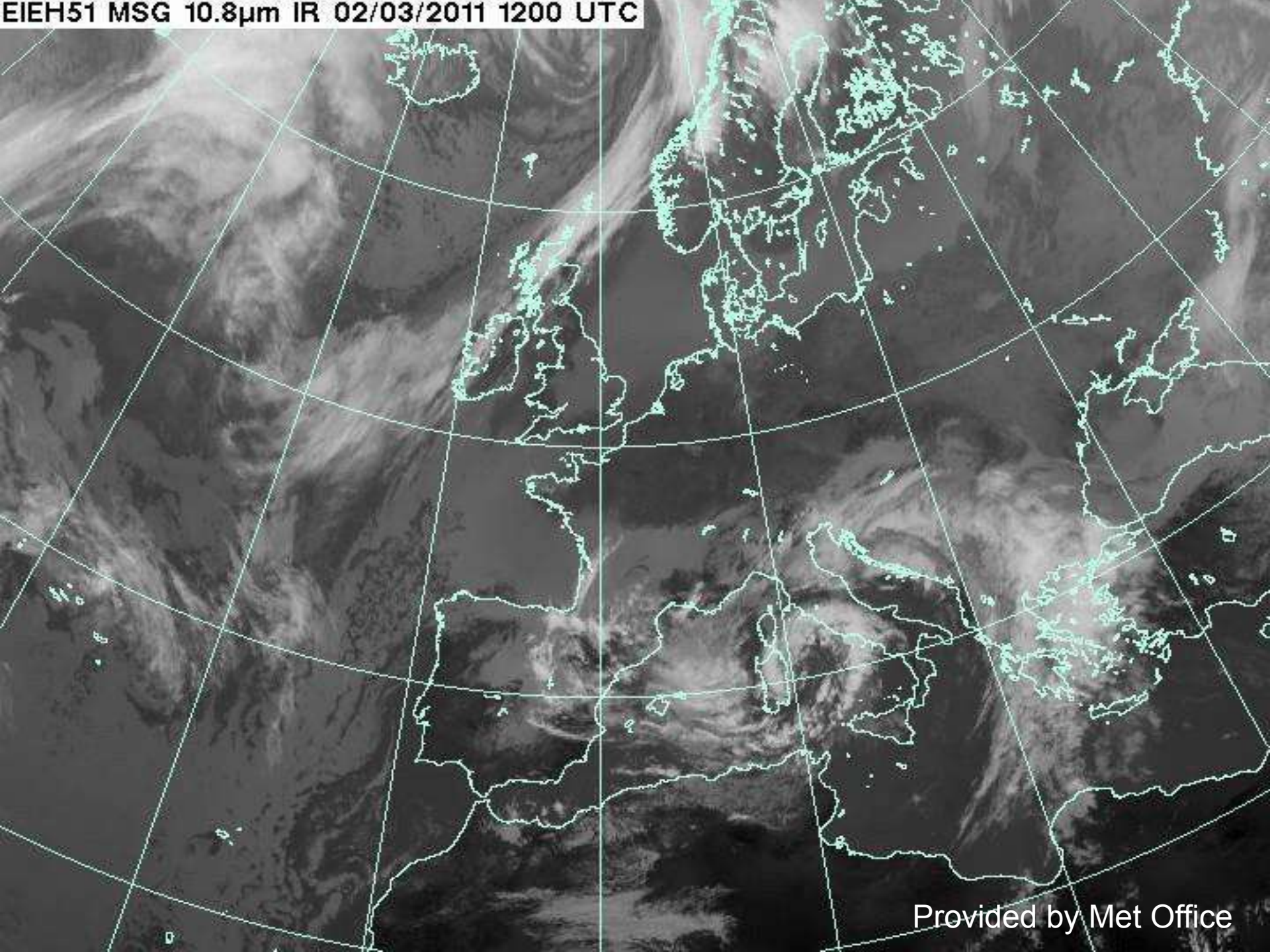


Clouds and Earth's radiation balance—observational evidence

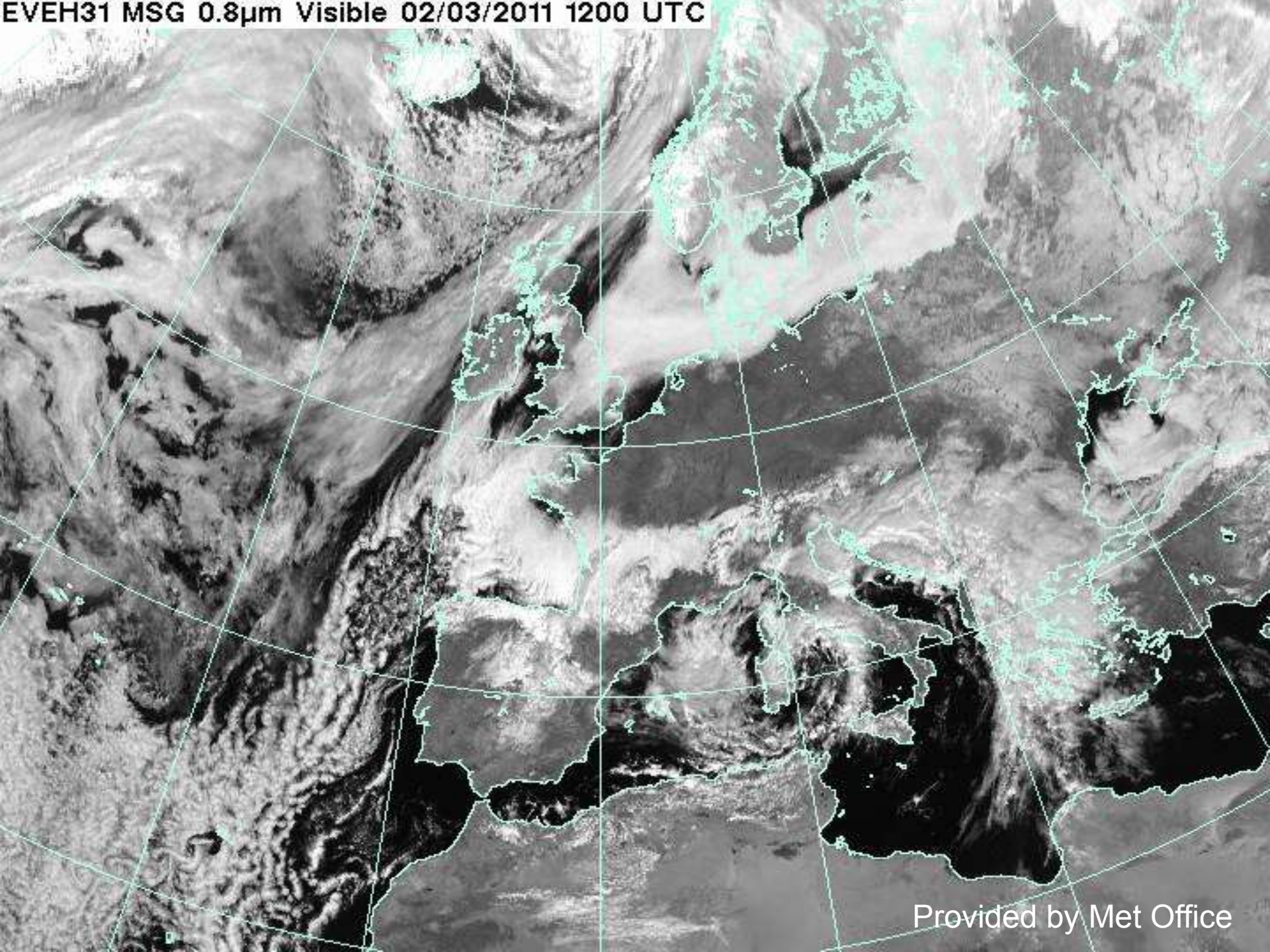


EIEH51 MSG 10.8 μ m IR 02/03/2011 1200 UTC

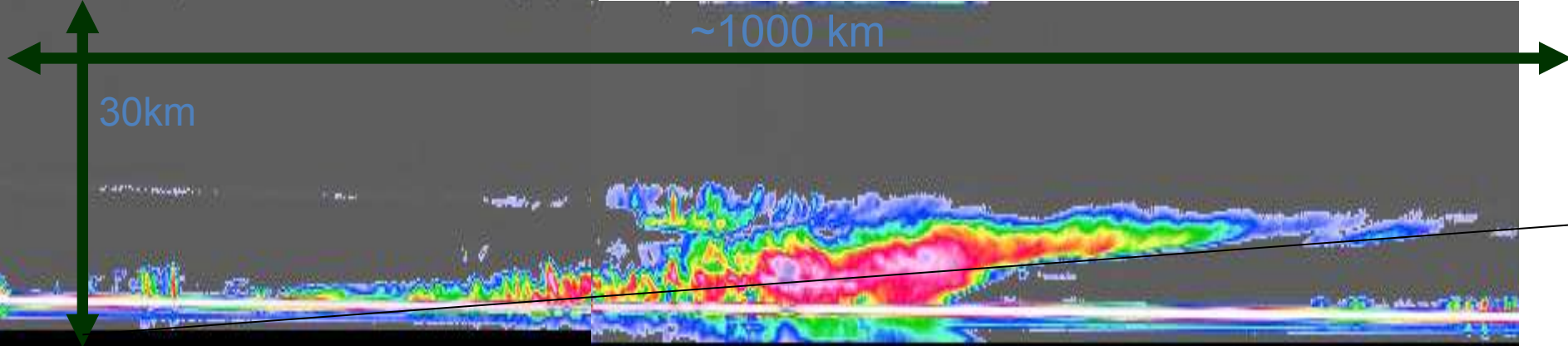


Provided by Met Office

EVEH31 MSG 0.8 μ m Visible 02/03/2011 1200 UTC



Provided by Met Office

