

# Status report: Rikubetsu FTIR (NDACC)

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# NDACC Sites

HERE



Rikubetsu (43.5N, 143.8E, 380 m)

NIES Bruker 120/5HR FTIR

Current status of the instrument is reported by Dr. Morino's poster in this meeting.



# ILS: stable

(Morino's poster in this meeting)

## LINEFIT 14.5 results for HBr cell, Rikubetsu FTS (120/5 HR)

2018.06.04 ~ 2019.05.10 Forward scan

Resolution: 0.0035cm<sup>-1</sup> (OPD: 257.1 cm)

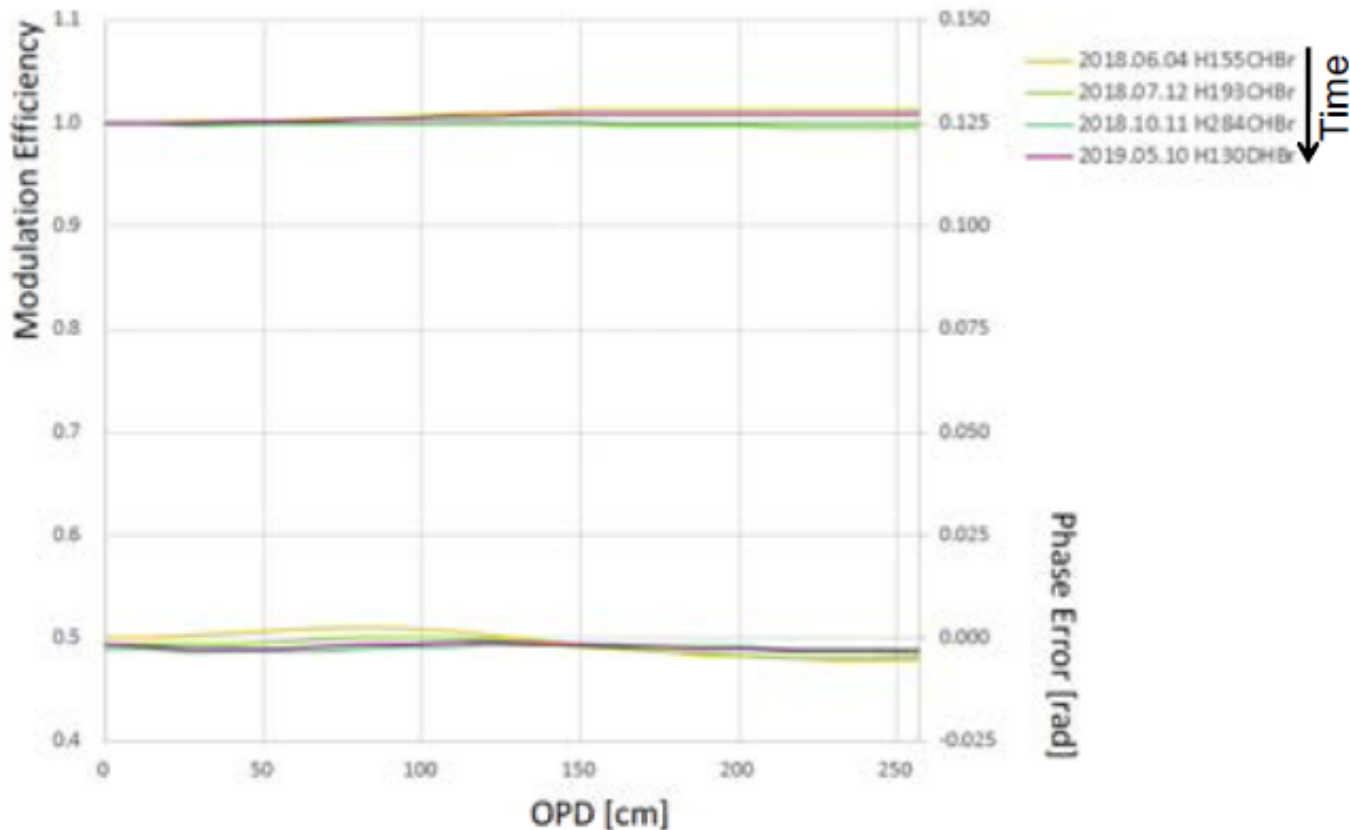
Aperture: 1.0mm (FOV = 1.196e-3) , Optical Filter #4

HBr cell #58 (2.4mbar, 2cm, Col.= 1.163E+21m<sup>-2</sup>, T= 299.0K)

