Radiative
Atmospheric
Divergence using
ARM Mobile Facility
GERB data and
AMMA STations

radagast.nerc-essc.ac.uk

RADAGAST - In and Out of Africa

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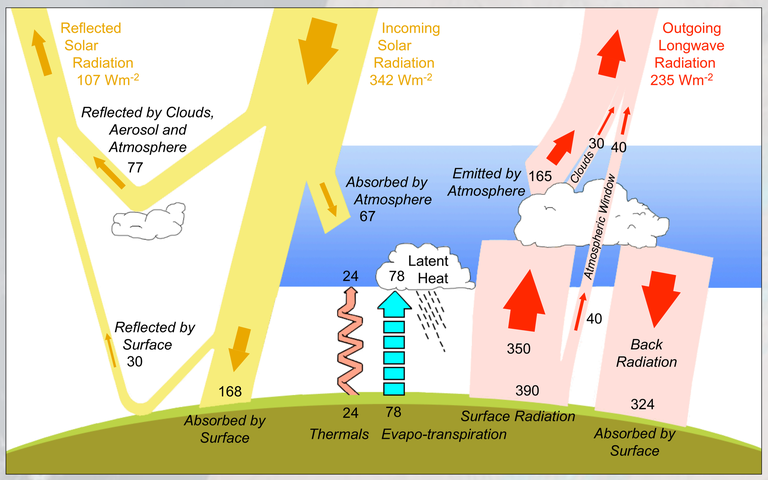
1. Introduction

RADAGAST is a collaborative project, involving UK, US and European scientists, to investigate the radiative divergence across the atmosphere.

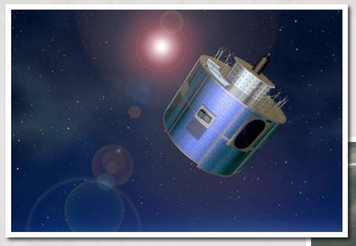


Adapted from Keihl and Trenberth, 1997

West Africa was chosen as the study area because the combination of wide range of column water vapour, episodic wind-generated dust events and seasonal aerosols from biomass burning presents a particular challenge to radiative transfer models.

2. Data Sources

The primary data inputs are top-of-atmosphere narrow and broad-band observations from METEOSAT Second Generation (MSG) satellites and surface observations from the ARM Mobile Facility (AMF), which was deployed throughout 2006 at Niamey, Niger, in support of RADAGAST.



Artist's impression of MSG-1 in orbit
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NERC/UK Met Office BAe 146 aircraft

ARM Mobile Facility, deployed at Niamey Airport

These data are supplemented by aircraft and *insitu* observations, made as part of the African Multi-disciplinary Monsoon Analyses (AMMA) campaign, with which RADAGAST interacts.

