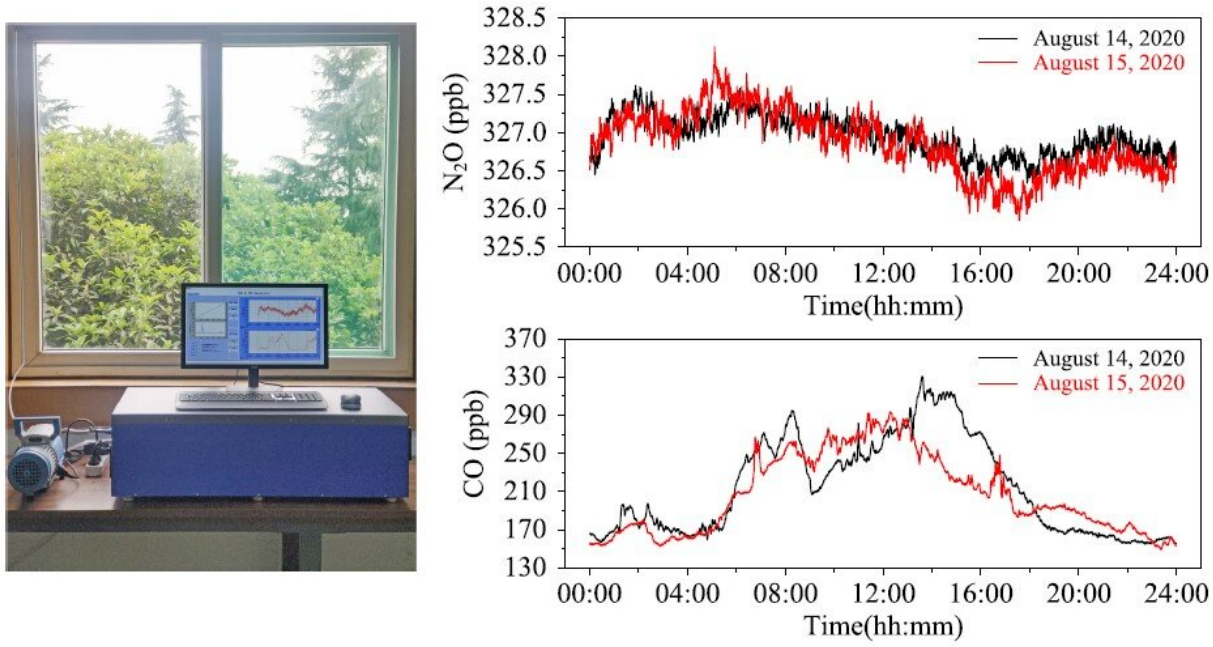
Laser spectrometer precisely monitors atmospheric N2O and CO

December 1 2021, by Zhang Nannan



Field deployment photograph and time series of N2O and CO measured concentration using the developed sensor from outdoor air during 48 h on August 14-15, 2020. Credit: Shao Ligang

Nitrous oxide (N_2O) and carbon monoxide (CO) are important drivers in global warming. However, there are many difficulties in reliable monitoring, especially for N_2O, as the concentration of N_2O in atmospheric is only a few hundred parts per billion. However, the compatibility precision recommended by World Meteorological