ILS model: extended

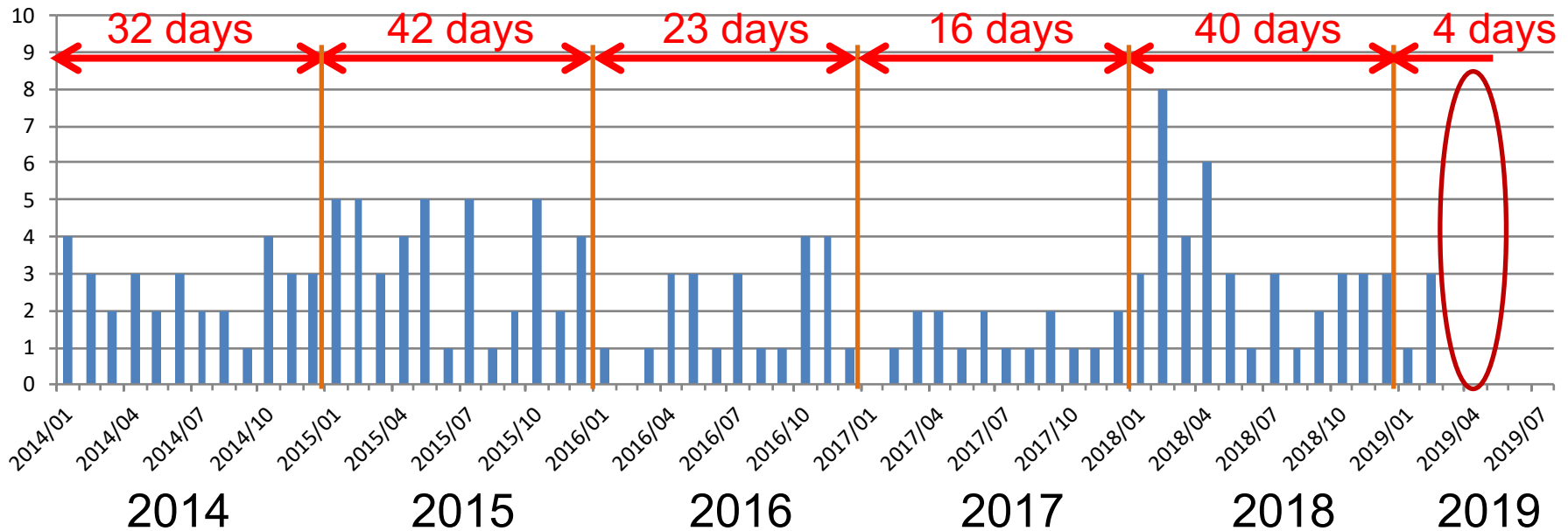
Fit of temperature?: true

Vacuum Control: Evacuating



# 1) Status of measurement and analysis

Table: Number of NDACC measurement days with Rikubetsu FTIR (as of 2019/04)



>NDACC measurements are made **typically 3 days per month**.

But in March and April 2019, no data is obtained due to **bad weather and failure of the solar tracker**, respectively.

>Retrievals of the **vertical distribution of 14 species**

(10 NDACC-standard species + OCS, CCl<sub>4</sub>, **HCHO**, **C<sub>2</sub>H<sub>2</sub>**) have been made with SFIT4 (Ver. 0.944).

>The HDF data of the NDACC standard species measured until April 2019 is archived in May 2019 at the NDACC DHF.

# Troubles since the last meeting –solar tracker–

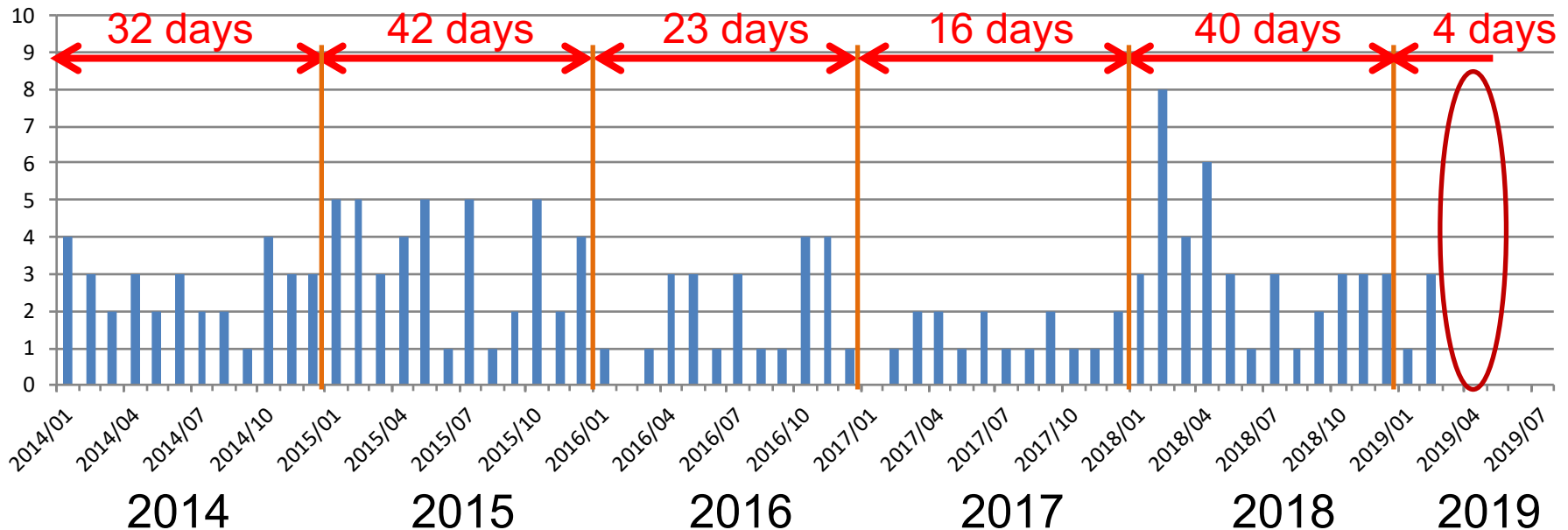
(Morino's poster in this meeting)

