



Key results from the AMF deployment to Niamey, Niger

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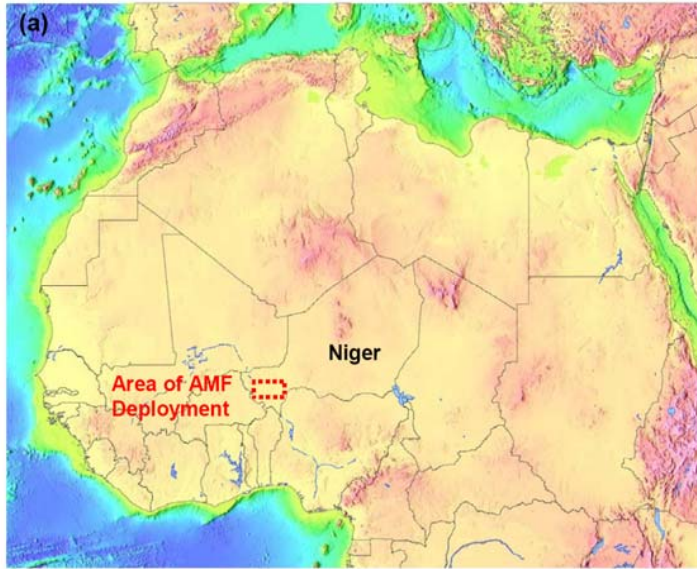
The RADAGAST project

- Radiative Atmospheric Divergence using ARM Mobile Facility, GERB data and AMMA stations
- Linked the **ARM Mobile Facility** with **GERB** (Geostationary Earth Radiation Budget instrument on Meteosat-8) and **AMMA (African Monsoon Multidisciplinary Analysis)**, during 2006
- Also with the Dust And Biomass EXperiment (DABEX) in January 2006

Collaboration

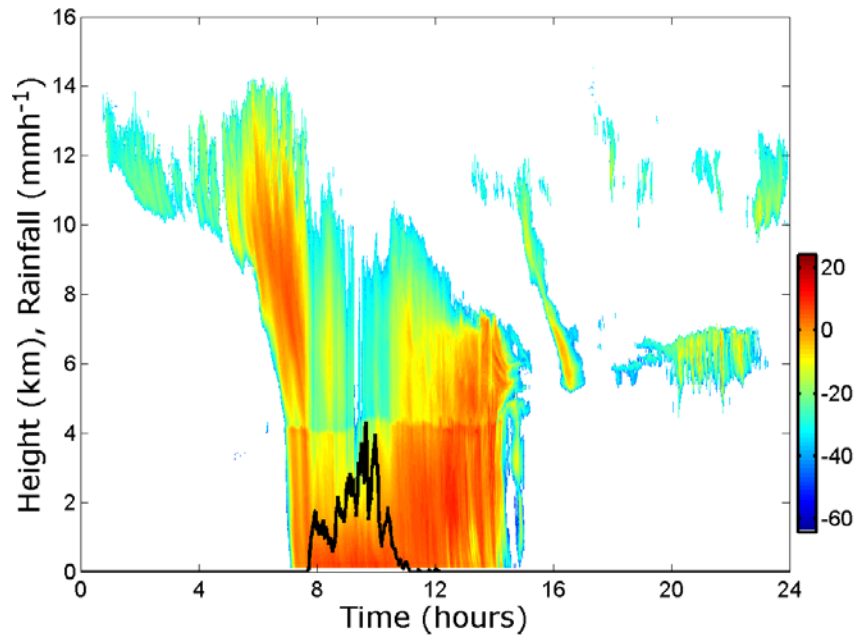
- Tony Slingo, Nazim Ali Bharmal, Gary Robinson, Jeff Settle, Richard Allan, Helen White (ESSC, UK)
- Peter Lamb and M. Issa Lélé (CIMMS, Oklahoma)
- Mark Miller (BNL and Rutgers) and Pavlos Kollias (McGill)
- Jim Haywood, Sean Milton and colleagues (UK Met Office)
- Sally McFarlane and colleagues (PNNL)
- Dave Turner (University of Wisconsin-Madison)
- Ron Miller (GISS)
- and, most importantly, the whole AMF team

