Supplement

Figure S1. Uncertainty (U_{x_sample}) for the CO_2 measurement of the ambient air at NOY (black dot) from 2005 to 2009. A blue dot indicates the reproducibility of the measurement system (σ_{sws}) for about one week. Note that a red dot is used when the number of measurements is less than 10.
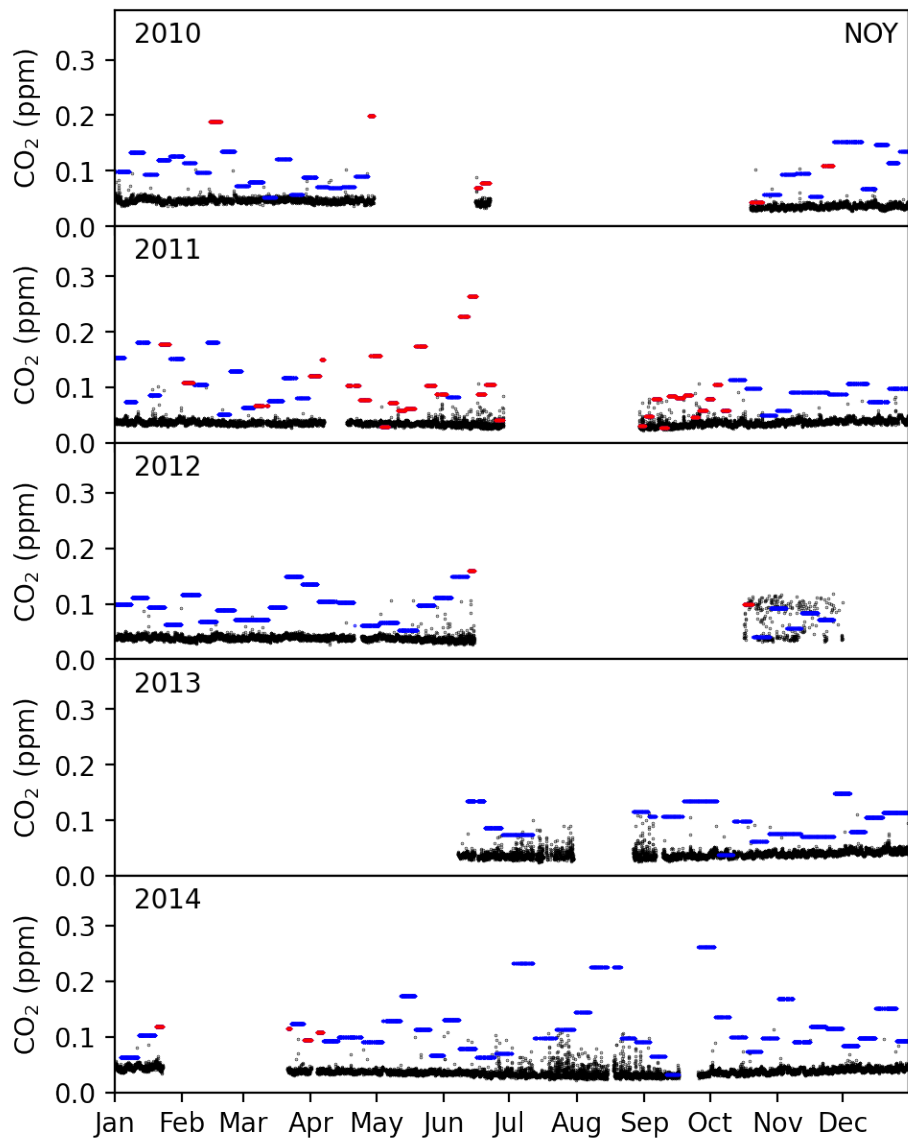
Figure S2. The same as Figure S1 but from 2010 to 2014.
