ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

The World Radiation Monitoring Center

Update 2022: status, challenges, tasks

WRMC-BSRN
World Radiation Monitoring Center- Baseline Surface Radiation Network

Amelie Driemel, Christian Lanconelli, Laura Riihimaki

HELMHOLTZ ASSOCIATION

The WRMC at the Alfred-Wegener Institute

Current staff

Amelie Driemel
(Data Curator/Director)
~10% for BSRN

Wolfgang Cohrs
(Technical coordinator)
~1% for BSRN

Infrastructure

1. **ftp server:**

   ftp.bsrn.awi.de
   station-to-archive files

2. **PANGAEA:**

   https://dataportals.pangaea.de/bsrn/

PANGAEA.
Data Publisher for Earth & Environmental Science

https://dataportals.pangaea.de/bsrn/ 90%

Baseline Surface Radiation Network – Status

[BSRN homepage] - [Staff | Stations | Stations, sortable | Parameter | Methods] - [LR0100 | LR0300 | LR0500 | LR1000 | LR1100 | LR1200 | LR1300 | LR3010 | LR3030 | LR3300 | **All** | latest datasets | latest snapshot]

Click on a X shows a list of all datasets for selected year and station.

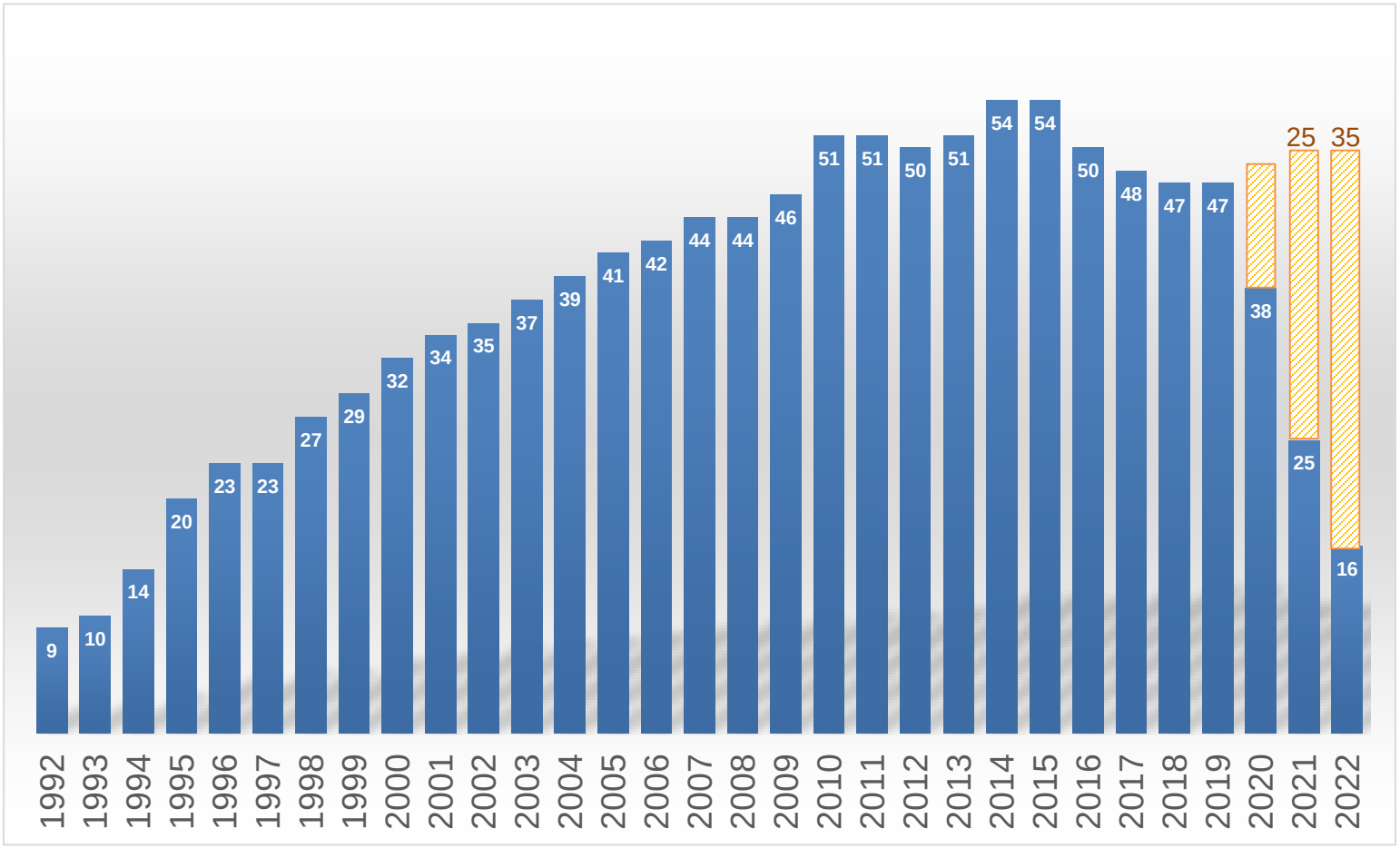
Station	Short name	Station scientist currently in charge	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	All
Abashiri	ABS	OHTAKE Jun (rrc-jma@met.kishou.go.jp)																														X	X	X
Alert	ALE	** Station closed/no longer maintained **													X	X	X	X	X	X	X	X	X	X	X									X
Alice Springs	ASP	Matt Tully (m.tully@bom.gov.au)				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Barrow	BAR	Laura Riihimaki (laura.riihimaki@noaa.gov)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						X
Bermuda	BER	Laura Riihimaki (laura.riihimaki@noaa.gov)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X					X
Billings	BIL	Laura Riihimaki (laura.riihimaki@noaa.gov)		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Bondville	BON	John Augustine (John.A.Augustine@noaa.gov)				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Boulder, SURFRAD	BOS	John Augustine (John.A.Augustine@noaa.gov)				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Boulder	BOU	** Station closed in July 2016 **	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							X
Brasilia	BRB	Enio Bueno Pereira (enio.pereira@inpe.br)														X	X	X	X	X	X	X	X	X	X			X	X					X
Budapest	BUD	Dénes Fekete (fekete.d@met.hu)																												X	X	X	X	X
Cabauw	CAB	Wouter Knap (knap@knmi.nl)														X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Data overview, status 06-2022