## Rikubetsu TCCON site

- Feb. 12-15, 2018
  - Adjustment of aperture sizes recorded with a NDACC filter #6 due to smaller S/N of spectra,
  - Re-measurement of ghost lamp later and there was no ghost.
- Mar. 19-20, 2019
  - Vacuum system was interlocked with opening and closing valves.
- April 9, 2019
  - A solar tracker controller did not work probably due to GPS Week Rollover on April 7. After ignoring the GPS, the solar tracker controller started to work again.  
We are asking Bruker optics the solution.
- We will
  - Connection of weather station instruments to FTS PC.

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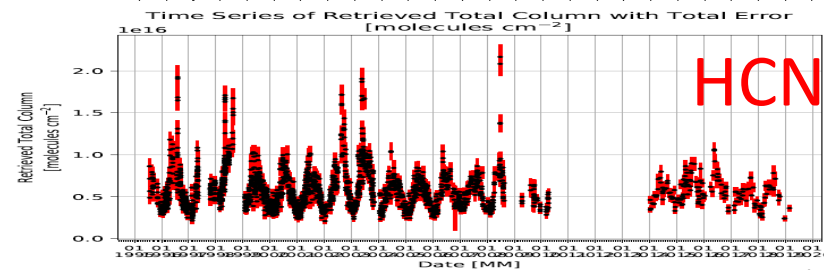
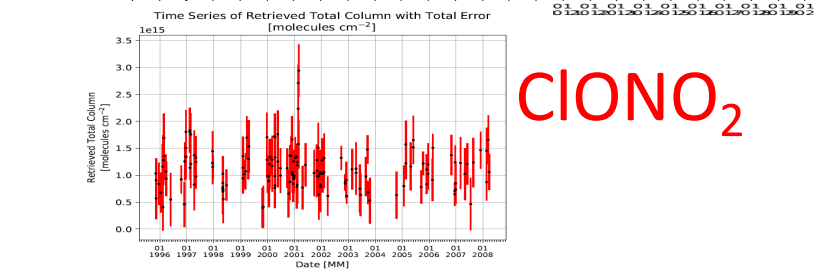
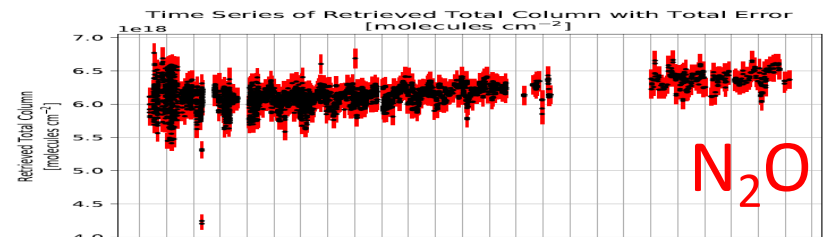
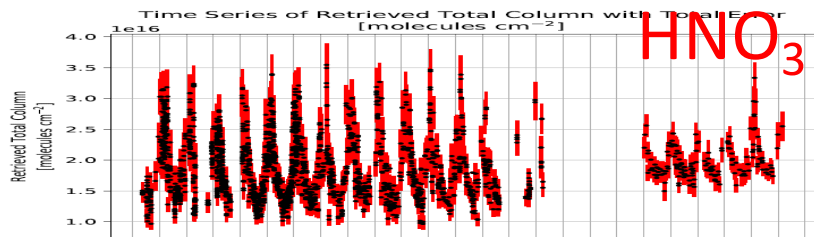
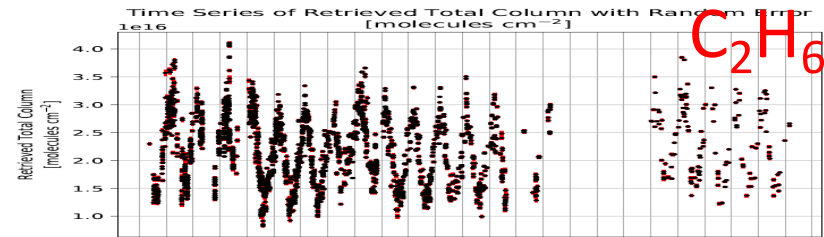
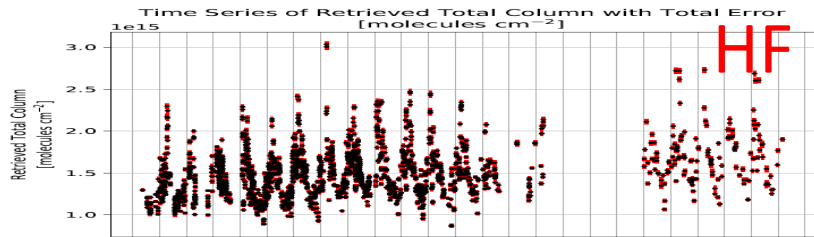
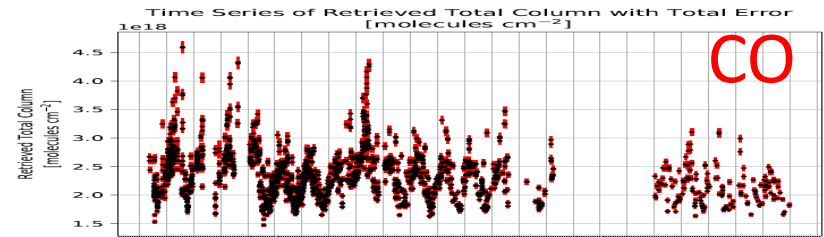
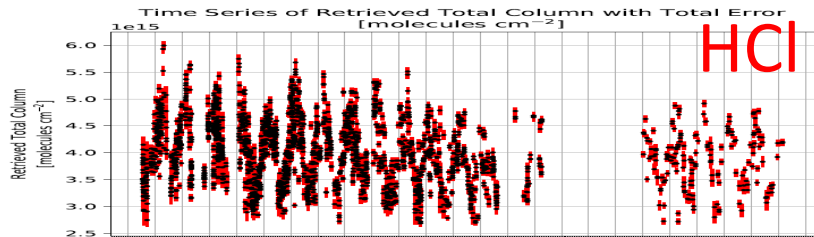
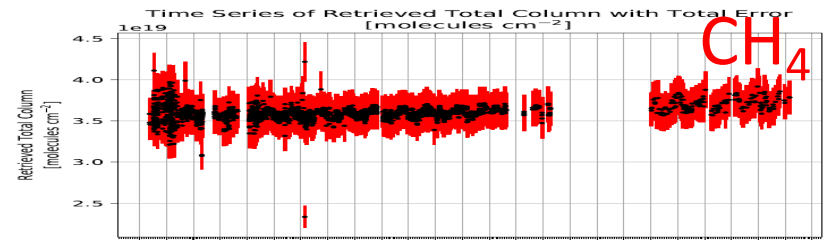
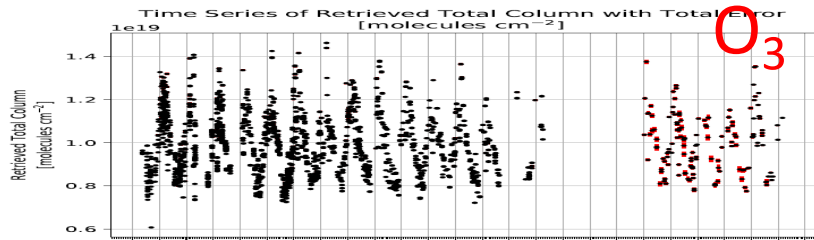
But in March and April 2019, no data is obtained due to **bad weather and failure of the solar tracker**, respectively.

