

LONGWAVE AND WINDOW ADMs FOR
CLEAR, BROKEN CLOUD AND
OVERCAST SCENES

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METHOD OF GENERATING ADMs

- Radiance measurements are composited from CERES SSFs (69 RAPS + 9 AT days) into VZA ranges and fixed percentile intervals of selected parameters (e.g. PW, IR emissivity, etc.).
- Compute mean radiance for each combination of parameters.
- To fill in empty bins, apply theoretical LW ADMs whose radiance ratio matrix best matches the observed radiance ratio matrix.

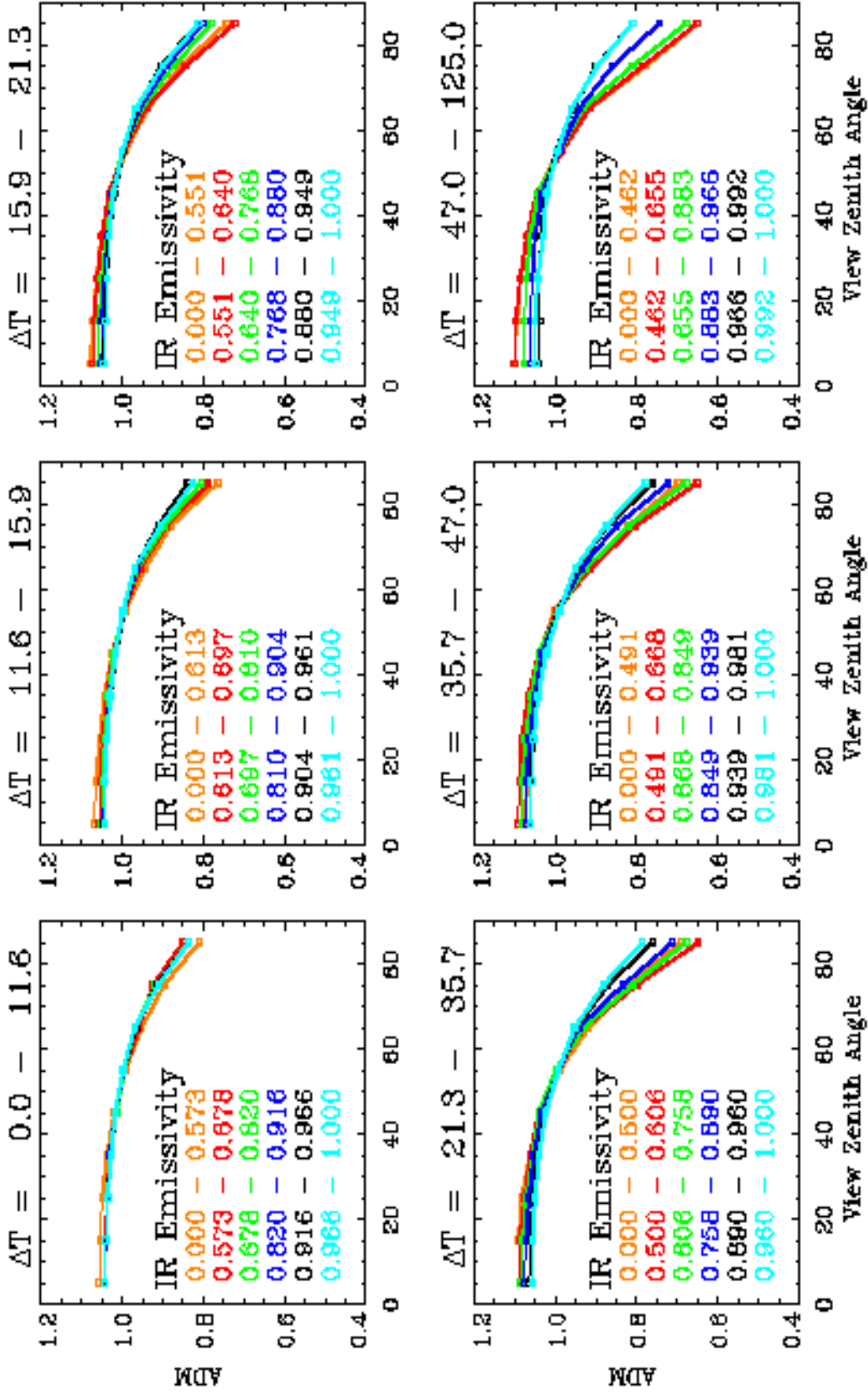
Preliminary Scene Types for CERES-TRMM LW and Window ADMs

ADM Category		Scene Type Stratification	Total
Clear	Ocean	3 Precipitable Water	12
		4 Vertical Temperature Change	
	Land	3 Precipitable Water	36
		4 Vertical Temperature Change	
		3 Surface Emissivity	
	Desert	3 Precipitable Water	36
		4 Vertical Temperature Change	
		3 Surface Emissivity	
	Broken Cloud Field (4 intervals)	Ocean/Land	3 Precipitable Water
6 ΔT (Sfc-Cloud)			
4 IR Emissivity			288 (L)
Overcast	Ocean + Land	3 Precipitable Water	108
		6 ΔT (Sfc-Cloud)	
		6 IR Emissivity	

Variation of Overcast (Ocean & Land) LW ADM with
 $\Delta T(\text{Sfc-Cloud Eff. Temp})$, PW, & IR Emissivity

DAY RAPS/AT (Val_R4c)