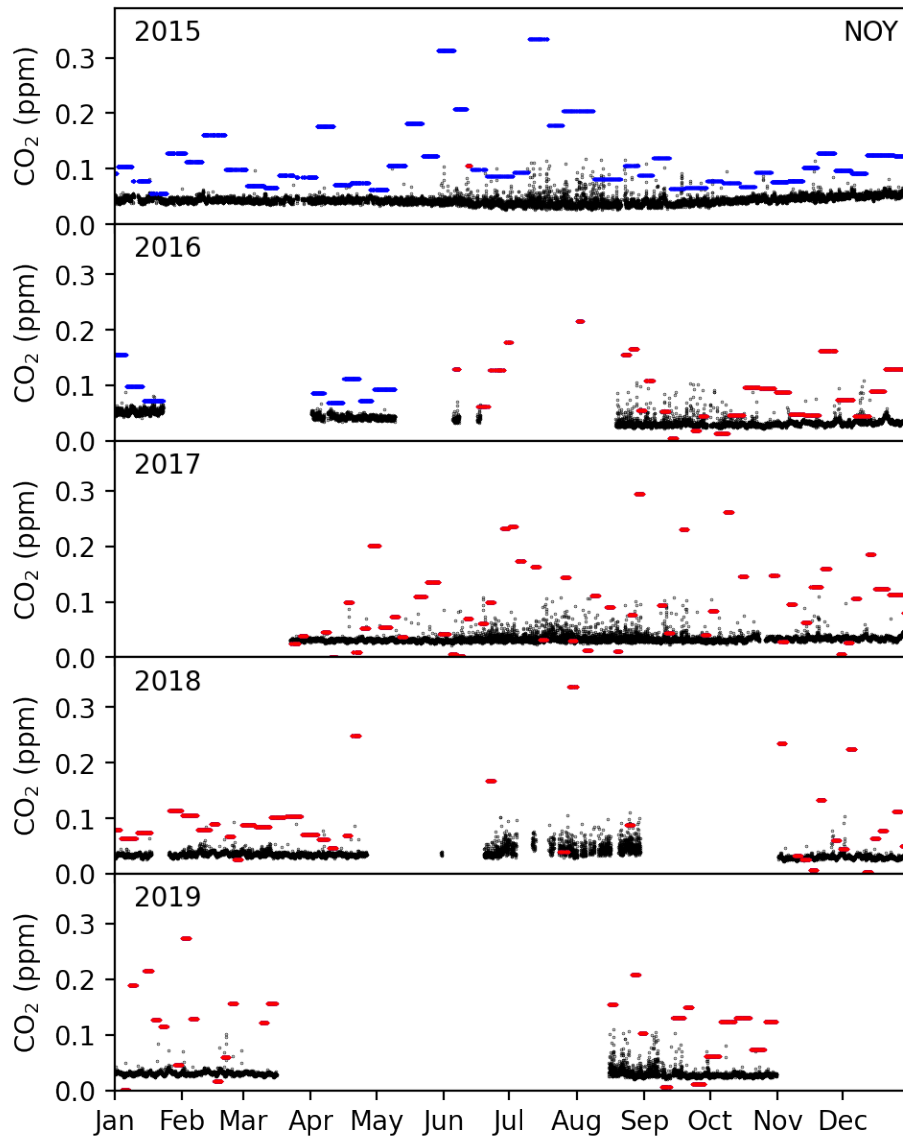
Figure S3. The same as Figure S1 but from 2015 to 2019. Since the CRDS was installed at NOY in August 2016, the consumption flow rate has doubled, and the SWS-gas changeover time has decreased.
