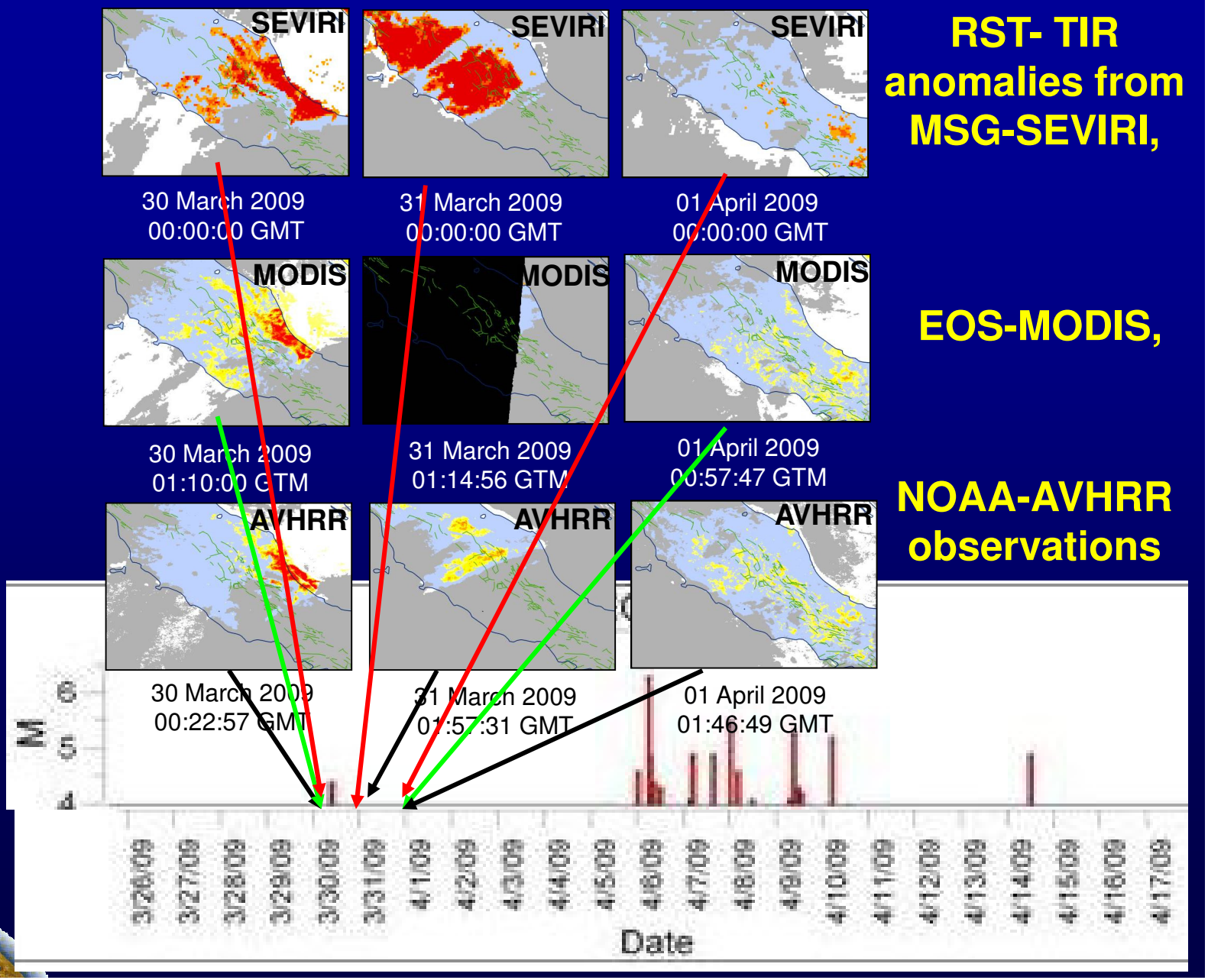
Independent observations at the time of Abruzzo April 6th 2009 EQ

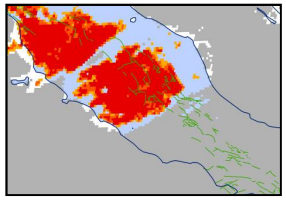


RST- TIR anomalies from MSG-SEVIRI,

EOS-MODIS,

NOAA-AVHRR observations

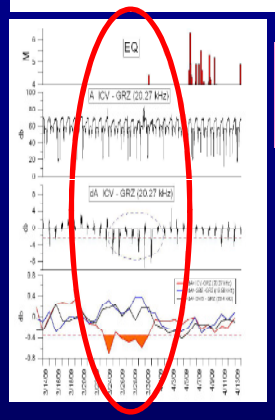
Independent observations at the time of Abruzzo April 6th 2009 EQ



