

## Development of small-size balloon instruments equipped with CO<sub>2</sub> sensors

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<http://www.stelab.nagoya-u.ac.jp/ste-www1/div1/matsumi/>

Emissions of CO<sub>2</sub> have increased drastically over the past century as a result of the mass consumption of fossil fuels due to the expansion of industrial activities resulting in dramatic increases in atmospheric concentrations of CO<sub>2</sub>. To ascertain the global and geophysical flux values of CO<sub>2</sub> and their seasonal and inter-annual variation, detailed CO<sub>2</sub> measurements including vertical distribution are required. However, nowadays the monitoring sites for CO<sub>2</sub> are mainly ground-based, and air flight measurements are performed only in the restricted areas at a very limited frequency.

We are developing balloon-borne instruments which can measure the vertical distribution of CO<sub>2</sub> in any places in the world under any weather conditions, like ozone sounder instruments. The instruments can be used for the validation of green-house monitoring satellites such as GOSAT which was launched in January 2009. Furthermore, the instruments will accumulate new scientific knowledge on the global distribution of greenhouse gases and its temporal variations, and the mechanism of the global carbon cycle, which will prove useful in predicting future climate change and assessing its impact.

The balloon-borne instruments should have performances of 1 ppm in precision, 300 m in vertical resolution, low-cost for disposable usage, and easy operation even for non-experts. Since there is no commercial CO<sub>2</sub> sensor suitable for the balloon-borne instruments, we have developed the original CO<sub>2</sub> sensors.

We have tested the CO<sub>2</sub> sensors in the laboratory and built the balloon borne package and data transmission system. We launched two CO<sub>2</sub> instrument balloons in Ibaragi, Japan for the first time and measured the vertical profile of CO<sub>2</sub> concentration. We will report the progress of the development of the CO<sub>2</sub> balloon-borne instruments.