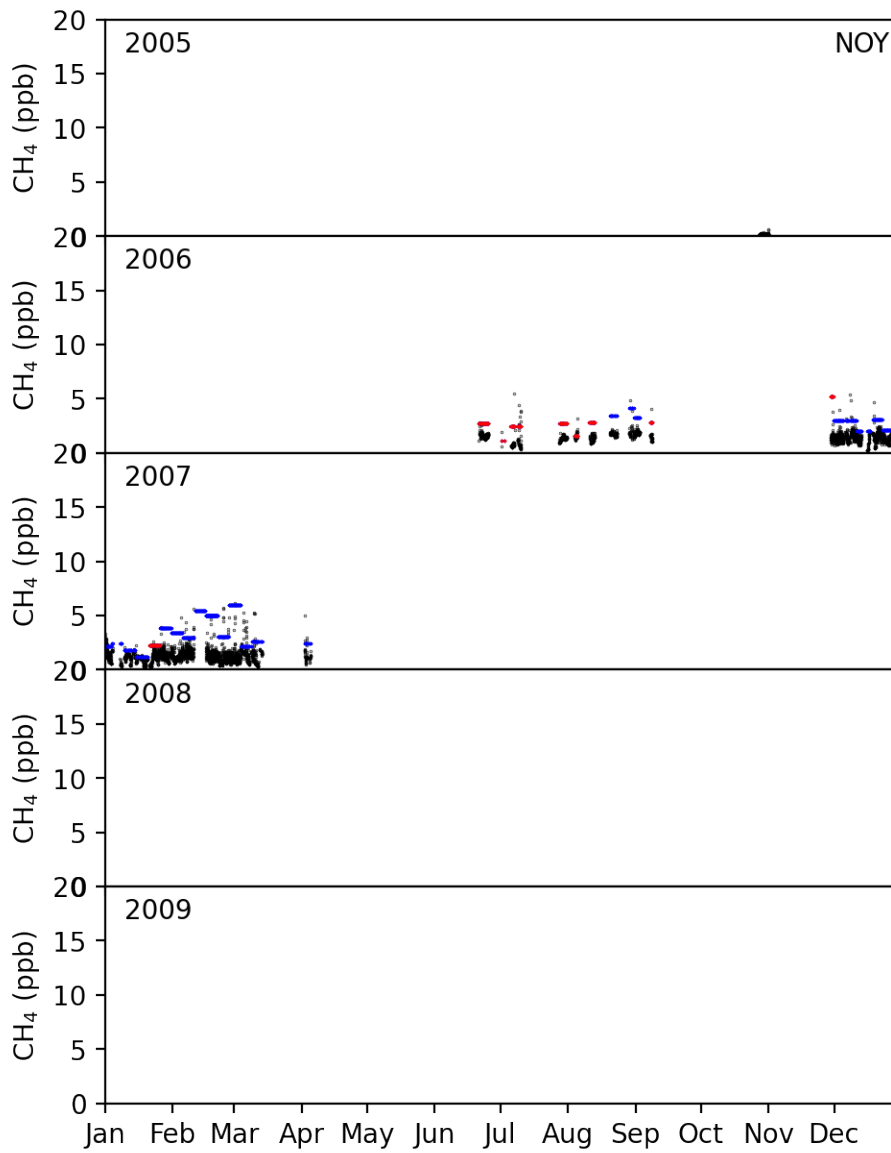
Figure S4. Uncertainty (U_{x_sample}) for the CH$_4$ measurement of the ambient air at NOY (black dot) from 2005 to 2009. A blue dot indicates the reproducibility of the measurement system (σ_{sws}) for about one week. Note that a red dot is used when the number of measurements is less than 10.
