

CO₂ and SF₆ concentrations in the stratosphere over Indonesia

*Satoshi Sugawara¹, Shuji Aoki², Shinji Morimoto², Shigeyuki Ishidoya³, Takakiyo Nakazawa², Sakae Toyoda⁴, Chusaku Ikeda⁵, Hideyuki Honda⁵, Yoichi Inai⁶, Fumio Hasebe⁶, Fanny Aditya Putri⁷, Daisuke Goto⁸

1.Miyagi University of Education, 2.Tohoku University, 3.AIST, 4.TITECH, 5.JAXA/ISAS, 6.Hokkaido University, 7.LAPAN, 8.NIPR

Stratospheric air collections were carried out at Biak, Indonesia in February 2015, by using the compact cryogenic air sampler (J-T sampler). Eight sets of air sampler were launched from the experiment field in LAPAN observatory (001°10'32" S, 136° 06'02" E) using 4 large plastic balloons. The data obtained at 8 different altitudes will be used for elucidating the vertical structures of GHGs and their chemical processes in the TTL and the tropical stratosphere, with an average vertical resolution better than 2km. Air samples were analyzed for concentrations of CO₂, CH₄, N₂O, and SF₆ at Tohoku University and Miyagi University of Education. The concentrations of CO₂ and SF₆ at 29 km altitude were 392.9 ppmv and 7.5 pptv, respectively. Stratospheric CO₂ and SF₆ are known as the 'clock tracer'. In this study, we estimated the mean age of air in the tropical stratosphere over Biak, and compared them with the results obtained from the previous experiments at Japan, Kiruna, and Syowa station. The CO₂ concentration data was corrected for the airborne production by methane oxidation. CO₂- and SF₆-age were estimated by comparing the observed concentrations with the CONTRAIL data records in the tropical upper troposphere. As a result, the mean age of air was estimated to be about 3 years at 29km altitude. This value was significantly lower than those obtained from the satellite SF₆ measurements.

Keywords: CO₂, SF₆, Age of air