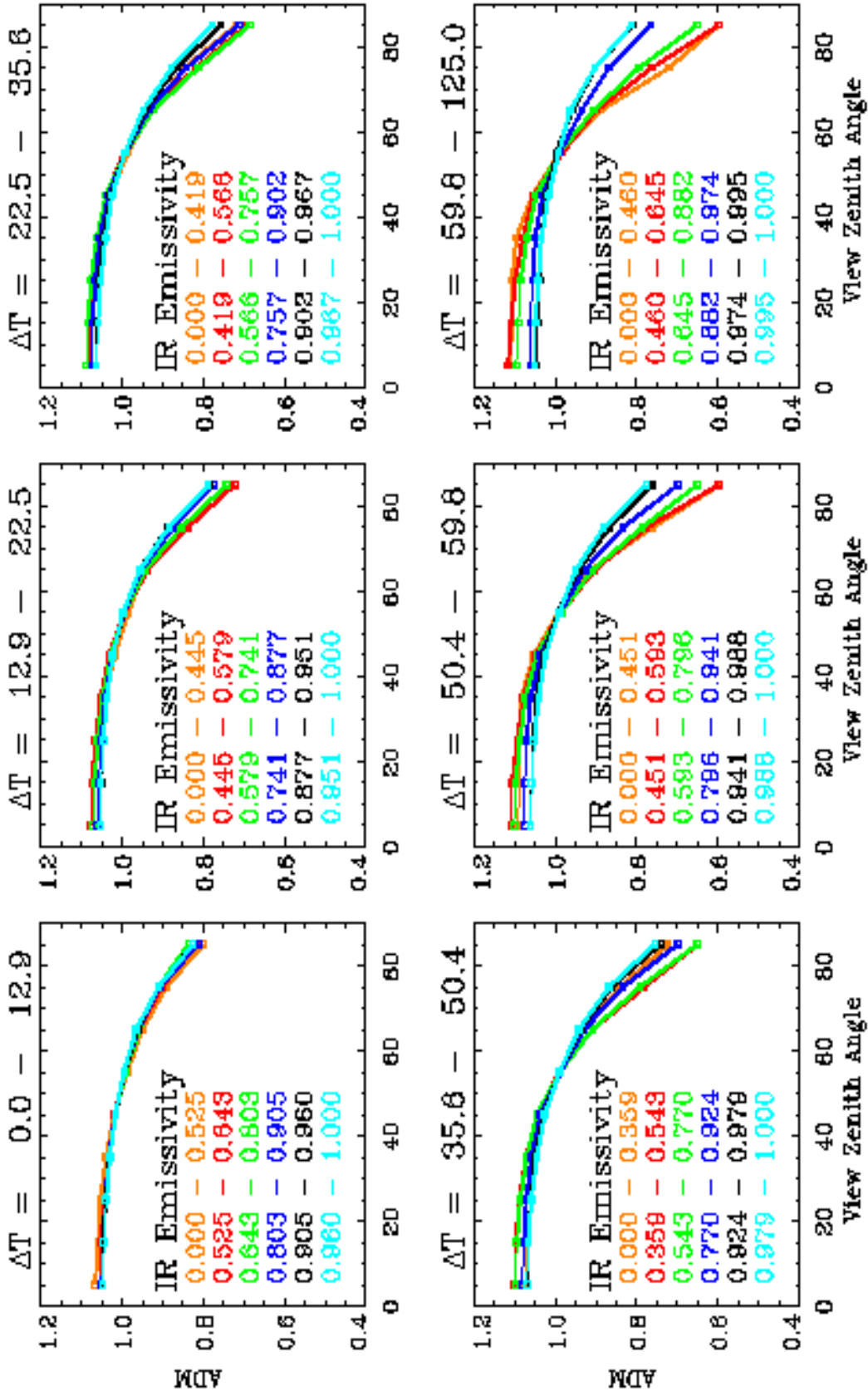
Precipitable Water: 0.000 - 2.452



Variation of Overcast (Ocean & Land) LW ADM with
 $\Delta T(\text{Sfc-Cloud Eff. Temp})$, PW, & IR Emissivity

DAY RAPS/AT (Val_R4c)

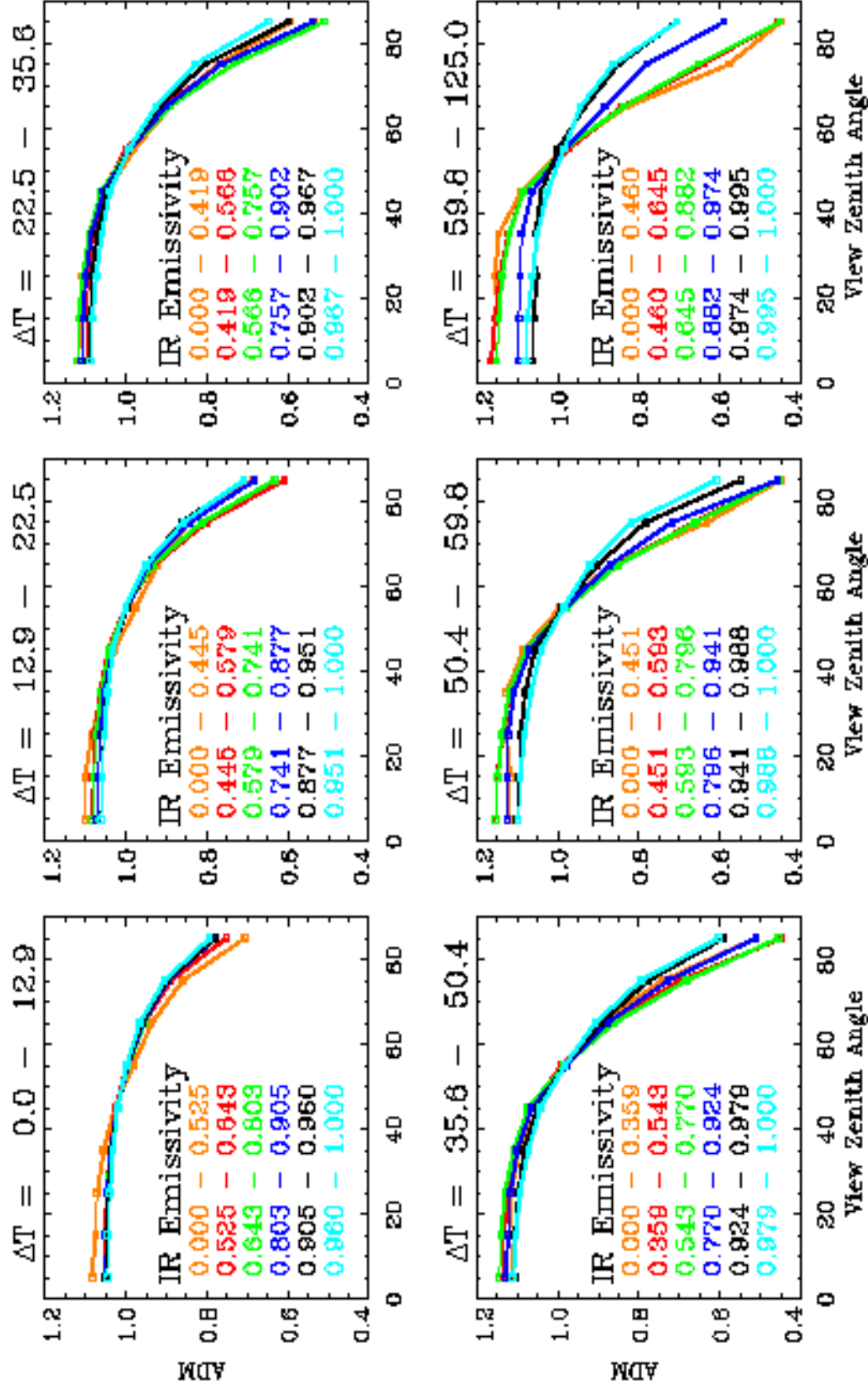
Precipitable Water: 2.452 - 4.552



Variation of Overcast (Ocean & Land) Window ADM with
 $\Delta T(\text{Sfc-Cloud Eff. Temp})$, PW, & IR Emissivity

