RAMS, Some Crystal-Face Preliminary Results and Analysis

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Conclusions and Progress so Far

- Collected and archived good quality radiation data from the ER-2 and WB-57 (IR radiances and irradiances plus Solar broad-band irradiances and Visible Spectral (seven channels) Direct/Diffuse (WB-57 only)).

- Studied one aspect of the radiative impact of the coupled ocean-atmosphere system. The water vapor-clear sky greenhouse effect in the C-F domain.

- Compared Model calculations and satellite observations (Ceres) with data for “clear” and “cloudy” sky conditions.

- Started analysis to retrieve cloud properties from radiance and irradiance measurements.
RAMS ER-2 IR Radiances and Irradiances July 09, 2002

RAMS ER-2 Data From 9 July 2002

- 4-40 μm Radiance
- 8-12 μm Radiance
- 4-40 μm Flux

NFOV Radiance (W m⁻² Ster⁻¹)

Time (GMT hr)

IRBR Flux (W m⁻²)

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Measured and Modeled IR Irradiances and Sea Surface Temperatures

CRYSTAL-FACE, 26Jul02 ER-2 Data

Flux (W/m²)

Temperature

GMT Time

26Jul02_sst_vs_irbr_flux_feb2003.xls
2/6/03

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Calculated and Measured LW Upwelling Flux at 20 km; Marine Aerosol, $\tau = 0.20$

![Graph showing calculated and measured LW upwelling flux at 20 km for different models with and without aerosol correction, along with corresponding sonde times on July 9, 2002.](image)

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Calculated and Measured LW Downwelling Flux at 20 km

July 09, 2002

Flux (W/m²)

Sonde Times (hhmmss)

160143
164404
195405

CRM corrected
RRTM_LW corrected
Fu-Liou corrected with Aerosol
Streamer with Aerosol
SBDART with aerosol
Modtran4 with Aerosol
IRBR with Aerosol

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Calculated and Measured LW Upwelling Flux at 20 km; Marine Aerosol, $\tau = 0.20$

![Graph showing flux values at different times and models](image)

July 26, 2002
Calculated and Measured LW Upwelling Flux at 20 km; Marine Aerosol, $\tau = 0.20$

July 26, 2002

Sonde Times (hhmmss)

Flux (W/m²)

CRM corrected
RRTM_LW corrected
Fu-Liou corrected with Aerosol
Streamer with Aerosol
SBDART with aerosol
Modtran4 with Aerosol
IRBR
CERES, RAMS (IRBBR and NFOV)
Measured Greenhouse Absorption

Broadband Greenhouse Absorption (26 July 2002)

- NFOV: $dG_0/dT_s = 9.7 +/− 0.3$
- IRBR: $dG_0/dT_s = 13.2 +/− 0.8$
- CERES: $dG_0/dT_s = 14.9 +/− 0.60$

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Comparison of Greenhouse, July 9 and July 26, 2002
Ratio of Water July 9/July 26
IR irradiance CRYSTAL-FACE, July 9, 2002
Cloud \( \tau: 2,4,8,10,15,20,25,50,75,100 \) (filled)
Cloud \( \tau: 0.25,0.50,0.75,1.0,1.25,1.5,1.75 \) (open)

- IRBRnad
- IRBR Upwelling Flux (W/m\(^2\))
- Sonde 174240
- Sonde 180956
- Sonde 183008
- SBDART
- Fu-Liou
- Streamer

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Solar Irr. CRYSTAL-FACE, July 09, 2002
Cloud τ: 2,4,8,10,15,20,25,50,75,100 (filled)
Cloud τ: 0.25,0.50,0.75,1.0,1.25,1.5,1.75 (open)

- TSBR nadir
- nre=100um
- nre=30um
- nre=100um
- nre=30um
- nre=100um
- nre=30um

Sonde 174240
Sonde 180956
Sonde 183008

SBDART
Fu-Liou
Streamer

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ER-2/RAMS Measured Greenhouse Absorption

Broadband Greenhouse Absorption (9 July 2002)

July 09, 2002

- NFOV: $\frac{dG_o}{dT_s} = 13.4 \pm 1.00$
- IRBR: $\frac{dG_o}{dT_s} = 18.6 \pm 1.1$

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RAMS ER-2 IR Radiances and Irradiiances July 26, 2002