A-Train Cloud Retrieval Comparisons in the Bay of Bengal

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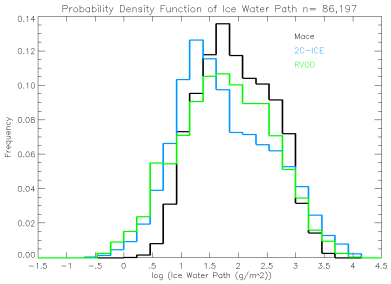
Goal: Compare A-train cirrus microphysical retrieval algorithms.
Focus on Bay of Bengal region [0-20N,75-95E] for August-September, 2007.

Algorithm	Data				
	Radar	Geoprof-lidar cloud mask	Lidar	Visible optical depth	CERES fluxes
2B-CWC-RVOD	X			X	
2C-ICE (preliminary)	X	X	X		
Mace (2010)	X	X		X	X



Left: Distribution of IWP, for profiles where all three algorithms contained ice. Percentage of ice-free profiles was 10% for Mace (2010) algorithm, 12% for 2C-ICE and 31% for RVOD.

Algorithm	Ice Water Path Statistics [g/m^2] n = 86,197		
	Mean	Standard Deviation	Median
2B-CWC-RVOD	264	692	46
2C-ICE (preliminary)	362	1083	34
Mace (2010)	236	532	66

Methodology: Use microphysical properties to derive radiative properties. Then compare calculated TOA fluxes to CERES fluxes to evaluate which algorithm agrees more closely with CERES

$$R_{net} = S\downarrow - S\uparrow - L\uparrow$$

Results:

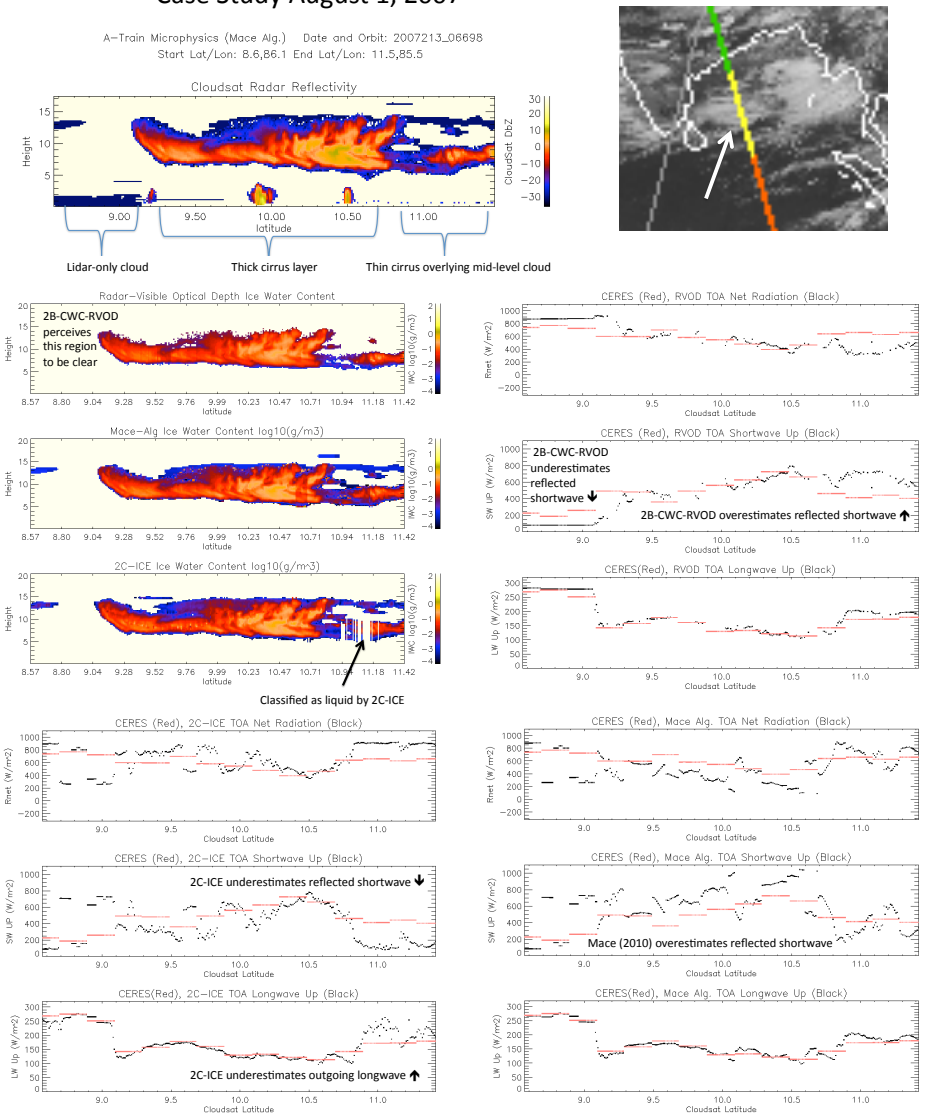
Algorithm	Mean Bias Error (Predicted - CERES) [W/m^2]		
	TOA SW up	TOA LW up	TOA Net
2B-CWC-RVOD	-12	15	-3
2C-ICE (preliminary)	-15	9	6
Mace (2010)	-10	-8	18

2B-CWC-RVOD shows largest compensating errors. This algorithm tends to have less reflected shortwave and more outgoing longwave compared to CERES, which is likely due to missing lidar-only cloud.

2C-ICE algorithm has largest error in reflected shortwave. This is partly due to differences in phase determination and is an artifact of our analysis, since the liquid retrieval from Mace (2010) is combined with 2C-ICE to obtain the radiative properties.

Mace (2010) algorithm has smallest combined SW and LW error. However, these errors are additive and lead to a larger error in net radiation.

Case Study August 1, 2007



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