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.

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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	288 (O) 288 (L)
		6 ΔT (Sfc-Cloud)	
		4 IR Emissivity	
Overcast	Ocean + Land	3 Precipitable Water	108
		6 ΔT (Sfc-Cloud)	
		6 IR Emissivity	

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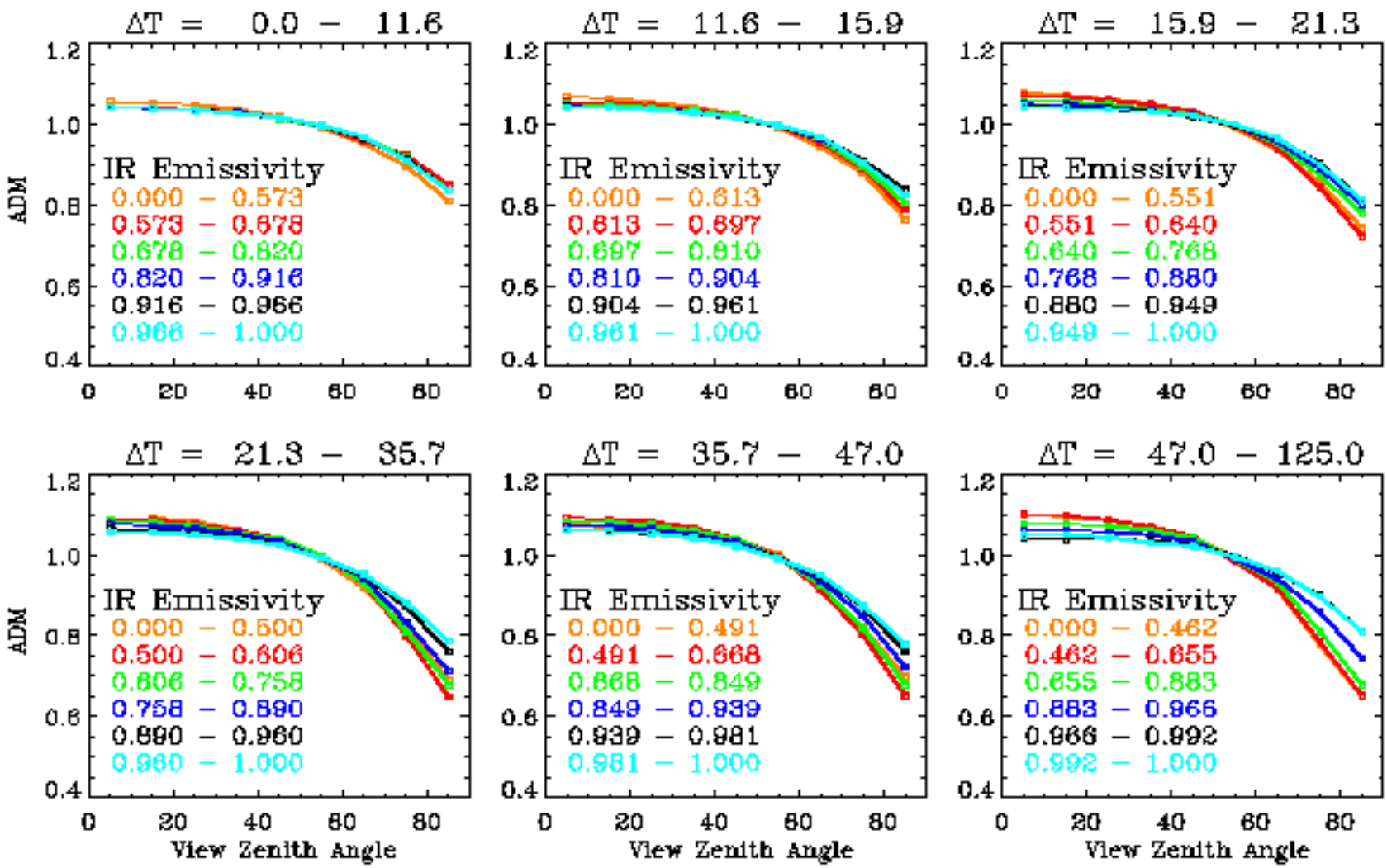
Variation of Overcast (Ocean & Land) LW ADM with
ΔT(Sfc−Cloud Eff. Temp), PW, & IR Emissivity
DAY RAPS/AT (Val_R4c)
Precipitable Water: 0.000 − 2.452