DAY RAPS/AT (Val_R4c)

Precipitable Water: 2.452 - 4.552



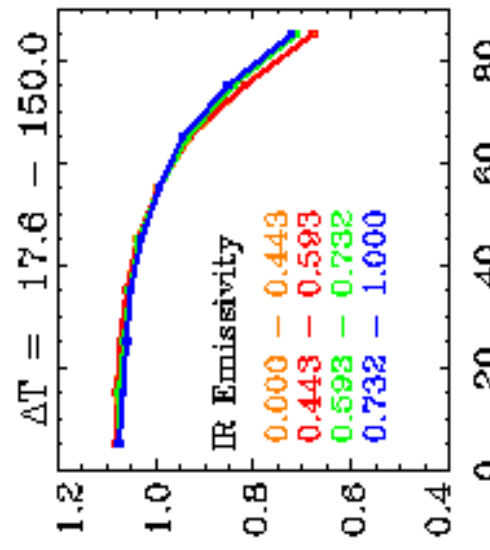
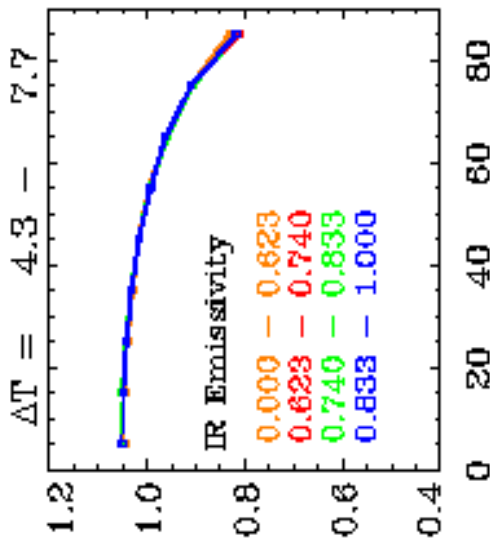
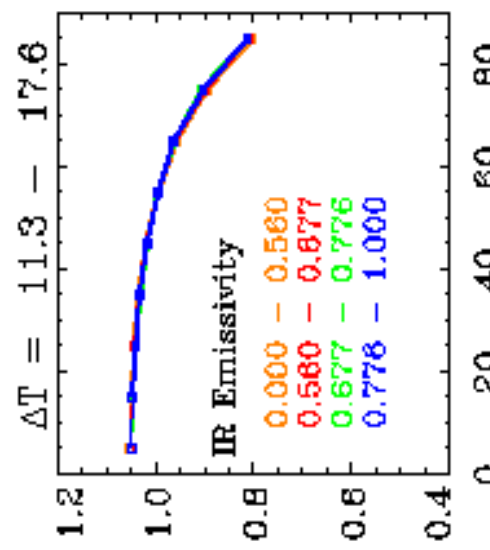
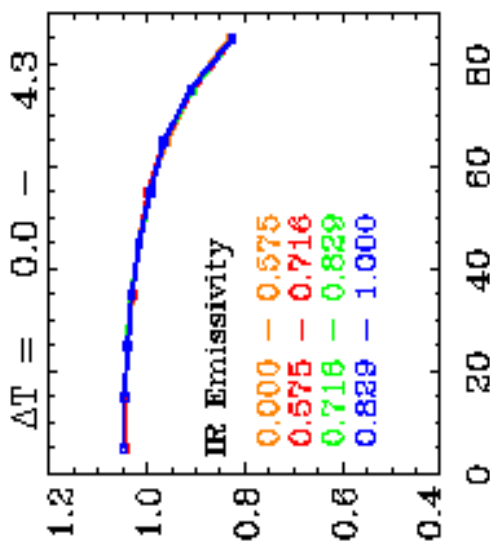
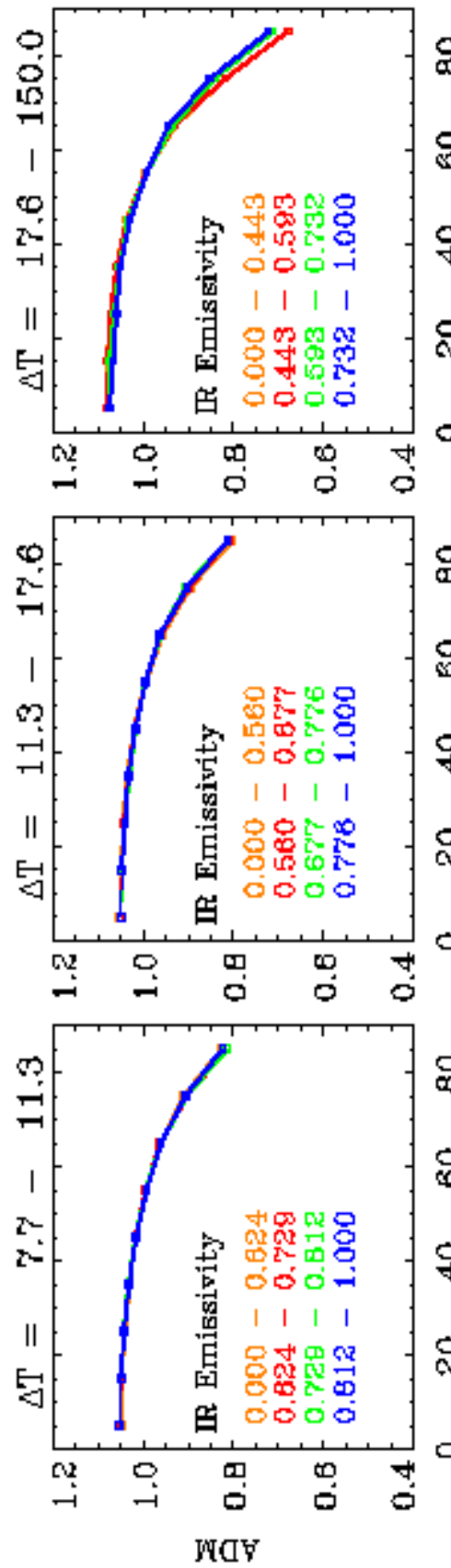
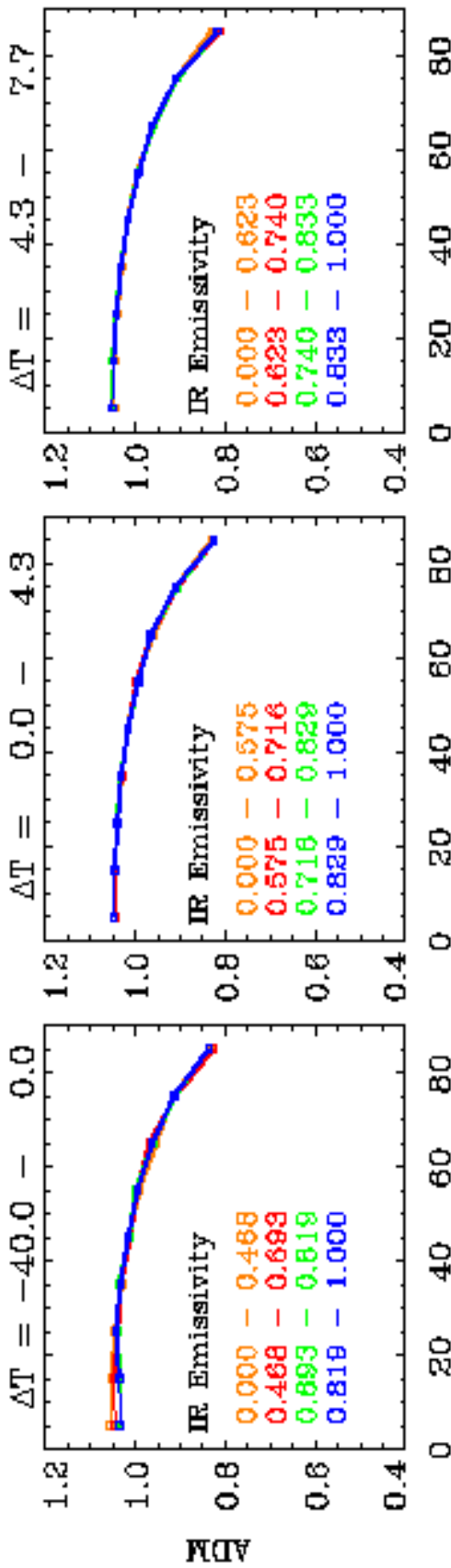
Variation of LW ADMs for Broken Cloud Fields (Ocean) with

