http://joyce.cloud

JOYCE-CF user guide

Table of contents

JOYCE-CF user guide – Introduction

JOYCE – CF (**J**ülich **O**bservator**y** for **C**loud **E**volution – **C**ore **F**acility) is a research infrastructure for cloud and precipitation studies funded by the Deutsche Forschungsgemeinschaft (German Science Foundation, DFG).

This user guide gives some background explanation on the goals of JOYCE-CF and its instrumentation and locations. Furthermore, it provides practical information on the possibilities to use JOYCE-CF's infrastructure and data.

Major goals of JOYCE-CF

The overall goal of JOYCE-CF is to provide a state-of-the art research infrastructure for ground-based cloud and precipitation observations. JOYCE-CF gives users the possibility to use our large amount of data, and our expertise in cloud and precipitation processes in the atmosphere. External users are welcome for any cooperation to use our infrastructure. As a core facility we provide instrument information and documented datasets. We are also serving as a reference site for calibration, best practice, data formats, and observation strategies.

JOYCE-CF instrumentation aims to observe spatial and temporal variability of atmospheric water cycle variables.

JOYCE-CF related research is

- to disentangle water vapor variations due to advection and local surface influence,
- to better understand the development of boundary layer clouds,
- to analyze cloud and radiation interaction,
- to recognize microphysical processes in a precipitating cloud,
- to detect precipitation formation and type,
- to distinguish precipitation phases,
- and to observe precipitation development.

If you are interested or dealing with any of these scientific questions, JOYCE-CF can provide many options for your research and we will be happy to cooperate with you.

Structure and location of JOYCE-CF

JOYCE-CF is a joint project between the universities of Bonn (Institute of Geoscience and Meteorology) and Cologne (Institute for Geophysics and Meteorology), and the Forschungszentrum Jülich (Research Centre Jülich, FZJ). The operation of the instruments and the research is shared between these institutions according to their individual expertise.

The installation of instruments started in 2007, and since 2016, the JOYCE-CF has been funded by the DFG as a core facility for cloud and observation processes. The project was initiated by four principal investigators (PIs) from the Universities of Bonn and Cologne:

Susanne Crewell (University of Cologne),
Ulrich Löhnert (University of Cologne),
Clemens Simmer (University of Bonn), and
Silke Trömel (University of Bonn).

As a base for instrument operation, calibration, and data, JOYCE-CF is performing state-of-the-art research and takes part in many projects in and around cloud and precipitation processes. It is embedded in the regional geosciences alliance (Geoverbund ABC/J) within the **Lab**oratory for **C**louds and **P**recipitation **Ex**ploration (**CPEX-LAB**). CPEX-LAB coordinates research in the area of clouds and precipitation, which are of increasing importance for weather and climate prediction as well as for renewable energy applications. JOYCE-CF serves as a base for a better understanding of the physical processes leading to clouds and precipitation through ground-based remote sensing and data assimilation in earth system models. For more information take a look at www.cpex-lab.de.

Location of JOYCE-CF observational sites

JOYCE-CF consists of three major observational locations:

- **JuCol** (**J**ülich **Col**umn Observatory), situated in Jülich at the FZJ with a suite of passive and active remote sensing instruments dedicated to mainly vertical observations of the atmospheric column for clouds, water vapor, temperature, wind, turbulence, radiation, etc. A detailed list of instruments can be found at the end of this document. *(Lat: 50.908547°N, Lon: 6.413536°E, Alt: 111 m asl)*

- **BoXPol** (**Pol**arimetric **X**-band radar **Bo**nn) and **JuXPol** (**Pol**arimetric **X**-band radar **Jü**lich) represent the two sites where the scanning X-band radars are situated. The focus of these two radars lies both on the spatial distribution of precipitation and its temporal development. The two locations allow to observe precipitation processes in a large overlapping domain simultaneously. Further additional instrumentation is installed next to BoXPol at the Institute of Geoscience and Meteorology in Bonn, such as temperature, pressure, humidity, wind, local point measurements for precipitation, etc. A detailed list of instruments can be found at the end of this document. *(BoXPol: Lat: 50.73052°N, Lon: 7.071663°E, Alt: 99 m asl; JuXPol: Lat: 50.92750°N, Lon: 6.45626°E, Alt: 310 m asl)*
- Two additional locations are at Bergheim and Bonn, Roleber. At these locations two Micro Rain Radars (MRR) are operated for an area-wide column observation of precipitation at different ranges of the X-Band radars. *(Bergheim: Lat: 50.960517° N, Lon: 6.631733° E, Alt: 69 m asl; Roleber: Lat: 50.734950° N, Lon: 7.193033° E, Alt: 146 m asl)*