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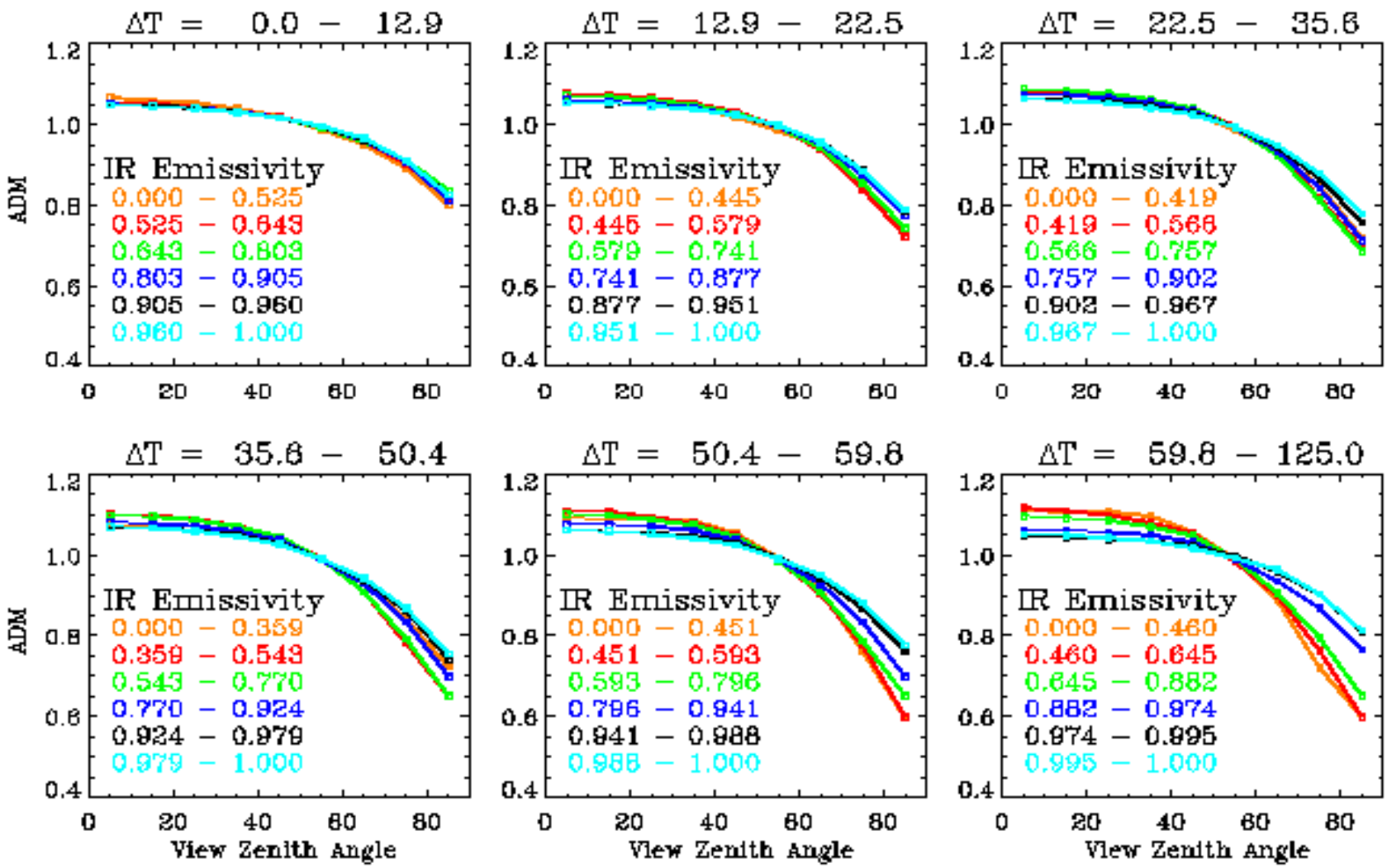
Variation of Overcast (Ocean & Land) LW ADM with
ΔT(Sfc−Cloud Eff. Temp), PW, & IR Emissivity
DAY RAPS/AT (Val_R4c)
Precipitable Water: 2.452 − 4.552



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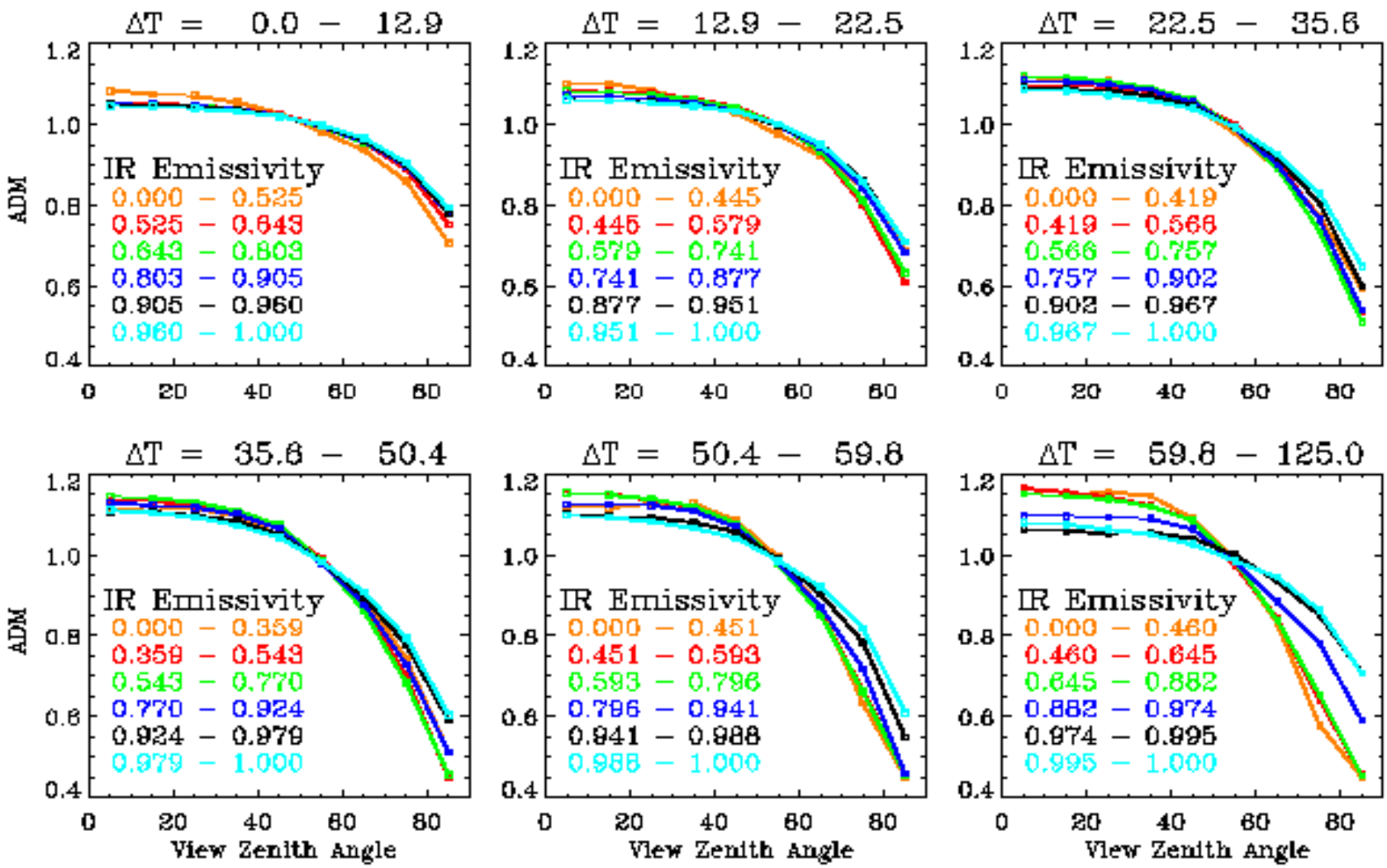
Variation of Overcast (Ocean & Land) Window ADM with
ΔT(Sfc−Cloud Eff. Temp), PW, & IR Emissivity
DAY RAPS/AT (Val_R4c)
Precipitable Water: 2.452 − 4.552



