

REMOTE SENSING OF FIRES AND SMOKE DURING THE SCAR EXPERIMENTS

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ABSTRACT

The purpose of the fire phase of the Smoke Clouds and Radiation (SCAR) experiments is to develop a technique for the quantitative remote sensing of fires and fire emissions. The first of the three fire experiments occurred in 1994 in California and the Pacific Northwest. This first experiment, called SCAR-C (California), involved remote sensing of prescribed and wild fires using two remote sensing instruments: AVIRIS (A Visible and InfraRed Imaging Spectrometer) and MAS (MODIS Airborne Simulator) aboard NASA's ER-2 aircraft. The imagers measured fire energy quantitatively by employing channels in the thermal and mid-IR, and quantified the smoke output by measuring smoke optical thickness using the visible channels. The result clearly showed a relationship between fire thermal energy and the quantity of smoke produced. In the second experiment, SCAR-B (Brazil), we used the same instrumentation to observe thousands of fires in a tropical biomass burning region. The results provided a testbed to validate and improve the algorithms destined for use with actual spaceborne MODIS (MODerate Resolution Imaging Spectroradiometer) data. However, the abundance of background smoke aerosol in Brazil prevented analysis that could link fire thermal energy to smoke produced. In order to quantify this link, SCAR-99 will take place in the fall of this year in the Pacific Southwest. Just as with SCAR-C in 1994, we intend to observe several, well-characterized, individual fires. In addition to the instrumentation flown in the previous SCAR deployments we anticipate the inclusion of a new instrument, MOPITT-A, that will permit analysis of trace gases as well as the smoke aerosol emitted by the fires.