonde table

Best meteorology (wind speed and direction)

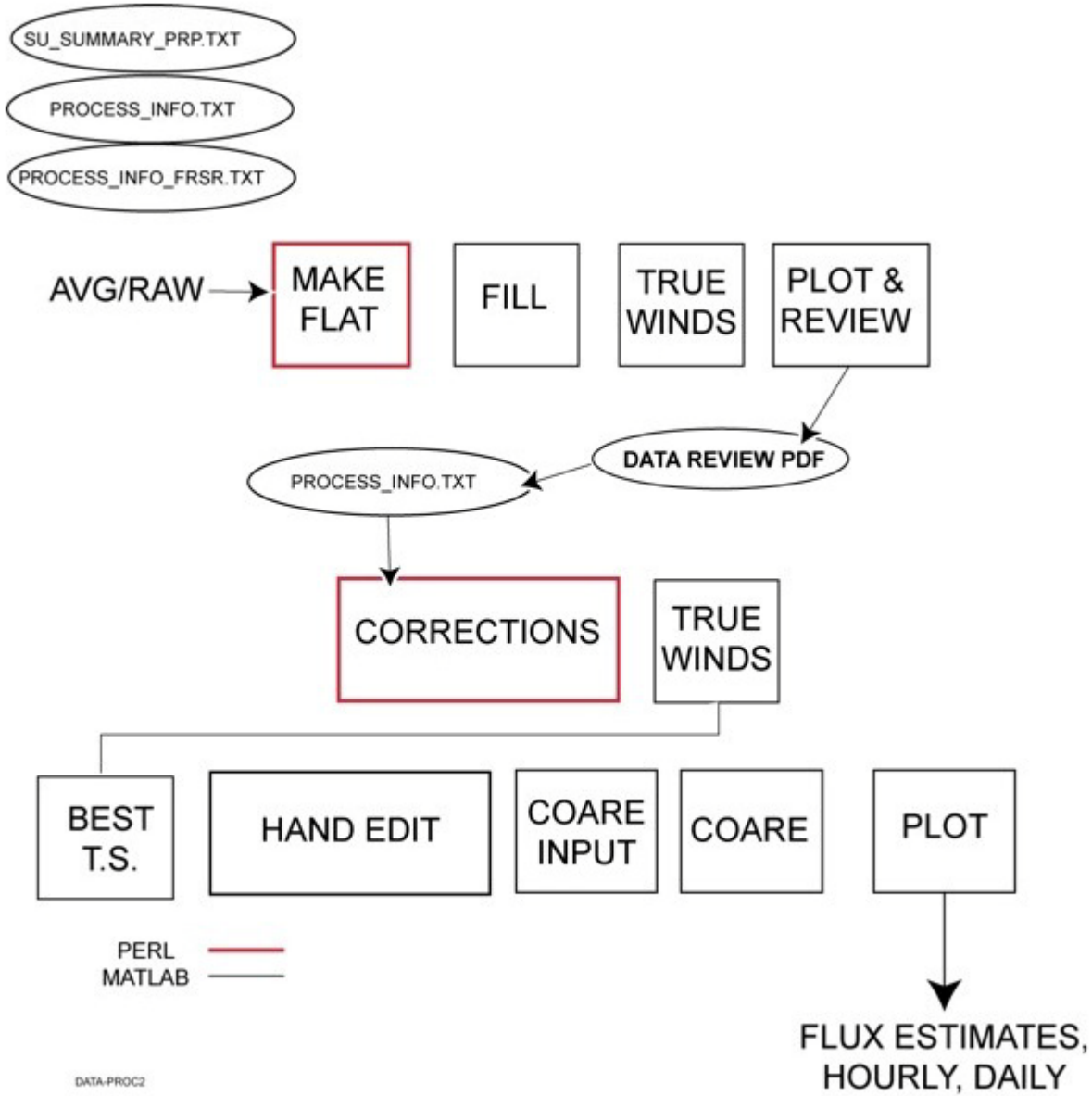
Bulk aerodynamic fluxes (SW, LW, latent & sensible heat, total)