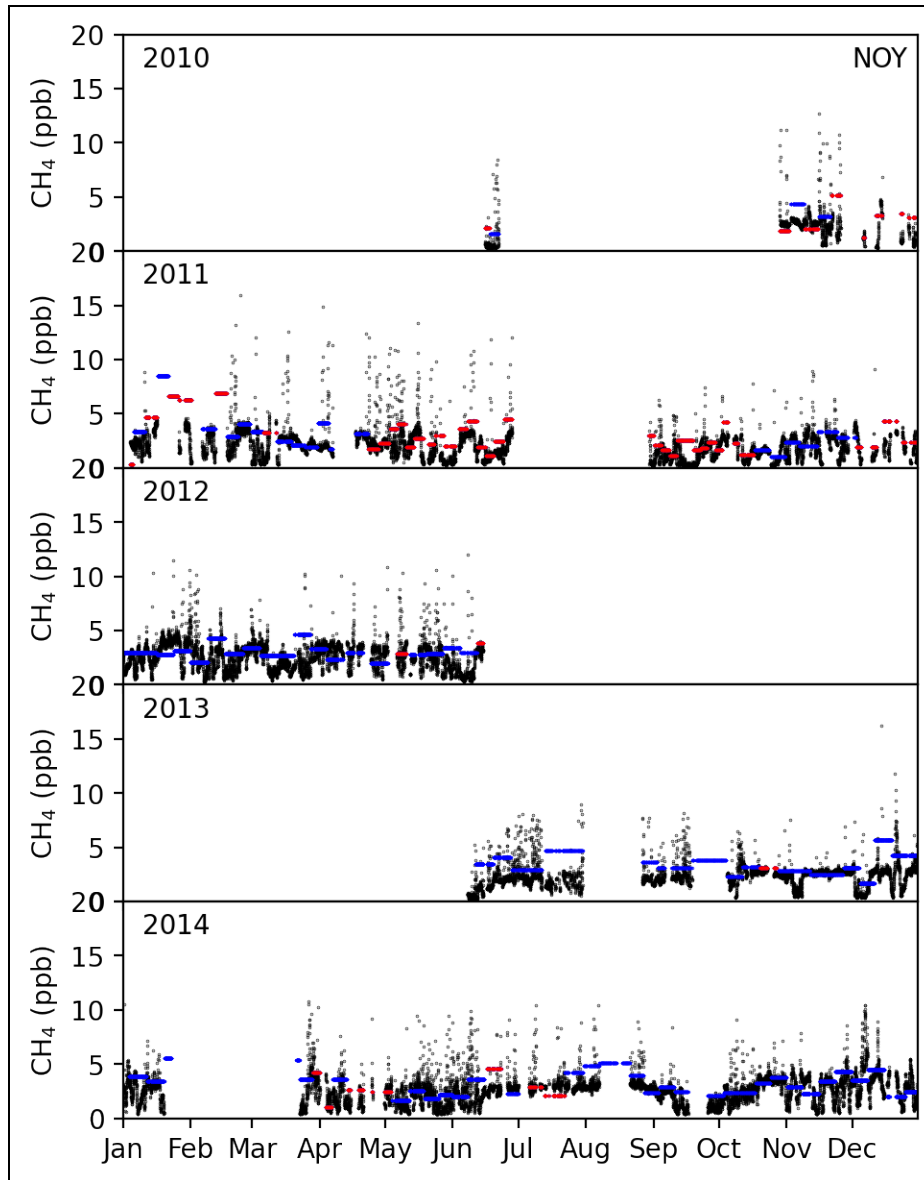
Figure S5. The same as Figure S4 but from 2010 to 2014.
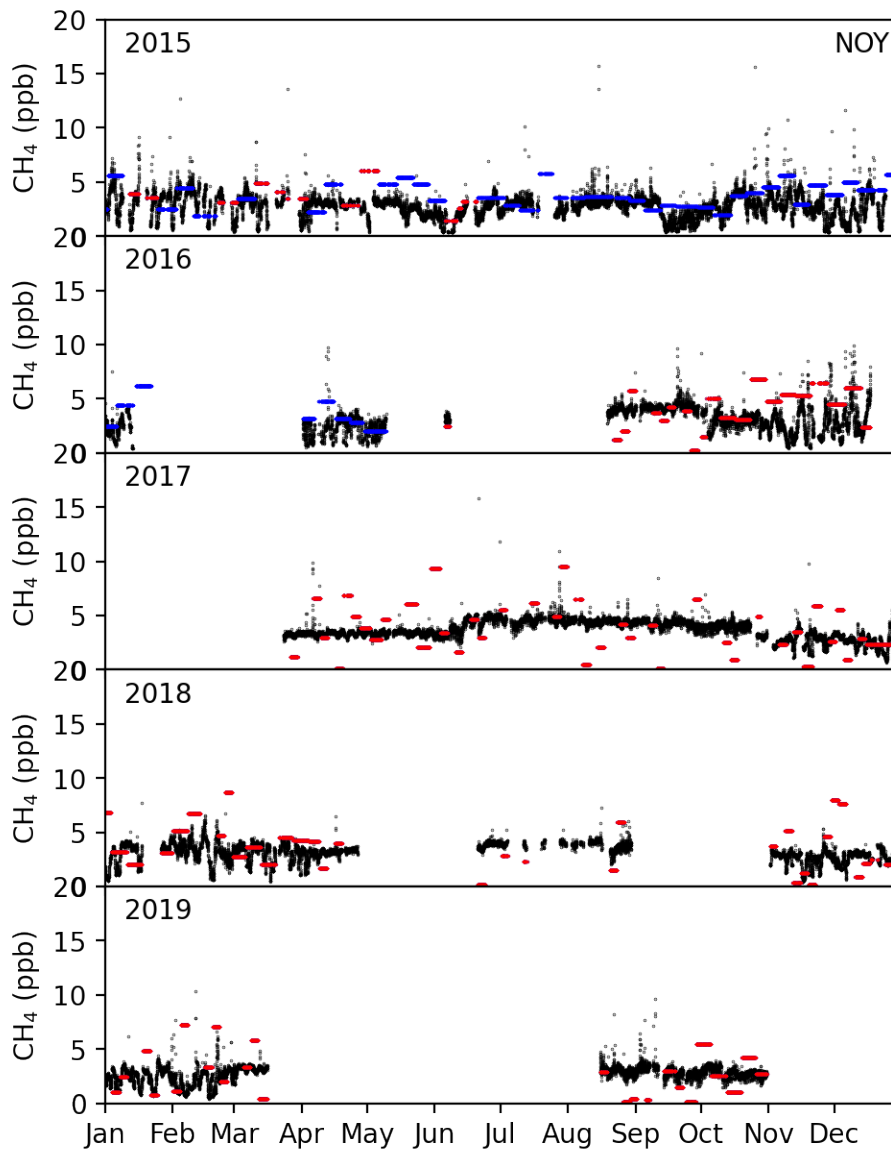
Figure S6. The same as Figure S4 but from 2015 to 2019. Since the CRDS was installed at NOY in August 2016, the consumption flow rate has doubled, and the SWS-gas changeover time has decreased.