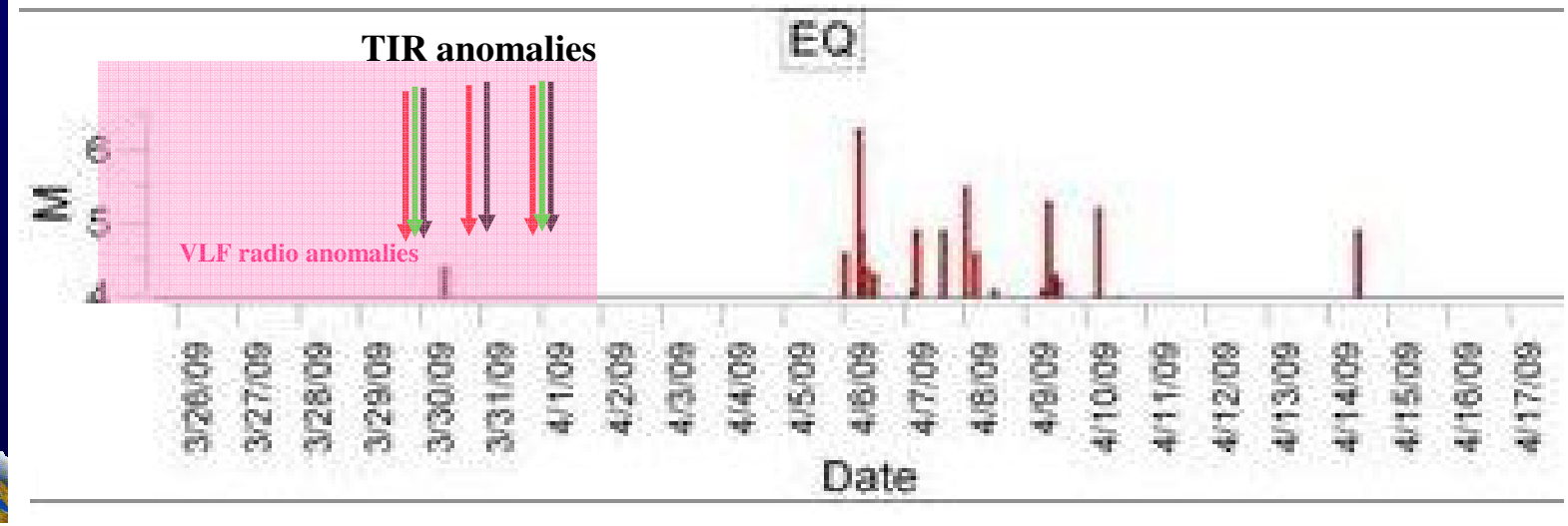
RST - SEVIRI TIR anomalies

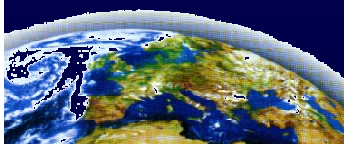
RST – MODIS TIR anomalies

RST - AVHRR TIR anomalies



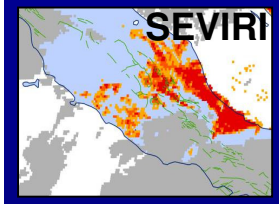
VLF radio anomalies
Rozhnoi et al., 2009



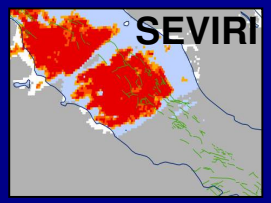


Independent observations at the time of Abruzzo April 6th 2009 EQ

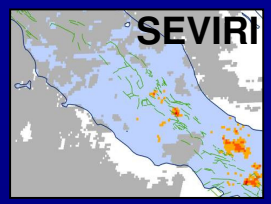
TIR anomalies



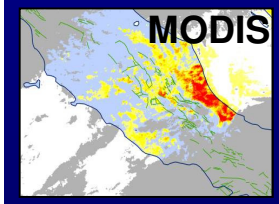
30 March 2009
00:00:00 GMT



31 March 2009
00:00:00 GMT



01 April 2009
00:00:00 GMT



30 March 2009
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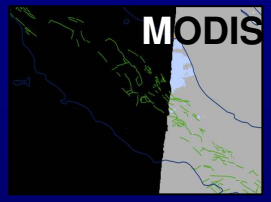

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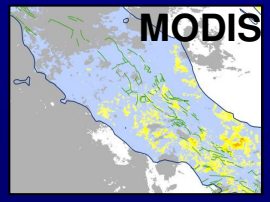