1	LR 0100: **Global, Diffuse, Direct, Long-wave down**	76 (72) stations
2	LR 0300: **Reflex, Long-wave up**	19 (19) Stations
3	LR 0500: **UV**	13 (13) Stations
4	LR 1000: **Synops**	15 (14) Stations
5	LR 1100: **Upper air soundings**	33 (32) Stations
6	LR 1200: **Total ozone**	9 (9) Stations
7	LR 1300: **Ceilometer data**	3 (3) Stations
8	LR 30x0: **Radiation measurements from tower**	13 (13) stations

Status Juli 2022 **~12500 monthly datasets** (~1041 years)

Stations with data in the WRMC



51 active, 9 ‚inactive‘, 16 closed stations in 2022

2021: 25 and 2022: 35 stations behind schedule…

Data users by country

Requests from about 56 countries so far
New data requests ~**140 per year**

BSRN articles in Web of Science

Publications
175
Total
From 1970 to 2022

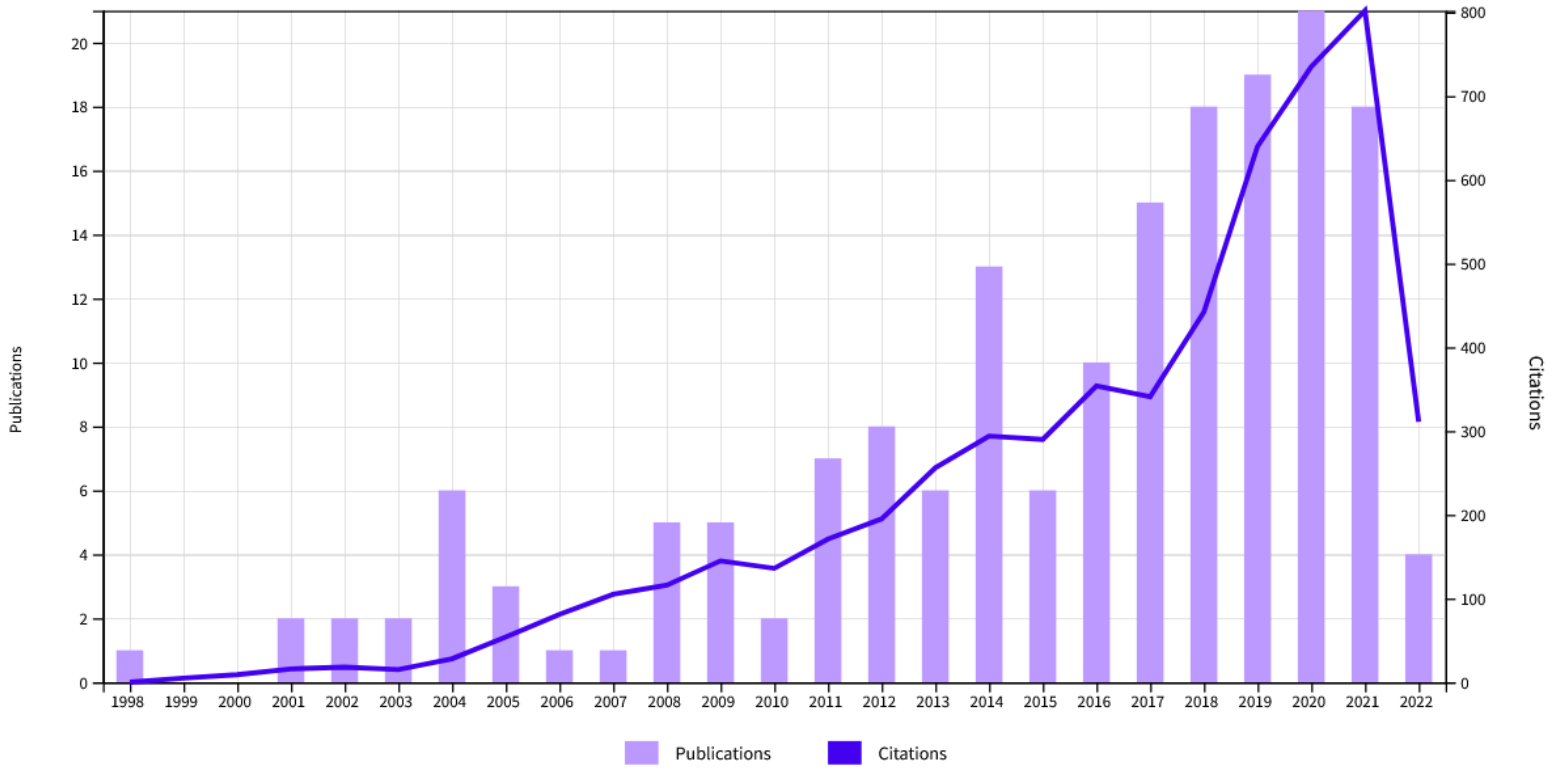
Citing Articles
3,756 Analyze
Total
3,605 Analyze
Without self-citations