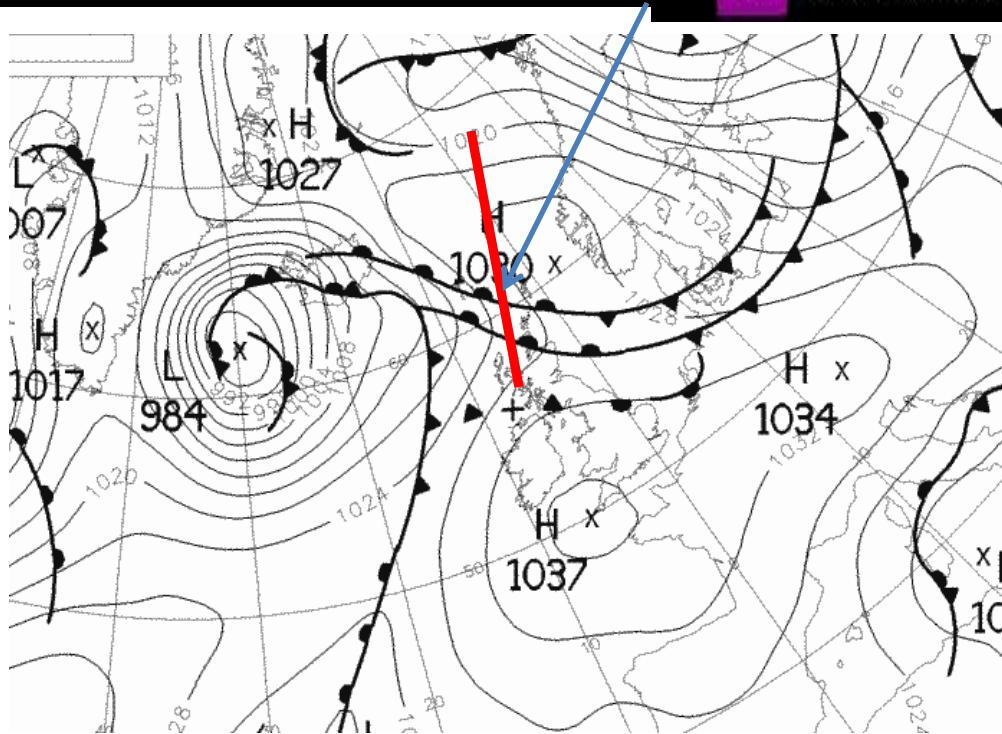


www.cloudsat.cira.colostate.edu

06) 01:34:26 UTC | 1A-AUX | Granule 8049

26

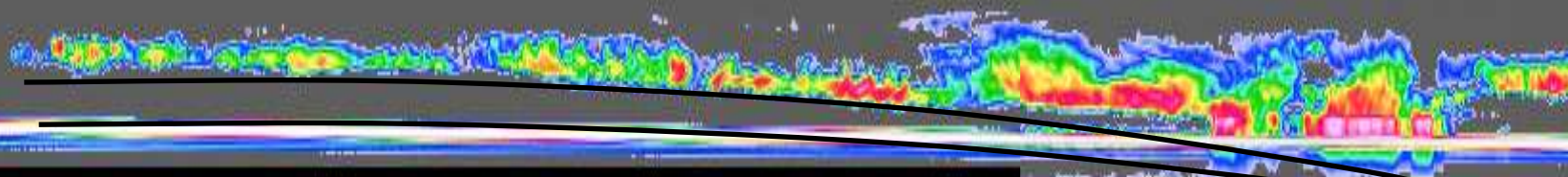
Time 02:57:22 02:54:11 | Lat 57.4 68.3 | Lon -5.6 3.5



Friday 2nd November 2007

CloudSat radar:
Profile of a warm
front from the

Cold Front, 22nd October 2007 (03:15)