Area of deployment



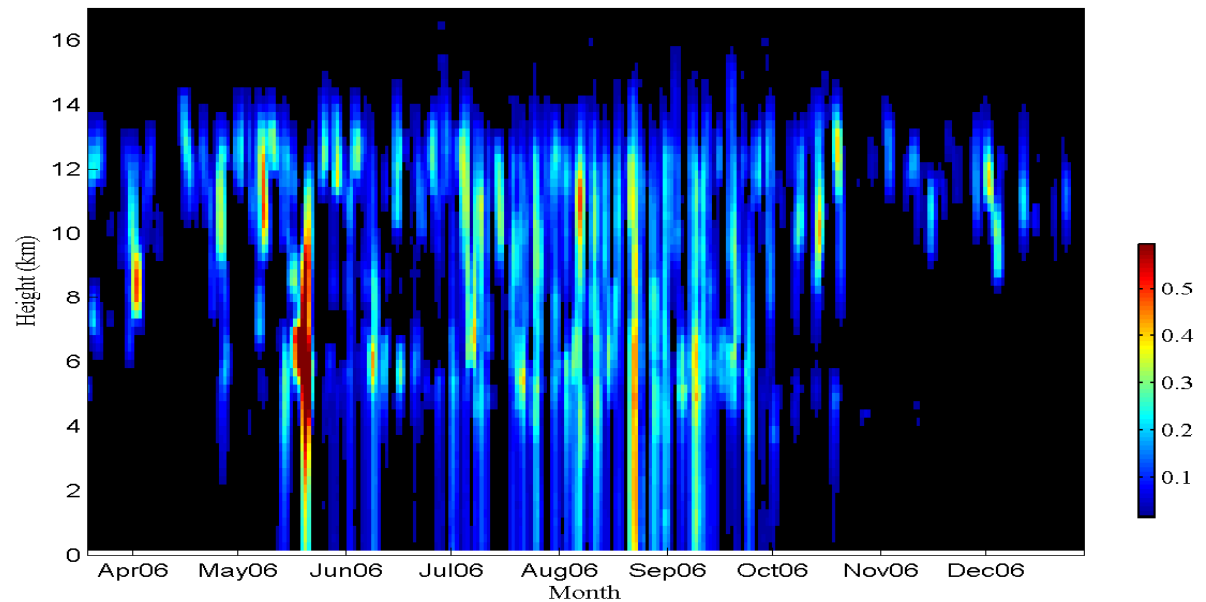
Some important questions

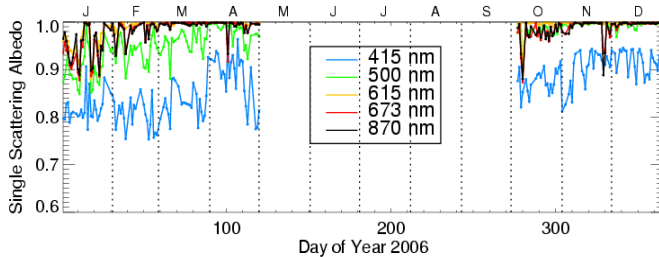
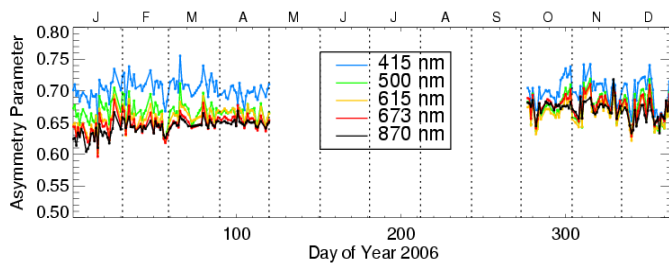
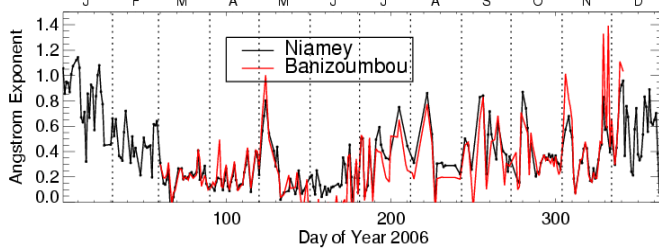
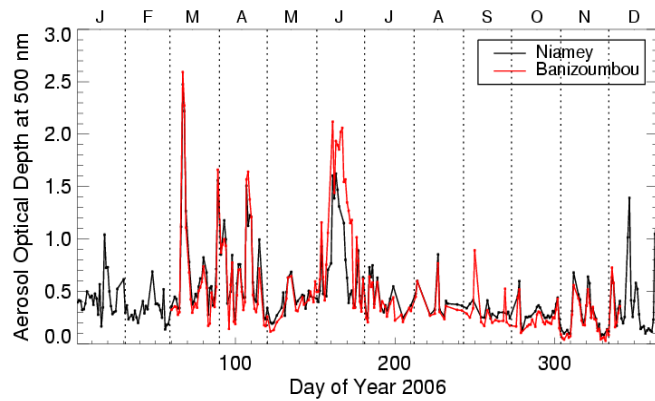
- What controls the surface and top of atmosphere radiative fluxes at Niamey?
- How large are the signals from aerosols?
- Can we retrieve the properties of aerosols using AMF data?