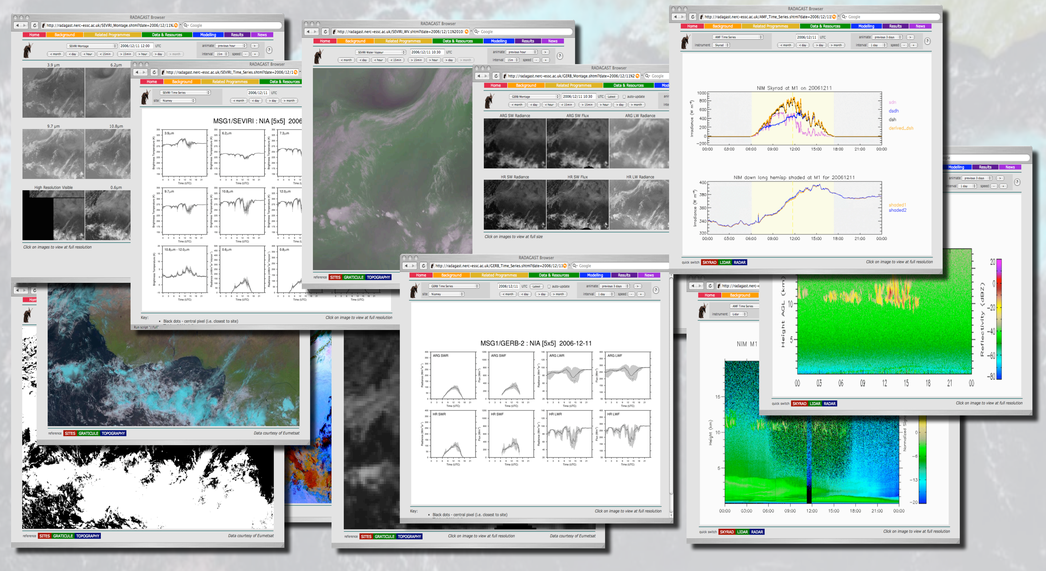
3. Data Processing and Dissemination

SEVIRI narrow-band data were received from EUMETSAT *via* ftp in near-real time during the Niamey deployment (Dec 2005 to start 2007). GERB broad-band data were retrieved from GGSPS and RMIB using 'wget'.

From these data images of individual bands and derived products of the West Africa study area and time series plots of radiances/brightness temperatures at the main AMF site at Niamey airport and the ancillary site at Banizoumbou were generated.

These images and plots, along with ancillary data such as cloud masks, and 'quick-look' time series plots of selected AMF instruments downloaded from the ARM data site, are made accessible *via* a user-friendly web interface. The images and plots may also be animated.

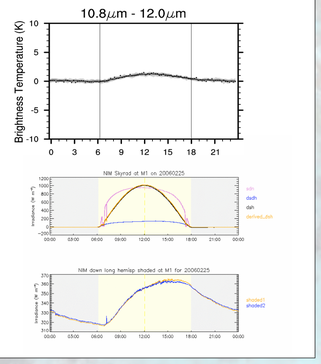
http://radagast.nerc-essc.ac.uk



4. Examples and Analyses

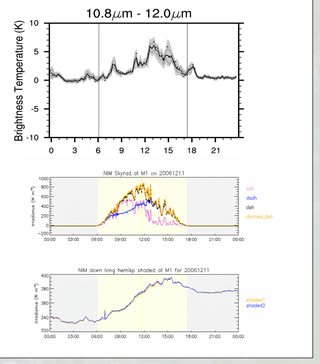
'Clear' sky case (2006/02/25)

Using radiosonde observations of T and Q we model up and down-welling fluxes for comparison with surface and TOA measurements. Note the slightly positive window BT difference.



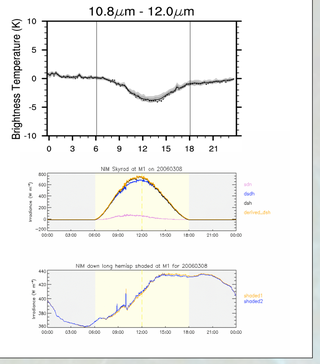
Cirrus case (2006/12/11)

A fairly typical day, with cirrus advecting from the West over the AMF site at Niamey, leading to positive TOA window BT differences and rapid changes in down-welling SW direct flux.



Dust storm (2006/03/08)

An anomalous northerly flow generated a large dust storm over West Africa during March 2006. Note the decrease in down-welling SW direct flux and negative TOA window BT difference.



For further details see the other RADAGAST posters

Publications:

Miller, M.A. and A. Slingo, 2007. The Atmospheric Radiation Measurement (ARM) Mobile Facility (AMF) and its first international deployment: measuring radiative flux divergence in West Africa. *Bull. Am. Meteorol. Soc.*, in press

Slingo, A., T. P. Ackerman, R. P. Allan, E. I. Kassianov, S. A. McFarlane, G. J. Robinson, J. C. Barnard, M. A. Miller, J. E. Harries, J. E. Russell and S. Dewitte, 2006. Observations of the impact of a major Saharan dust storm on the atmospheric radiation balance. *Geophys. Res. Lett.*, 33, L24817, doi:10.1029/2006GL027869