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Ozone and water vapor observations in the equatorial Pacific

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Ozone and water vapor play crucial roles in chemical and radiative processes especially in the upper troposphere and the lower stratosphere (UT/LS). Ozone in the stratosphere shields us from the Sun's ultraviolet (UV) radiation, making life on Earth possible; that in the troposphere acts as a strong greenhouse gas and an environmental pollutant. Water vapor in the upper troposphere is a main emitter of the Earth's infrared radiation, controlling the Earth's radiative balance; that in the lower stratosphere affects the stratospheric ozone photochemistry and the recovery of the stratospheric ozone depletion. Due to lack of observational data, however, space-time variations of ozone and water vapor in the UT/LS region have not been well described yet.

The Soundings of Ozone and Water in the Equatorial Region/Pacific (SOWER/ Pacific) mission has been running campaigns since 1998 to improve our knowledge of ozone and water vapor distributions in the UT/LS in collaboration with domestic and international researchers, filling the gap of data sparse regions such as in the equatorial UT/LS. Ozone and water vapor sonde observations have been made at several places in the equatorial Pacific: the Galapagos Islands (Ecuador), Christmas Island, Tarawa (Kiribati), Watukosek, and Bandung (Indonesia), including shipboard observations from the research vessel (e.g. Shiotani et al., 2002; Fujiwara et al., 2003).

On the basis of these experiences we plan to perform comprehensive observation campaigns to examine the dehydration process in the tropical tropopause layer (TTL) during northern winter when dehydration operates very efficiently. The first coordinated campaign was conducted in December 2004 at several stations described above including Ha Noi (Vietnam) in Indochina and a shipboard base; another campaign is expected from December 2005 to January 2006. In these campaigns we will focus dehydration processes and their efficiency with horizontal advection through the cold core region around the tropical tropopause in the western and central Pacific. We also propose to contribute to the satellite (EOS-Aura) validation, and plan to use Aura data to examine the internal consistency in a much wider space-time regime.

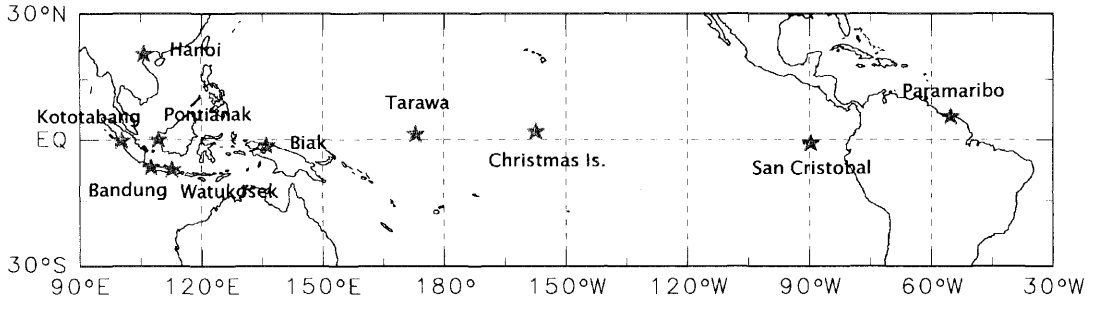

Fig. 1 Tropical stations related to the SOWER project

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