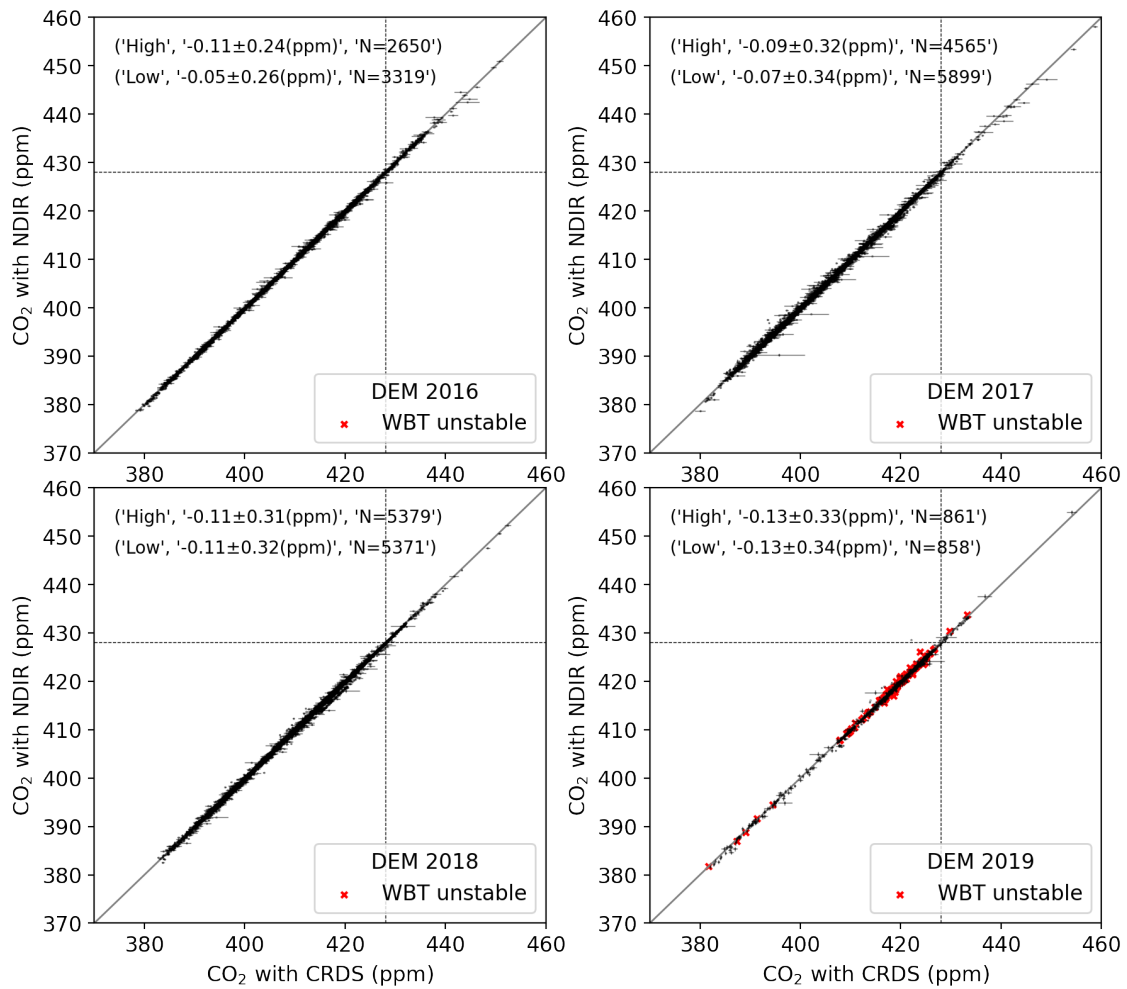
Figure S7. **Relationship between CO_2 concentration measured by the NDIR and the CRDS during ambient air measurements at DEM. The CRDS 3-minute measurements are averaged on the horizontal axis, and the NDIR values are on the vertical axis. Error bars on the horizontal axis are the standard error of the averaged data. Error bars on the vertical axis are U_{x_sample} The gray line represents the 1:1 line. The dotted lines indicate the highest concentration of standard gases.**