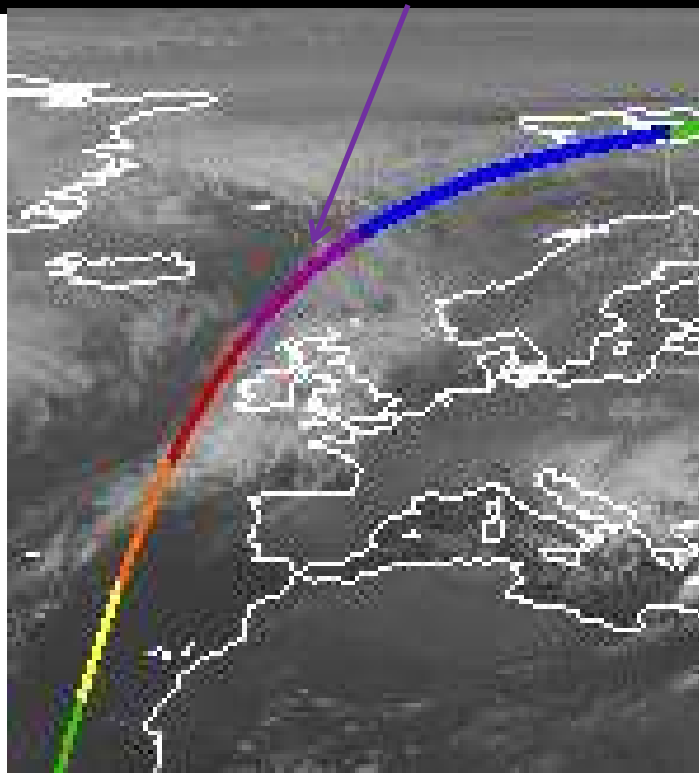
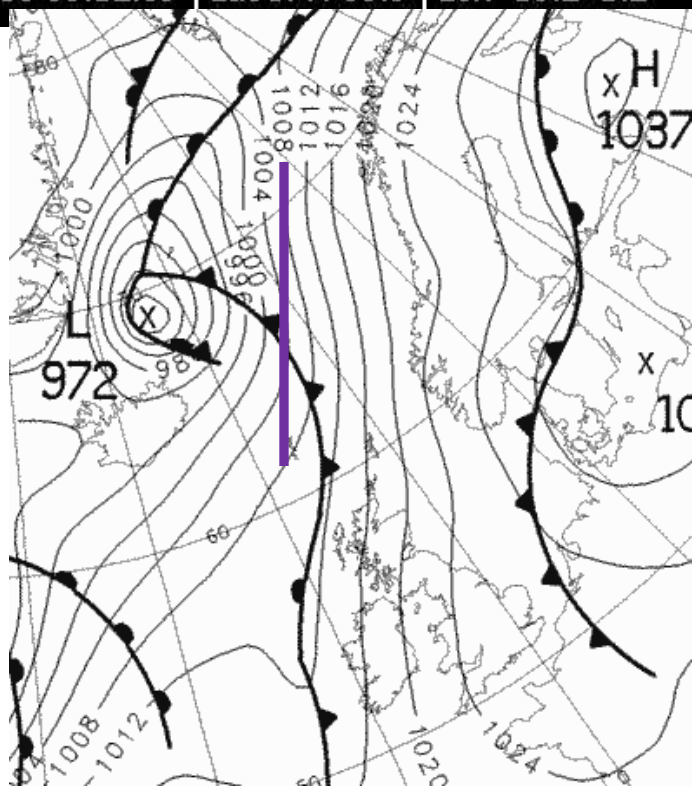


www.cloudsat.cira.colostate.edu

Time 03:15:50 03:12:39 | Lat 57.4 68.3 | Lon -10.2 -1.2

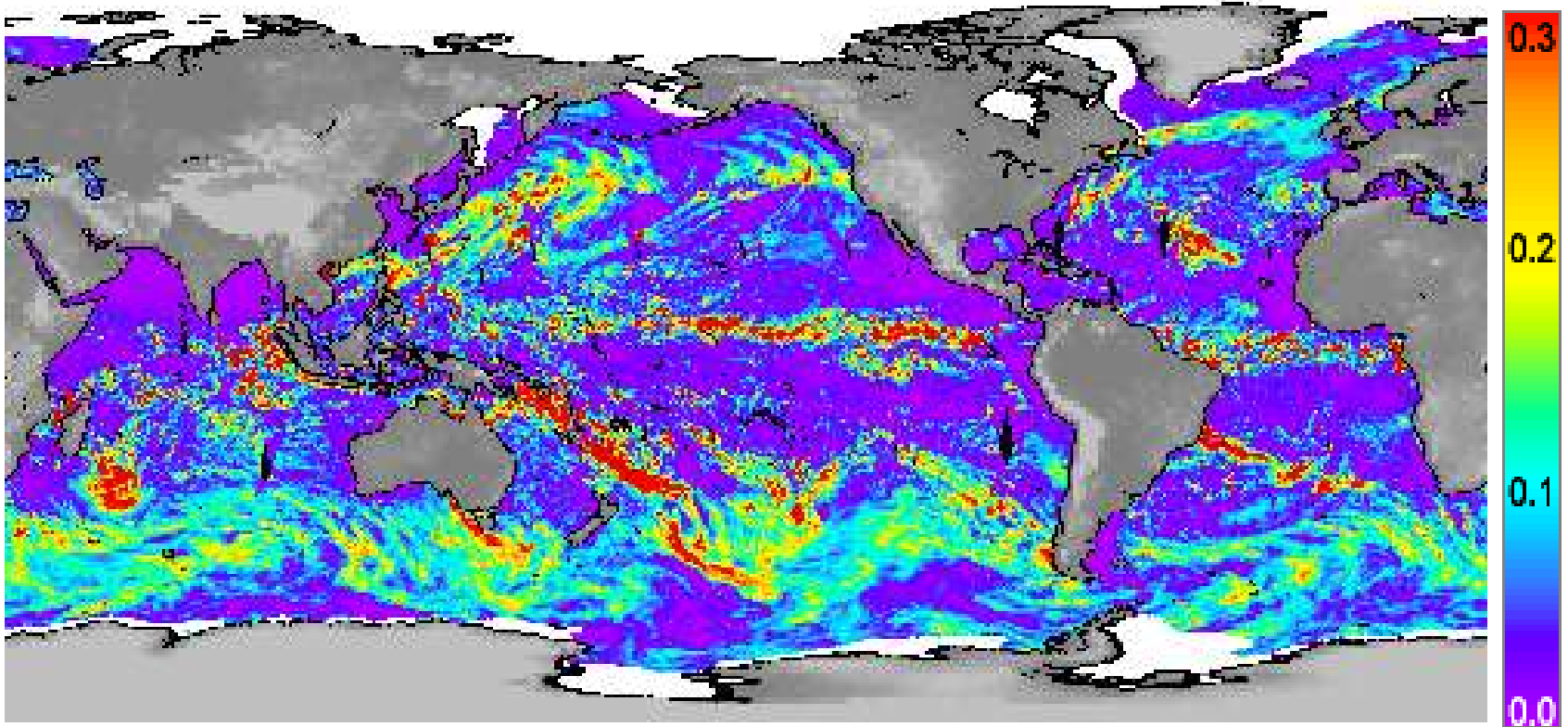
CIRA CloudSat DPC 20th Oct 22 (295) 01:52:54 UTC | 1A-AUX

