ICOS | Atmosphere Thematic Centre

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ICOS ATMOSPHERIC STATION LABELLING STEP1

FOR THE SITE

JUNGFRAUJOCH, SWITZERLAND

ICOS ATC, March 5, 2016

ICOS ATC 2016

Contact Information:

ICOS ATC
Laboratoire des Sciences du Climat et de l'Environnement (LSCE)
CEA – Orme des Merisiers
91191 Gif sur Yvette, France
Email: leonard.rivier@lsce.ipsl.fr

1. Submitted information

The following information has been submitted by Lucas Emmenegger on the ICOS station labelling interface of the ICOS Carbon Portal website (https://meta.icos-cp.eu/labeling/).

Identification

- Station full name : *Jungfraujoch*
- Station short name : *JFJ*
- List of the names of the main personnel involved in ICOS station operation:

  Lukas Emmenegger (Empa); Markus Leuenberger (International Foundation High Altitude Research Stations Jungfraujoch and Gornergrat, Uni Bern); Stéphane Affolter (HFSJG); Martin Steinbacher (Empa); Simon Wyss (Empa); Beat Schwarzenbach (Empa); Béla Tuzson (Empa); Matthias Hill (Empa); Alexander Haefele (MeteoSwiss); Giovanni Martucci (MeteoSwiss); Tesfaye Berhanu (Uni Bern); Rüdiger Schanda (Uni Bern); Michael Schibig (Uni Bern); Franz Conen (Uni Basel)
- Institution name responsible for the station :

  International Foundation High Altitude Research Stations Jungfraujoch and Gornergrat (HFSJG)
- Postal address : *Sidlerstrasse 5, 3012 Bern, Switzerland*
- Web site : http://www.hfsjg.ch/
- Requested Station class labelling : *1*

Station Localisation

- Latitude [WGS84, decimal degrees] : *46.55*
- Longitude [WGS84, decimal degrees] : *7.98*
- Station altitude above sea level [m] : *3572*
- Inlet height(s) above ground (slash separated) [m] : *10*
- Describe accessibility (relevant for mobile lab for ex) :

  year-round accessibility by train.

Station Geographical Description

- Description of surrounding (e.g. vegetation, structures impeding air flow in a 100 km radius) :

  The high alpine research station Jungfraujoch is situated on a mountain saddle between the two mountains Jungfrau (4158 m asl) and Mönch (4099 m asl). The local wind is channeled due to the topography. Surrounding surfaces are mostly covered by

snow or ice apart from some steep slopes of bare rock. No vegetation or soil is present in the vicinity.

- Nearby anthropogenic activity (population density, closest cities, roads… in a 100 km radius) :

  The Jungfraujoch is also accessible for tourists with a public terrace approximately 10 m below the inlet. The upper part of the so-called Sphinx observatory is restricted to scientists. The closest settlements are the tourist villages Wengen (1200 inhabitants) and Grindelwald (3800 inhabitants), approximately 8km to the NW and 10km to the NE, respectively. Both are located about 2500m below Jungfraujoch. Interlaken (5700 inhabitants) is located approx. 3 km below Jungfraujoch and 20km to the North. Thun (42'600 inhabitants) and Bern (140'000 inhabitants) are located approximately 35 and 60 km to the NW. The highly industrialized Po Basin in Northern Italy is located approx. 150 km to the SE.

Construction/Equipment

- Planned date starting construction/equipment (for existing station leave blank) :
- Planned date ending construction/equipment (for existing station leave blank) :
- Planned date starting ICOS measurements : *2013-04-01*
- Available telecommunication means and its reliability : *Reliable internet connection (Switchlan, Swiss academic community internet network) as well as landline and mobil telephone connection is available.*
- Existing infrastructure (tall tower, collocated station, …) : *Accommodation facilities for researcher at the Research Station, Sphinx Observatory with fully equipped laboratory space.*
- Is the station already belonging to an environmental measuring network? If so, please list the names of the networks : *Atmospheric composition: Global Atmosphere Watch (global station) & Swiss National Air Pollution Monitoring Network & Advanced Global Atmospheric Gases Experiment (AGAGE); meteorology: SwissMetNet; total column atmospheric composition: Network for the Detection of Atmospheric Composition Change (NDACC); a complete list of network involvements is available at www.hfsjg.ch/reports*

