Adaptation of a Commercial Greenhouse Gas Analyzer for Expanded Altitude Range  
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<table>
<thead>
<tr>
<th>Picarro Configuration</th>
<th>Standard</th>
<th>Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell pressure (torr)</td>
<td>140</td>
<td>80</td>
</tr>
<tr>
<td>Altitude ceiling (km)*</td>
<td>8-10</td>
<td>13.5</td>
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</tbody>
</table>
| Precision (1σ)        | 0.02 ppm CO₂  
                      | 0.2 ppb CH₄  
                      | 4 ppb CO      |
|                      | 0.04 ppm CO₂  
                      | 0.5 ppb CH₄  
                      | 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

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).

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