MARINE BOUNDARY LAYER CLOUD MACRO-SCALE STRUCTURE DURING THE AMF POINT REYES DEPLOYMENT

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1. OBJECTIVES

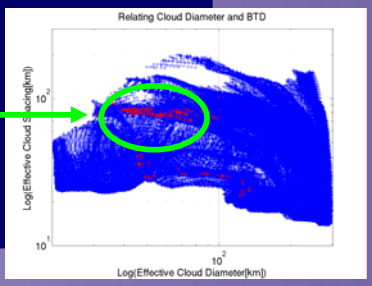
- Use satellite observations to place the AMF surface-based and aircraft observations into a larger-scale context relevant to GCM-sized grids (e.g. 300 x 300 km)
- Quantify the macro- and microphysical properties of California region marine boundary layer clouds.
- Quantify the diurnal cycle of MBL cloud properties from satellite observations
- Related the occurrence of pockets of open cells (POCs) to effective cloud diameter [C_D]

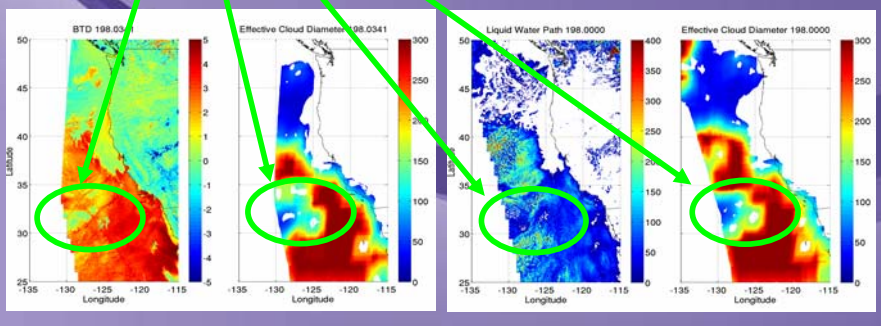
2. CLOUD SCREENING

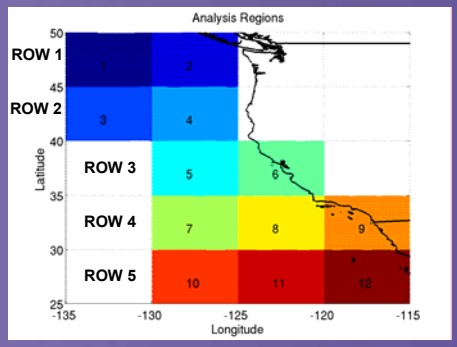
- Identify GCM-sized boxes containing mainly MBL clouds (cloud fraction > 20%)
- Automated cloud identification algorithm screens to remove scenes containing overlying cirrus and other cloud types
- Compute scene-mean cloud macro- and μ-physical properties
- For details see: Jensen et al, 2008: Investigation of regional and seasonal variations in MBL cloud properties from MODIS observations, *J. Climate*, in press.

3. POCs and C_D

- Brightness Temperature Difference (BTD) = $T_{10\mu m} - T_{4\mu m}$
- Small values of BTD (< 2K) are observed for broken cloud scenes (including POCs)
- POCs tend to be populated with small C_D, Large S_D…but so are other broken clouds



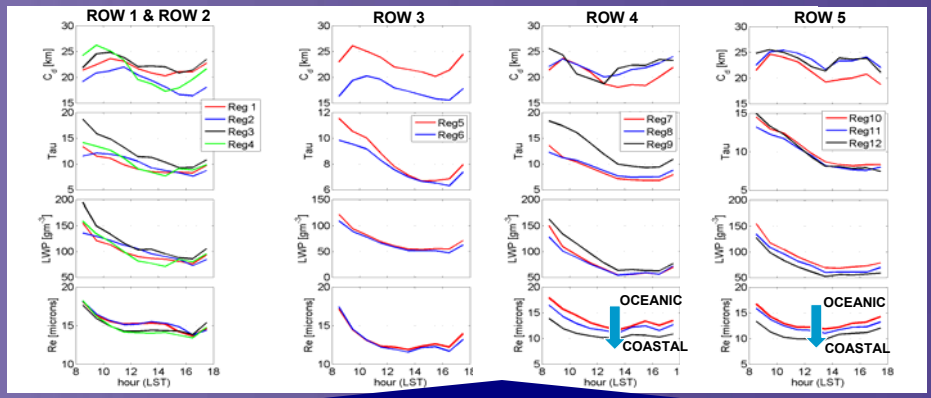




SUMMARY

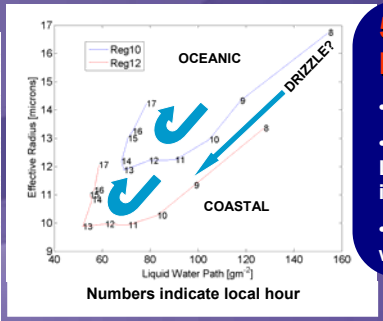
- POCs identified by low BTD occupy a unique region on C_D-S_D space
- Coastal influences on cloud macro-physical properties are suggested by regional differences in the diurnal cycle of C_D
- Diurnal cycle of LWP/R_e suggests drizzle processes play important role thru solar noon

4. Diurnal cycle of cloud macro- and microphysical properties



- Diurnal cycle of optical depth, LWP and R_e similar to other MLB sudies
- Lack of longitudinal gradients in R_e (Reg 1,2 and Reg 3,4 and Reg 5,6) = Lack of coastal influences
- Longitudinal gradients in R_e (Reg 7,8,9 and Reg 10,11,12) suggest coastal influences on cloud microphysics
- Coastal influence on diurnal cycle of cloud macrophysics (C_D) in Reg 8,9,11,12

5. Liquid Water Path and Effective Radius



- Most regions show similar pattern
- Morning to local noon depleting LWP and decreasing R_e suggests importance of drizzle
- After local noon LWP increases with nearly constant R_e

Movie of C_D