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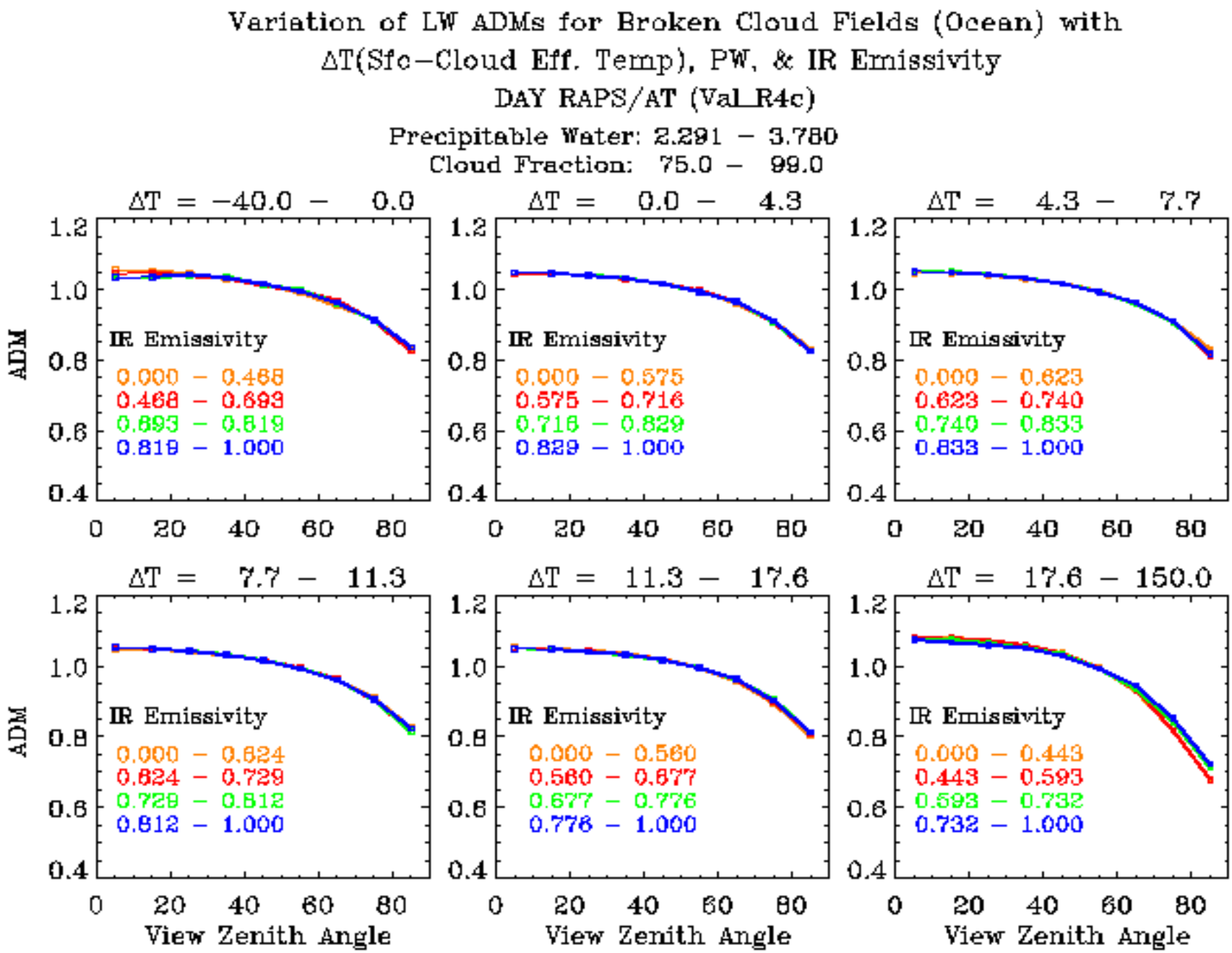