01 April 2009
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30 March 2009
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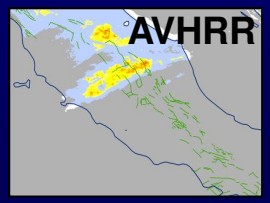

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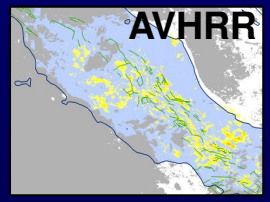
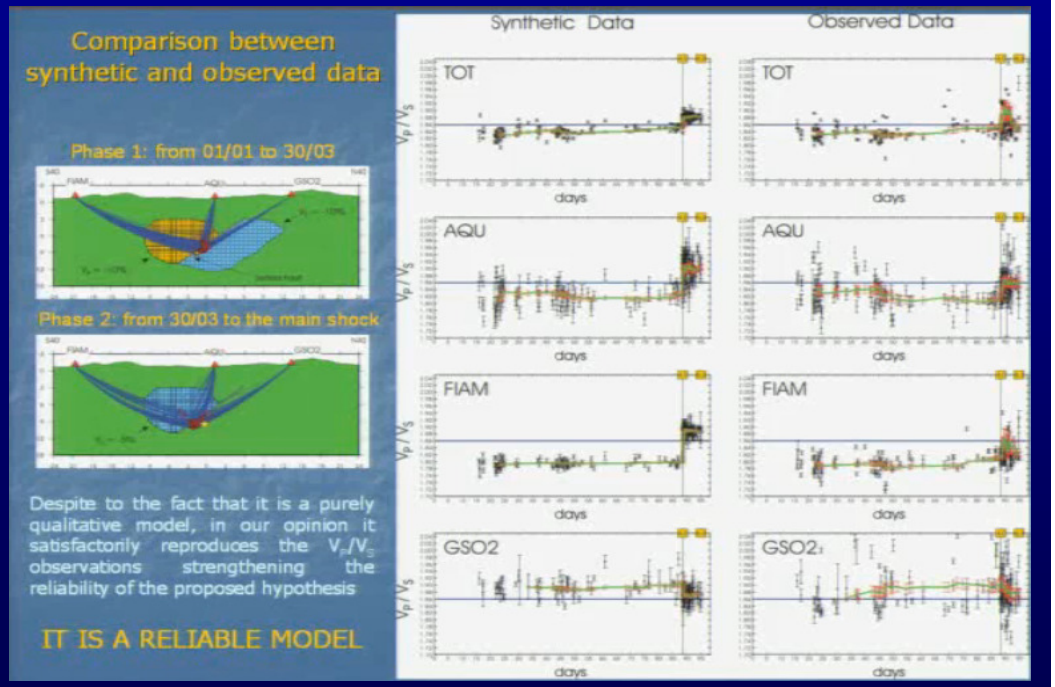


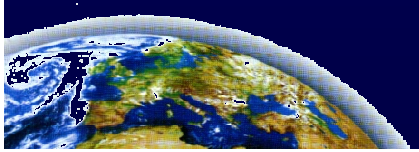
01 April 2009
01:46:49 GMT

Seismological observation (Vp/Vs)
(Chiarabba, ieri, Lucente et al, AGU 2009)