- Can we use AMF data as input to radiation codes to model the observed fluxes?
- Can we combine the AMF and GERR data to estimate the atmospheric radiative heating?
- Can we use the data to evaluate numerical weather prediction and climate models?



Pavlos Kollias & Mark Miller

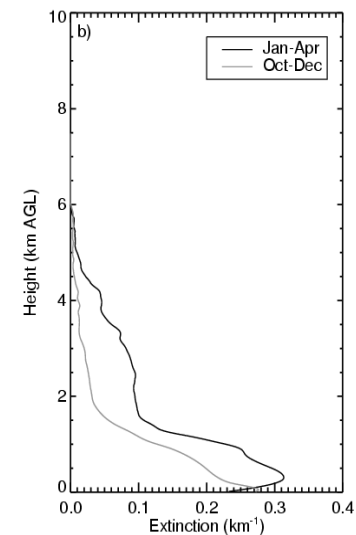
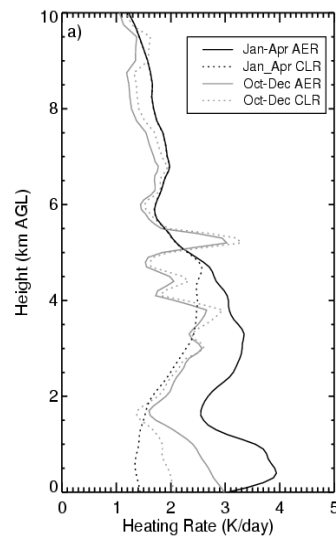
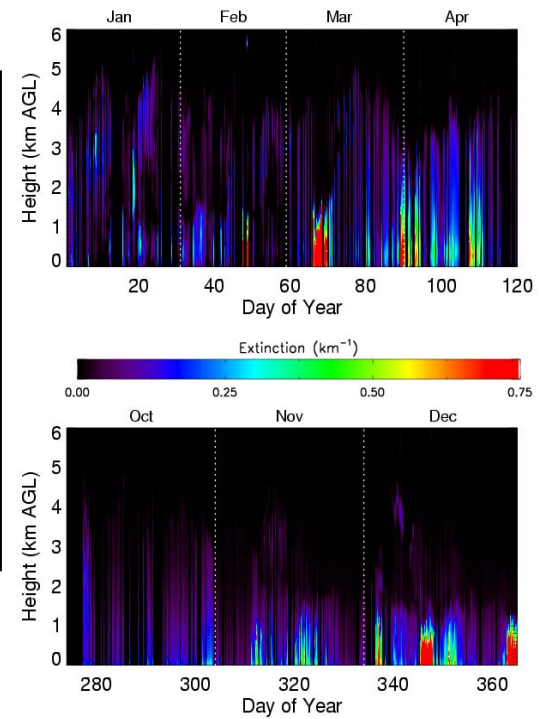
- combining cloud radar and micropulse lidar to generate retrievals of cloud cover through the year



