

Lidar System for Investigation of Aerosols and Cirrus Clouds Near the Equator.

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Abstract:

In the current environment of concern over global warming, climate change, and ozone depletion/recovery, measurements in the tropics, within $\pm 5^\circ$ of the equator are limited and/or sporadic. Clearly, routine observations in this region would be of great benefit to many programs including those dealing with atmospheric chemistry, dynamics and radiation, and validation of satellite instruments. Such observations represent the primary goals of the Network for the Detection of Stratospheric Change (NDSC). The original concept of the NDSC was for a global network of stations, primary and complementary, making regular atmospheric measurements and to specifically include stations in the Arctic, N-mid-hemisphere, Tropics, S-mid-hemisphere, and the Antarctic. While a significant number of stations are currently involved in the NDSC, in more than 20 different countries, the closest measurements to the tropics are at Hawaii, 19.5°N , and at Reunion Island, 21.8°S , neither of which are truly representative of the tropical atmosphere. This project, to construct and place a small aerosol/cloud lidar at Christmas Island (Kiritimati), Kiribati, in the central Pacific (2°N , 157°W), represents the first step towards establishing an NDSC station at this location.

Due to the remote location of the planned lidar deployment it is absolutely essential that the system be both eye-safe and autonomous. These requirements severely restrain the design of the lidar. For example, To compensate for the low allowable energy levels we propose to operate at high pulse repetition rates, 2.5kHz. Numerous options for the design of the aerosol-cloud lidar have been considered. The system, currently under construction, will transmit and receive 532 nm and 1064 nm with depolarization analysis of the 532 nm returns. A particularly novel aspect of the design is that it will be totally powered by wind and solar energy allowing it to be totally independent and allowing it to

be deployed to remote locations with no services. Details of this new lidar system will be presented.

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