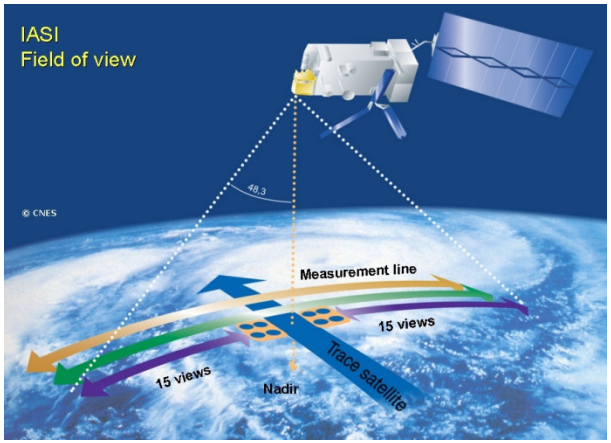
NEXT FUTURE

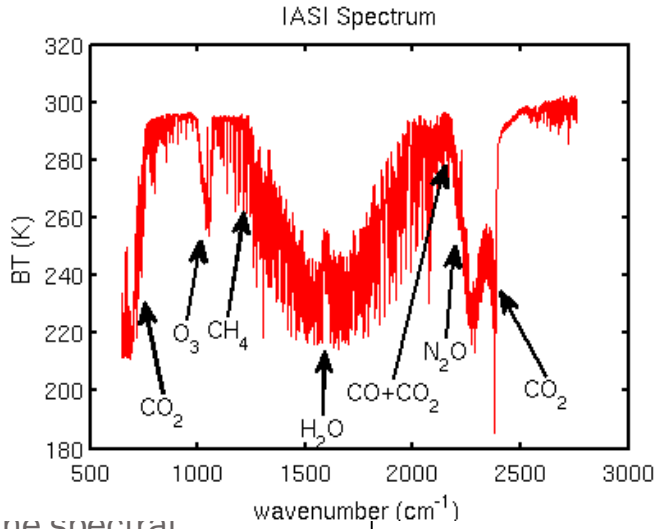
- Improving S/N by extending RST to
  - LST products achievable from last generation of geostationary satellites (like the Japanese MTSAT and the European MSG) having split-window capabilities: S/N up to 5 and more can be expected !
  - to passive MW (microwaves) sensors (better on geostationary platforms like GEOSTAR) in order to reduce cloud coverage negative impact on the Validation/Confutation process and significantly improve statistics
  - Next generation of satellite sensors (like Sciamachy, and IASI, AIRS, IMG interferometers) capable to direct measurements of green-house gases emissions



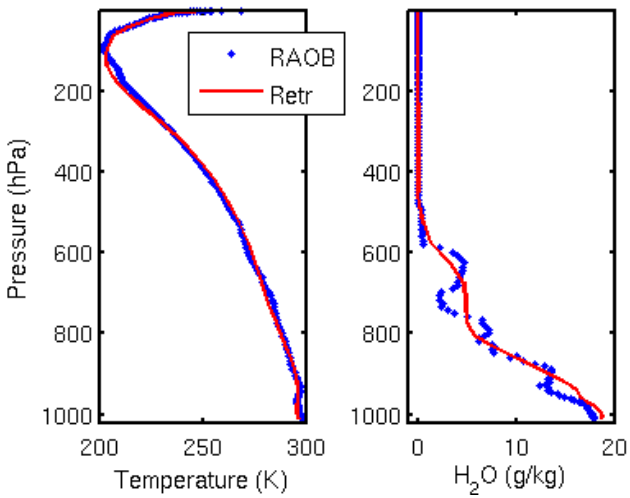
Measuring green-house gases from satellite

IASI (Infrared Atmospheric Sounding Interferometer)