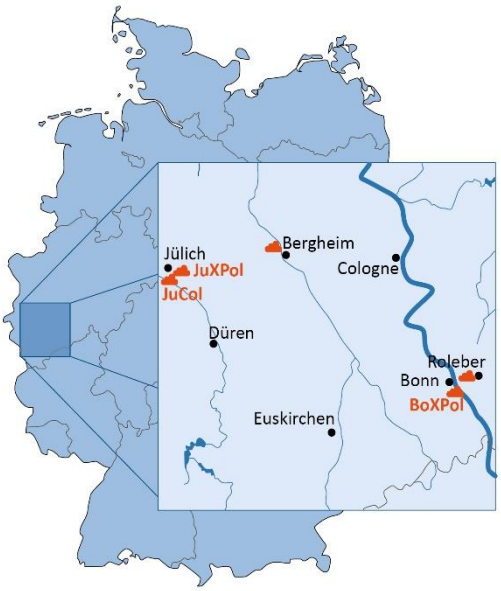


Figure 1: Location of JOYCE-CF observatories in Germany with a zoom into western Germany. The major observatories are marked and written in orange. Two minor measurement locations are marked in orange.

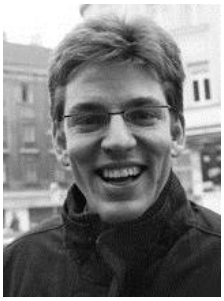
Contact JOYCE-CF

JOYCE-CF is coordinated by the team of Josephin Beer (University of Bonn) and Bernhard Pospichal (University of Cologne).

Josephin Beer is working at the Institute of Geoscience and Meteorology in Bonn and coordinates the two Radars BoXPol and JuXPol, and the instruments co-located to BoXPol, as well as the two MRRs located in Bergheim and Roleber, Bonn. The research focus lies in precipitation observation, processes, and development.

Josephin Beer
University of Bonn
Institute of Geoscience and Meteorology
Room 0.008
Auf dem Hügel 20
53121 Bonn, Germany
Tel.: +49 (0)228 73-3152
E-mail: jbeer@uni-bonn.de

Bernhard Pospichal is working at the Institute for Geophysics and Meteorology in Cologne and coordinates the observatory JuCol. The major research focus lies on active and passive microwave cloud observations and microphysical processes and development.



Bernhard Pospichal
University of Cologne
Institute for Geophysics and Meteorology
Room 3.108
Pohligstr. 3
50969 Cologne, Germany
Tel.: +49 (0)221 470-3691
E-mail: bernhard.pospichal@uni-koeln.de

The supporting advisory board is formed by experts in cloud and precipitation research from all over the world. The advisory board includes

Michael Frech (German Weather Service, Deutscher Wetterdienst, DWD),
Andrea Lammert (University of Hamburg),
Volker Lehmann (DWD),
Dimitri N. Moisseev (University of Helsinki),
Alexander Ryzhkov (National Oceanic and Atmospheric Administration, NOAA),
Dirk Schüttemeyer (European Space Agency, ESA)
Dave D. Turner (NOAA).

Access to JOYCE-CF

In this section we provide both information on the access to data from JOYCE-CF as well as physical access to our instruments and sites.

Access to data and instrument information

To stay up to date you should always take a look at our webpage joyce.cloud. Current news and future dates will be published there. The webpage also contains information about data access or JOYCE-CF instrumentation and data. The JOYCE-CF infrastructure offers instrument information and three different ways of exploitation, data, measurement time, and additional installations.

Instrument information

The information about the different instruments can be found in the JOYCE-CF user guides for every instrument listed below or on the page. If you would like to get any further information on a specific instrument, please contact the person listed in the contact field in the JOYCE-CF user guide for the specific instrument.