>Retrievals of the **vertical distribution of 14 species**

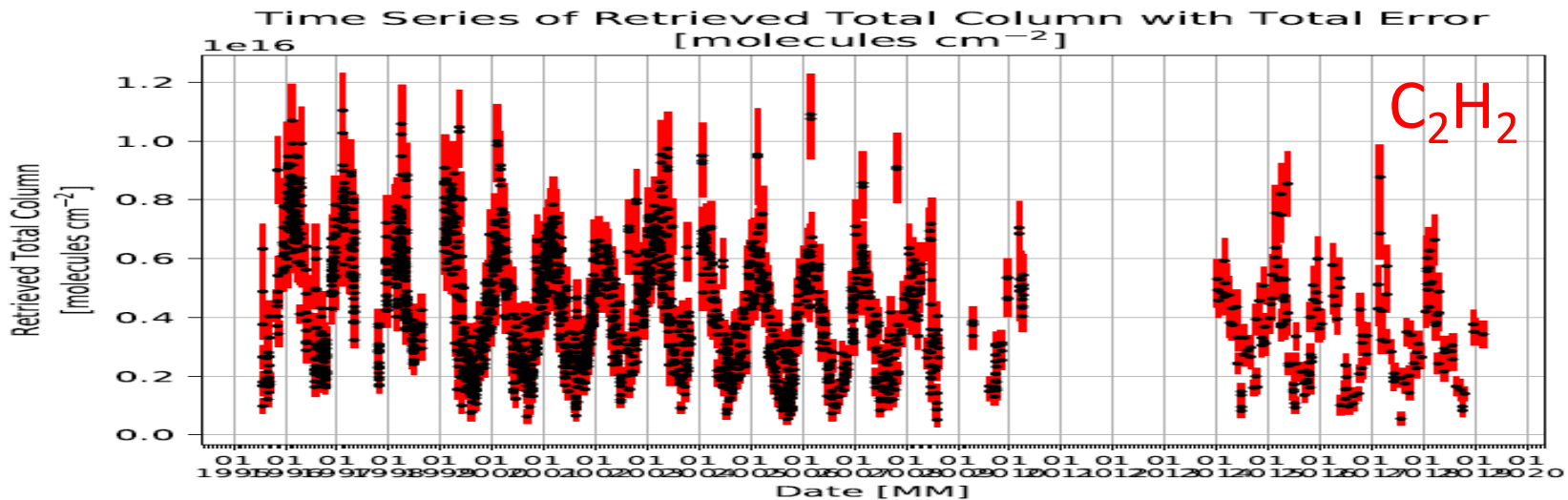
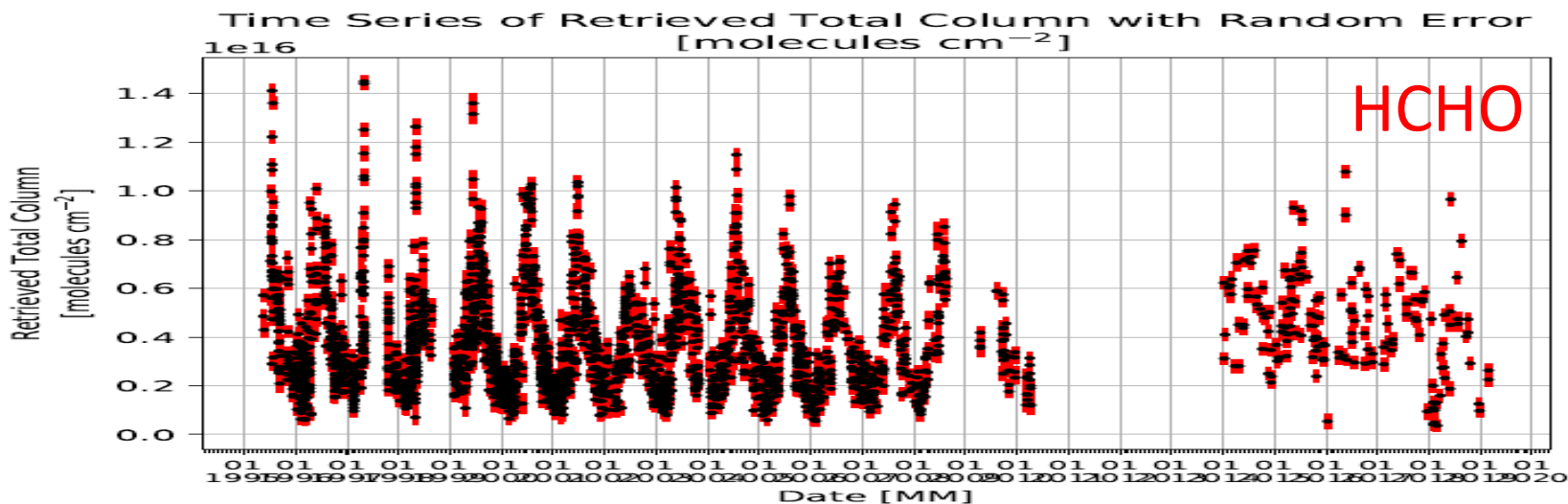
(10 NDACC-standard species + OCS, CCl<sub>4</sub>, **HCHO, C<sub>2</sub>H<sub>2</sub>**) have been made with SFIT4 (Ver. 0.944).

>The HDF data of the NDACC standard species measured until April 2019 is archived in May 2019 at the NDACC DHF.

# Time series of total columns over Rikubetsu



# HCHO & C<sub>2</sub>H<sub>2</sub> total columns over Rikubetsu





# Funding status, data usage, ...

- Funding status: **Stable (not so bad...)**

The instrument is operated by NIES as parts of the GOSAT series validation activities.

- Data usage:

## Presentations

JpGU: CFCs, HCFCs, HFCs

iCACGP-IGAC GA 2018: HCN

AGU & EGU: CFCs, HCFCs, HFCs

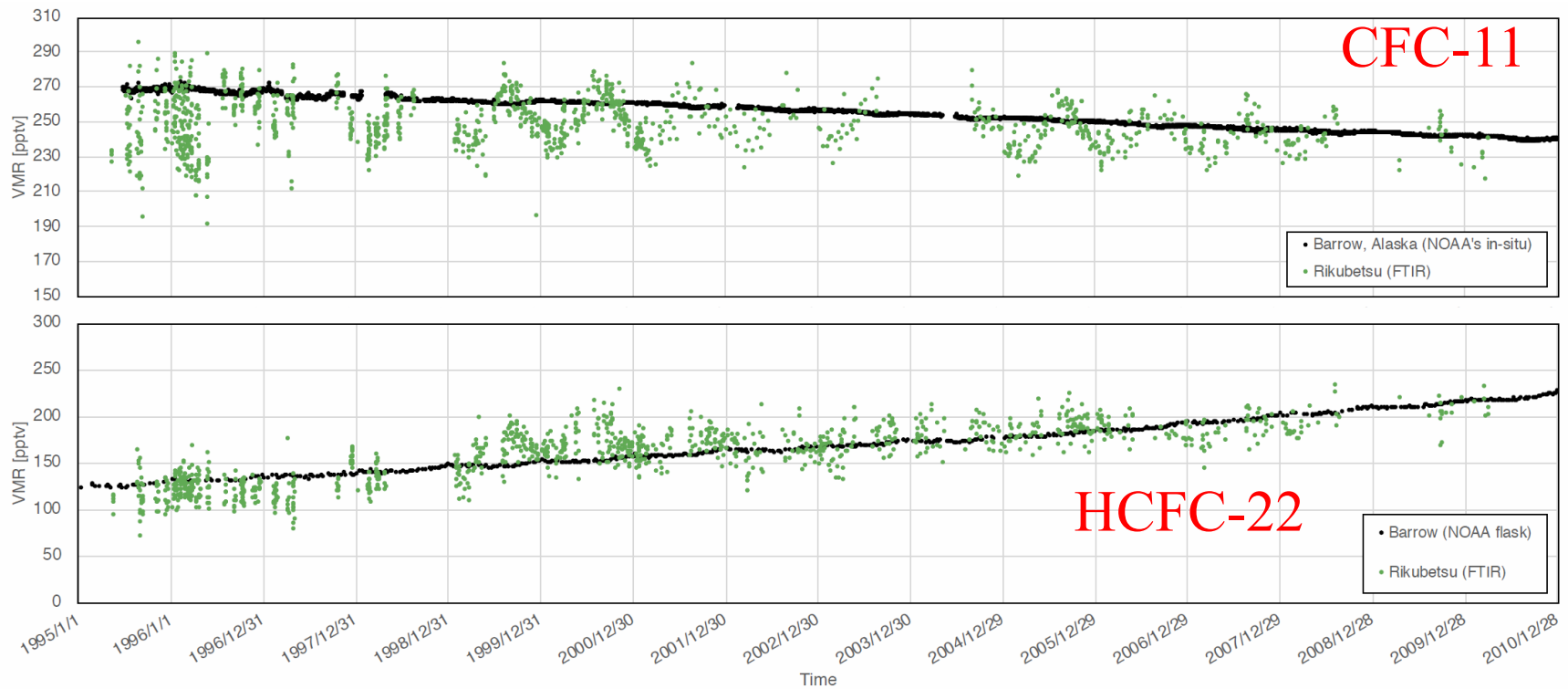
C<sub>2</sub>H<sub>6</sub>, CH<sub>4</sub>, CO

## Data validation

TROPOMI: CO, HCHO

# CFC-11 & HCFC-22 over Rikubetsu

Time-series of column-averaged mixing ratio of CFC-11 (upper) and HCFC-22 (lower) over Rikubetsu

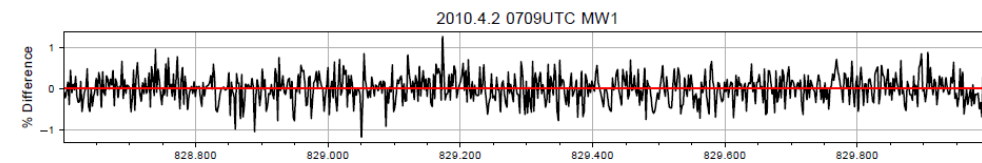


(Nakajima et al., Takeda et al. in this meeting)

# Troubles since the last meeting

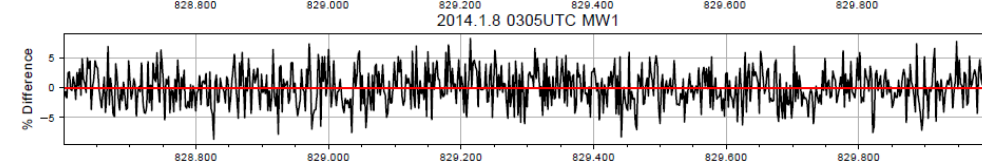
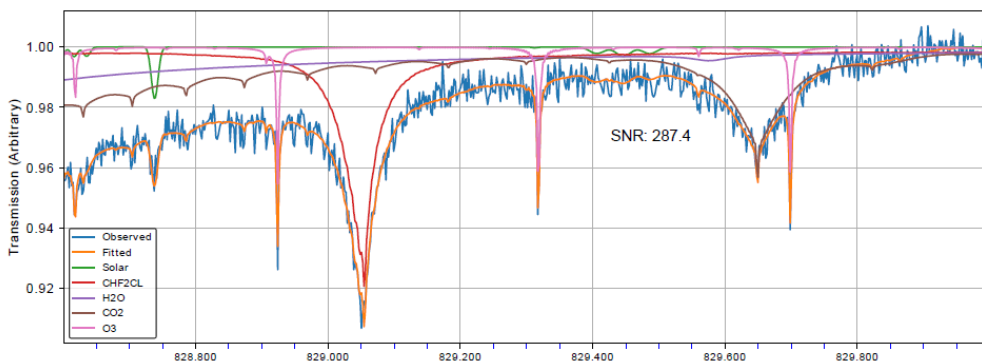
## -aperture size for fil#6 measurement-