0000
chart



Microwave retrievals

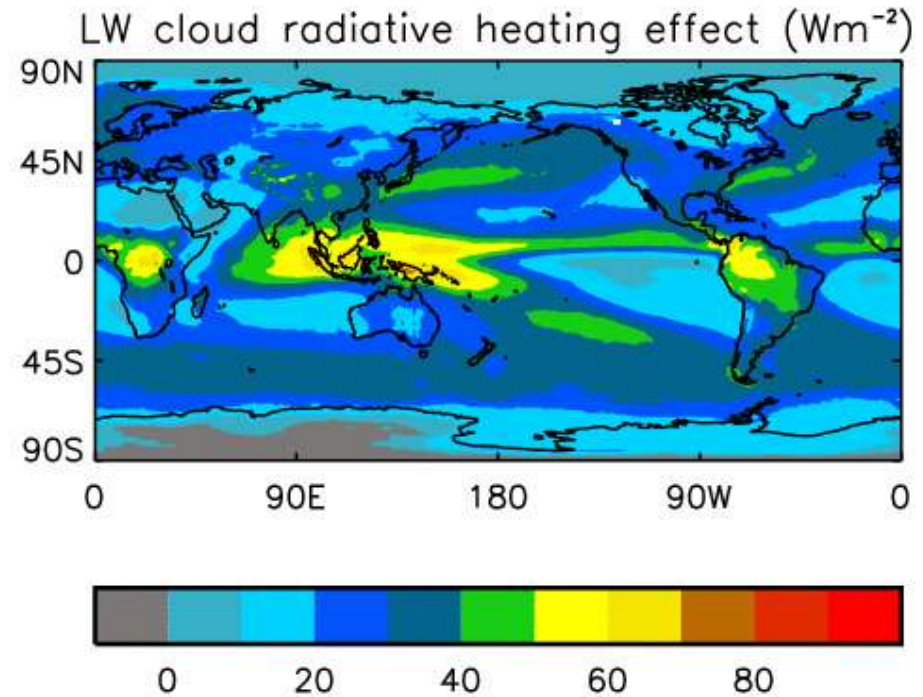
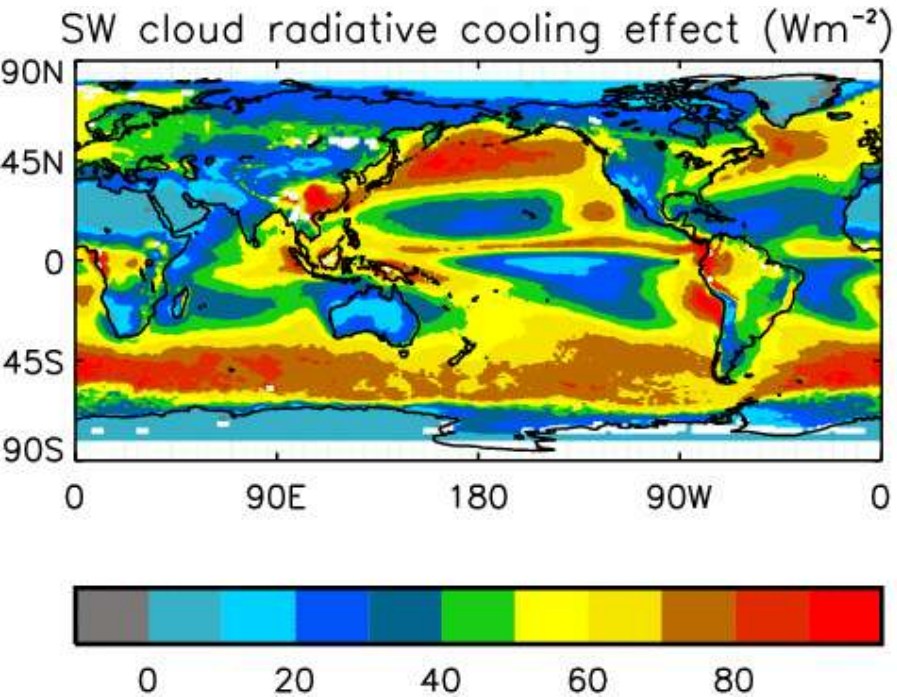
Average of 3 days ending: 2011/03/09, SSMIS - F17, version 7



Microwave ocean estimates of cloud liquid water (mm).