Times Cited
5,559
Total
31.77
Average per item
5,081
Without self-citations

36
H-Index

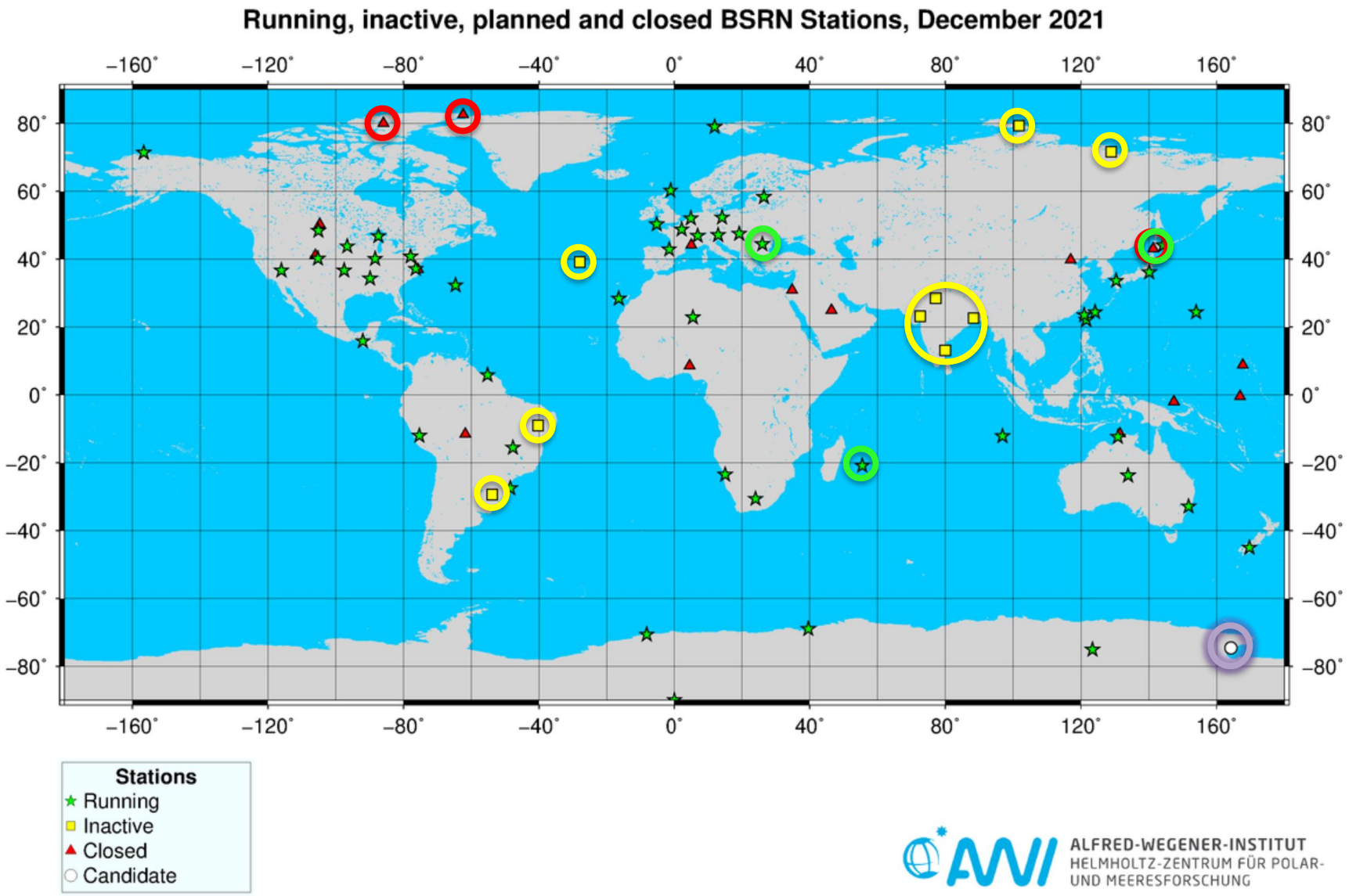
Times Cited and Publications Over Time

DOWNLOAD



Google scholar search ‚"BSRN" +radiation' : over **4500** hits (incl. grey literature)

Changes in stations



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Changes in stations

Since 2020:

- 3 stations declared as closed (only 1 of them really closed)
- 9 stations declared as inactive (ENA will become active soon)
- 3 new stations
- 1 candidate (Terra Nova Bay, already submitted raw data)
- 3 pending (from Cyprus, Indonesia, Thailand)