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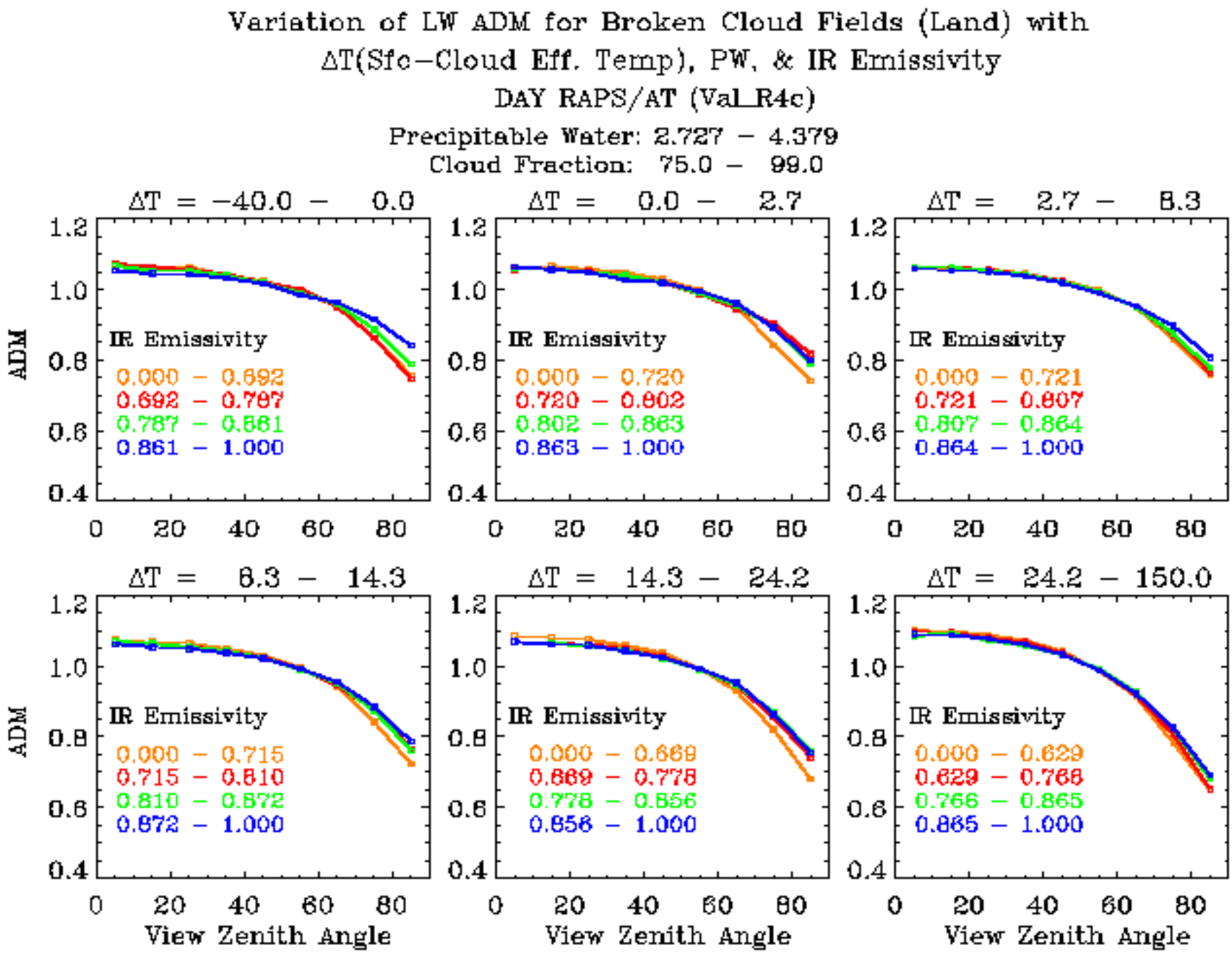

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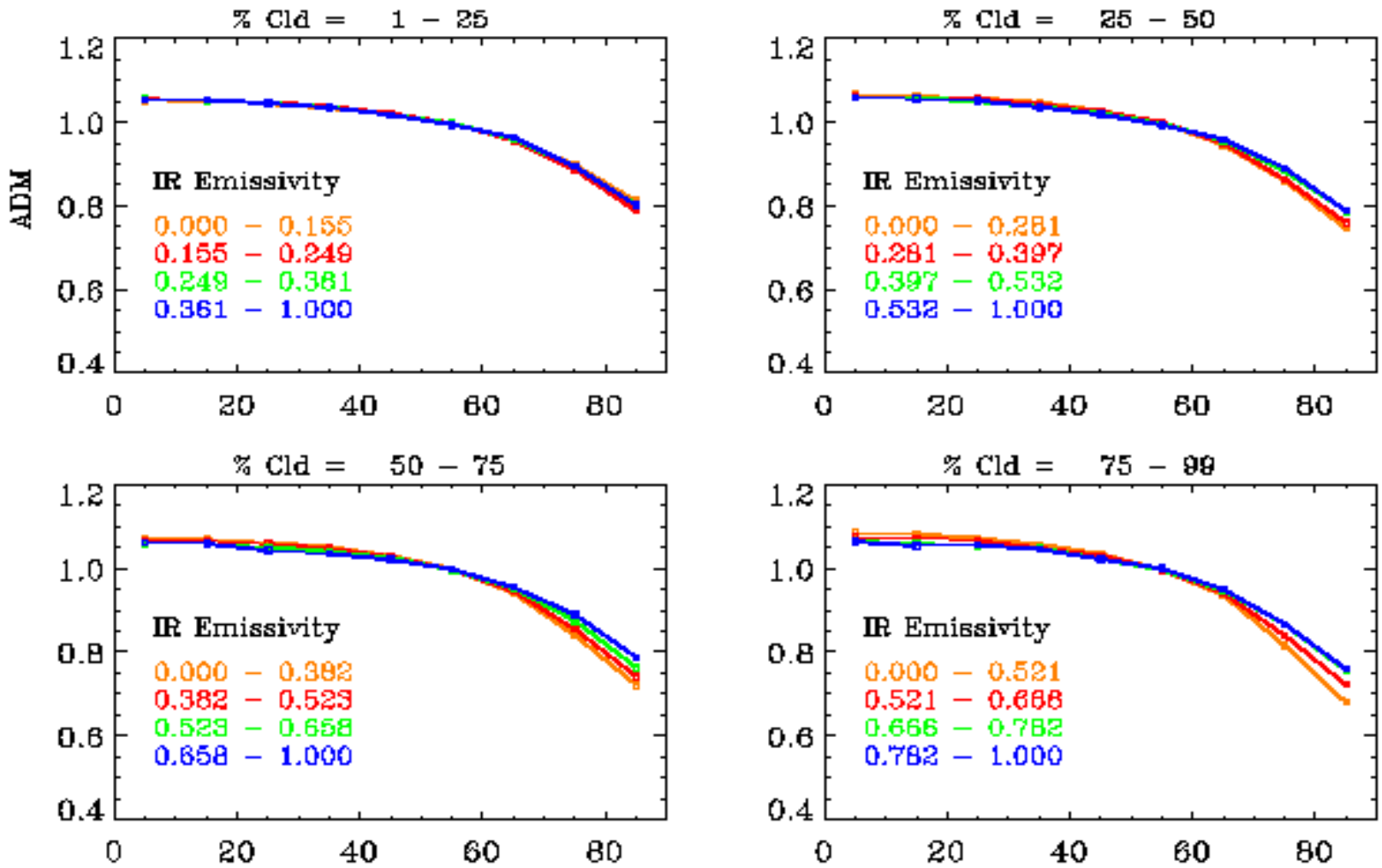
Variation of LW ADMs for Broken Cloud Fields (Ocean) with
ΔT(Sfc−Cloud Eff. Temp), PW, & IR Emissivity
DAY RAPS/AT (Val_R4c)
Precipitable Water: 0.000 − 2.291
ΔT = 18.1 − 150.0