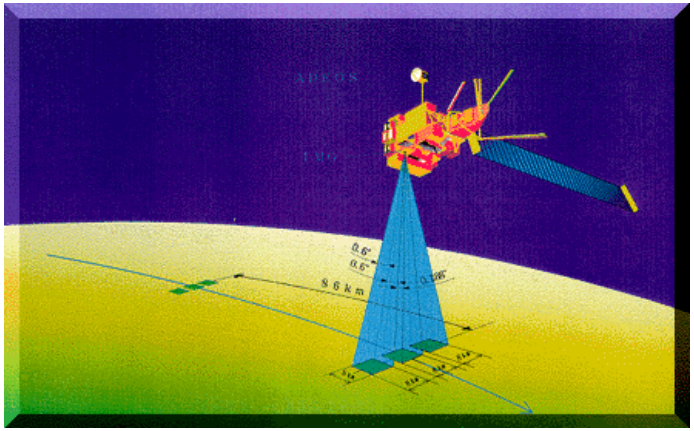


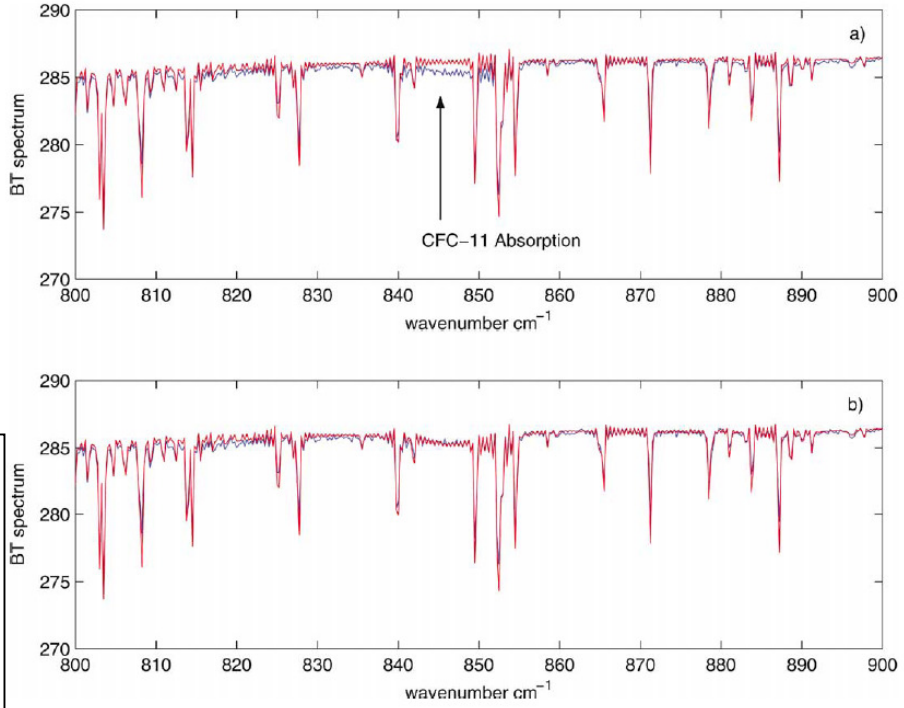


- IASI is a Michelson Interferometer measuring the spectral distribution of the atmospheric radiation covering the Spectral range 15.5 to 3.62 μm with a sampling rate of 0.25 cm^{-1}
- developed at CNES/EUMESAT
- IASI has been designed for operational meteorological soundings with a very high level of accuracy (specifications on Temperature accuracy: 1K for 1 km and 10 % for humidity) being devoted to improved medium range weather forecast.
- It was successful launched on board of EUMETSAT METOP-A on 19 October 2006 and it is in the operational status since 30 November 2006
- AMATO et al. *ENSO*, 17/7 2002
- MASIELLO and SERIO, *GRL*, 31/11 2004
- CARISSIMO et al. *ENSO*, 20/9 2005.
- GRIECO et al. *QJRMS*, 133/s3 2007



Measuring green-house gases from satellite IMG (Interferometric Monitor for Greenhouse gases)





- IMG is a Michelson Interferometer measuring the spectral radiance in the range between 3.3 and 14 micron, with an apodized resolution of 0.1 cm^{-1}
- It has been developed to measure with high accuracy
  - the earth's radiation budget
  - surface temperature and atmospheric temperature profiles
  - atmospheric constituents:
  - Density profiles of CO_2 and H_2O, Total ozone, Mixing ratios of CH_4, N_2O and CO in the troposphere
- Developed at Japanese Space Agency, NASDA (JAXA)
- It flews on board of ADEOS platform from August 1996 to June 1997.

