# TCCON Site Report: Cambridge Bay, NU

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## Site Description

Cambridge Bay (Iqaluktuuttiaq) is located on the south shore of Victoria Island in the Canadian Arctic Archipelago. The Bruker 125HR (installed summer 2024) is inside a modified shipping container, which was customized by the Arctic Research Foundation. Polar day lasts from 21 May to 22 July, and polar night lasts from 30 November to 10 January.







*Above: Location of Cambridge Bay compared to other Arctic TCCON sites.*
*Left: Container housing the Bruker 125HR. The suntracker housing can be seen on the roof of the container in the left of the image.*

## Instrumentation and Updates

The instrument contains both an InGaAs detector and an InSb detector, allowing extension into the mid-infrared range and retrieval of several additional species:

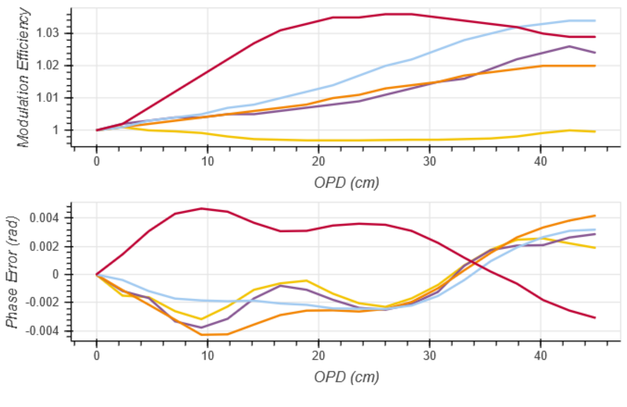
- Ozone ($O_3$)
- Acetylene ($C_2H_2$)
- Ethane ($C_2H_6$)
- Propane ($C_3H_8$)
- Formaldehyde ($H_2CO$)
- Hydrogen cyanide (HCN)
- Carbonyl sulfide (OCS)
- Nitric oxide (NO)
- Nitrogen dioxide ($NO_2$)

June 2025: the Norhof liquid nitrogen pump was brought online (dual-detector measurements possible)
August 2025: the cable assembly feedthrough below the source compartment was replaced, and temperature sensors and heat pads were attached to the instrument to aid in maintaining a consistent temperature. The position of the beam on the input aperture was adjusted to centre it.
HCl cell tests have been conducted regularly; the latest results are just barely outside of TCCON specifications. A re-alignment of the instrument is planned for summer 2026.




*Above: Bruker 125HR with source and detector compartments open during testing (and PI Kim Strong!)*
*Below: Suntracker housing on the roof of the container*

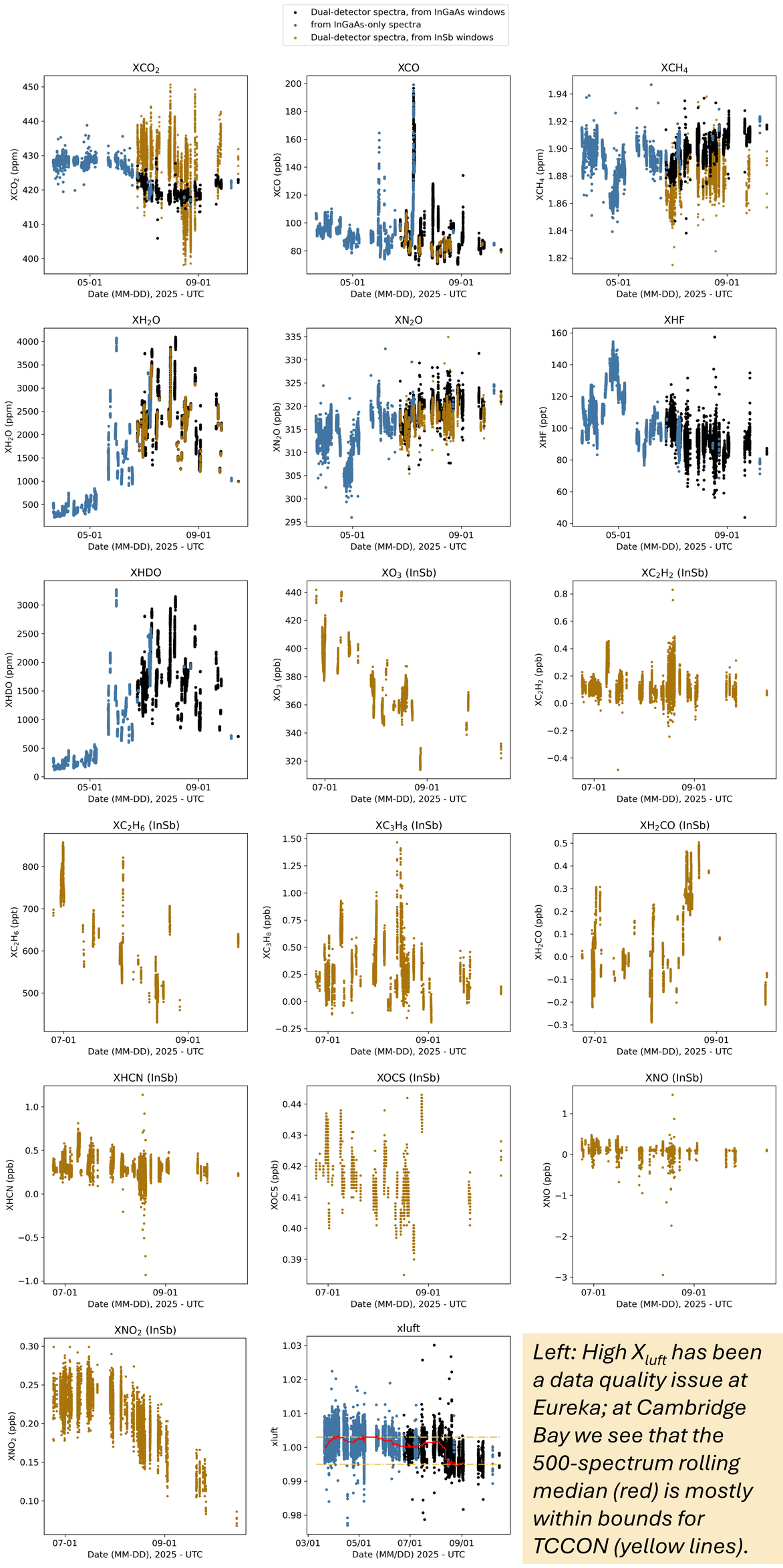





*Left: HCl cell test results from 2025. The dates of the tests are shown in the legend below; the test from 21 September 2024 is the acceptance test.*

## Initial Retrievals

These results have not yet been through QAQC and are thus provisional. The plots show $X_{gas}$ for which the quality flag is 0. Data with non-zero flags are filtered out, and $X_{gas}$ obtained from InSb spectra are additionally limited to those that have an error that is less than 2 times the standard deviation of the mean error.




*Left: High $X_{luft}$ has been a data quality issue at Eureka; at Cambridge Bay we see that the 500-spectrum rolling median (red) is mostly within bounds for TCCON (yellow lines).*

## Next Steps

Data presented here will be submitted to QAQC for inclusion in the TCCON. We will also perform an instrument re-alignment in summer 2026 to ensure it is within TCCON specifications.

*See also: talk by Gurmanjot Singh on the detection of transported wildfire plumes in this data*

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