$\Delta T(\text{Sfc}-\text{Cloud Eff. Temp})$, PW, & IR Emissivity

DAY RAPS/AT (ValR4c)

Precipitable Water: 2.291 - 3.780

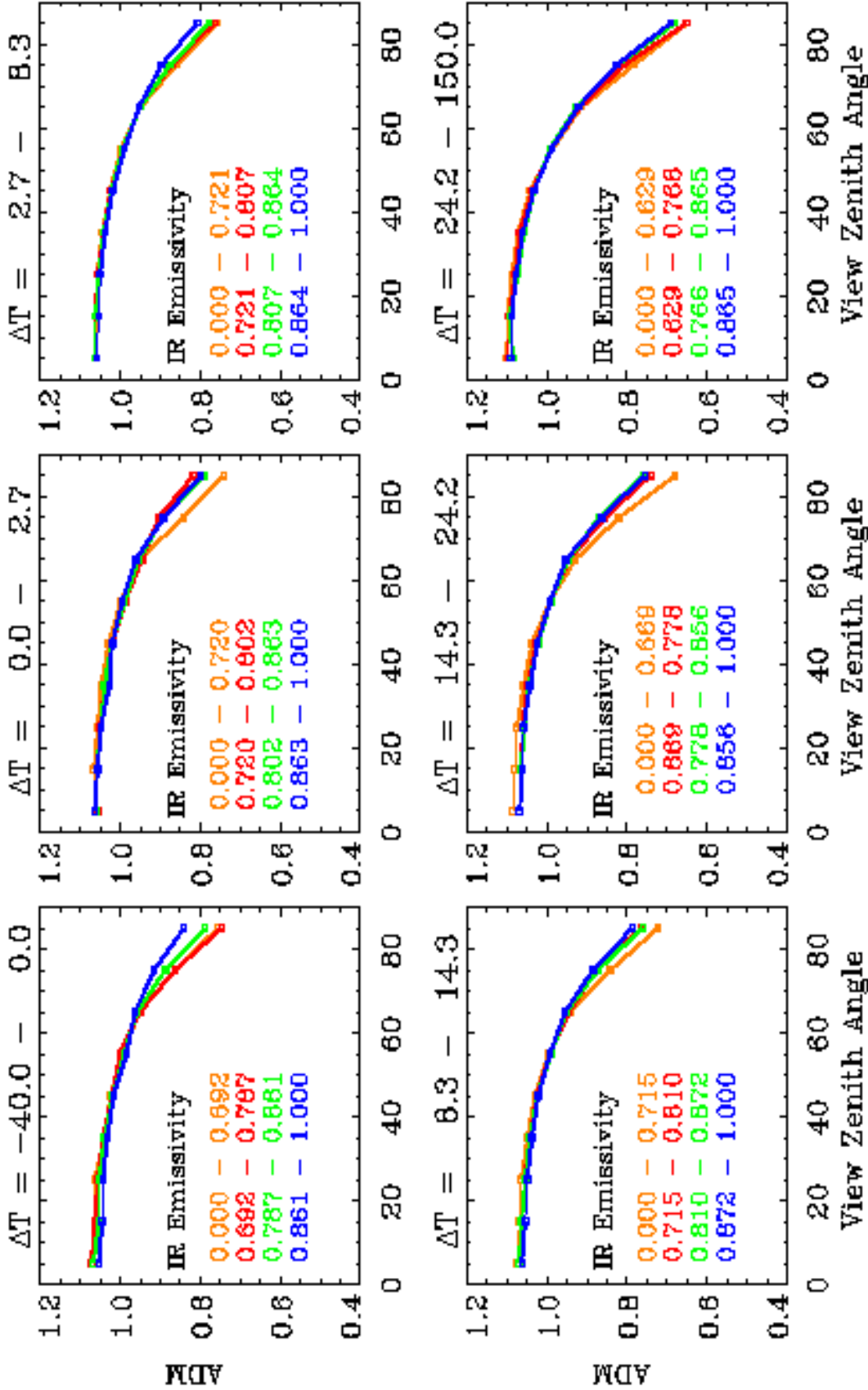
Cloud Fraction: 75.0 - 99.0



Variation of LW ADM for Broken Cloud Fields (Land) with $\Delta T(\text{Sfc}-\text{Cloud Eff. Temp})$, PW, & IR Emissivity