- Degrading spectrum with fil#6 since 2014

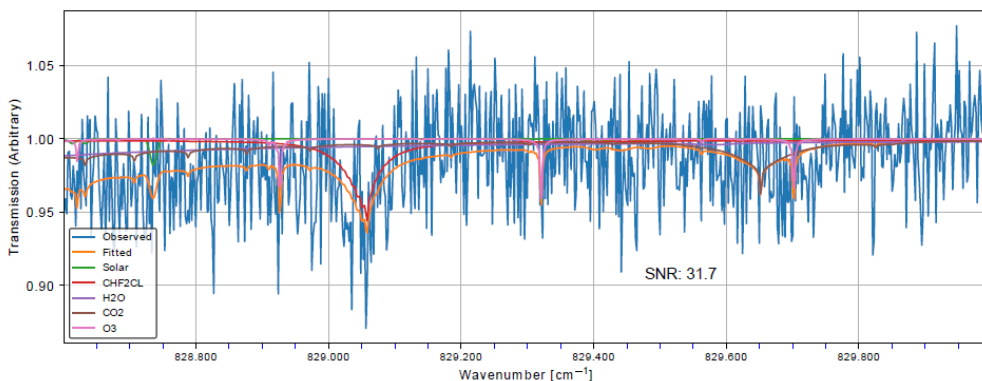


In case of HCFC-22

120M (-2010)

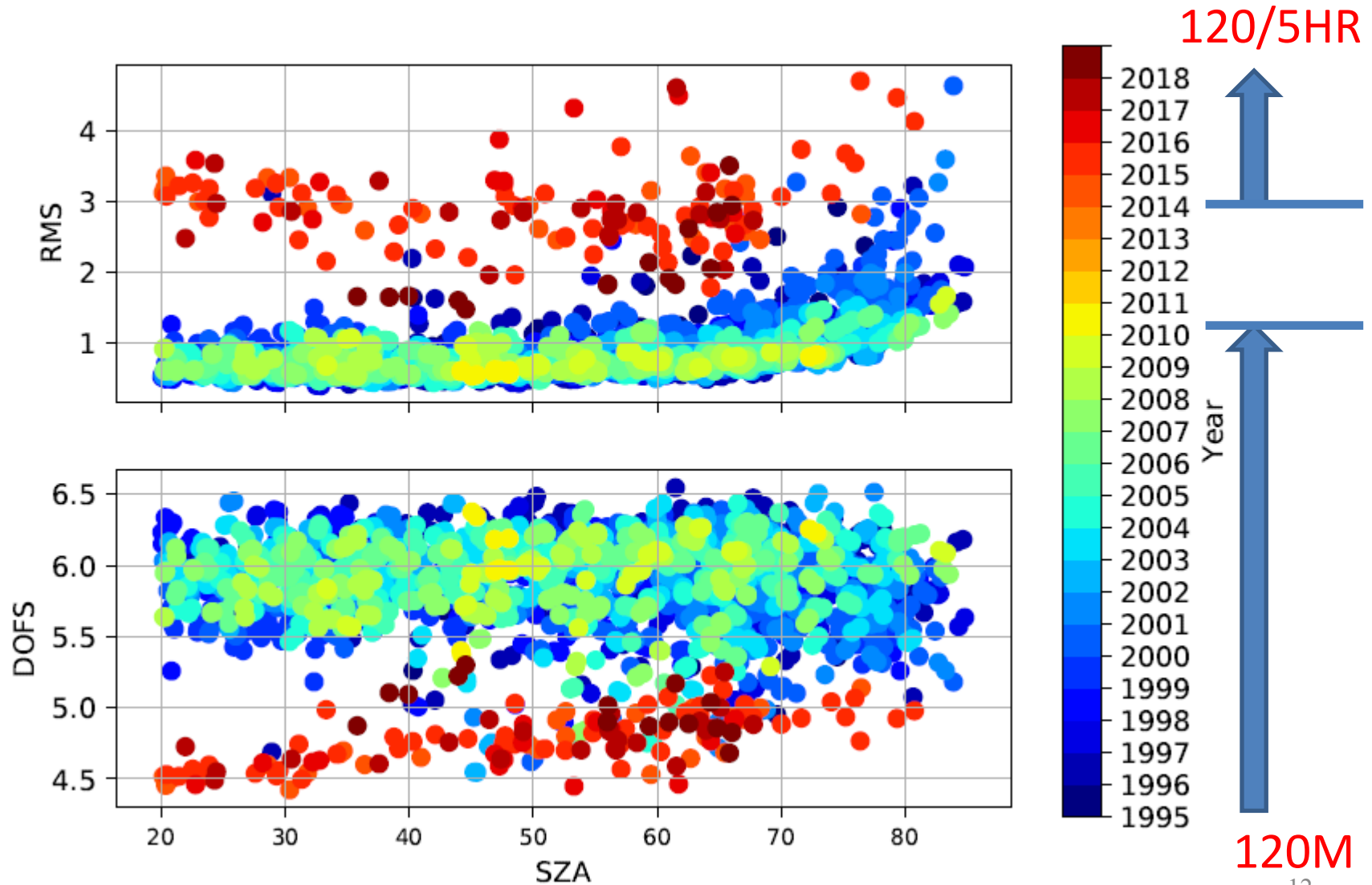


120/5HR (2014-)