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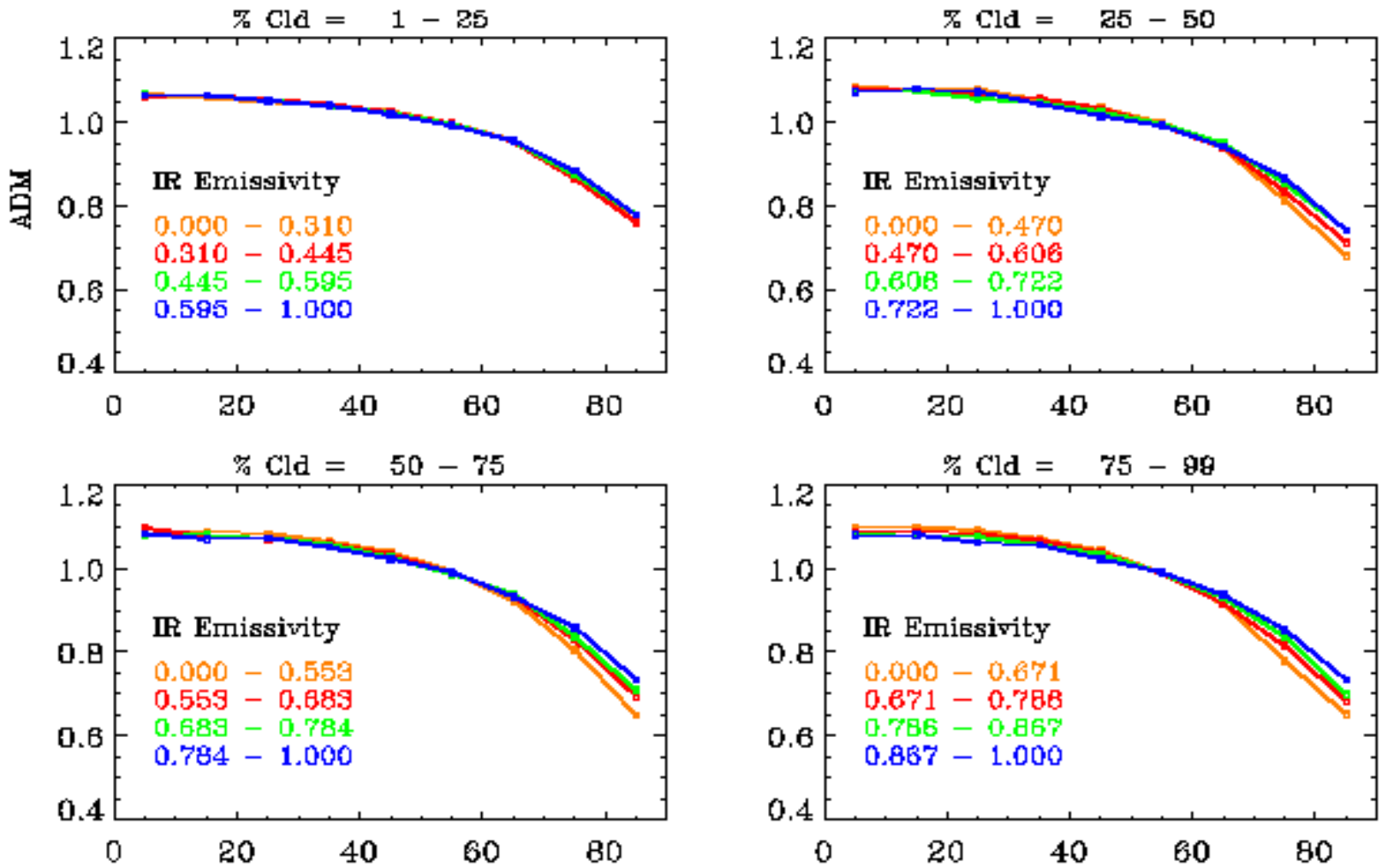
Variation of LW ADMs for Broken Cloud Fields (Land) with
ΔT(Sfc−Cloud Eff. Temp), PW, & IR Emissivity
DAY RAPS/AT (Val_R4c)
Precipitable Water: 0.000 − 2.727
ΔT = 18.3 − 150.0