DAY RAPS/AT (ValR4c)

Precipitable Water: 2.727 - 4.379
 Cloud Fraction: 75.0 - 99.0



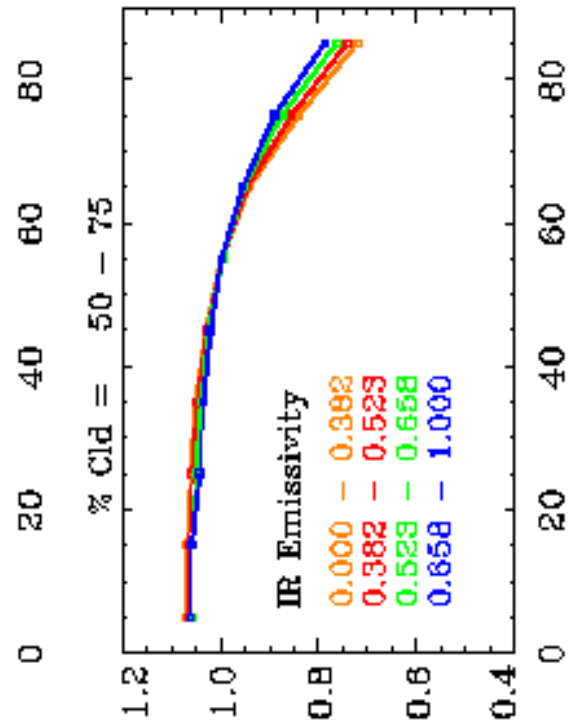
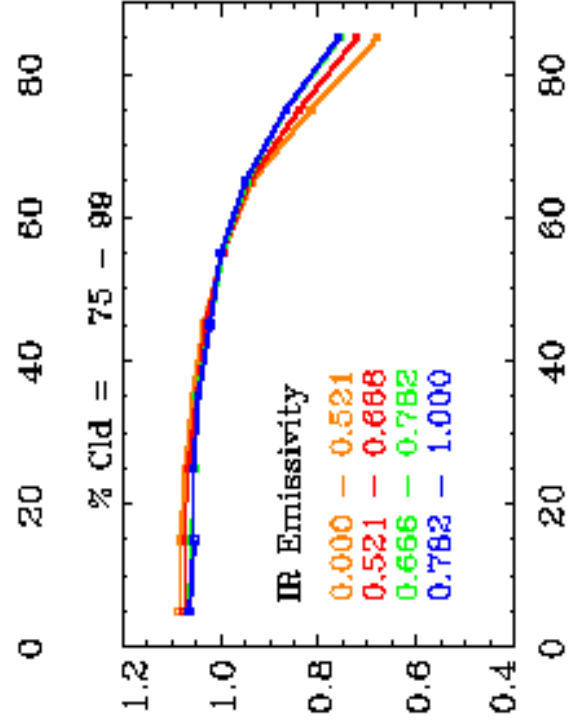
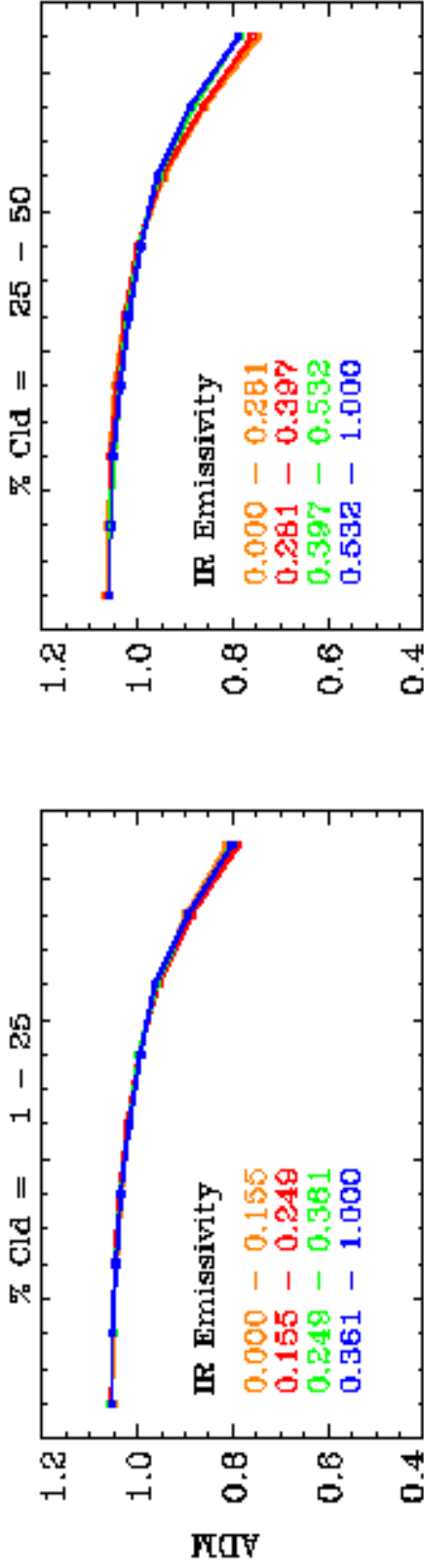
Variation of LW ADMs for Broken Cloud Fields (Ocean) with

$\Delta T(\text{Sfc}-\text{Cloud Eff. Temp})$, PW, & IR Emissivity

DAY RAPS/AT (ValR4c)

