



REIGN-MP

GLOBAL NETWORKS SUPPORTING
THE MONTREAL PROTOCOL

REIGN-MP Kick-Off Meeting

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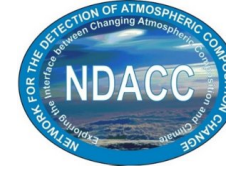
29th-30th September, 2026



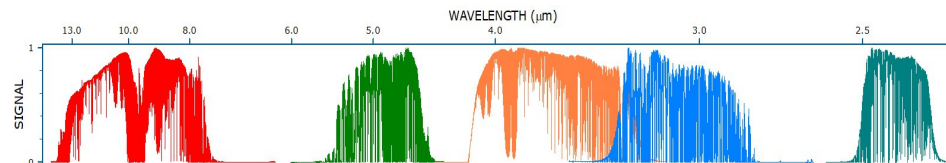
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ULiège partner's involvements



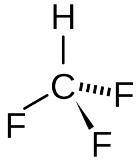
- Running the long-term FTIR monitoring experiment at Jungfraujoch (FTIR data available without noticeable interruption since 1984 → 40+ years)
- Just renewed the instrumentation (spectrometer and sun tracker in 2024/25)
- Affiliated to the NDACC-network (also acting as working group co-chair)
- Part to the ACTRIS.eu research infrastructure, labelization process is ongoing
- Topics of primary interest:
 - Support to the Montreal Protocol (halogens in troposphere and stratosphere; ozone...)
 - Monitoring of long-lived greenhouse gases
- Fire tracers, air quality degradation... => Support to Copernicus (rapid data delivery)



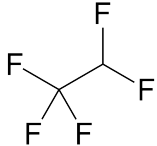
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Task 5.2: Improve retrieval algorithm for column ODS+ F observations

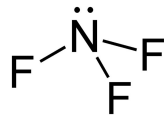
Target molecules



- HFC-23: Operational retrieval strategy at Jungfraujoch station (JFJ) (Hiault et al., 2026; under review for ACP) → TBD: Network adaptation for other (low altitude/humid) NDACC sites.



- HFC-125: target gas implemented recently in the SFIT4 algorithm (research version) → requires development of a high-resolution retrieval strategy.



- NF₃: Need to develop a retrieval strategy (none existing for FTIR).

Task 5.3: Assessment of lower-cost ground based FTIR ODS+ F retrievals



Typical information for HR/MR commercial spectrometers

	125HR	Vertex 80v
Maximum OPD (cm)	258	11.25
Typical OPD (cm)	82 / 125 / 180	11.25
Resolution (0.9/OPD) cm^{-1}	0.011 / 0.007 / 0.005	0.08
Measurement time B/F (s)	134 (4 scans) / 312 (6 scans) 434 (6 scans)	18.6 (2 scans)
Size (cm^3)	230 x 160 x 100	85 x 70 x 30
Weight (kg)	>500	110
Purchase cost (€)	~400k	~90-100k