Data Access

If you are interested in any of the JOYCE-CF data you can request all data via the ‘data request sheet’ from our webpage. Additionally some data is available via SAMD database, or via the data portal of the University of Bonn. Which kind of data is available via which database is described in the instrument’s user guide. The request sheet should be sent to one of the scientific coordinators.

Measurement time

Some instruments have the possibility to do additional scans or other special observation strategies. If you are interested in special scans, you can request them via the ‘measurement time request sheet’. This can support your field campaign or any other study you might be interested in. Besides the standard operation modes, additional available observation strategies are described in the instrument’s user guide. Please take a look into the instrument sheet and check if you need additional scan strategies. The request sheet should be sent to one of the scientific coordinators.

Installation of own instrument

Though JOYCE-CF already offers a large set of instruments in and around the field of cloud and precipitation evolution, you can also bring your own instrument to one of our sites in order to test your equipment, to complete the existing setup, to calibrate your instrument or any other need. If you are interested in an additional installation please fill the ‘Instrument installation request sheet’ and specify your instrument(s). The more detailed you are in your needs, ideas and description, the easier it is to find the optimal setup for your installation. The request sheet should be sent to one of the scientific coordinators.

Physical Access

Depending on your concern you might need to access JOYCE-CF. In general there are three addresses to access JOYCE-CF instrumentation or get in contact with the coordination team.

University of Bonn:
Institute of Geoscience and Meteorology
Auf dem Hügel 20
53121 Bonn, Germany
Person to contact: Josephin Beer
Room 0.008
Tel.: +49 (0)228 73-3152
E-mail: jbeer@uni-bonn.de

University of Cologne
Institute for Geophysics and Meteorology
Pohligstr. 3
50969 Cologne, Germany
Person to contact: Bernhard Pospichal
Room 3.108
Tel.: +49 (0)221 470-3691
E-mail: bernhard.pospichal@uni-koeln.de

To enter the JuCol observatory you must to get into contact with the JOYCE-CF coordinators first, as the access to the instrument platform has to be verified.

You can access the JuCol observatory after contact with JOYCE-CF coordinators.

Forschungszentrum Jülich
Wilhelm-Johnen-Straße
52428 Jülich, Germany

The observatories BoXPol, JuCol, Bergheim and Roleber have to be verified by the coordinating team as well.

JOYCE-CF instruments

Location	Instrument Type	Instrument name
JuCol (Jülich)		
	Ka-Band cloud radar	JOYRAD-35
	X-Band cloud radar	JOYRAD-10
	W-Band cloud radar	JOYRAD-94
	Micro rain radar	MRR-04
	Ceilometer	CHM15k-02
	Ceilometer	CT25k
	Doppler wind lidar	HALO
	K/V-Band Microwave radiometer	TOPHAT
	Infrared spectrometer	AERI
	Sun photometer	Cimel
	Shadowband radiometer	MFRSR
	Pyranometer	CMP21
	Pyrgeometer	CGR4
	Pyrheliometer	CHP1
	Infrared pyrometer	TOPHAT
	Disdrometer	Parsivel-02
	Pluviometer	Pluvio-02
	Total sky imager	TSI
	Photovoltaic module	PVM
Sophienhöhe		
	X-Band polarimetric radar	JuXPol
Bonn Institute of Geoscience and Meteorology		
	X-Band polarimetric radar	BoXPol
	Micro rain radar	MRR-01
	Ceilometer	CHM15k-01
	Microwave radiometer	ADMIRARI
	Solar radiation (direct/diffuse)	
	Infrared radiation (Broadband)	
	Scintillometer	BLS900
	Disdrometer	Thies-01
	Disdrometer	Thies-02
	Disdrometer	Parsivel-01
	Pluviometer	Pluvio-01
	Tipping rain gauge	Gauge
	Temperature/humidity	Psychro
	Temperature/humidity	Humicap-01
	Temperature/humidity	Humicap-02
	Atmospheric pressure	
	Wind speed and direction	
Other locations		
Bergheim	Micro rain radar	MRR-02
Bonn-Roleber	Micro rain radar	MRR-03