Precipitable Water: 0.000 - 2.291

$\Delta T = 18.1 - 150.0$



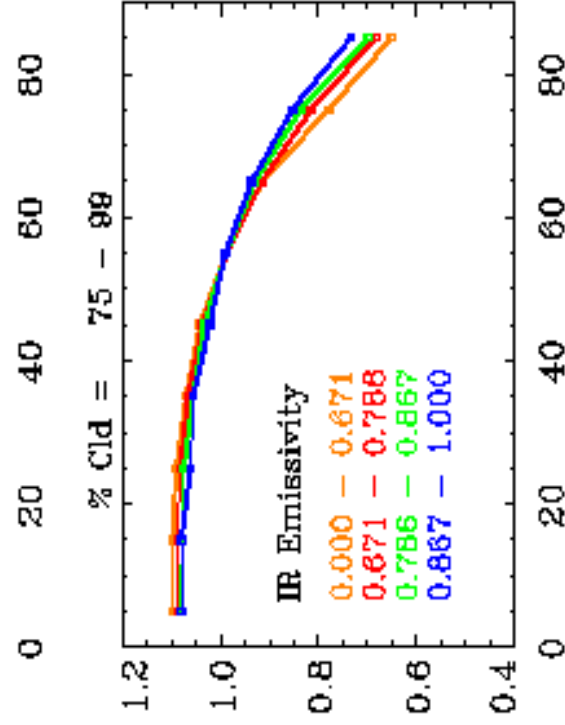
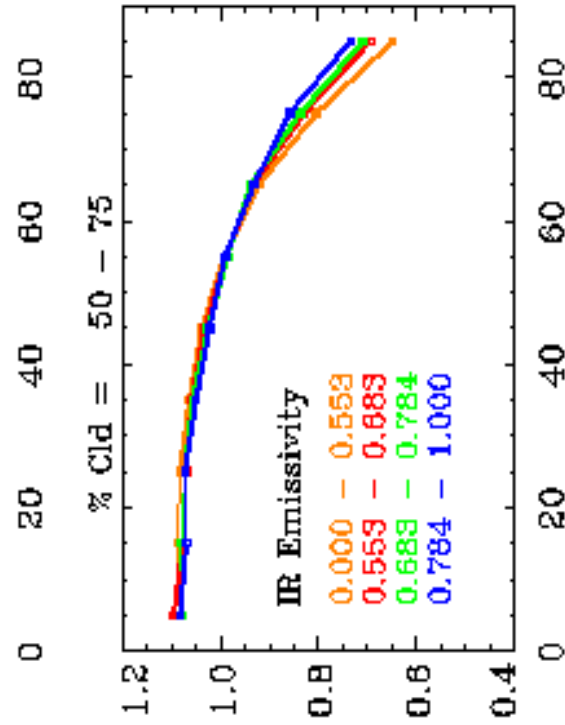
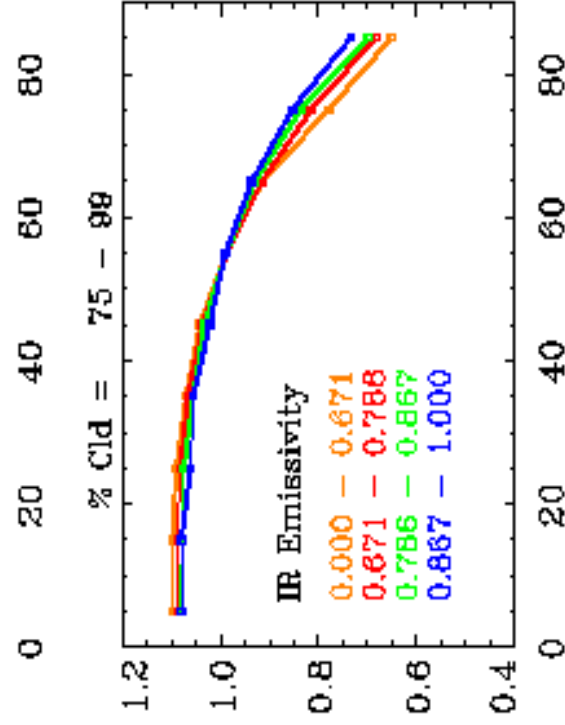
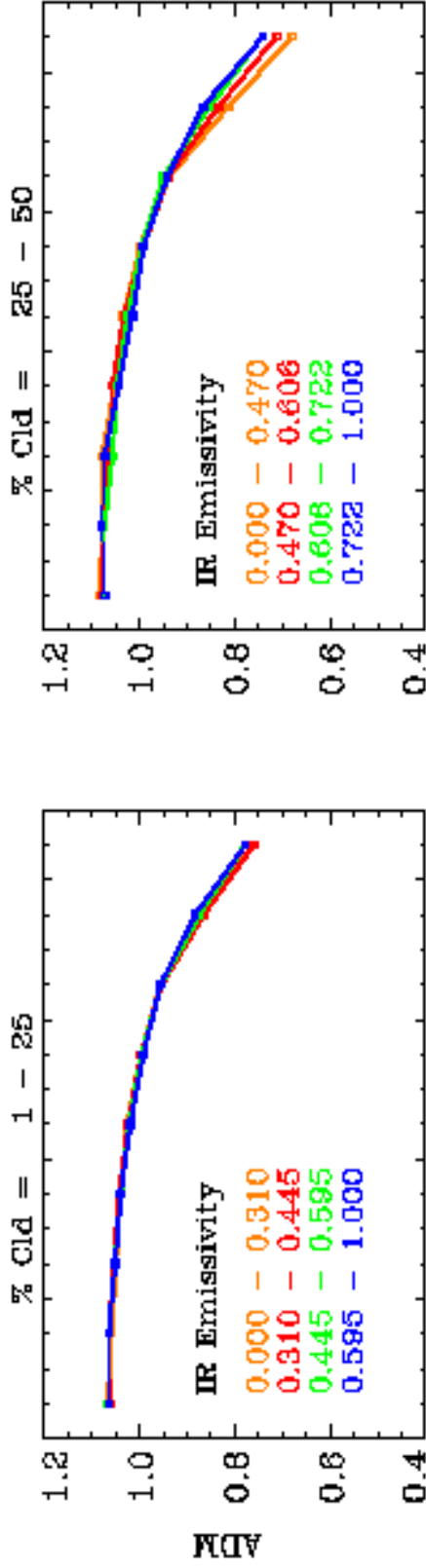
Variation of LW ADMs for Broken Cloud Fields (Land) with

