

Adaptation of a Commercial Greenhouse Gas Analyzer for Expanded Altitude Range

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Picarro Configuration

	Standard	Modified
Cell pressure (torr)	140	80
Altitude ceiling (km)*	8-10	13.5
Precision (1 σ)	0.02 ppm CO ₂ 0.2 ppb CH ₄ 4 ppb CO	0.04 ppm CO ₂ 0.5 ppb CH ₄ 9 ppb CO
Measurement interval (sec)	2.4	1.2

*With no upstream pumping or pressure control

Steps:

- Edit set-points in software
- Derive new "factory" calibrations
- Adjust pressure control parameters
- Reduce scans of CO peak

Applications

ORCAS NCAR GV, Southern Ocean, Jan-Feb 2016

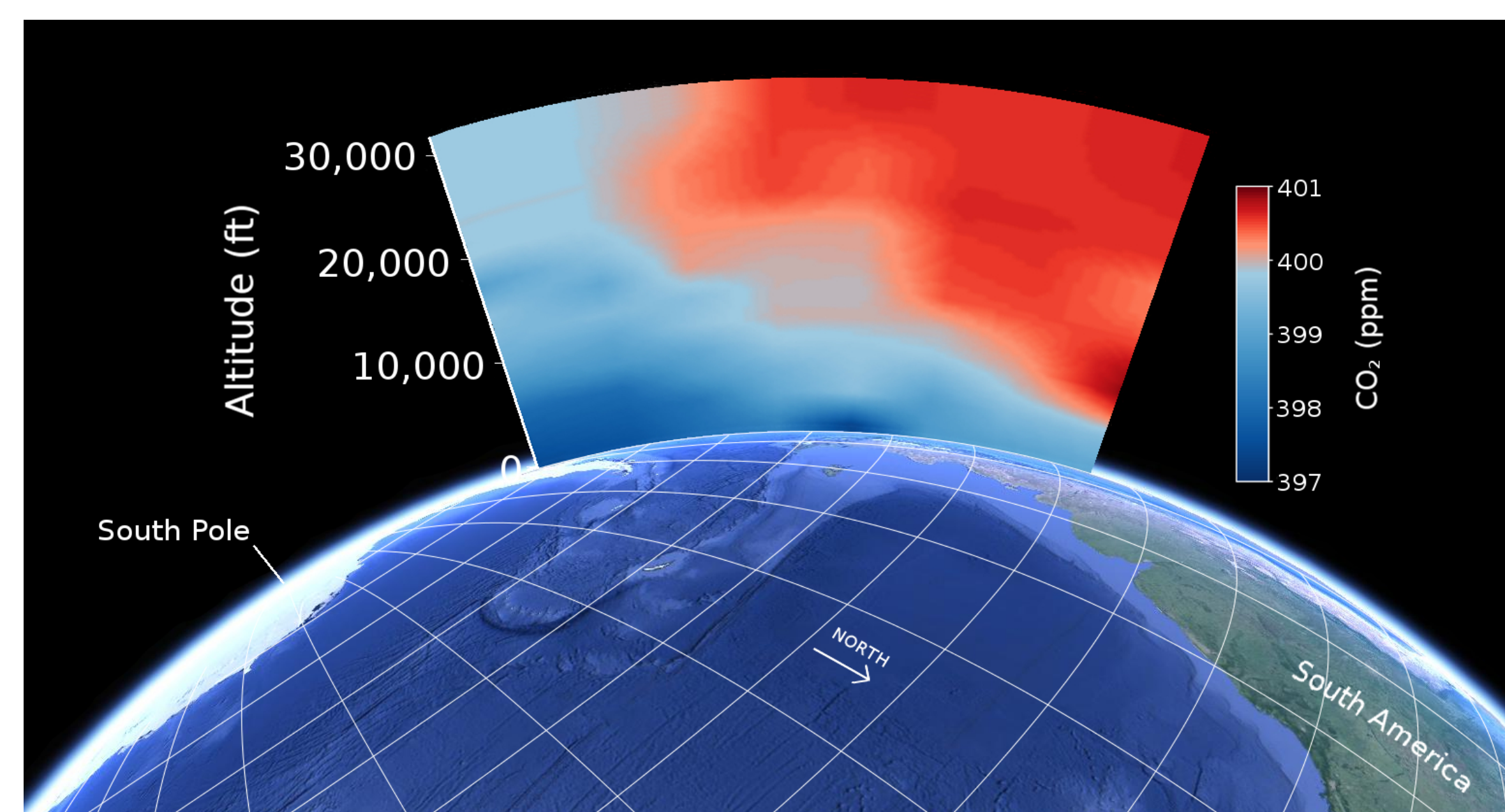
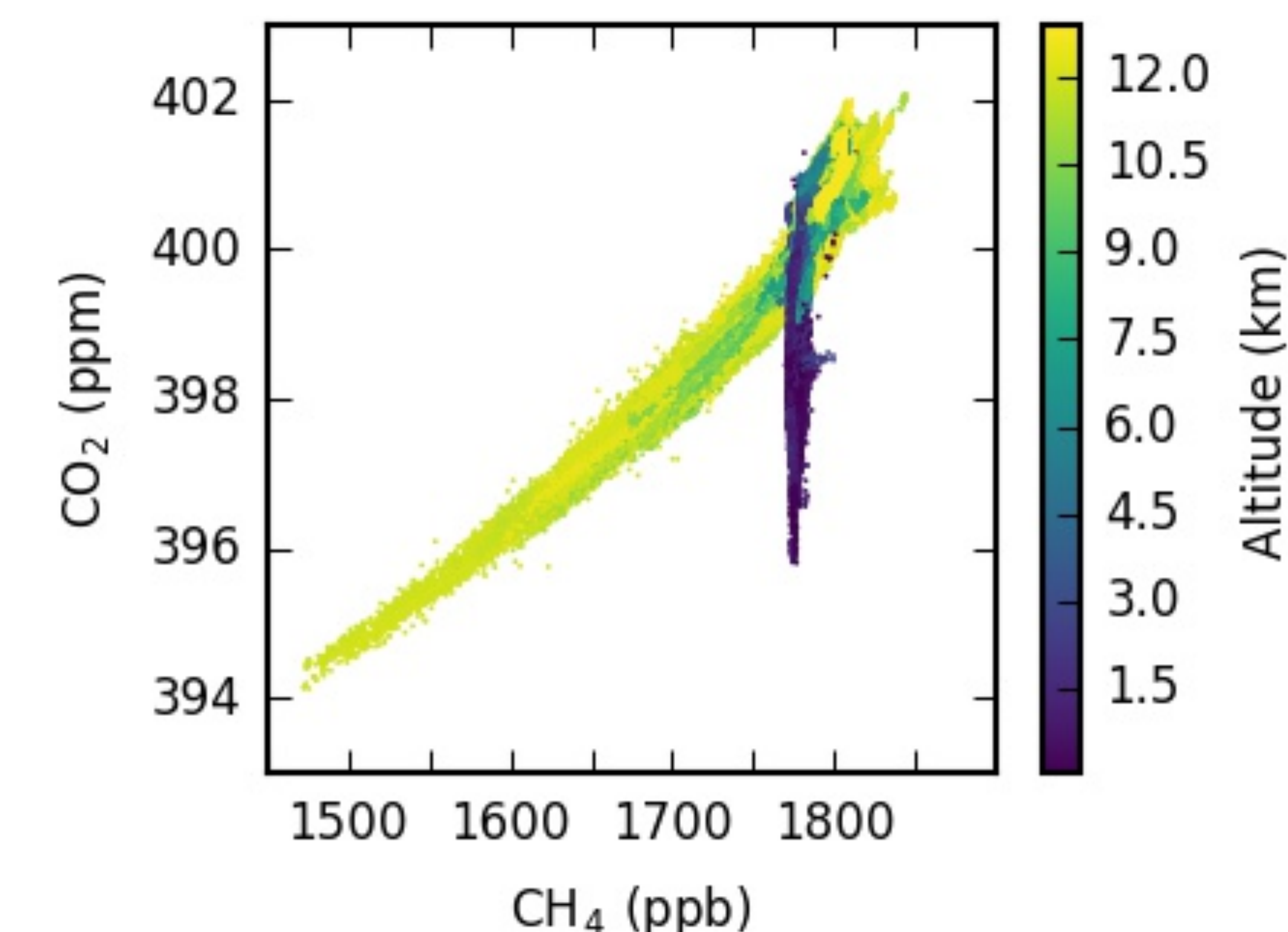