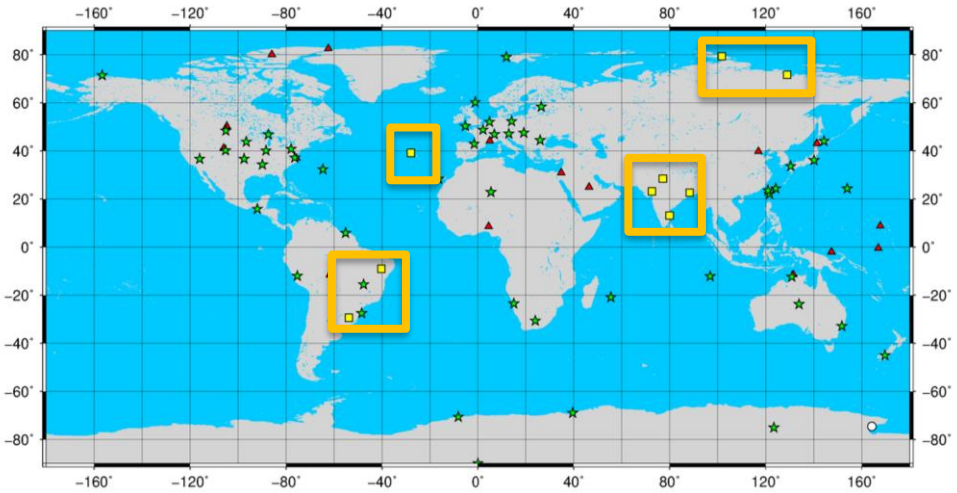
- Newcastle (NEW) will be marked as inactive due to Covid-related problems (station closed for large amounts of time, tracker and server problems)

Inactive stations - status

- GUR, GAN, HOW, TIR (India)
  During the COVID period, all the stations were shut down and currently, none of the stations is running.

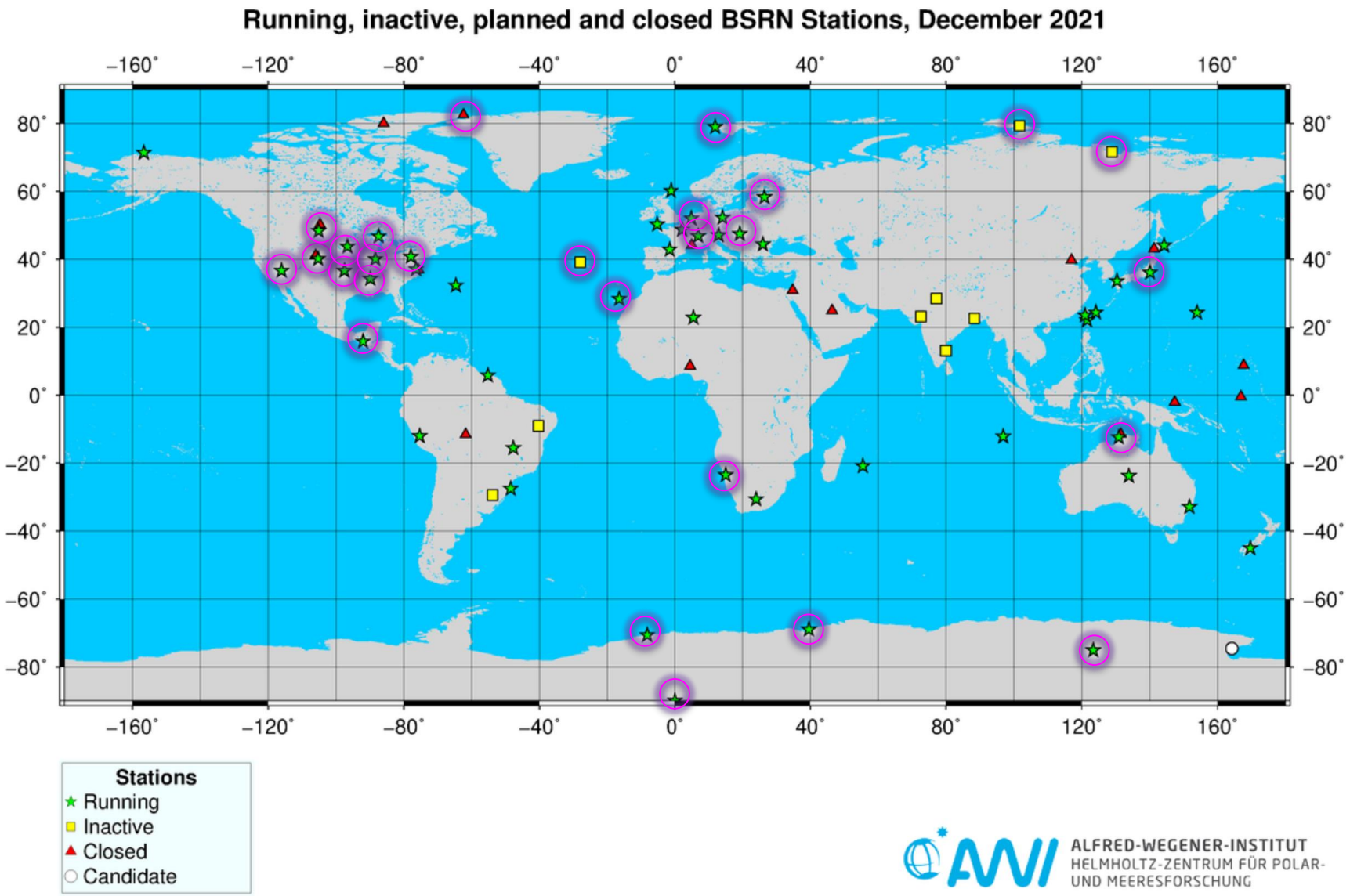
- PTR, SMS (Brazil)
  Lack of trained technicians, funding issues. Team will be partially restored July 2022. From August on the plan is to resume data upload