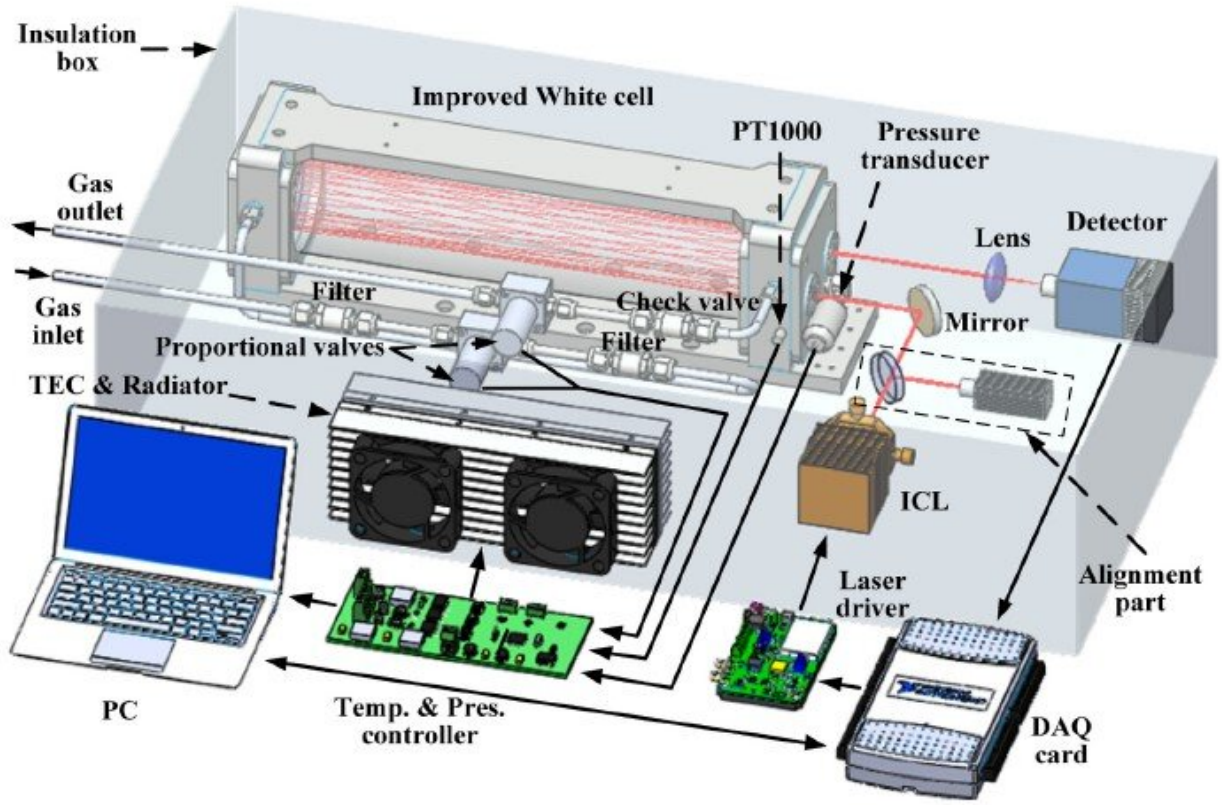
Organization (WMO) is much lower. Therefore, a solution that can offer more precise monitoring is needed.

Researchers led by Prof. Gao Xiaoming from the Hefei Institutes of Physical Science (HFIPS) of the Chinese Academy of Sciences developed a dual gas sensor with high precision and low drift to measure atmospheric N_2O and CO. Related findings were published in *Sensors and Actuators B: Chemical*.

The researchers designed an improved White Cell to obtain long optical path length (76 m) at a short base length (34.5 cm). The radio frequency noise was equipped to low optical fringes. Combined with an Interband Cascade Laser, they got a high precision spectrometer for atmospheric greenhouse gases N_2O and CO.

With this spectrometer, the researchers can test micro-daily-drift (less than 1.5 part per trillion). The precisions of N_2O and CO reached 0.065 part per billion and 0.133 part per billion, respectively, which meets the requirement of WMO.

This work provides a potentially valuable laser spectrometer for highly precise measurement of greenhouse gases, which is of great significance to the monitoring and suppression of global warming.



Schematic diagram of the developed dual gas sensor. Credit: Shao Ligang

More information: Ligang Shao et al, Highly precise measurement of atmospheric N2O and CO using improved White cell and RF current perturbation, *Sensors and Actuators B: Chemical* (2021). DOI: 10.1016/j.snb.2021.130995

Provided by Chinese Academy of Sciences

https://phys.org/news/2021-12-laser-spectrometer-precisely-atmospheric-n2o.html