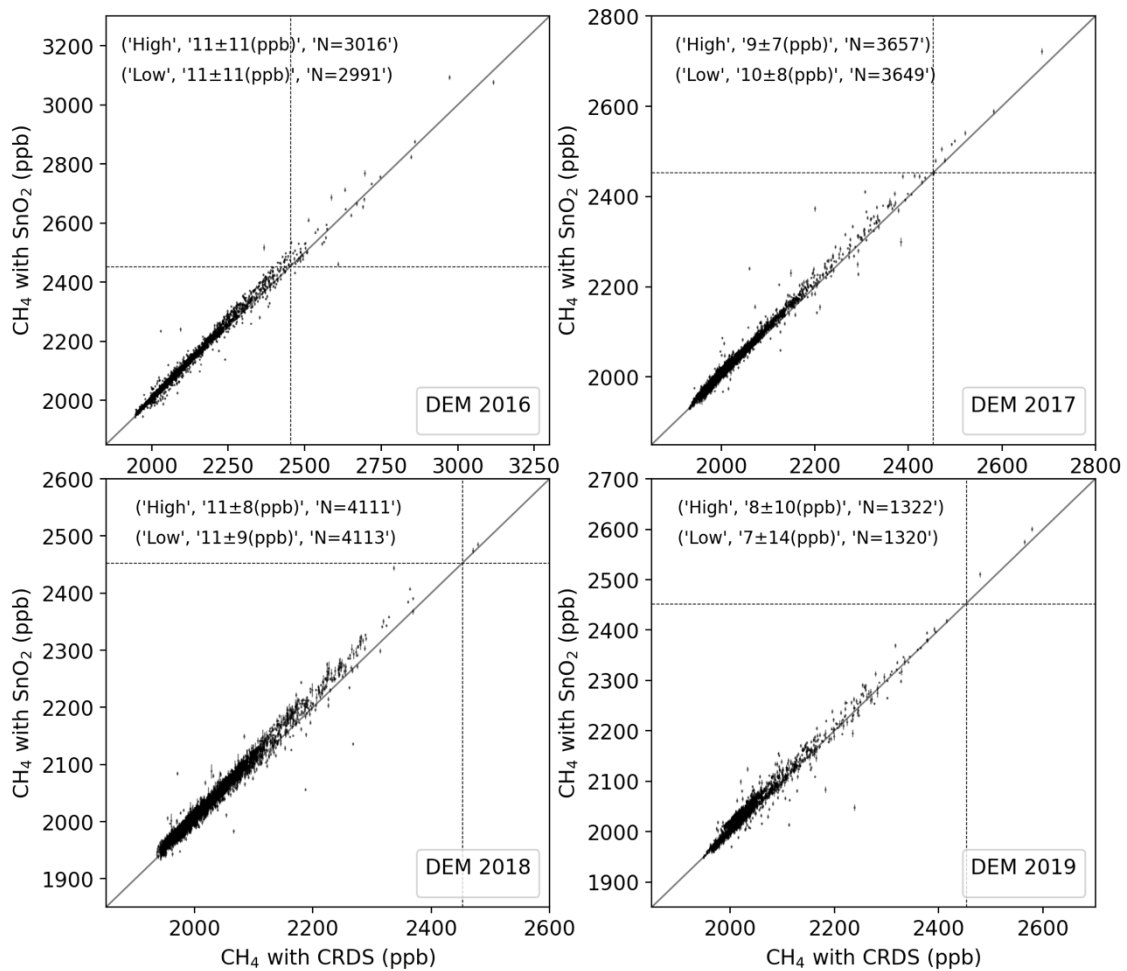
Figure S8. **Relationship between CH$_4$ concentration measured by the TOS and the CRDS during ambient air measurements at DEM. The CRDS 3-minute measurements are averaged on the horizontal axis, and the TOS values are on the vertical axis. Error bars on the horizontal axis are the standard deviation of the averaged data. Error bars on the vertical axis are U_{x_sample} The gray line represents the 1:1 line. The dotted lines indicate the highest concentration of standard gases.**