- CAP, TIK (Russia)
  CAP: Data quality issues, no personnell for processing,
  TIK: the whole system will be changed, incl. intercalibration submission resumed Dec 2022



- ENA: Data submission resumed

27 Stations with complete budget



Website news

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Errata and Updates

The station scientists are responsible for the quality of their submitted data. Within the archive all incoming data are format-checked and visualized. Files with obvious errors are not imported into the archive.

Nevertheless, errors within the archive cannot be fully excluded. If errors have been detected the erroneous data are replaced by corrected datasets. If corrected data cannot be submitted within a reasonable period of time, the questionable data will be deleted in PANGAEA, and a warning will be given in the corresponding ftp files.

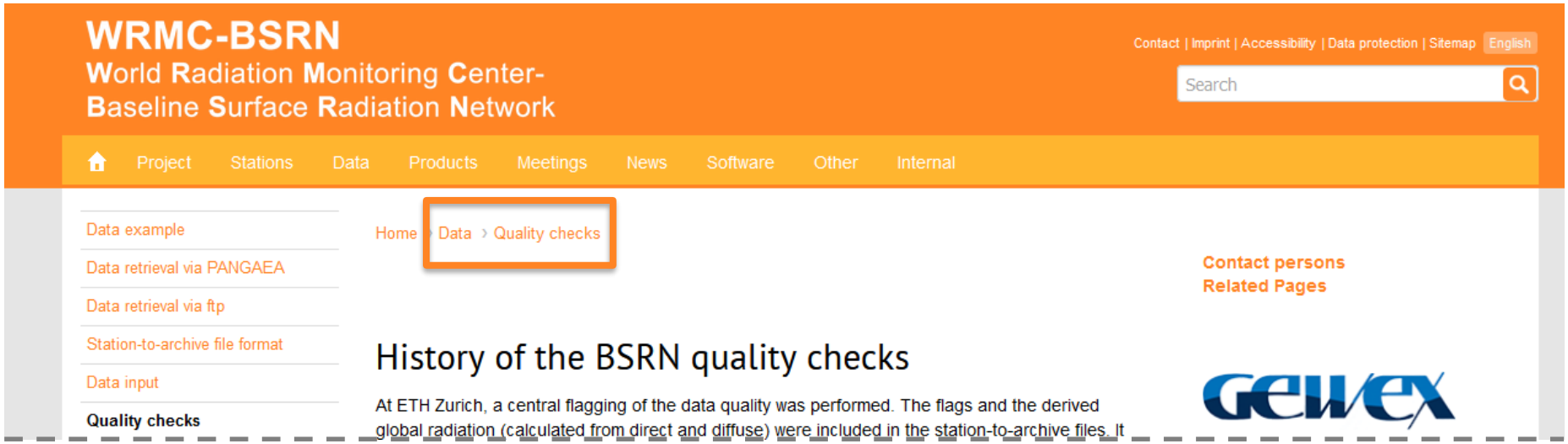
The version of the data is given in the first line of the station-to-archive files. New versions within PANGAEA obtain new doi-numbers. The old doi-numbers will not be deleted but linked to the new version. A comment in the PANGAEA meta-data displays the version number and the date of the change if more than one version has been submitted.

