Conditions		Rain Rate Relationship	Rate Cap	Applications
Z < 48 dBZ	Below the bottom of the ML	$R = 4120A^{1.03}$ (if ϕ_{DP} span ≥ 3°)	7.9 in/hr	Pure, steady rain (i.e. no ice, hail)
		max{ R(A) , R(Z) } where R(Z): $Z = 75R^{2.0}$ (east of 105W) $Z = 200R^{1.6}$ (west of 105W)	varies	Very light, sporadic, stratiform rain
48 ≤ Z < 50 dBZ		Weighted mean of R(A) and $R(K_{DP})$ (linear weight of function of Z)	varies	---
Z ≥ 50 dBZ		$R = 29\lvert K_{DP}\rvert^{0.770}$ (ρ < 0.97) $R = 44\lvert K_{DP}\rvert^{0.822}$ (ρ ≥ 0.97)	4.9 in/hr 6.9 in/hr	Areas of potential hail & heavy rain
---	50 km transition zone from bottom of ML	Weighted mean of R(A) and R(Z) where R(Z) is based on SPT	varies	---
---	Above the bottom of the ML	R(Z) where R(Z) is based on SPT	see previous slides	Within & above the ML

Surface Precip Type	Z-R Relationship	Rate Cap
Warm stratiform rain	$Z = 75R^{2.0}$ when $Z < 40$ dBZ $Z = 200R^{1.6}$ when $Z \geq 40$ dBZ	1.9 in/hr
Cool stratiform rain		
Convective rain	$Z = 300R^{1.4}$	4.1 – 5.9 in/hr
Hail	$Z = 300R^{1.4}$	2.1 – 5.9 in/hr
Snow	$Z = 75R^{2.0}$	none
Tropical Stratiform	Weighted mean: $Z = \beta*250R^{1.2}$ $Z = \max\{75R^{2.0}, 200R^{1.6}\}$	varies, up to 8.7 in/hr
Tropical Convective	Weighted mean: $Z = \beta*250R^{1.2}$ $Z = 300R^{1.4}$	

β increases in tropical environments