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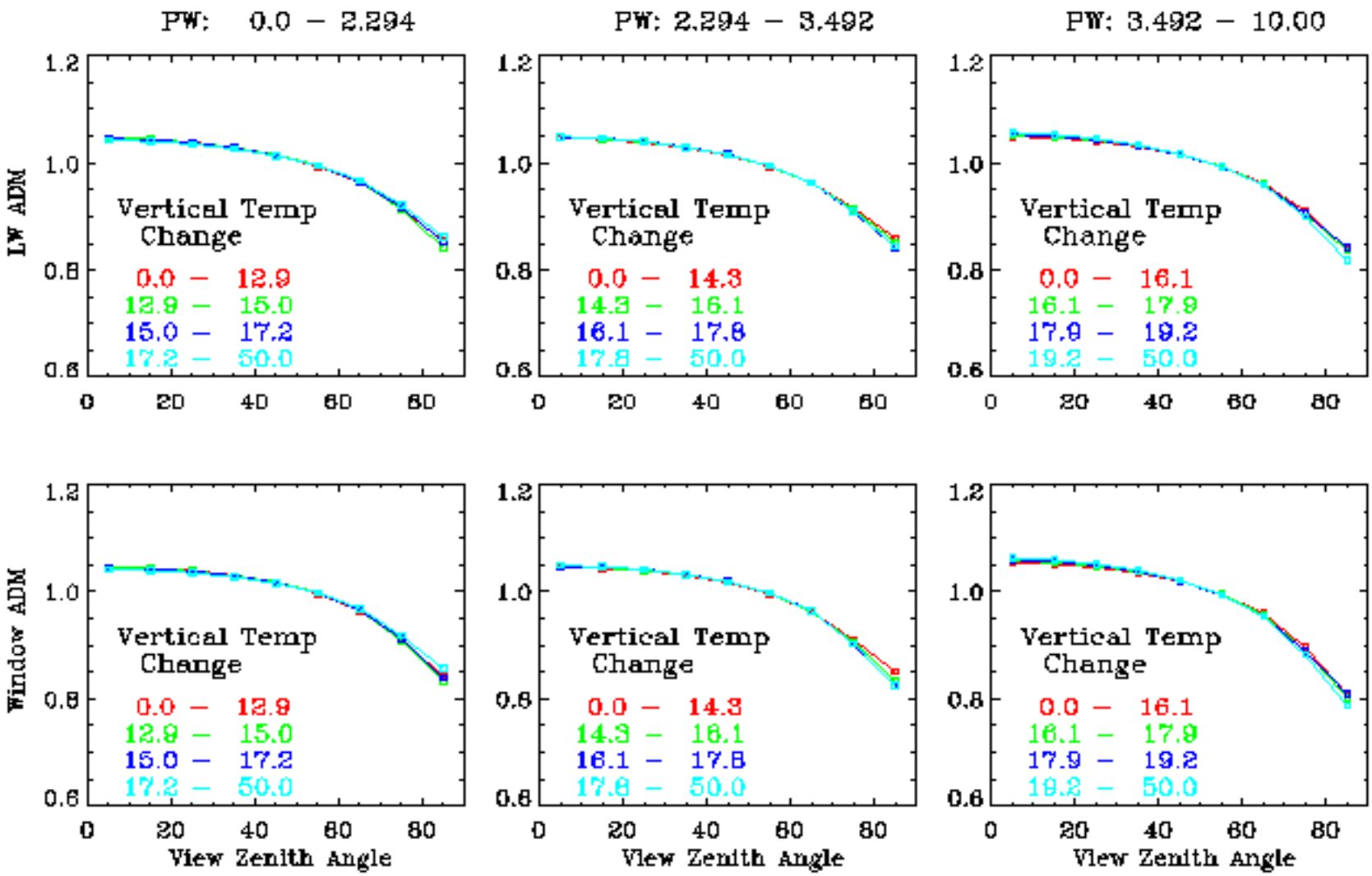
Variation of Clear Sky (Ocean) LW/Window ADM with PW and Vertical Temperature Change

DAY RAPS/AT (Val_R4c)