This page is written to inform the customers about detected errors and updated versions, or about stations behind schedule and the reasons hereof.

2022-02-01 Granite Island (GIM) data loss

The station got hit by an ice storm at the beginning of January 2022, and everything got covered with a layer of ice. Also, there was such a long period of heavy overcast that the solar power

Website news



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- **Quality checks**

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History of the BSRN quality checks

At ETH Zurich, a central flagging of the data quality was performed. The flags and the derived global radiation (calculated from direct and diffuse) were included in the station-to-archive files. It

Other quality check initiatives

There are of course many other initiatives for quality checks of solar data, a few of them are listed here (you are free to propose additions, just write us an E-Mail):

https://pypi.org/project/pybsrnqc/
https://github.com/LE2P/PyBsrnQC
--
https://assessingsolar.org/notebooks/quality_asessment.html
--
https://github.com/YvesMSaintDrenan/IEA_PVPS_T16_QC_pynb/blob/master/03_SolarDataQC.ipynb
--
https://github.com/dazhiyang/SolarData (see Yang D. 2018. SolarData: An R package for easy access of publicly available solar datasets, Solar Energy 171, doi:10.1016/j.solener.2018.06.107 and Yang, D. 2019. SolarData package update v1.1: R functions for easy access of Baseline Surface Radiation Network (BSRN), Solar Energy, 188, doi:10.1016/j.solener.2019.05.068)
--
http://www.bqcmethod.com/ (Urraca R, Sanz-Garcia I, Sanz-Garcia A. 2020. BQC: a free web service to quality control solar irradiance measurements over Europe. Solar Energy, 211, doi:10.1016/j.solener.2020.09.055)

BSRN Toolbox news

Toolbox programmer no longer available.
I can only program basic things and only for the windows version

⇒ MacOS and Linux version NOT updated (e.g. LR4000, renaming of MRS to INO)

⇒ Mathieu Delsaut (La Réunion station) might be able to help me at least with the Linux version

Cooperation with Data Quality WG

Current Workflow:

Data on ftp/incoming

WRMC checks data

Data overall ok

Inconsistencies detected

Data is uploaded to ftp/PANGAEA

Data is uploaded to bsrn-qc.net

contact to station scientist

Wouter checks with his Tool, contact to station scientist

BSRN Quality Control — Pilot

https://bsrn-qc.net/

Current issues

- Data Quality
- Covid – related problems for stations (see Indian stations etc.)
- Funding – related problems for stations (personnel, instrumentation, e.g. TAM still missing new tracker)
- Change in personnel, new scientists struggle with the set up/station-to-archive format (e.g. CAM/LER still no new submissions)
- No programmer for the Toolbox (I can only do basics for Windows Version)
- One remark from Wolfgang: change ftp protocol to ssh or cloud (e.g. Nextcloud) in future

https://doi.pangaea.de/10.1594/PANGAEA.914927

PANGAEA.

Data Publisher for Earth & Environmental Science

SEARCH SUBMIT HELP ABOUT CONTACT

Citation: **Maturilli, Marion (2020):** Basic and other measurements of radiation at station Ny-Ålesund (2006-05 et seq). *Alfred Wegener Institute - Research Unit Potsdam, PANGAEA,* https://doi.org/10.1594/PANGAEA.914927

Always quote citation above when using data! You can download the citation in several formats below.

