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Title: "Sensitivity of marine warm cloud retrieval statistics to algorithm choices: Examples from MODIS Collection 6"

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Abstract:

The optical and microphysical structure of warm boundary layer marine clouds is of fundamental importance for understanding a variety of cloud radiation and precipitation processes. With the advent of MODIS (Moderate Resolution Imaging Spectroradiometer) on the NASA EOS Terra and Aqua platforms, simultaneous global/daily 1km retrievals of cloud optical thickness and effective particle size are provided, as well as the derived water path. In addition, the cloud product (MOD06/MYD06 for MODIS Terra and Aqua, respectively) provides separate effective radii results using the 1.6, 2.1, and 3.7 μm spectral channels.

Cloud retrieval statistics are highly sensitive to how a pixel identified as being "not-clear" by a cloud mask (e.g., the MOD35/MYD35 product) is determined to be useful for an optical retrieval based on a 1-D cloud model. The Collection 5 MODIS retrieval algorithm removed pixels associated with cloud edges as well as ocean pixels with partly cloudy elements in the 250m MODIS cloud mask – part of the so-called Clear Sky Restoral (CSR) algorithm. Collection 6 attempts retrievals for those two pixel populations, but allows a user to isolate or filter out the populations via CSR pixel-level Quality Assessment (QA) assignments.

In this paper, using the preliminary Collection 6 MOD06 product, we present global and regional statistical results of marine warm cloud retrieval sensitivities to the cloud edge

and 250m partly cloudy pixel populations. As expected, retrievals for these pixels are generally consistent with a breakdown of the 1D cloud model. While optical thickness for these suspect pixel populations may have some utility for radiative studies, the retrievals should be used with extreme caution for process and microphysical studies.