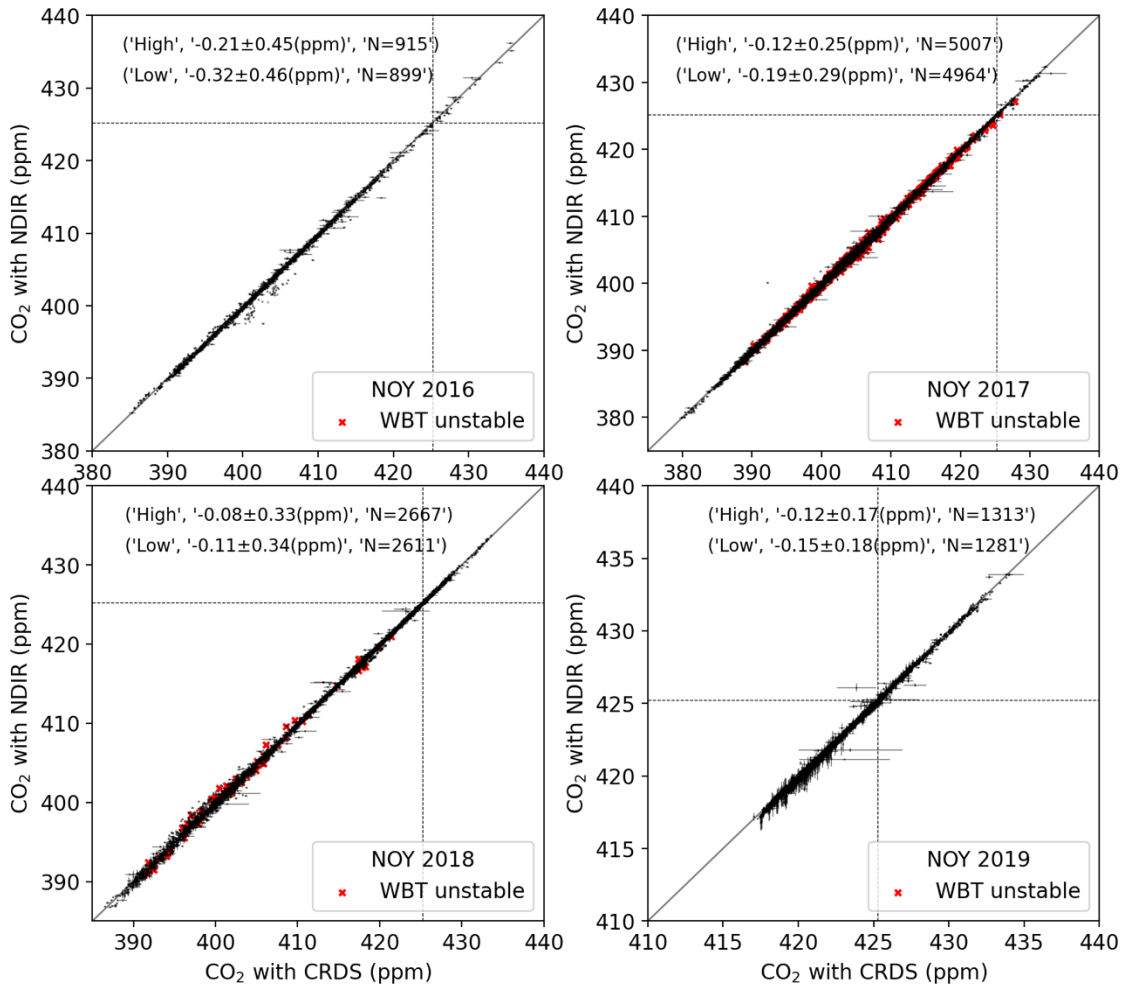
Figure S9. **Relationship between CO₂ concentration measured by the NDIR and the CRDS during ambient air measurements at NOY. The CRDS 3-minute measurements are averaged on the horizontal axis, and the NDIR values are on the vertical axis. Error bars on the horizontal axis are the standard error of the averaged data. Error bars on the vertical axis are** U_{x_sample} **The gray line represents the 1:1 line. The dotted lines indicate the highest concentration of standard gases.**