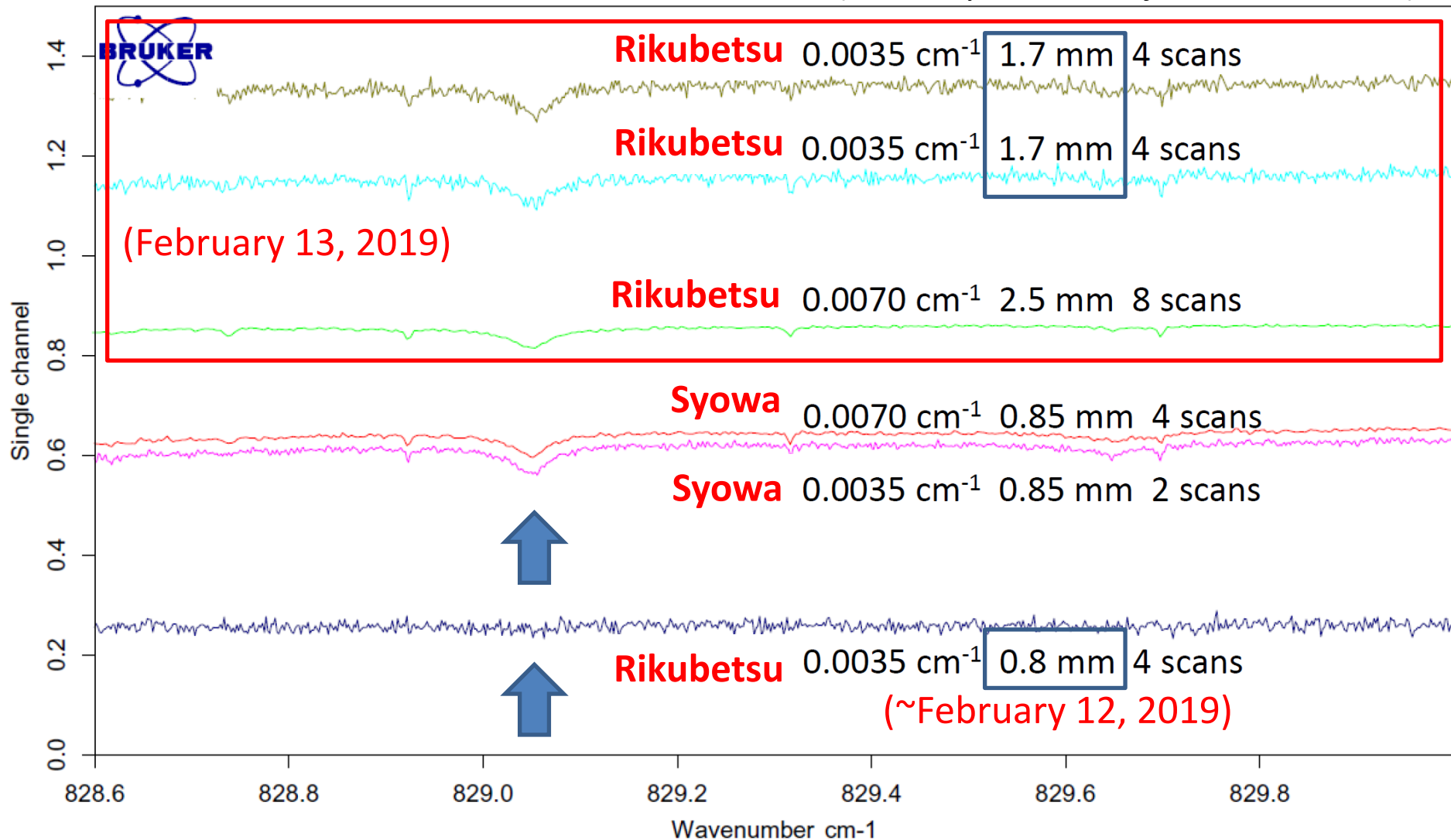
(Courtesy of Masanori Takeda)

# RMS and DOFs of O<sub>3</sub> (1000-1005 cm<sup>-1</sup>)



# This issue is due to small input to MCT detector.

Solar absorption spectra of HCFC-22 with fil#6 before and after the aperture size was optimized. (Courtesy of H. Nakajima & M. Takeda)



We thank to Hideaki Nakajima, Isao Murata & Masahiro Takeda for invaluable help.

# Summary

- > NDACC measurements with the NIES Bruker 120/5HR are continued at Rikubetsu. **We measured for 40 days in 2018.**
- > Retrievals of **vertical distribution of 14 species** with SFIT4(v0.944) were made, and the HDF files of the NDACC standard species were archived in May 2019.
- > Degrading spectra in the filter #6 region since 2014 appeared. **We fixed it after changing the aperture size from 0.8 mm to 1.7mm.** After this change, the spectrum with fil#6 becomes suitable for retrieval of species having weak absorption such as CFCs, HCFCs, etc.



# What is “GPS Week Rollover”?

<https://techcrunch.com/2019/04/06/gps-rollover-is-today-heres-why-devices-might-get-wacky/>

When Global Positioning System was first implemented, **time and date function was defined by a 10-bit number.**

So unlike the Gregorian calendar, which uses year, month and date format, **the GPS date is a “week number,” or WN.**

**The WN** is transmitted as a 10-bit field in navigation messages and **rolls over or resets to zero every 1,024 weeks.**

**At midnight April 6, the GPS WN is scheduled to reset.**