Source: <http://www.remss.com>

Observed Radiative Effect of Cloud

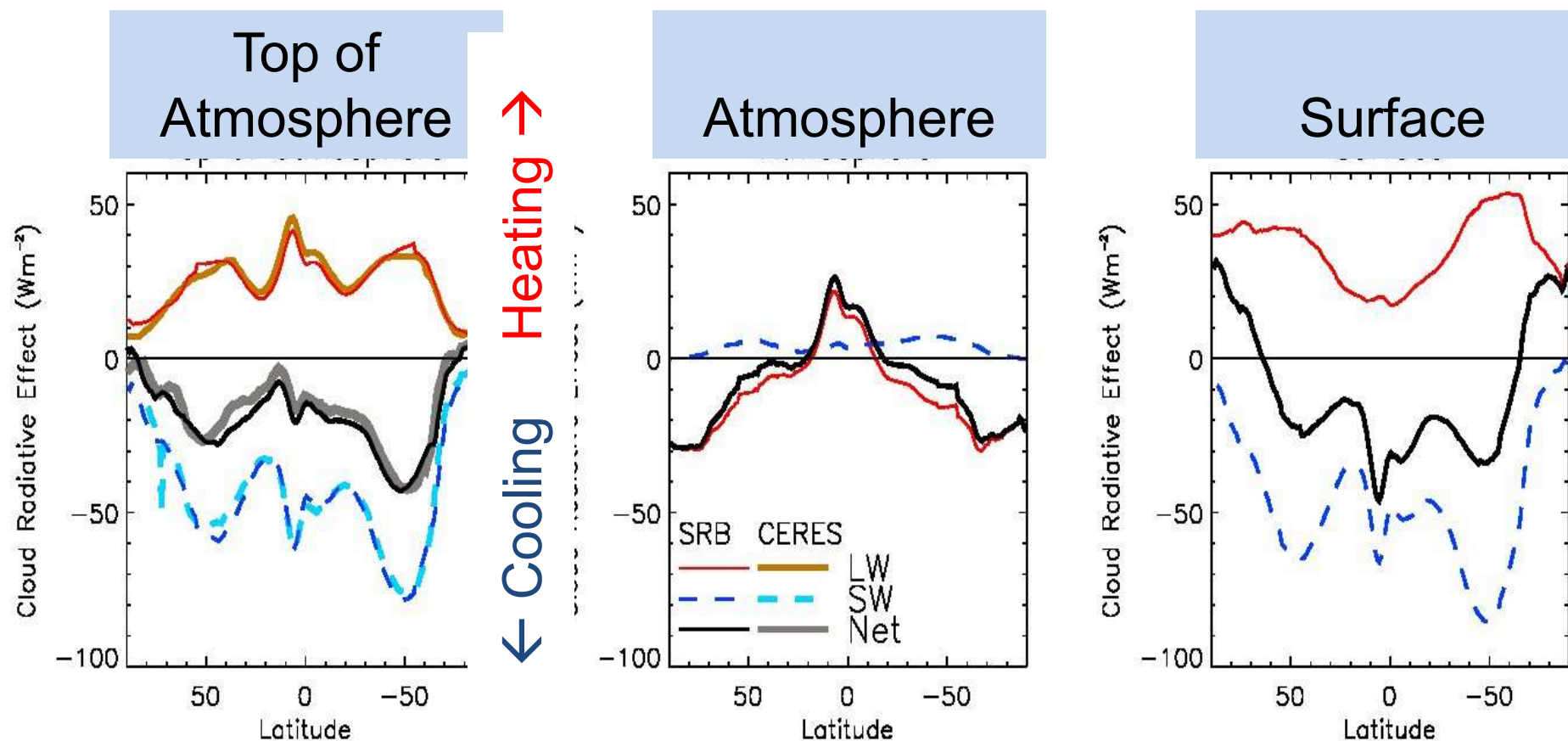


Solar shading effect (cooling)

Greenhouse effect (heating)

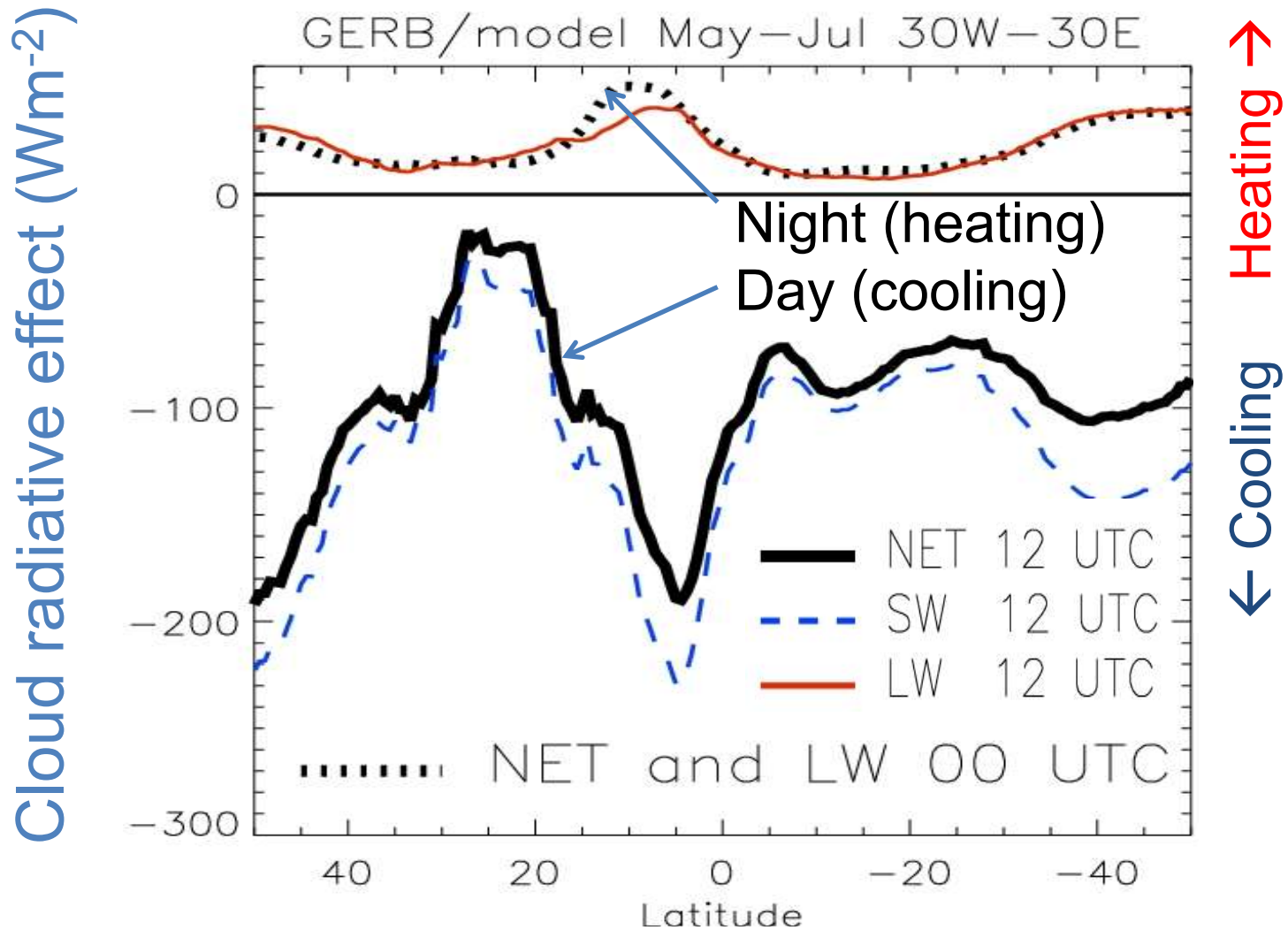
CERES instrument on Terra satellite (2000-2010, Edition 2.5 Lite)

