MARINE BOUNDARY LAYER CLOUD PROPERTIES FROM AMF POINT REYES SATELLITE OBSERVATIONS

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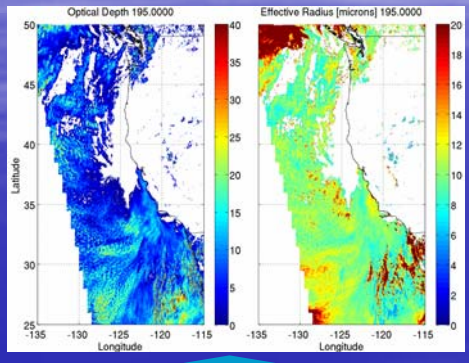
1. OBJECTIVES

- 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



SUMMARY

• C_D offers a simple measure of MBL cloud organization

• The diurnal cycle of cloud μ-physical properties and C_D at Pt Reyes are consistent with previous work.

• The time series of C_D can be used to identify distinct mesoscale organization regimes within the Pt. Reyes observation period

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

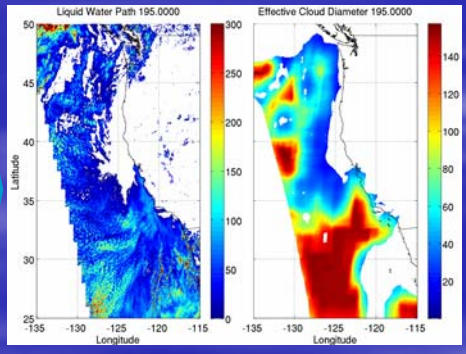
• Compute scene-mean cloud macro- and μ-physical properties

• For details see: Jensen et al, 2007: Investigation of regional and seasonal variations in MBL cloud properties from MODIS observations, *J. Climate*, (submitted).

4. CLOUD PROPERTIES

• Large values of C_D for solid cloud decks. Smaller values for scattered cloud scenes

• Large C_D generally accompanied by largest optical depth and liquid water path

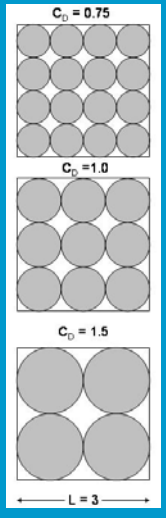


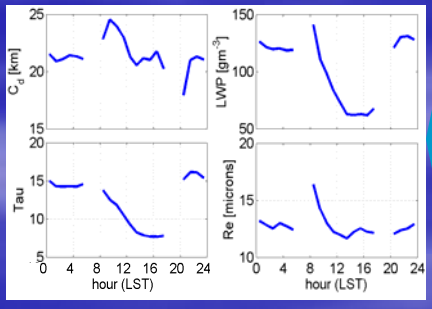
3. MACROPHYSICAL PROPERTIES

• Mesoscale cloud structure is quantified using the effective cloud diameter:

$$C_D = \frac{4\sum_{i}^{N} A_i}{\sum_{i}^{N} P_i}$$

• A_i = Area of a single cloud element, P_i = Perimeter of a single cloud element, N = number of cloud elements





5. DIURNAL CYCLE

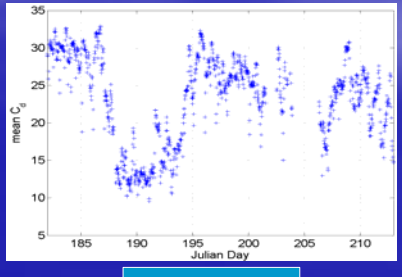
• Max optical depth, LWP and R_e occur in the morning decreasing through the daytime

• Diurnal cycle of C_D is consistent with more solid clouds in the morning becoming more scattered in the afternoon.

6. TIME SERIES

• July shows 4-6 day cycle from larger C_D (more solid) to smaller C_D (more scattered)

• Large C_D tends to correlate with large optical depth, large liquid water path



Movie of C_D