$\Delta T(\text{Sfc}-\text{Cloud Eff. Temp})$, PW, & IR Emissivity

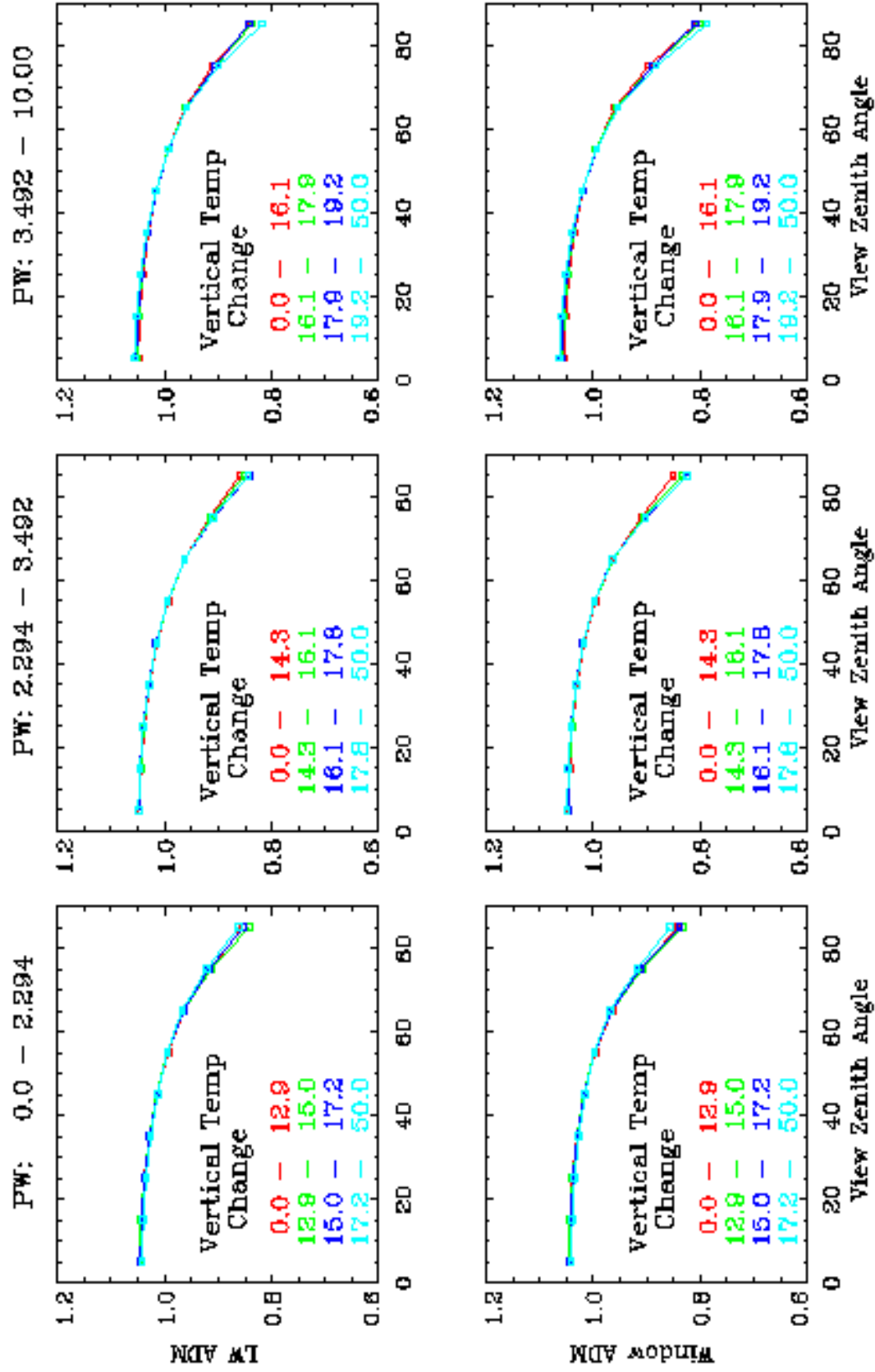
DAY RAPS/AT (ValR4c)