Observed Radiative Effect of Cloud



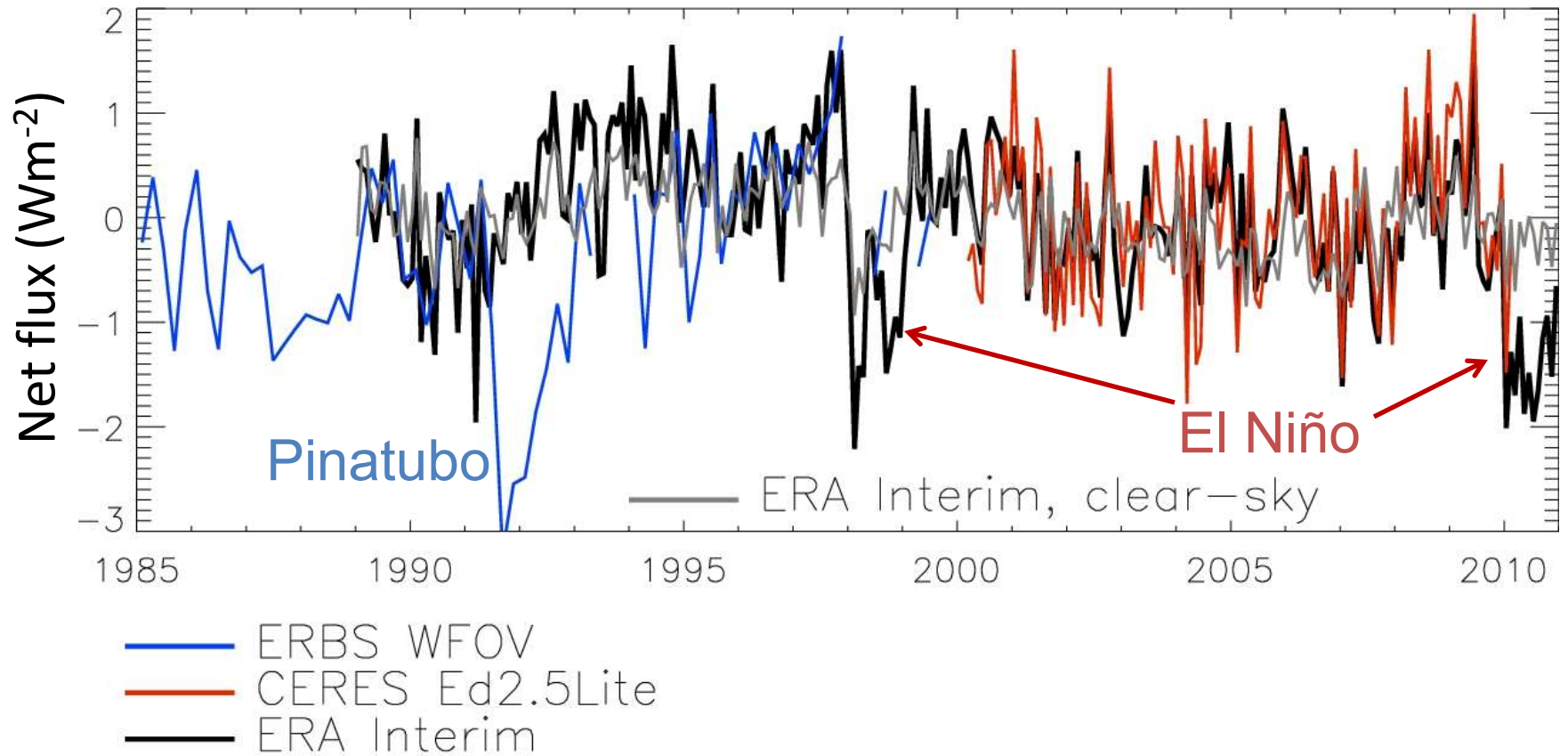
CERES Edition 2.5Lite; SRB version 3; 2001–2007 average

Observed Radiative Effect of Cloud



GERB ED01 fluxes/MetUM clear-sky fluxes, 2004-2007

Interannual/Decadal Changes?

