

First airborne measurements of SO₂, H₂SO₄, NO, HNO₃, and NO_y in the Asian Summer Monsoon Anticyclone between 12 and 20 km

Hans SCHLAGER¹, Heinfried AUFMHOFF¹, Greta STRATMANN¹, Jule HEUCHERT¹,
Frank ARNOLD², Robert BAUMANN¹

¹ *DLR-Institute of Atmospheric Physics, Oberpfaffenhofen, Germany*

² *Max-Planck-Institute of Nuclear Physics, Heidelberg, Germany*

Our understanding is still incomplete of the chemical and aerosol composition in the so-called Asian Summer Monsoon Anticyclone (ASMA) which forms in the upper troposphere during summer annually over SE Asia resulting in a huge confined and distinct air mass. Also, the chemical and microphysical transformations in the ASMA and transport from this region into the stratosphere are insufficient known.

Results of first airborne SO₂, H₂SO₄, NO, HNO₃, and NO_y measurements in the upper troposphere and lower stratosphere in the ASMA are presented, obtained during the StratoClim campaign with the Geophysica in Kathmandu, Nepal, in July/August 2017. Multiple layers with enhanced trace gas mixing ratios were observed, originating from outflow of deep convection. Interestingly, also increased mixing ratios of SO₂ and H₂SO₄ were observed above the cold point tropopause. For conditions with very low temperatures at the tropopause, depleted mixing ratios of HNO₃ were found, most probably due to HNO₃ uptake in particles. Implications of the StratoClim observations will be discussed.

Key words: Asian Summer Monsoon, deep convection, sulfur dioxide, reactive nitrogen