

45 Years of Atmospheric in-situ Trace-Gases Observations at Jungfraujoch

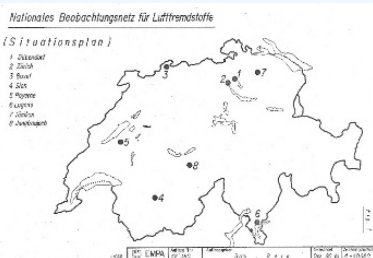


photo: jungfrau.ch

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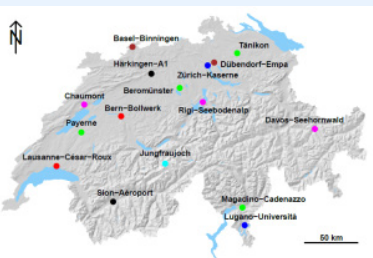
Establishment of NABEL – 1978

Empa and the Swiss Federal Office for the Environment (FOEN/BAFU) initiate the Swiss National Air Pollution Monitoring Network (NABEL); Jungfraujoch (JFJ) is one of the first 8 sites.



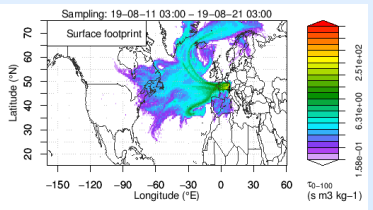
Extension of the NABEL network – 1990/1991

The NABEL network is extended to 16 stations; Jungfraujoch remains the only high-altitude station providing reference data of the background atmosphere.



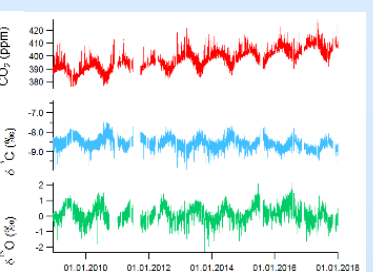
Modelling complements measurements – 2002

The increasing use of atmospheric transport models provides additional information for interpretation of the observations and allows simulating advection patterns; retrievals are developed to allocate European source regions of air pollutants.



CO₂ and CO₂ isotopes - 2010

Continuous CO₂ records complete the observations of the most important greenhouse gases; Empa pioneers with continuous CO₂ isotopes measurements which add unique information to the interpretation of CO₂ sources and sinks.



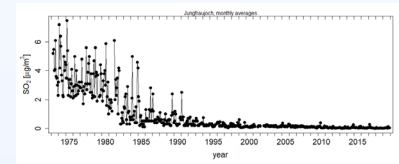
GHG observations are part of ICOS – 2018

The Integrated Carbon Observation System (ICOS) Research Infrastructure standardizes greenhouse gas observations of highest quality within Europe; candidate stations undergo a rigorous assessment; JFJ awards the status of an ICOS class 1 site, i.e. a site with the most ambitious set of parameters.



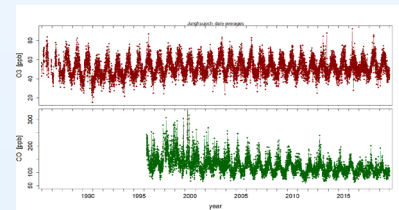
1973 – First observations

Atmospheric measurements were launched as part of an early engagement of Switzerland in a programme organised by the Organisation for Economic Co-operation and Development (OECD).



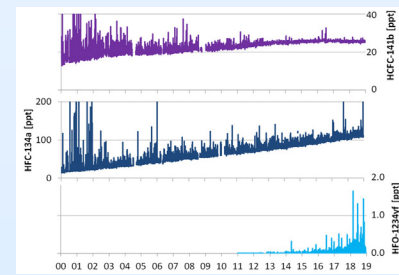
1980s & 1990s – more parameters added

The number of species continuously observed is steadily growing; standardized procedures and advanced quality assurance result in improved data coverage and data quality, both important for long-term trend analysis.



2000 – Monitoring anthropogenic halocarbons

The Montreal Protocol regulates the phase-out of ozone-depleting chlorofluorocarbons, which are replaced mainly by hydrochlorofluorocarbons, and hydrofluorocarbons; JFJ is among the first stations world-wide implementing a continuous monitoring of a wide range of species.



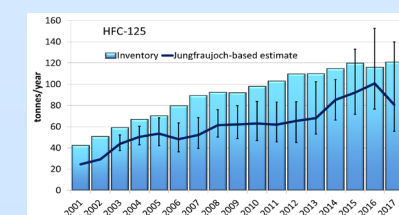
2005 – JFJ obtains global GAW status

In recognition of the long-term and extended data set (including the aerosol measurements done by Paul Scherrer Institute - PSI), JFJ receives global status within the Global Atmosphere Watch (GAW) programme of the World Meteorological Organization (WMO).



2013 – Independent emission estimates

Switzerland becomes one of the first countries world-wide supporting the National Inventory Reports submitted to UNFCCC with independent emission estimates based on JFJ observations.



today – extensive measurements, well embedded

nearly 100 species are routinely measured; observations are part of various national and international programmes. In 2019, Jungfraujoch becomes a Historic Site of the European Physical Society and Swiss Academy of Sciences honors Jungfraujoch as Chemical Landmark.



Acknowledgements

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