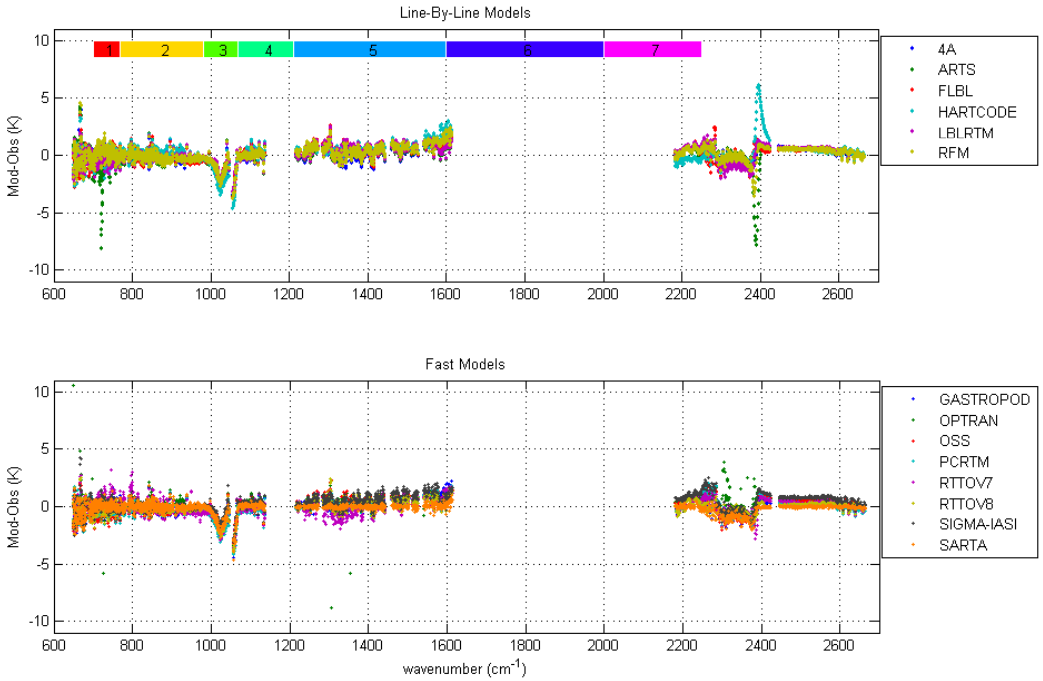
Evidence of CFC absorption in the atmospheric window

- LUBRANO et al., *JQSRT*, 72/5 2002
- MASIELLO et al. *JQSRT*, 77/2 2003
- MASIELLO et al. *APP.OPT.*, 43/11 2004
- GRIECO et al., *JQSRT* 95/3 2005

Measuring green-house gases from satellite

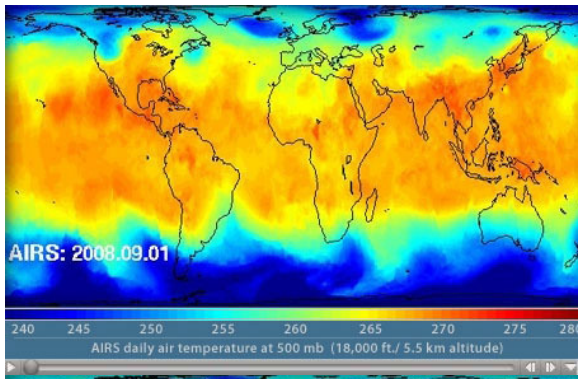
AIRS (Atmospheric InfraRed Sounder)

- AIRS is the radiometer covering the spectral range between 3.7 and 16 micron.
- developed at US Space Agency, NASA
- It flight on board of EOS-AQUA platform since may 2004.
- It observes the global water and energy cycles, climate variation and trends, and the response of the climate system to increased greenhouse gases.

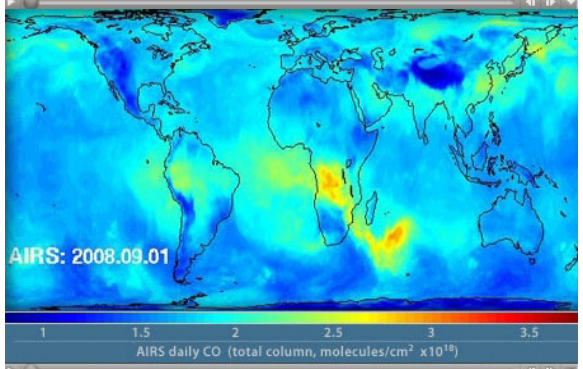


Comparison among RTM and AIRS observed spectra.
SAUNDERS et al, JGR 112, 2007

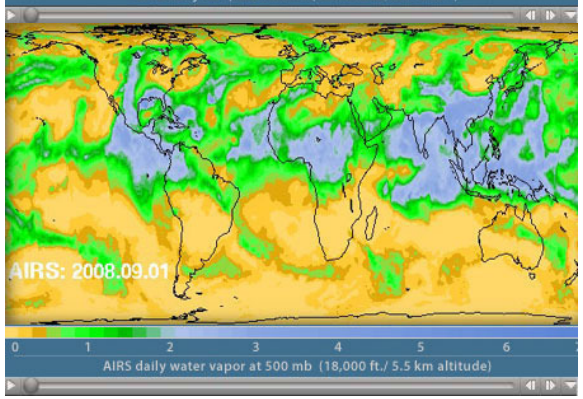
Temperature



Carbon Monoxide



Water Vapour



RAT/RST is done by

Thank you