figure courtesy Eric Morgan, Scripps



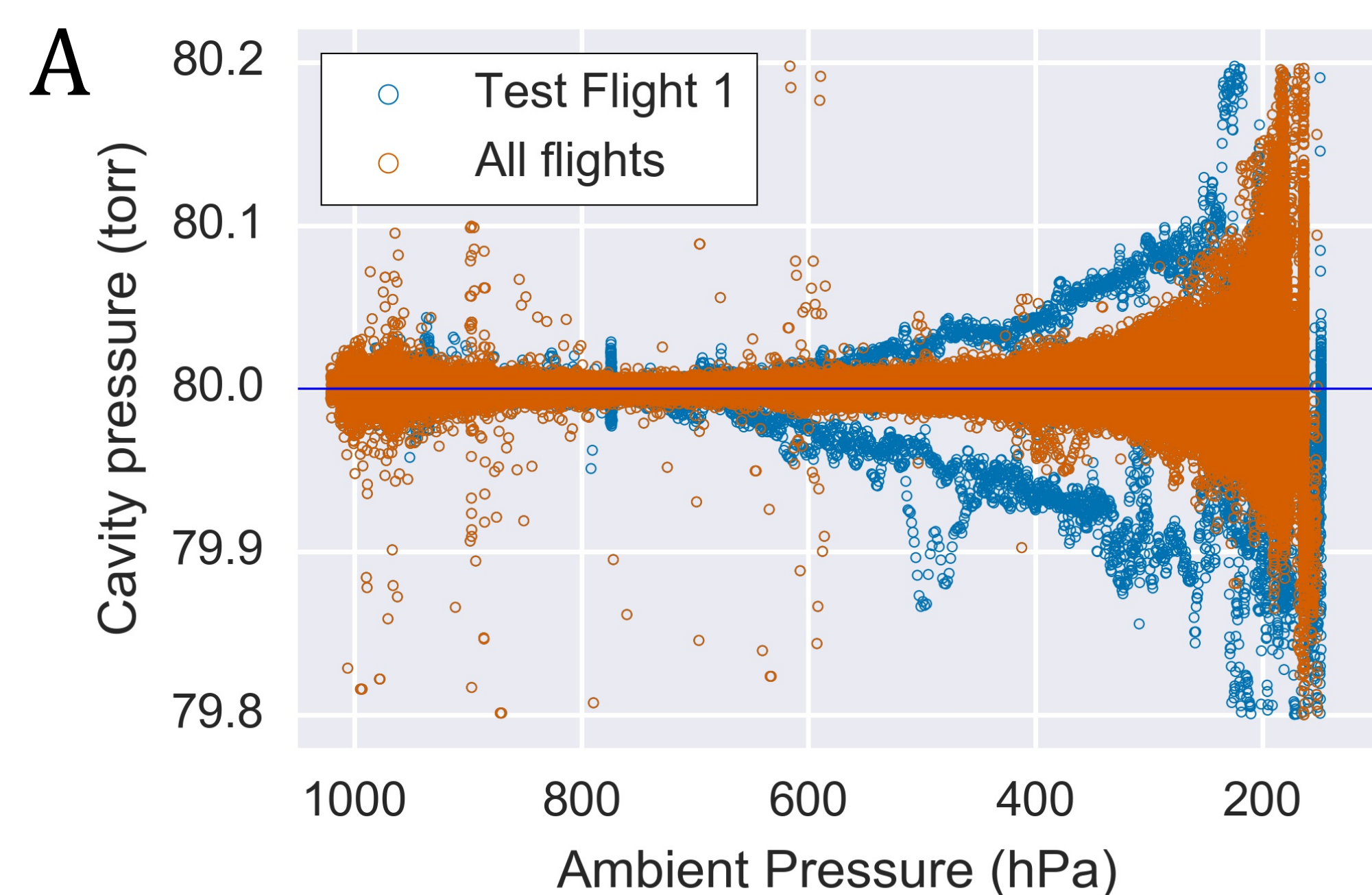
Upcoming

ATom - NASA DC8, pole-to-pole, 2016-2018

Stratospheric Observatory for Infrared Astronomy (SOFIA, NASA)



Cell Pressure Stability & Measurement Impact



(A) Cell pressure control parameters were optimized to the middle of the altitude range.

(B) Lab tests to derive the impact of cell pressure deviations on measured values and the concentration-dependence of correction factors

(C) A single tank was measured throughout a test flight. Corrected values were within ± 0.1 ppm CO₂ and ± 1 ppb CH₄ (95% CI).