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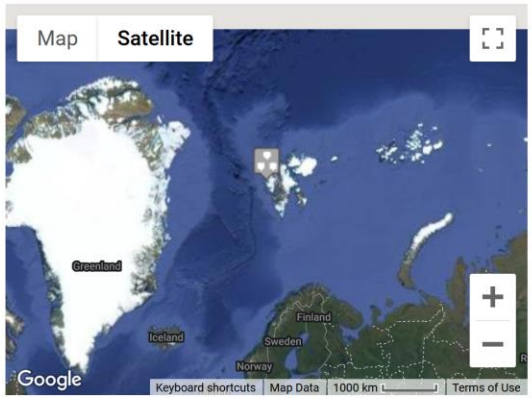

Abstract: This is a compilation of all short-wave and long-wave radiation datasets from Ny-Ålesund that were and are published in the frame of BSRN. New data will be added regularly.

Related to: **Maturilli, Marion; Herber, Andreas; König-Langlo, Gert (2014):** Basic and other measurements of radiation from the Baseline Surface Radiation Network (BSRN) Station Ny-Ålesund in the years 1992 to 2013, reference list of 253 datasets. *PANGAEA,* https://doi.org/10.1594/PANGAEA.150000

Project(s): **Baseline Surface Radiation Network** (BSRN)

Coverage: *Latitude:* 78.925000 * *Longitude:* 11.930000

Date/Time Start: 2006-05-01T00:00:00 * *Date/Time End:* 2022-02-28T23:59:00

Comment: Any user who accepts the BSRN data release guidelines (http://bsrn.awi.de/data/conditions-of-data-release) may ask Amelie Driemel (Amelie.Driemel@awi.de) to obtain an account to download these datasets.

Size: 108 datasets

https://doi.pangaea.de/10.1594/PANGAEA.914927

Grazie mille

to

the Directorate for Sustainable Resources of the Joint Research Centre

JRC
EUROPEAN COMMISSION

LR4000

Stations already submitting LR4000:
LIN, CAB, GVN, PAY
Probably soon: NYA

At the moment: only format check included in Toolbox, no extraction or QC,

Ideas: consistency check of LW(D and U) derived from LR4000 vs LR0100 and LR0300
=> BUT: who could be programming that into the Toolbox??!

Which infos need to be included in LR0003 for this logical record?

Table A.1. BSRN station-to-archive file format update LR4000 – pyrgeometer temperatures

Logical record	Line no.	Description of field / format of line	Range of values	Missing code	Format of v./l.
4000	1	date [day]	1-31		I2
pyrgeo.	1	time [minute]	0-1439		I4
temp	1	dome temperature 1 downward long-wave instrument [°C]		-99.99	F6.2
	1	dome temperature 2 downward long-wave instrument [°C]		-99.99	F6.2
	1	dome temperature 3 downward long-wave instrument [°C]		-99.99	F6.2
	1	body temperature downward long-wave instrument [°C]		-99.99	F6.2
	1	thermopile output downward long-wave instrument [W/m²]		-999.9	F6.1
	1	dome temperature 1 upward long-wave instrument [°C]		-99.99	F6.2
	1	dome temperature 2 upward long-wave instrument [°C]		-99.99	F6.2
	1	dome temperature 3 upward long-wave instrument [°C]		-99.99	F6.2
	1	body temperature upward long-wave instrument [°C]		-99.99	F6.2
	1	thermopile output upward long-wave instrument [W/m²]		-999.9	F6.1
		(X,I2,X,I4,X,4(F6.2,X),F6.1,2X,4(F6.2,X),F6.1)			
4nnn pyrgeo. temp. at nnn meter		Pyrgeometer temperatures from instruments mounted on towers at a height of nnn meters are coded according to the definitions for pyrgeometers at a standard height (~2 m), see LR4000			

Update date: 2022-01-25