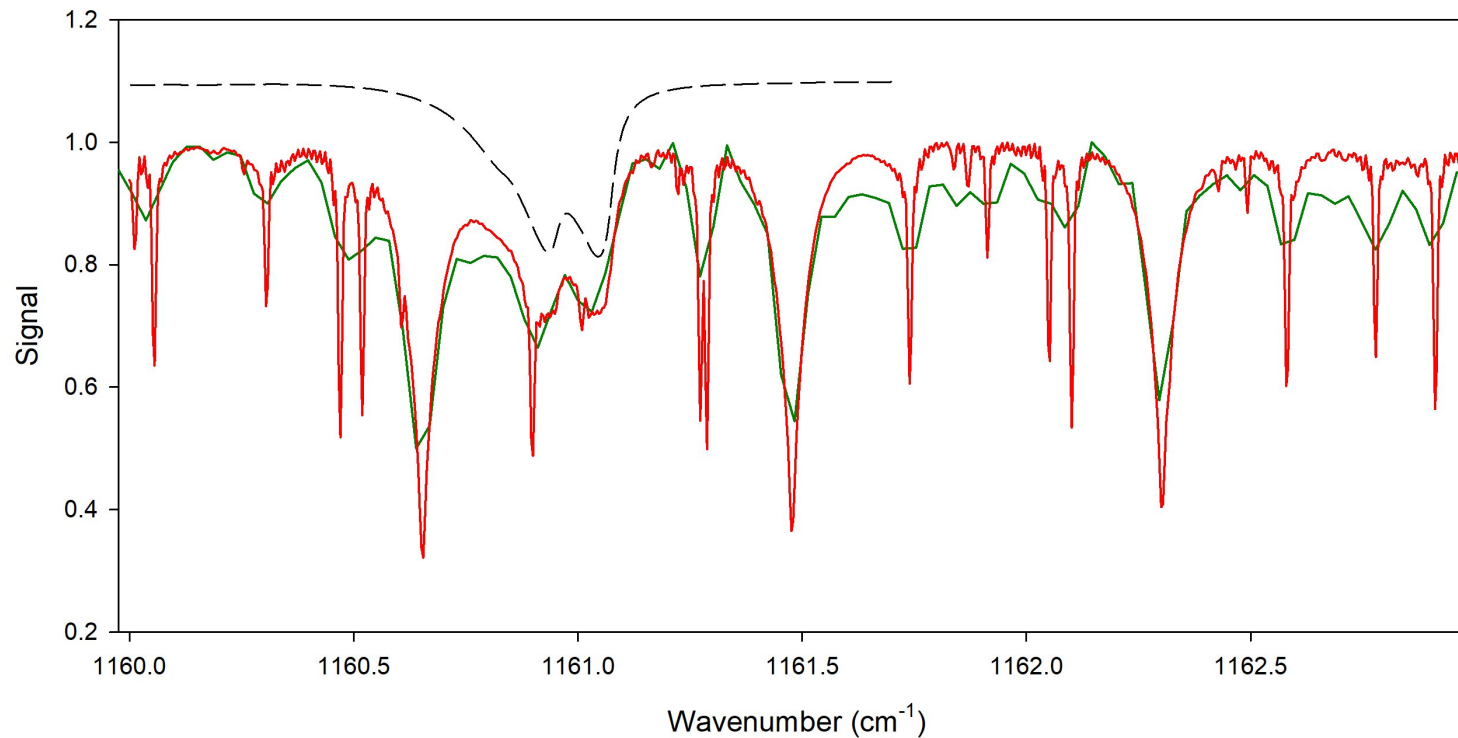


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Bruker 125HR and Vertex 80v IR spectra: CFC-12 test case

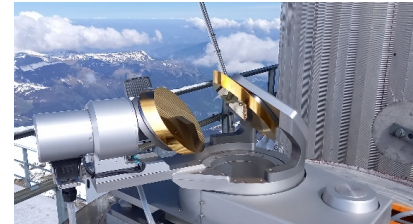
CFC-12 window (Jungfrauoch)



- Preferred CFC-12 window for ground-based retrievals
- Figure showing spectra recorded at Jungfrauoch (3.58 km asl) at 11 and 82 cm max OPD
- V80 spectra are available for a year (202405-202504) with numerous coincident days with the 120HR and 125HR instruments

Reserve slide

NDACC FTIR measurements at Jungfraujoch



- Most FTIR time series extend over 1984-2026
- Some datasets start in the mid-1970s
- Pioneering measurements (1950-51) complete the picture!

CURRENTLY, more than 35 gases are routinely retrieved from our spectra

Major greenhouse gases	H ₂ O, CO ₂ , CH ₄ , N ₂ O, CF ₄ , SF ₆	Support to the Kyoto Protocol and the Paris Agreement (COP21)
Related to ozone depletion	O ₃ , NO, NO ₂ , HNO ₃ , ClONO ₂ , HCl, HF, COF ₂ , CFC-11, CFC-12, HCFC-22, HCFC-142b, HFC- 134a, HFC-23, CCl ₄	Support to the Montreal Protocol on substances that deplete ozone
Air quality, biomass burning, oil production and transport	CO, CH ₃ OH, C ₂ H ₆ , C ₂ H ₂ , C ₂ H ₄ , HCN, HCHO, HCOOH, PAN, NH ₃	Europe's eyes on Earth
Others	OCS, N ₂ , numerous isotopologues (HDO, CH ₃ D, ¹³ CH ₄ , ¹³ CO...)	Various applications; e.g., sulfur budget, source apportionment/attribution

For these targets,
total columns are
obtained, often
supplemented with
information on their
distributions with
altitude