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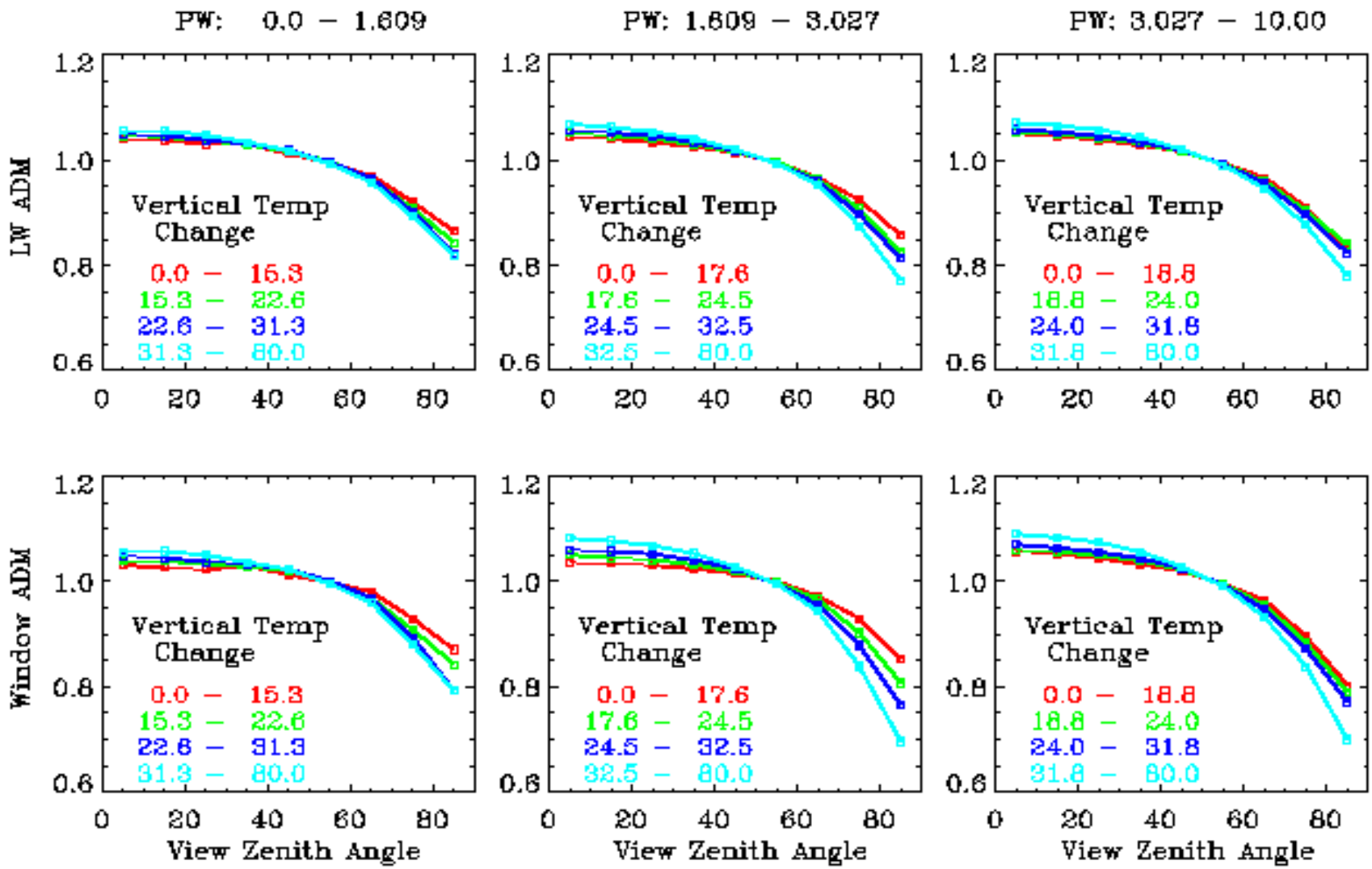
Variation of Clear Sky (Land) LW/Window ADM with PW and Vertical Temperature Change

DAY RAPS/AT (Val_R4c)



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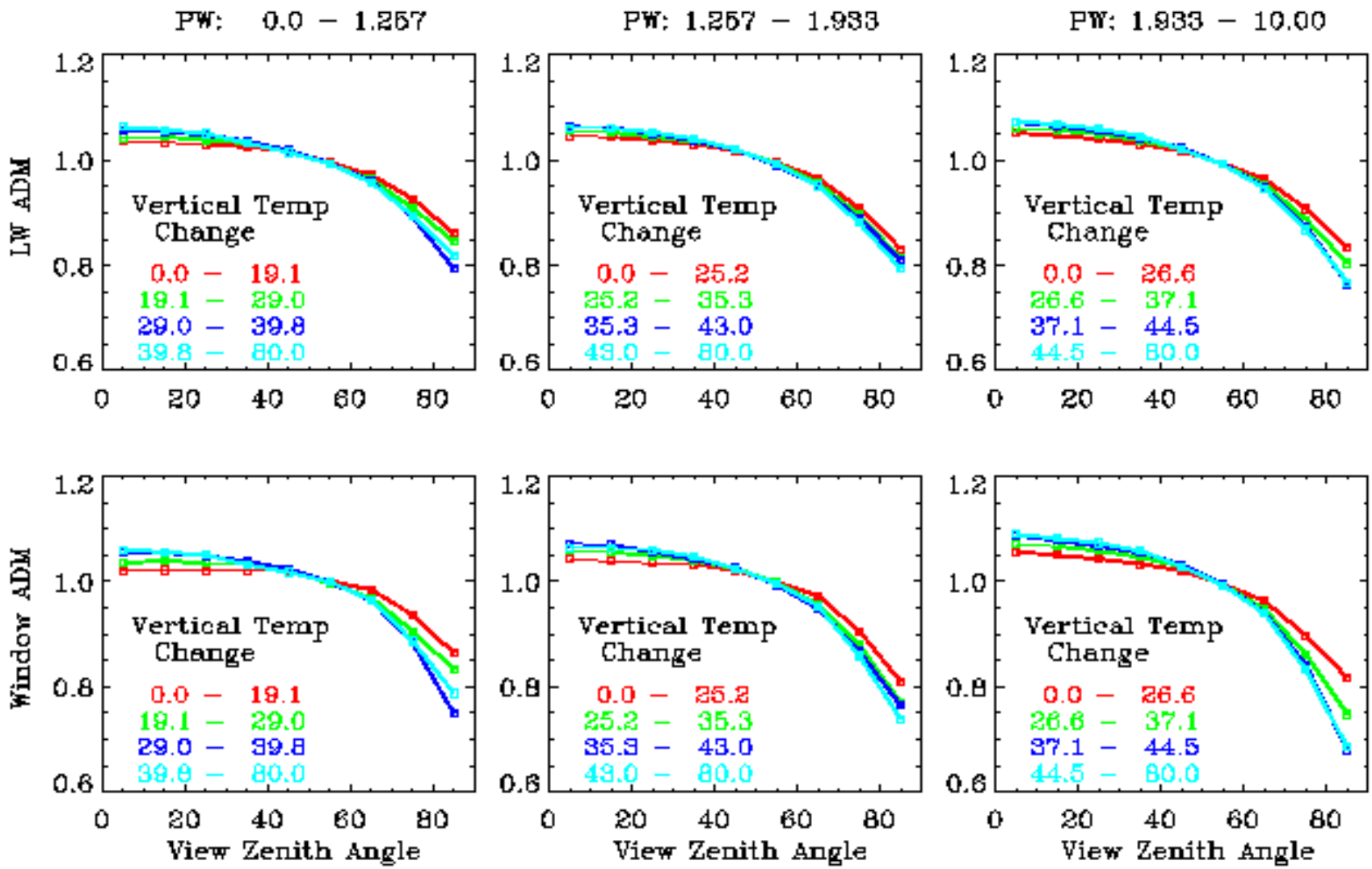
Variation of Clear Sky (Desert) LW/Window ADM with PW and Vertical Temperature Change