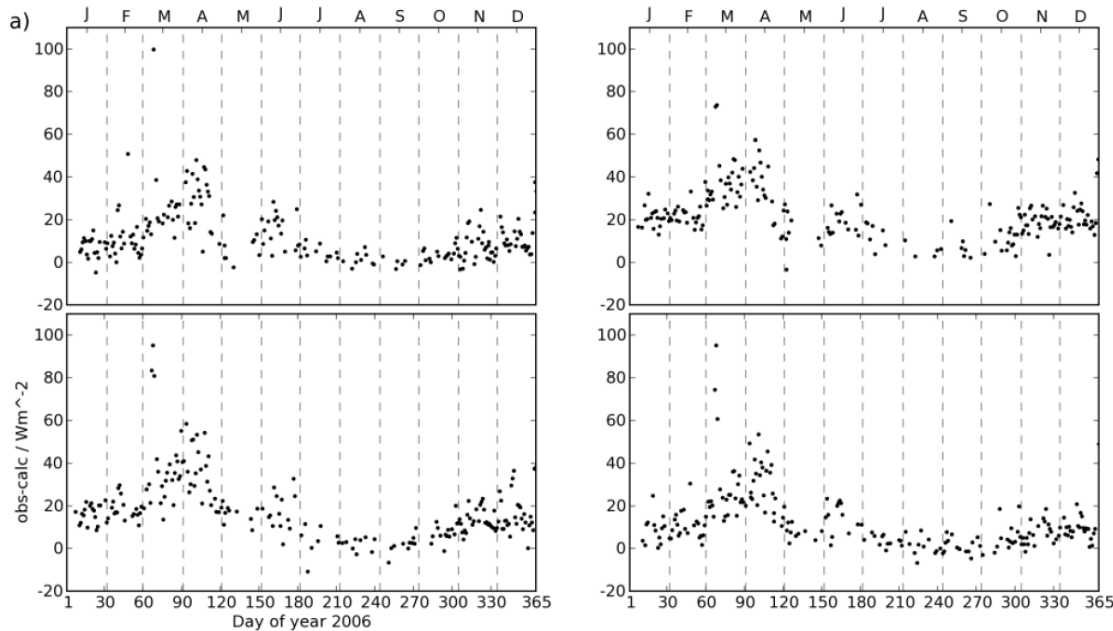


Sally McFarlane and colleagues

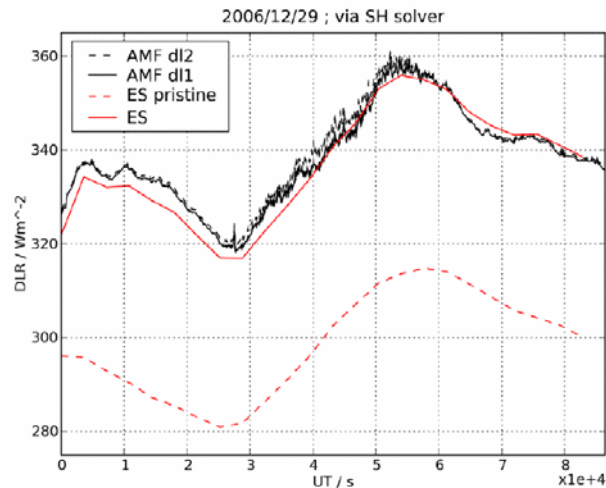
- aerosol retrievals from MFRSR and MPL
- simulations of shortwave fluxes and heating rates