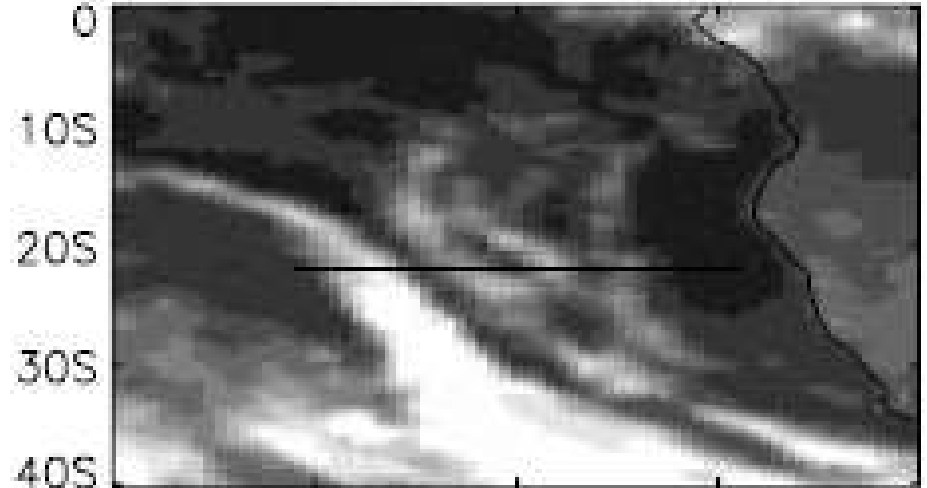


Model Evaluation

Model albedo

5 June 2006 12:00

GERB albedo



10W 0 10E

10W 0 10E



0.1 0.2 0.3 0.4 0.5

0.1 0.2 0.3 0.4 0.5

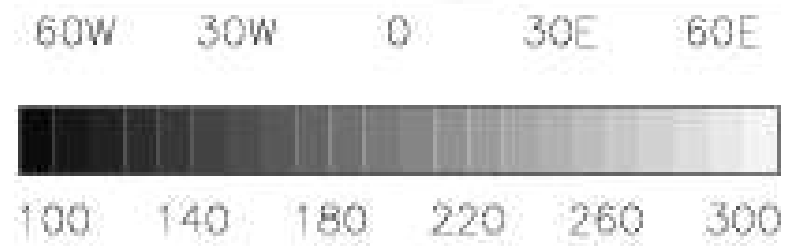
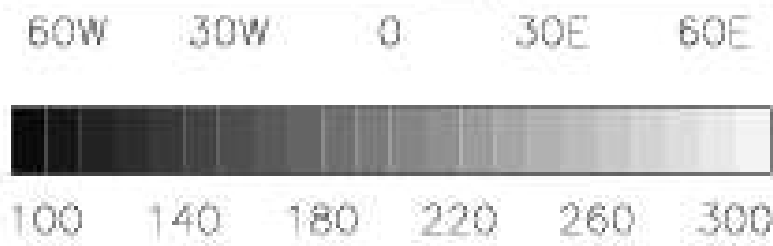
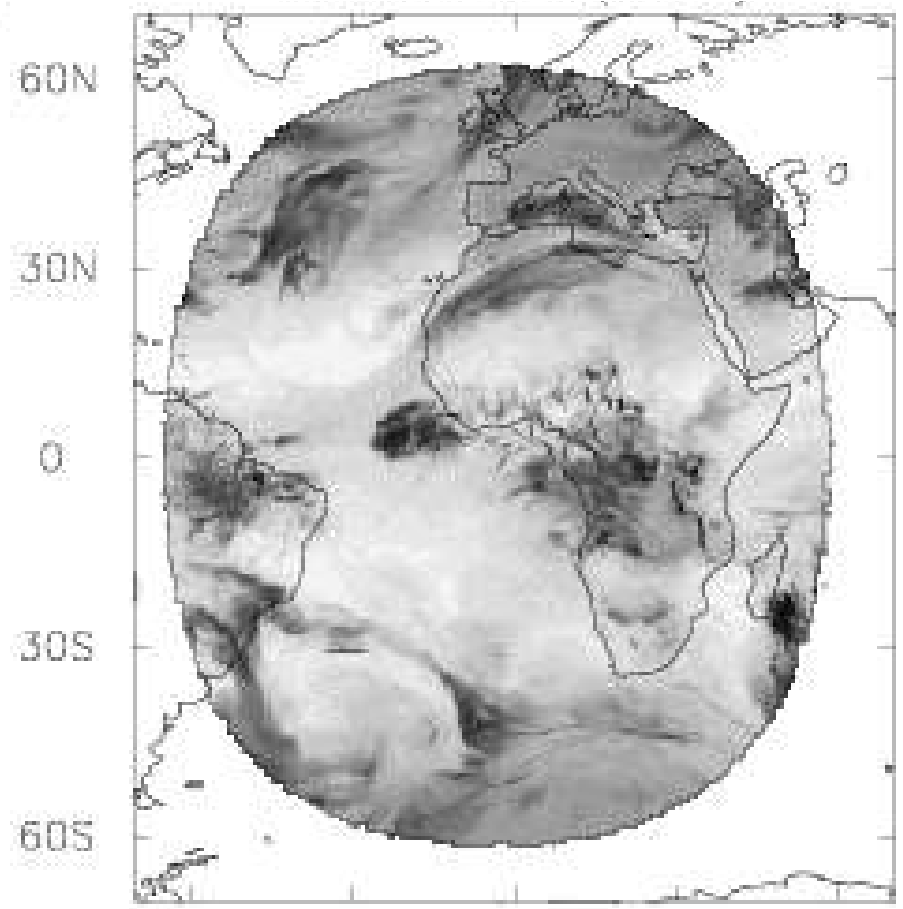
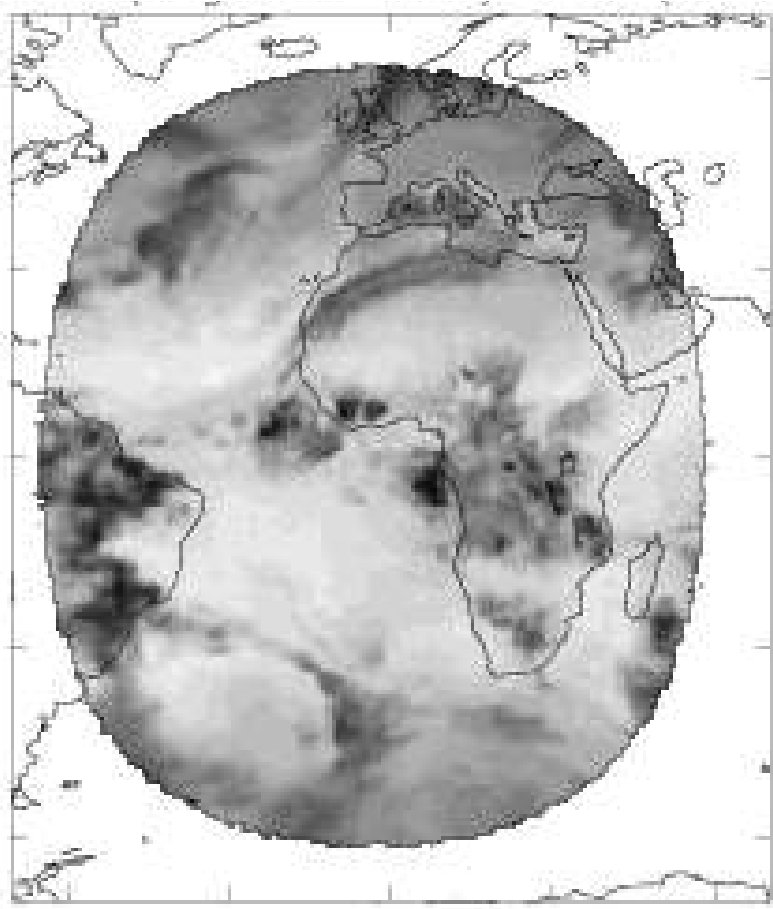
Stratocumulus cloud reflectivity (albedo)

20110201 0000 UTC

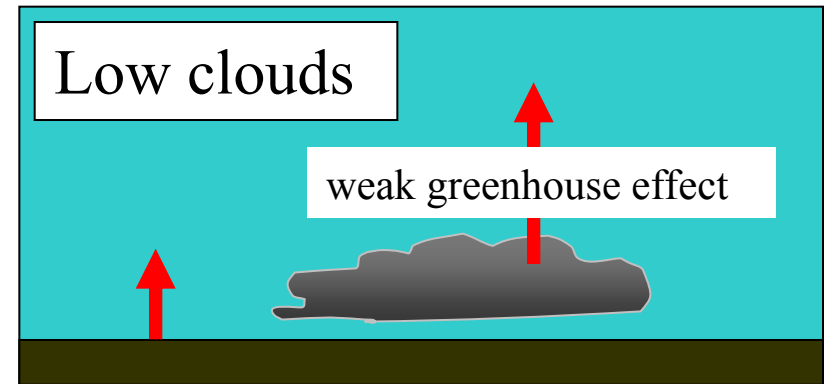
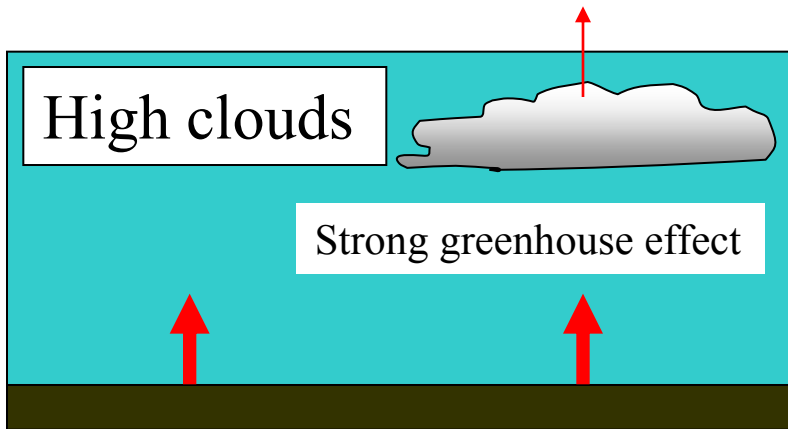
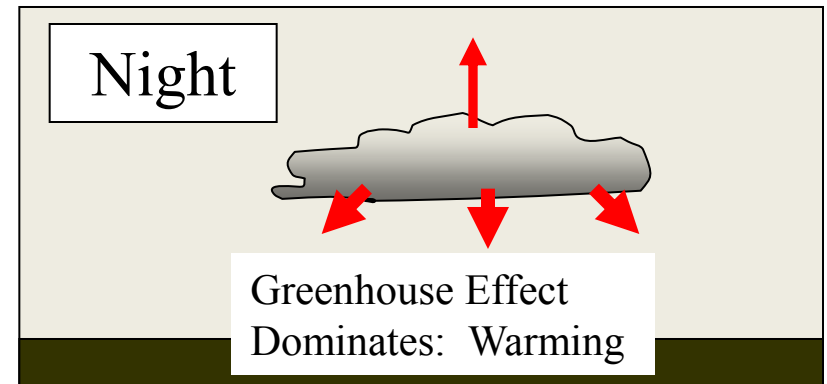
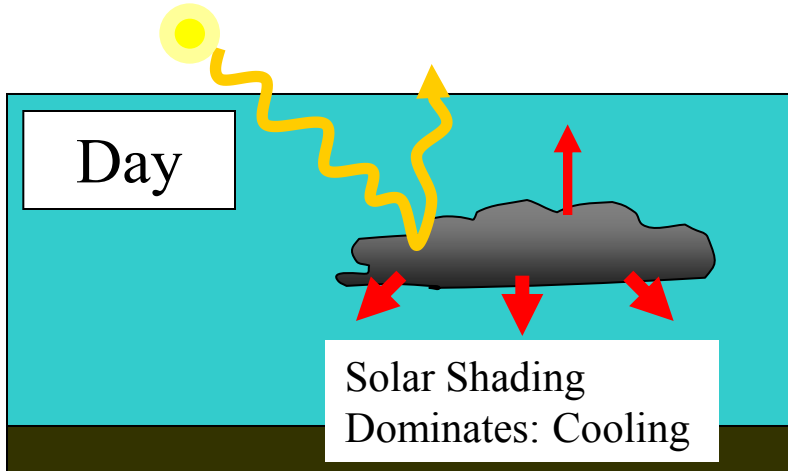
Mean OLR (Wm^{-2}): GERB 240.2 Model 249.2