Angle from zenith

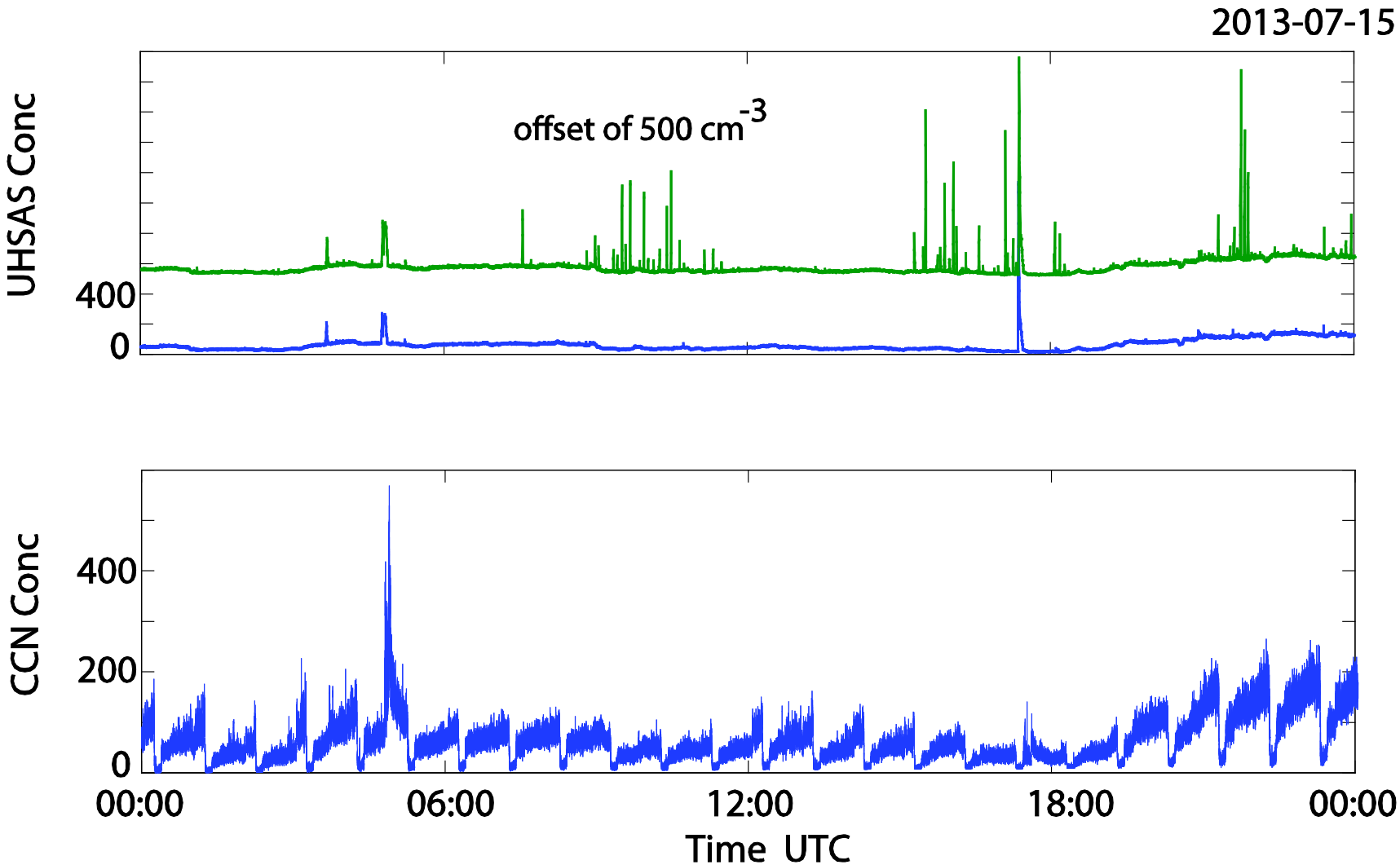
- Heights are measured from bridge deck, ~20 m above surface
- At 1 km, a 5° angle yields an change in height of 4 m

Aerosol spikes – ship tracks or nucleation events?

Flux Estimates (Mike Reynolds)



Identificaton of Ship Plumes



Data Reprocessing Issues?

Radars?

Lidars?

Others?