Observed downward longwave fluxes minus simulations for “pristine” atmosphere

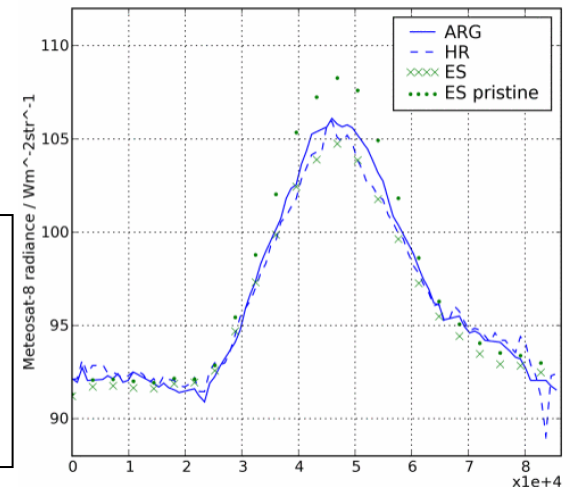


Nazim Ali Bharmal
- simulations of AMF longwave fluxes and of GERB fluxes and radiances
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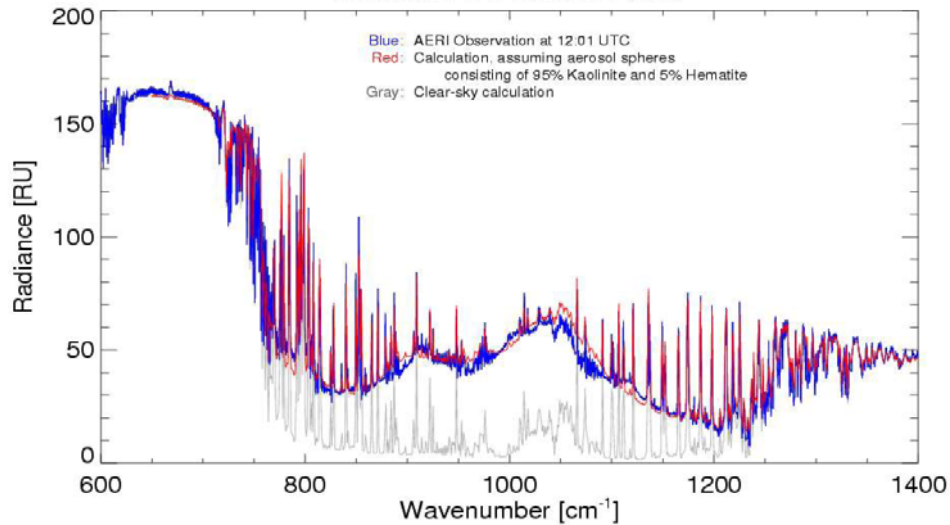