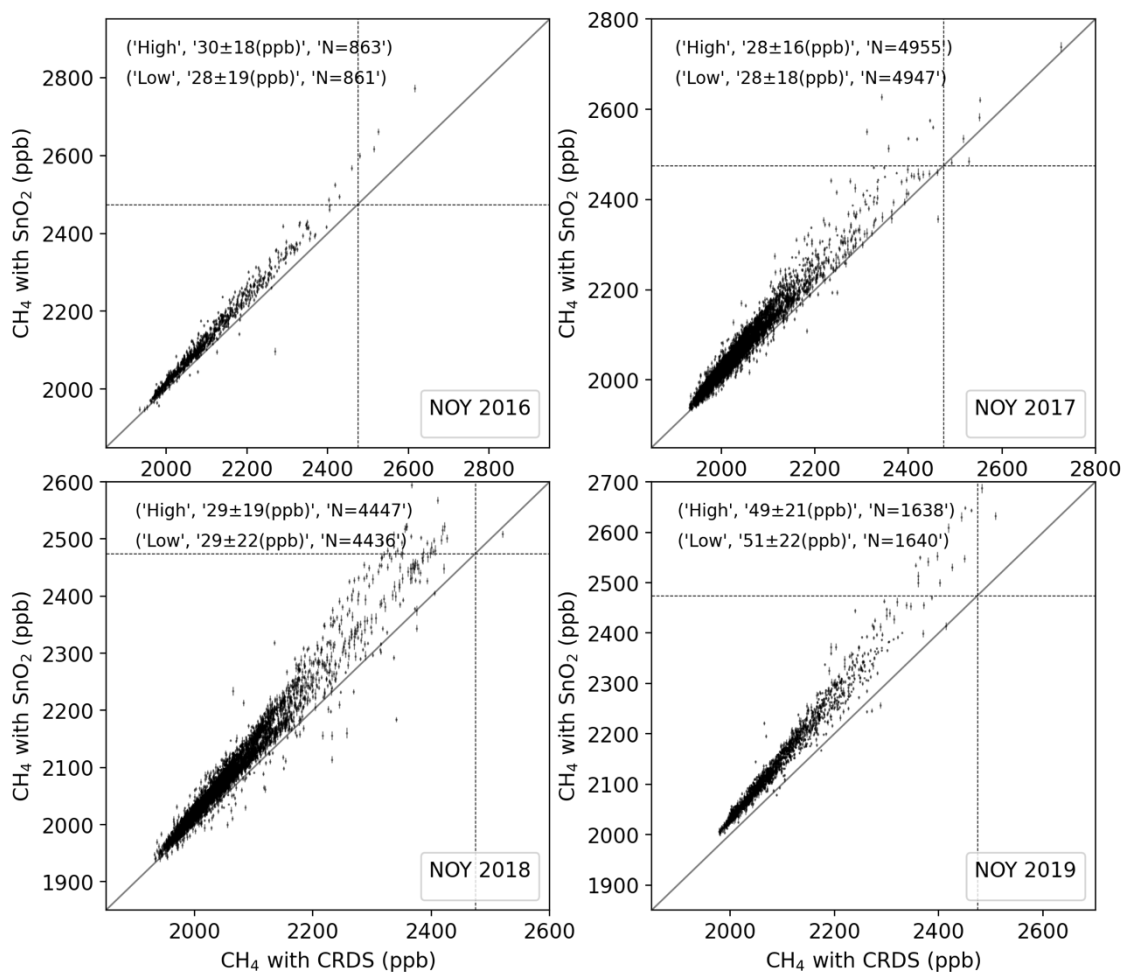
Figure S10. Relationship between CH₄ concentration measured by the TOS and the CRDS during ambient air measurements at NOY. The CRDS 3-minute measurements are averaged on the horizontal axis, and the TOS values are on the vertical axis. Error bars on the horizontal axis are the standard deviation of the averaged data. Error bars on the vertical axis are U_{x_sample} The gray line represents the 1:1 line. The dotted lines indicate the highest concentration of standard gases.