Umezawa, T., S. J. Andrews, and T. Saito, 2020: A cryogen-free automated measurement system of stable carbon isotope ratio of atmospheric methane. *J. Meteor. Soc. Japan*, **98**, 115-127.
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Plain Language Summary: Methane (CH_4) plays an important role in climate change and atmospheric chemistry. The stable carbon isotope ratio of atmospheric methane (δ^{13}C-CH_4) is useful for separating contributions of different CH_4 source types. We set up a new measurement system for δ^{13}C-CH_4, optimized for the automated analysis of air samples. The system is operated with no use of cryogens (e.g., liquid nitrogen) and attained reproducibility sufficient to analyze atmospheric variations (~0.1‰). Automated continuous measurements of ambient air characterized imprint of local methane sources well. Future measurement operation will provide a large number of atmospheric δ^{13}C-CH_4 data.

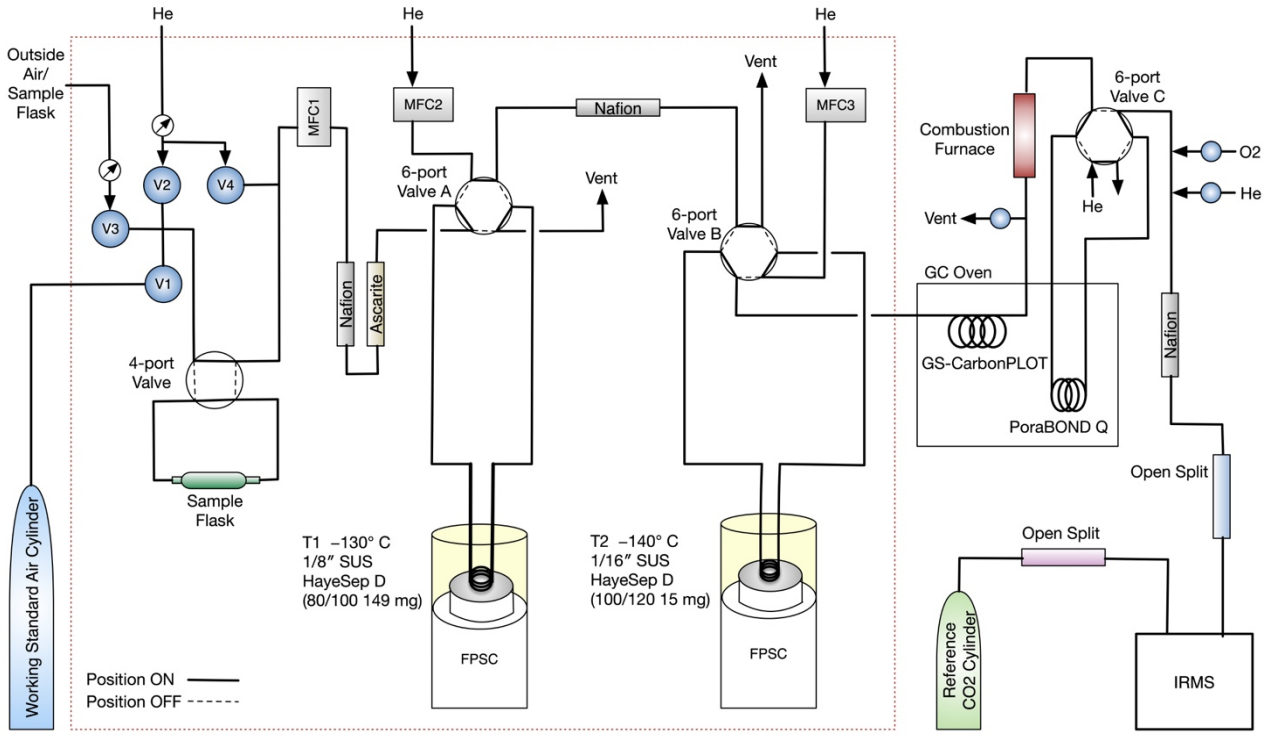

Figure 1. A schematic overview of the cryogen-free measurement set-up for the stable carbon isotope ratio of atmospheric methane. The measurement processes include preconcentration of CH_4 from sample air, cryofocusing, gas chromatographic separation, combustion of CH_4 to carbon dioxide, post-combustion separation, and isotope ratio mass spectrometry.

- We set up a new cryogen-free measurement system for the stable carbon isotope ratio of atmospheric methane (δ^{13}C-CH_4) with reproducibility of ~0.1‰.
- Automated continuous measurements of ambient air characterized atmospheric δ^{13}C-CH_4 variations well.
- Future operation will provide a large number of atmospheric δ^{13}C-CH_4 data.