good agreement when aerosol included

Comparisons with TOA radiances and fluxes from GERB provide independent check



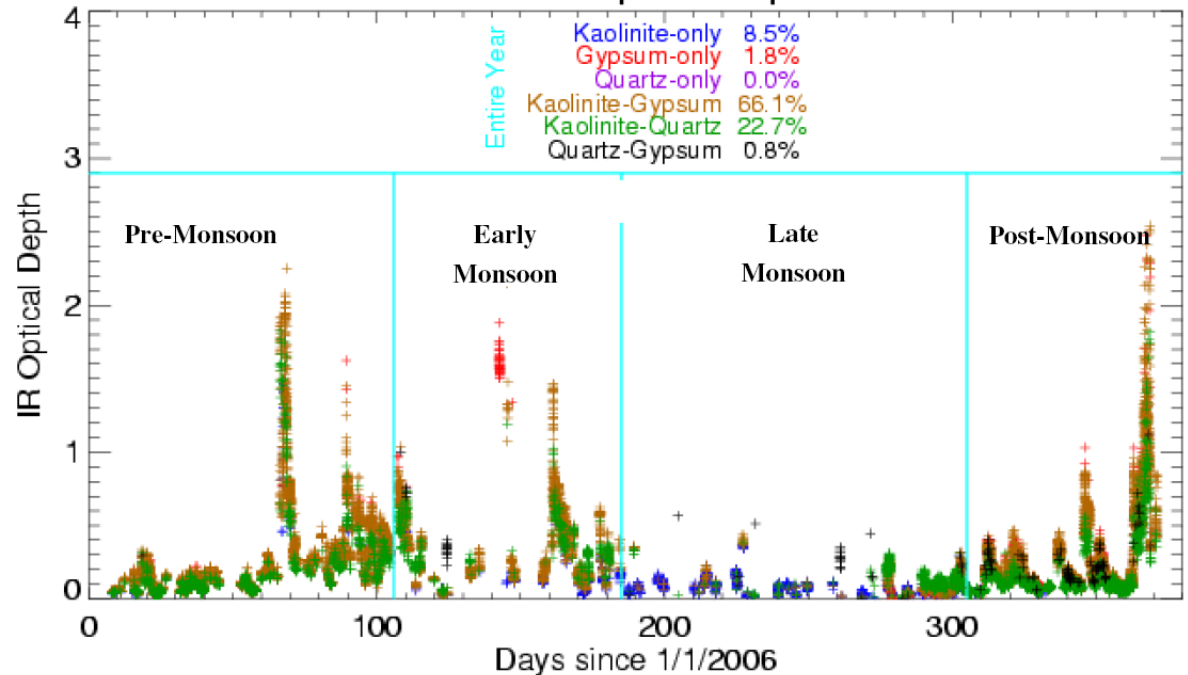
NIM AERI 7 March 2006



Dave Turner

- retrievals of aerosol composition and infrared properties from AERI radiances

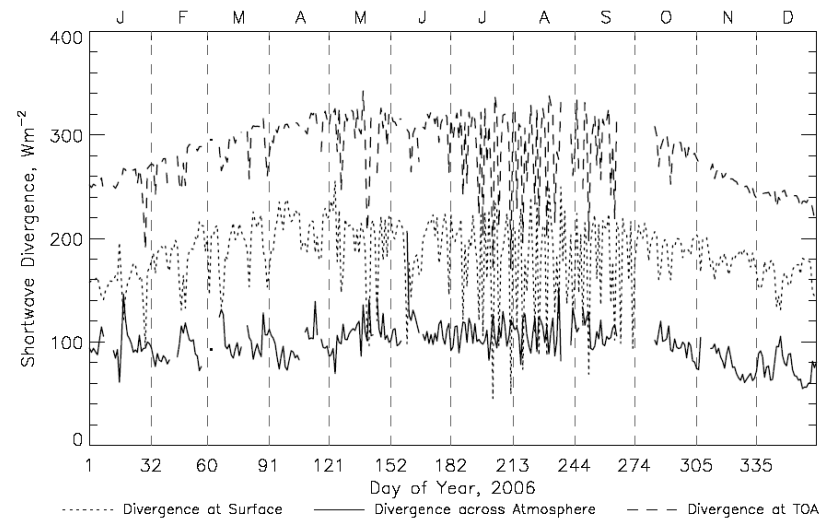
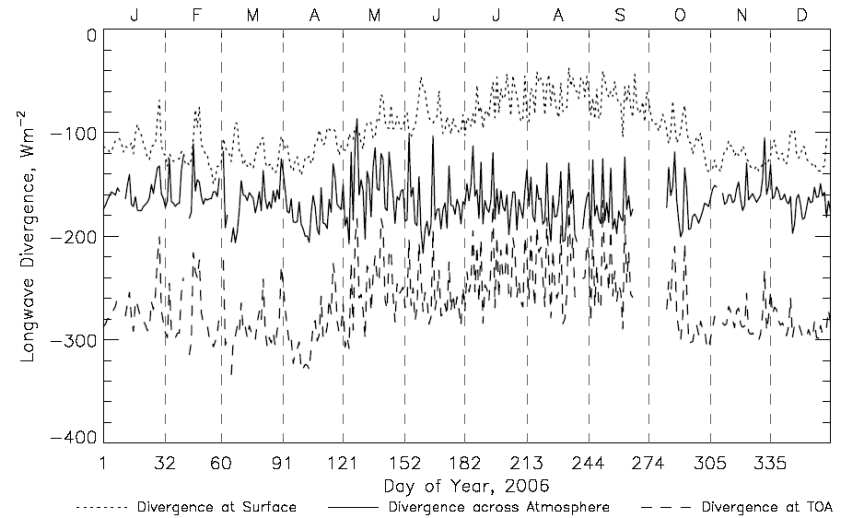
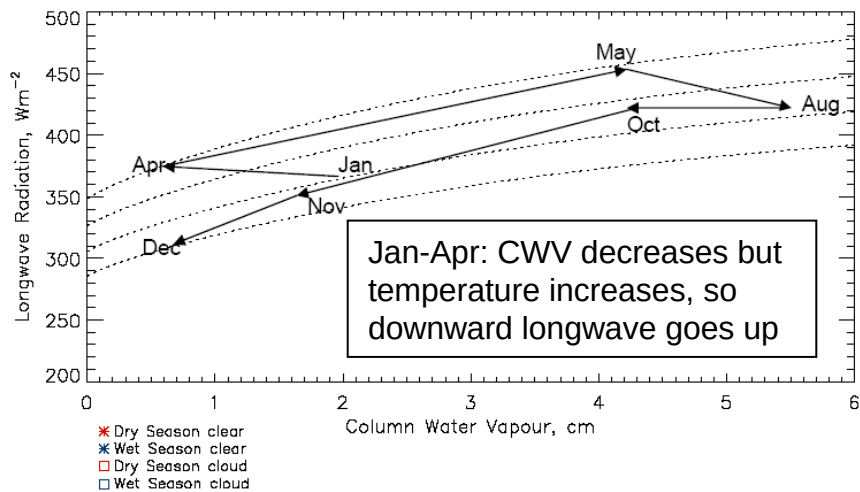
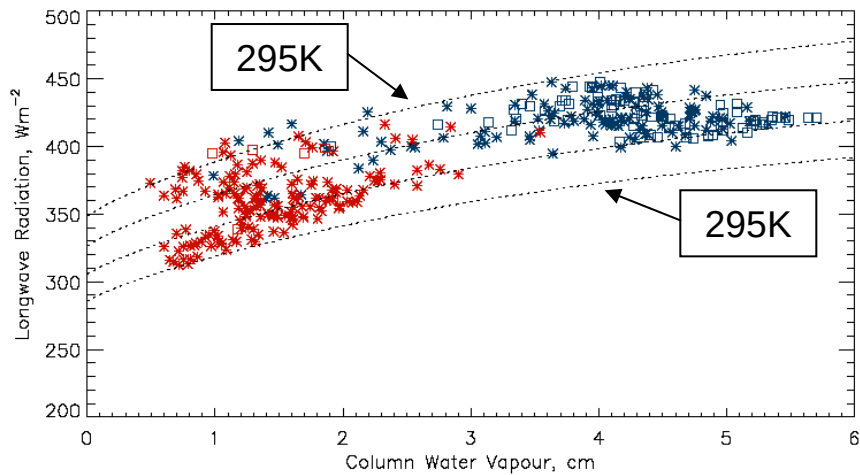
Mineral Optical Depth



Helen White

- temperature and humidity changes have opposing influences on longwave fluxes
- combining AMF and GERB data to estimate divergences

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Summary and ongoing work

- Key results
 - aerosol has a large impact on both SW and LW fluxes
 - retrievals of aerosol properties in SW and LW
 - temperature and humidity have opposing influences on LW fluxes
 - successful simulations of both SW and LW fluxes
- Key remaining questions
 - are SW and LW aerosol retrievals consistent?
 - is retrieved SSA consistent with other estimates?
 - what is the vertical profile of radiative heating and what are the relative roles of aerosols and clouds?
 - impact of aerosol in NWP and climate models?

Papers

- Major dust storm in March 2006
 - Slingo et al., *GRL*, 30 December 2006
- Overview paper
 - Miller and Slingo, *BAMS* (August 2007)
- Special section of JGR-Atmospheres on DABEX
 - including use of the AMF and GERB data to evaluate the Met Office weather forecast model
- Special section of JGR-Atmospheres on results from Radagast
 - 8 papers submitted or in preparation
- Dust simulations with a high resolution version of Hadley Centre climate model, HiGEM
 - Woodage et al.