# Optical and Microphysical Retrievals of Marine Stratocumulus Clouds off the Coast of Namibia from Satellite and Aircraft

Steven PLATNICK[1], Michael D. KING,[2]
Paul HUBANKS[3,1], Galina WIND[4,1], and G. Thomas ARNOLD[4,1]

**Submission for Session 71: The Lasting Scientific Legacy of the Southern African Regional Science Initiative - SAFARI 2000**

ABSTRACT

Though the emphasis of the Southern Africa Regional Science Initiative 2000 (SAFARI-2000) dry season campaign was largely on emission sources and transport, the assemblage of aircraft (including the high altitude NASA ER-2 remote sensing platform and the University of Washington CV-580, UK MRF C-130, and South African Weather Bureau JRA in situ aircrafts) provided a unique opportunity for cloud studies. Therefore, as part of the SAFARI initiative, investigations were undertaken to assess regional aerosol-cloud interactions and cloud remote sensing algorithms. In particular, the latter part of the experiment concentrated on marine boundary layer stratocumulus clouds off the southwest coast of Africa. Associated with cold water upwelling along the Benguela current, the Namibian stratocumulus regime has received limited attention but appears to be unique for several reasons. During the dry season, outflow of continental fires and industrial pollution over this area can be extreme. From below, upwelling provides a rich nutrient source for phytoplankton (a source of atmospheric sulfur through DMS production as well as from decay processes). The impact of these natural and anthropogenic sources on the microphysical and optical properties of the stratocumulus is unknown. Continental and Indian Ocean cloud systems of opportunity were also studied during the campaign.

SAFAR 2000 aircraft flights off the coast of Namibia were coordinated with NASA Terra Satellite overpasses for synergy with the Moderate Resolution Imaging Spectroradiometer (MODIS) and other Terra instruments. MODIS was developed by NASA and launched onboard the Terra spacecraft on December 18, 1999 (and Aqua spacecraft on May 4, 2002). Among the remote sensing algorithms developed and applied to this sensor are cloud optical and microphysical proper-

[1] NASA Goddard Space Flight Center, Greenbelt, MD USA.
[2] Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO USA.
[3] Wyle, Lanham MD USA. [4] SSAI, Lanham, MD USA.

ties that include cloud thermodynamic phase, optical thickness, and effective particle radius of both liquid water and ice clouds. The archived products from these algorithms have applications in climate change studies, climate modeling, numerical weather prediction, and fundamental atmospheric research. The archived MODIS Collection 5 cloud products processing stream will be used to analyze low water cloud scenes off the Namibian and Angolan coasts during SAFARI 2000 time period, as well as other years. Pixel-level Terra and Aqua MODIS retrievals (1 km spatial resolution at nadir) and gridded (1° uniform grid) statistics of cloud optical thickness and effective particle radius will be presented, including joint probability distributions between the two quantities. In addition, perspectives from the MODIS Airborne Simulator, which flew on the ER-2 during SAFARI 2000 providing high spatial resolution retrievals (50 m at nadir), will be presented as appropriate.