GERB data February 2011 OLR Animation

Met Office Model



Cloud Feedback: a complex problem

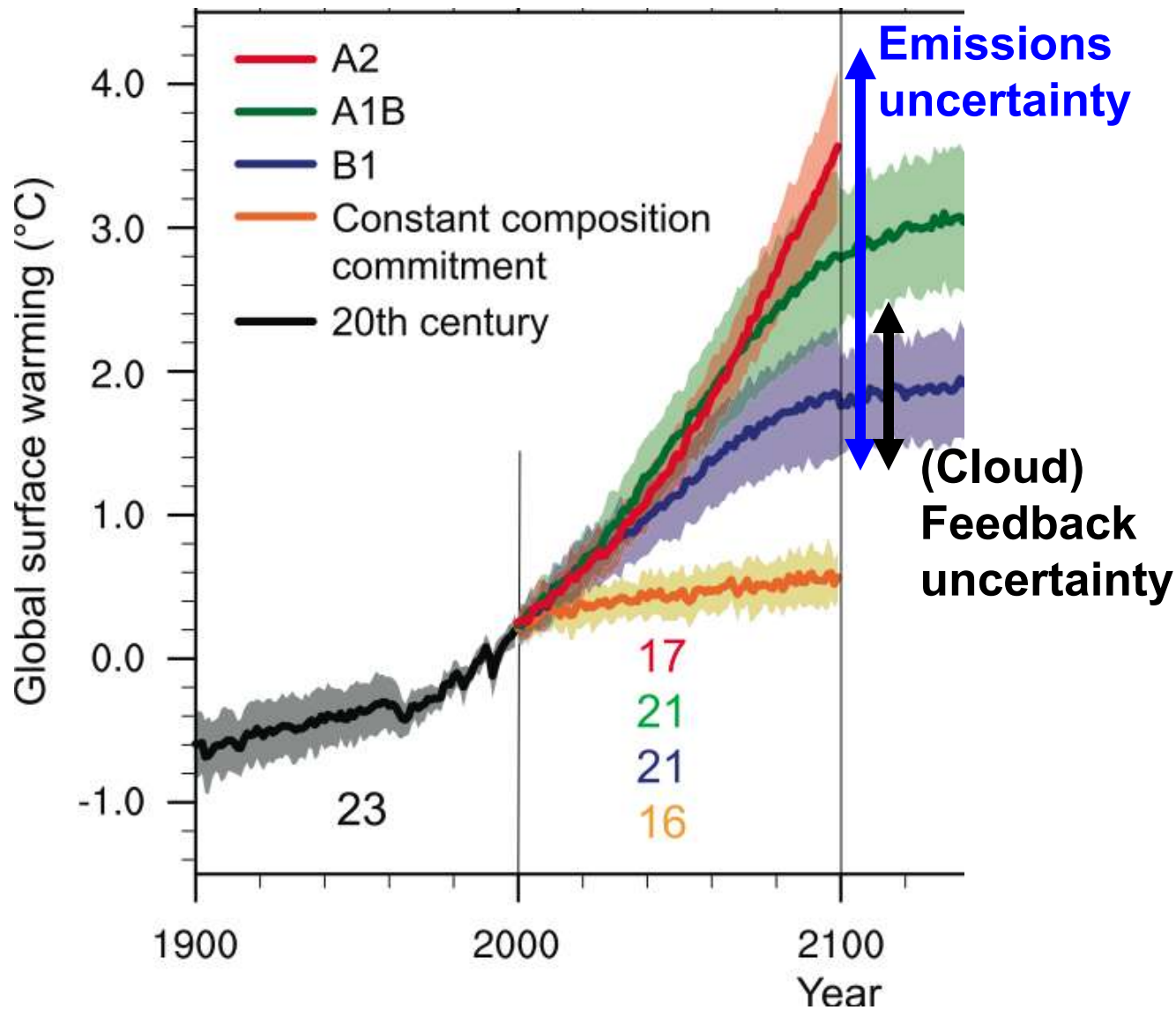


How will cloud properties respond to warming?

Will they amplify or diminish the warming?

How are cloud height, water content, ice content, droplet sizes, thickness, duration, time of occurrence expected to change?

Climate models: How much will Earth warm?



Introduction to the proper talks

- 2:30pm: Prof. John Harries
 - Observations of Earth's Radiation Budget from space
- Unfortunately Dr Mark Ringer is unwell...Fortunately we have:*
- 3:10pm : *Dr. Chris Merchant*
 - *Diurnal cycle of cloud radiative forcing*
- 3:40pm: Break for a natter*
- 4:10pm: Dr. Jonathan Shonk
 - Representing observed cloud structure in models
 - 4:50pm: Prof. Jim Haywood
 - Aircraft contrail-induced cirrus
- 5:30pm Wine*
- 6:00pm: Prof. Paul Hardaker
 - Challenges for the science and the scientist