Submitted documents

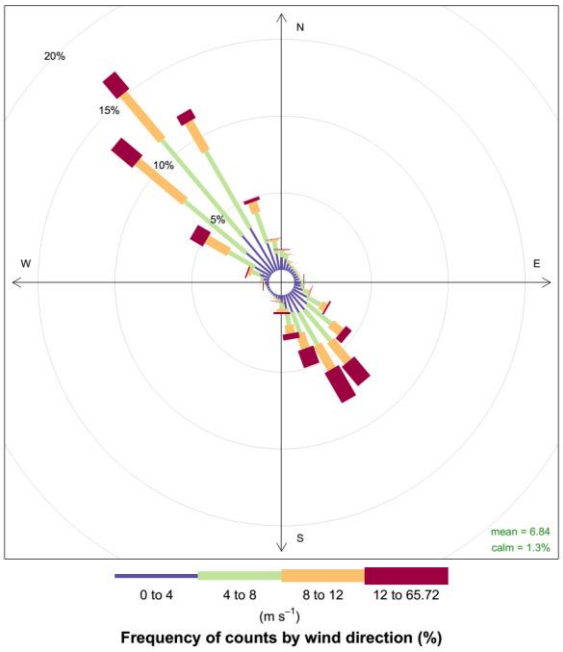

Figure 1: wind direction distribution at JFJ station

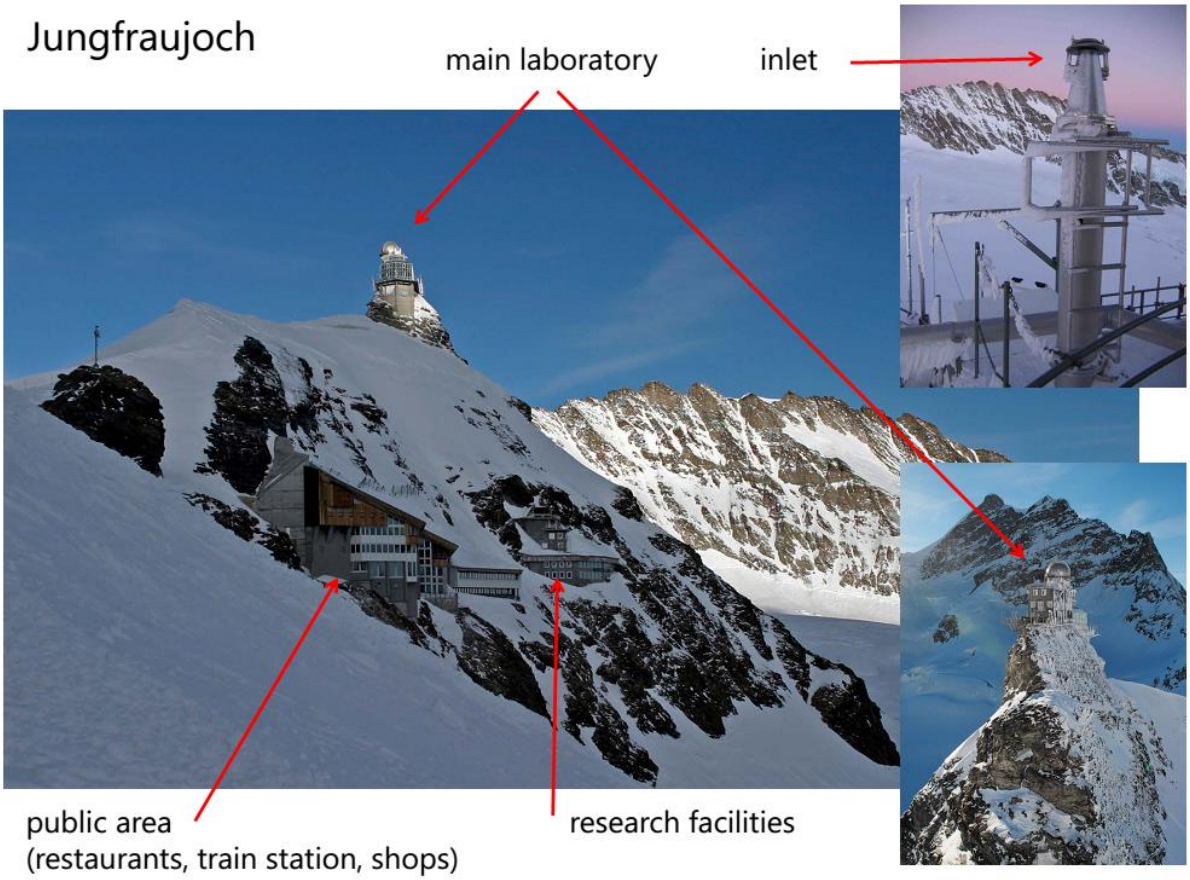

Figure 2: Jungfrauhoch station

2. Site assessment

The following assessment of the Jungfrauhoch site is based on the submitted information (cf. chapter 1) and the latest ICOS Atmospheric Station Specifications (version 1.1, October 2015).

Location :

The Jungfrauhoch site located in the Alps at an elevation of 3572 asl is a high mountain station which is predominantly sampling free tropospheric air. The ongoing measurements of trace gases, and several studies have demonstrated that local emissions have a low influence at this station (Zellweger et al., 2003; Tuzson et al., 2011).

As a reminder of the ICOS AS specifications, it is expected to have in the ICOS network only few stations (<10%) on mountain tops since they are more difficult to represent in atmospheric transport models and less directly exposed to air-masses carrying strong surface flux signals from the European continent.

Figure 3: Global view of the station location

Figure 3: Regional view of the station location

Station infrastructure

For the mountain site the ICOS AS specifications do not ask for a tall tower, but require using a sampling height sufficiently high to avoid contamination by local sources. The 10m high mast available should meet this specification.
Regarding the future flask sampling, required for class-1 stations, it will have to be organized during the night-time, more favourable to sample background air masses. The automatic flask sampler will allow such sampling strategy.

Station history and reference

The high alpine research station Jungfraujoch is a reference station for atmospheric sciences in Europe since many years. The station is already involved in several internation al networks (AGAGE, NDACC, …) and is labeled by WMO as a global station of the Global Atmosphere Watch program. The station has also been involved in European projects like AEROCARB, CARBOEUROPE, IMECC, InGOS to provide high quality greenhouse gases measurements.

3. ATC recommendation

The Jungfraujoch site location and site infrastructure meet ICOS requirements for STEP1 of the labeling process. Thanks to the quality of the infrastructure and the staff there is no doubt that the Jungfraujoch station will be able to provide the high quality measurements required for a class-1

ICOS station. Consequently the ATC recommends that the Jungfraujoch site be proposed to proceed to the step2 of the ICOS station labelling process. The actual measurements from Jungfraujoch will be then assessed by ATC in order to become one of the high mountain station of ICOS atmospheric network. This site will provide information on the background level of greenhouse gases over Western Europe.

4. References

ICOS Atmospheric Station Specifications, version 1.1 edited by O. Laurent (2015)
https://icos-atc.lsce.ipsl.fr/?q=doc_public