DAY RAPS/AT (Val_R4c)



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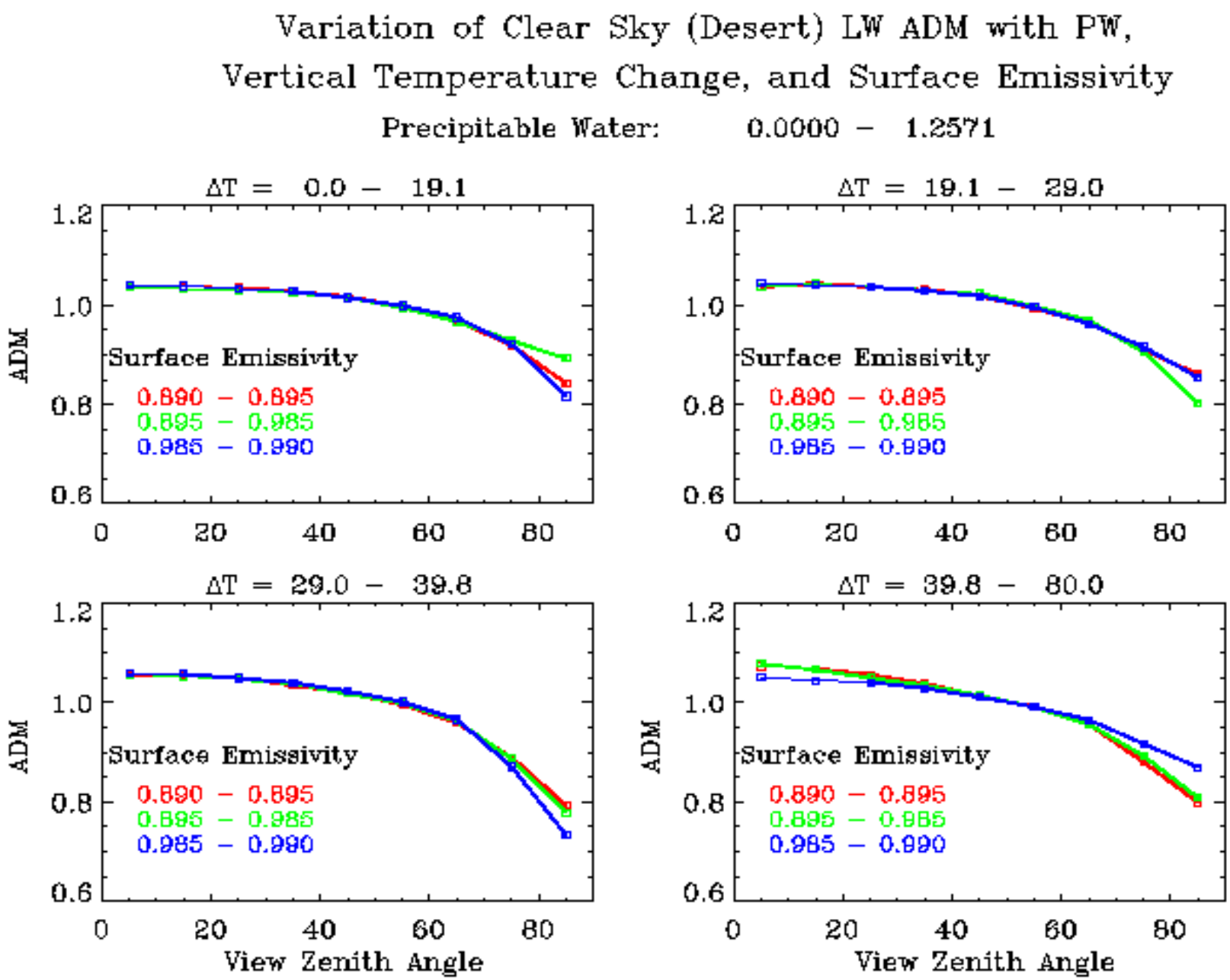

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SUMMARY OF RESULTS

- OVERCAST
  - ADMs exhibit more significant variation with IR emissivity than with PW or $\Delta T_{(sfc\text{-}cld)}$
  - Anisotropy increases with increasing PW, $\Delta T_{(sfc\text{-}cld)}$ 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 $T_{(sfc\text{-}cld)}$ or PW.
  - Land scenes are more anisotropic than ocean scenes.

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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.

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