Precipitable Water: 0.000 - 2.727

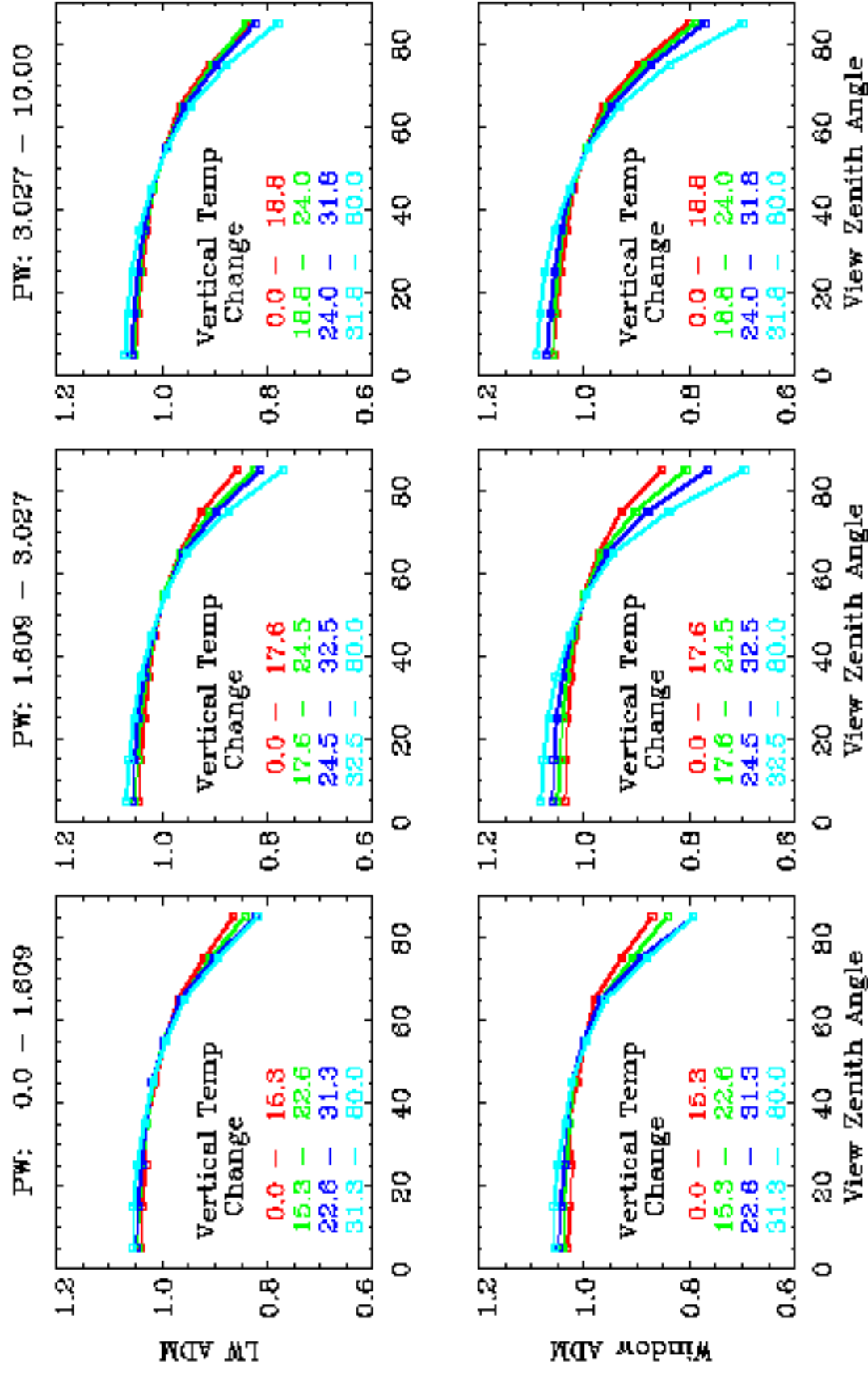
$\Delta T = 18.3 - 150.0$



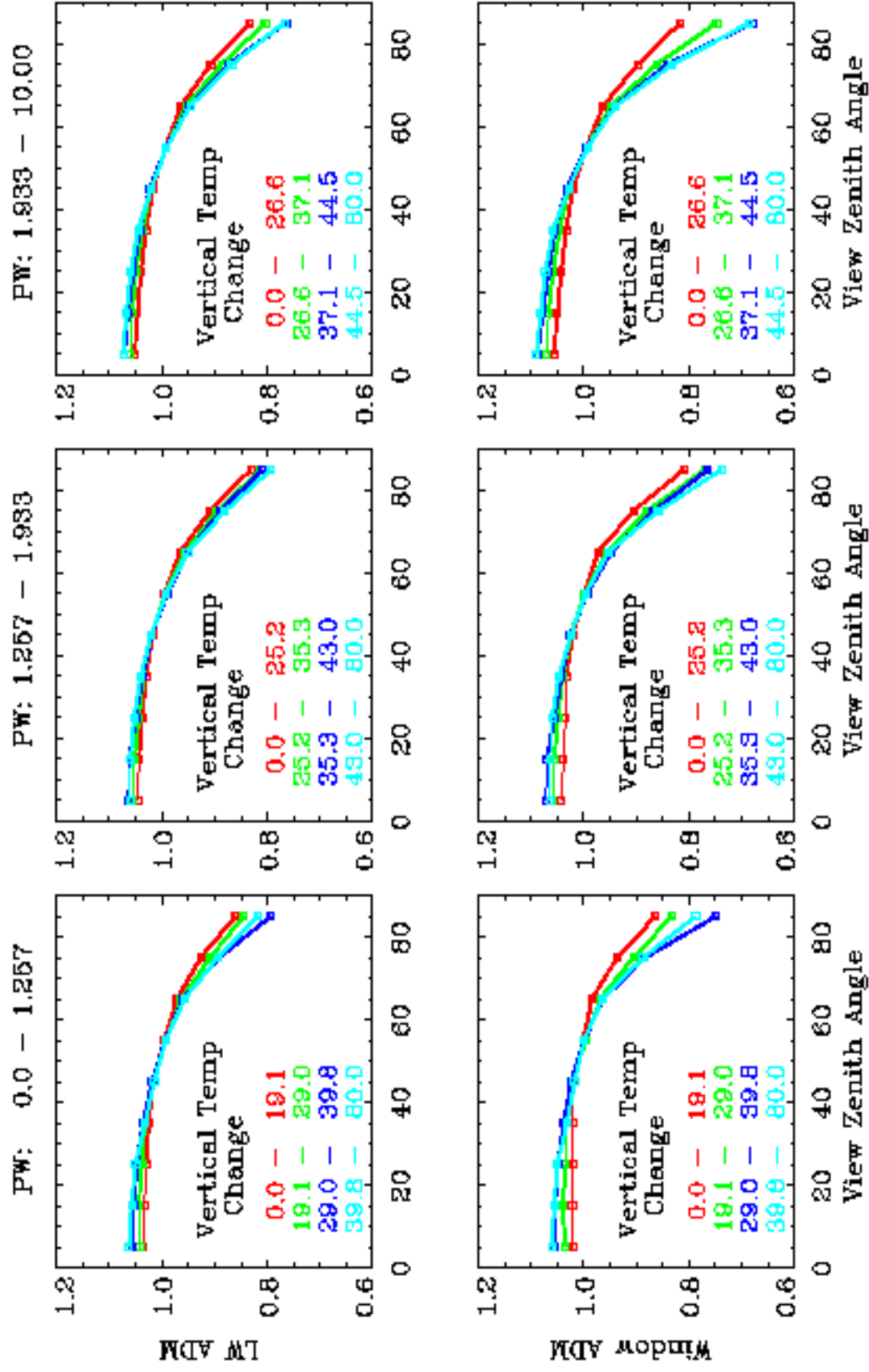
Variation of Clear Sky (Ocean) LW/Window ADM
with PW and Vertical Temperature Change
DAY RAPS/AT (Val_R4c)



Variation of Clear Sky (Land) LW/Window ADM
with PW and Vertical Temperature Change
DAY RAPS/AT (Val_R4c)



Variation of Clear Sky (Desert) LW/Window ADM
 with PW and Vertical Temperature Change
 DAY RAPS/AT (Val_R4c)



SUMMARY OF RESULTS

- OVERCAST
 - ADMs exhibit more significant variation with IR emissivity than with PW or $\Delta T_{(sfc-cld)}$
 - Anisotropy increases with increasing PW, $\Delta T_{(sfc-cld)}$ and decreasing cloud emissivity.
- BROKEN CLOUD FIELDS
 - Anisotropy increases as the cloud fraction and the vertical temperature change increase. ADMs show more variation with IR emissivity and less variation with $T_{(sfc-cld)}$ or PW.
 - Land scenes are more anisotropic than ocean scenes.

SUMMARY OF RESULTS

- **BROKEN CLOUD FIELDS (cont.)**
 - As cloud fraction increases, so does the ADM variation with cloud emissivity.
- **CLEAR**
 - Ocean ADMs exhibit little dependence on the vertical temperature change.
 - Anisotropy increases with PW for all surface types.
 - ADMs for clear land and desert scenes exhibit increasing anisotropy with increasing vertical temperature change.