



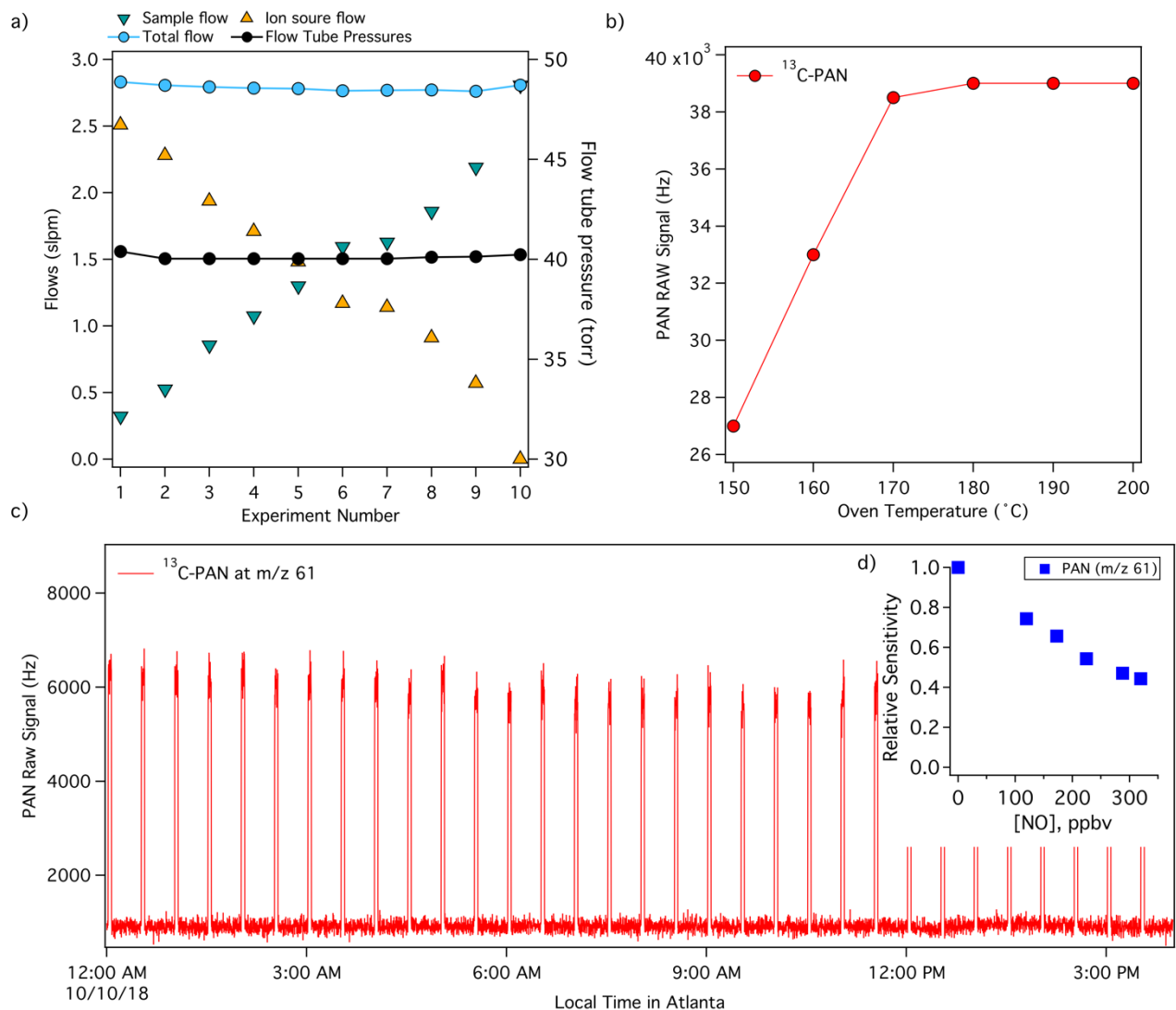
## *Supplement of*

# **A low-activity ion source for measurement of atmospheric gases by chemical ionization mass spectrometry**

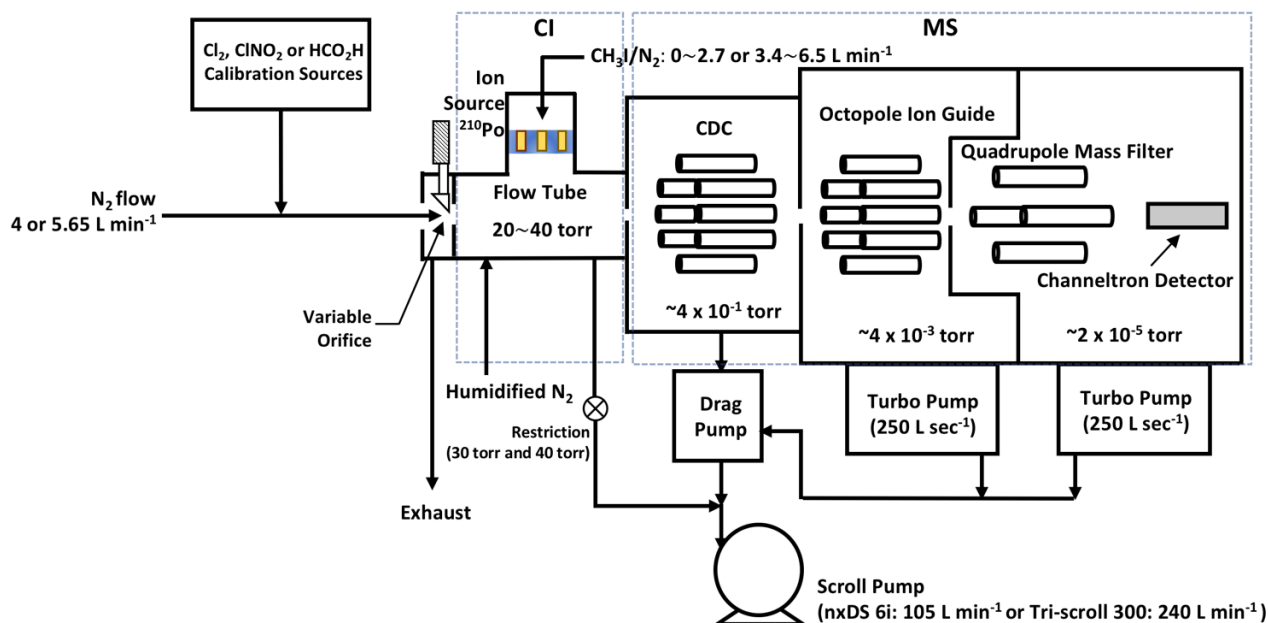
**Young Ro Lee et al.**

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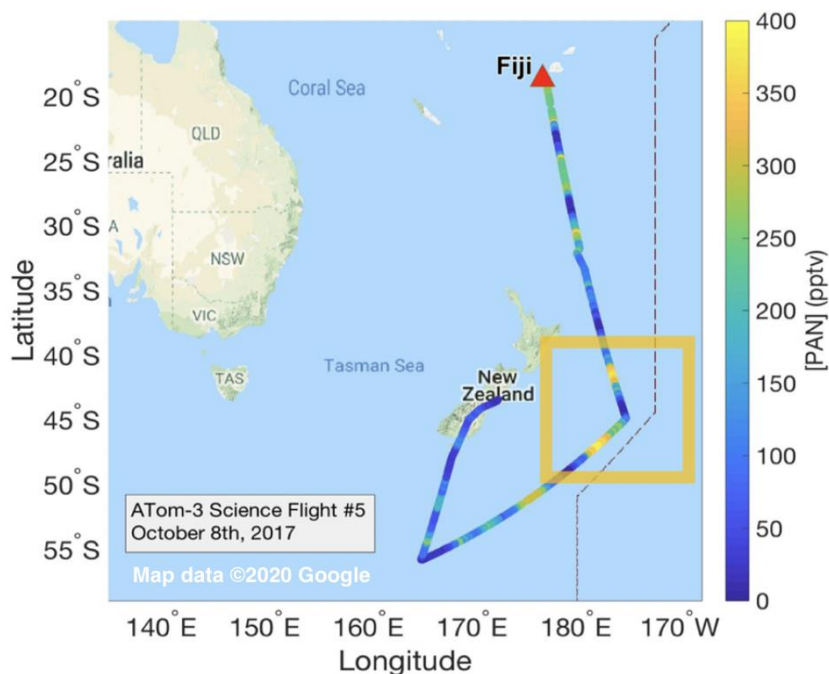
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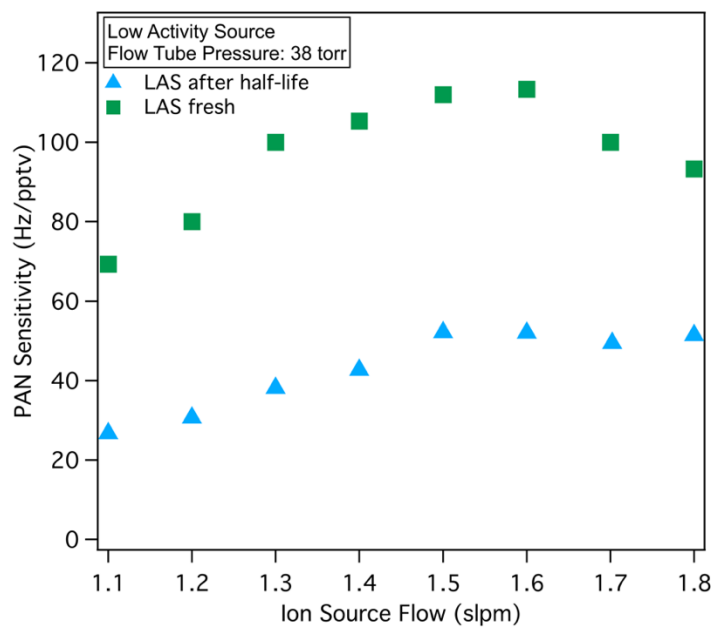
**Figure S1.** (a) An example of flows controlled by AVO at 40 torr flow tube pressure. (b) PAN calibration signal as a function of temperature. The rate coefficient for the thermal decomposition of PAN (at 453 K and 100 torr) is  $\approx 790 \text{ s}^{-1}$  (Atkinson et al., 2006; IUPAC, 2018), so that PAN calibration standard should be fully thermally dissociated within the residence time of  $\sim 40 \text{ ms}$ . This is confirmed by measurement of the calibration signal whilst varying the inlet temperature. (c) Time series of PAN calibration signal while sampling ambient air in Atlanta, showing a minimal interference by ambient species such as NO and  $\text{NO}_2$ . (d) Example of relative sensitivity of PAN as a function of NO concentration.



**Figure S2.** Schematic diagram of the Iodide-Adduct CIMS. The nitrogen flows with calibration gas enter the flow tube through the AVO (automatic variable orifice).



**Figure S3.** Flight map of the ATom-3 science flight #5 from Fiji to New Zealand. Orange box highlights the location of the southern hemisphere plume presented in Figure 5b.



**Figure S4.** Time dependence of the sensitivity of the LAS. The sensitivity of a fresh (green square) and one half-life aged (cyan triangle) LAS for PAN.