Technical specifications of high quality real time gas analyzer designed for simultaneous measurements of CO_2,CH_4, H_2O, N_2O and NH_3 in ambient air and from soil chambers and plant chambers

Specifications of the analyzer:

1. The analyzer must operate using a high precision, low drift technique commonly known as Cavity Ring-down Spectroscopy (CRDS), utilizing a time-based measurement.
2. There must be no laser light injected into the cavity during data acquisition to ensure very low noise to the ringdown signal.
3. The analyzer must have cavity temperature stability of +/- 0.005 °C and cavity pressure stability specification at +/- 0.0002 atm of atmospheric pressure.
4. The analyzer is required to have a wavelength monitor, which controls the wavelength of the laser on timescales of femtoseconds to ensure the highest precision and lowest drift performance.
5. The analyzer measurement cavity should have a sample volume <40 ml allowing for extremely fast gas sample throughput and minimal memory.
6. The system should be field deployable and robust
7. Measurement range should be stable and satisfy following criteria as dry mole fraction after correction for water vapour: For N_2O: 300 ppb – 150 ppm; For CH_4 : 1.5 – 12 ppm; For CO_2 : 380 ppm- 4500 ppm; For NH_3 : 0-300 ppb; For H_2O : 0-3 %
8. Temporal resolution of data should be better than 10 s per measurement to enable flux measurements
9. Precision of raw signal should be better than 0.05% of the reading + 30 ppb for N_2O, 0.05% of the reading + 10 ppb for CH_4, 0.05% of the reading + 600 ppb for CO_2, 0.05% of the reading + 5 ppb for NH3, and 500 ppm for H_2O
10. Rise- Fall of Gas Response (10-90% and 90-10%) should be better than 10 s
11. All measured values should be mole fractions of dry air
11. Should have inbuilt interference detection software that flags data which may be inaccurate due to spectroscopic interferences
13. Should be able to handle sample air temperatures of -5 to 45 degree Celsius
14. Should be able to handle sample ambient humidity upto 99%
15. Should be fitted with a high quality in-line particle filter to prevent particles from biomass burning plumes from entering the instrument
16. Should have 16 port manifold for automated source switching and calibration
17. Rack mounting should be possible
18. Should come with a compatible pump for recirculation of air during chamber measurements