Geophysical Research Abstracts
Vol. 12, EGU2010-8343, 2010
EGU General Assembly 2010

New insights of transport processes through the UTLS derived from the TransBrom-Sonne cruise in the Western Pacific during October 2009

Kirstin Krüger (1), Birgit Quack (1), Susann Tegtmeier (1), Sebastian Wache (1), Viktoria Mohr (1), Franz Immler (2), and Markus Rex (3)

(1) IFM-GEOMAR, Kiel, Germany, (2) DWD, Lindenberg, Germany, (3) AWI, Potsdam, Germany

Recent publications have shown that spatial and temporal variability is an important aspect of transport processes in the Tropical Tropopause Layer (TTL). According to the analysis of available meteorological data the fastest and most efficient transport through the TTL takes place during Northern Hemisphere (NH) winter season, when wave breaking in the extratropical stratosphere, driving the Brewer Dobson circulation, is most pronounced. As a result the transition seasons spring and autumn are investigated rarely and we have only a limited knowledge of the transport processes in the TTL during e.g. October, the month of the TransBrom-Sonne cruise through the tropical Western Pacific. The time of the ship cruise is within the season of high typhoon activity in the tropical Western Pacific, a region which is in general characterized by the globally highest convective activity ("warm pool") throughout the year.

From the TransBrom-Sonne cruise we derive new results about the meteorology background of the under-investigated autumn season, including convection and transport through the TTL. Given that the transit route is almost along one longitude at 146° E from 44° N to 18° S, we see clear differences between extratropical and tropical air mass measurements. Within the TTL, which had a latitudinal extension from at least 36° N up to 18° S during the time of our ship cruise, measured cold point temperatures and analysed vertical velocities are moderate compared to the boreal winter season. We present new insights of the transport processes through the upper troposphere lower stratosphere (UTLS) as we passed the typhoon Melor in northern extratropics and crossed two tropical depressions Nepartak and Lupit. We analyse air mass pathways (trajectories) from the surface to the stratosphere at key dates of interests (e.g. during wind maxima and during days with high very short lived substances (VSLS) concentrations). The radiosounding of temperature, wind, humidity, cloud properties and ozone are used to validate the meteorological input data of the trajectory calculations. We present highlights of the ship campaign including atmospheric trace gase profiles, VSLS measurements and transport calculations.