

Development of a Balloon-borne Optical Ozone Sensor with GPS receiver

Isao Murata[1]; Kaoru Sato[2]; Katsuyuki Noguchi[3]; Masaki Tsutsumi[2]; Shoichi Okano[4]; Hiroshi Fukunishi[5]

[1] Environmental Studies, Tohoku Univ.; [2] NIPR; [3] JAXA/ISAS; [4] PPARC, Tohoku Univ.; [5] Department of Geophysics, Tohoku Univ.

We have developed a balloon-borne optical ozone sensor to measure the vertical distribution of upper stratospheric ozone and observed at Sanriku, Japan since 1994. The sensor measures solar ultraviolet radiation in ozone Hartley band absorption at wavelength of 300 nm. The balloon used in the observation is a thin-film high-altitude balloon and it can attain an altitude of about 42 km. The vertical ozone distributions from 15 to 42 km were obtained with 1 km resolution. The observation were carried out once or twice in summer every year, and wave structures of 2 - 3 km in vertical wavelength which may be caused by atmospheric gravity wave were always observed. Then, we improved the sensor to measure wind speed simultaneously with ozone, pressure, and temperature. The wind speed is observed with GPS receiver which measures the position of the sensor every second. The electronics and telemetry system were replaced to transmit all data every second in a form of PCM. The new optical ozone sensor with GPS receiver was developed in 2002 and the validation measurements were performed in June and September, 2002 and September, 2003. The ozone number density, pressure, and temperature show good agreements with old-type optical ozone sensor and ECC ozone sensors. The wind speeds were in good agreements with GPS radiosondes and we can find wave structures of 1 - 3 km in vertical wavelength in ozone, temperature, and wind speed vertical distributions.