INTRODUCTION

Theoretical and observational studies (e.g., Koren et al. 2007; Wen et al. 2006, 2007) have indicated that 3-D radiative effects can cause problems in 1-D aerosol retrievals near clouds. Reflection from clouds increases the illumination of nearby areas, causing an overestimations of aerosol optical thickness.

DATA USED

• Collection 5 MOD02, MOD06, MOD35 products
• North-East Atlantic (45°-50°N, 5°-25°W), south-west from UK
• March and September 14-29 in 2000-2007 (2X2 weeks in 8 years)
• Solar zenith angle =48°±2.5°; Viewing zenith angle < 10°
• Ocean surface with no glint or sea ice
• Nearby  pixels are considered cloudy if MOD35 says
• Maximum cloud top pressure nearby > 700 hPa
• MOD35 says
• Data points included in analysis:
  • Nearby pixels considered cloudy if MOD35 says "confident clear"

GOAL OF THIS STUDY

Examine whether 3-D effects are statistically important in a large dataset of 1 km-resolution MODIS data.

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Clear-sky reflectances increase systematically near clouds.

The increase is larger at shorter wavelengths. This is called "apparent bluing of aerosol in the vicinity of clouds" (Marshak et al. 2008). This is consistent with 3-D effects near clouds.

Other factors that contribute to the observed increase:
• Larger and more aerosol particles near clouds
• Undetected clouds
• Instrument effects such as latency

To mitigate latency effects, only clear-sky areas with the nearest cloud in downstream direction are considered.

REFERENCES:


