

WRMC-BSRN

World Radiation Monitoring Center- Baseline Surface Radiation Network

The Baseline Surface Radiation Network Status

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BSRN Scientific Review and Workshop

- 14th BSRN Scientific Review Workshop
 - 26-29 April 2016 in Canberra, Australia
 - Hosted by Australian BoM
 - Host Nicole Hyett



https://www.wcrp-climate.org/WCRP_Reports/2016/WCRP_Report_17_2016_14th_BSRN_Meeting_Report.pdf

Selected Topics

- Of 12 new sites proposed:
 - 8 provisionally accepted as candidate BSRN sites
 - Rest need further development, invited to the 2018
 Workshop to present their progress
- Five former candidate sites which never submitted data have been excluded.
- Instituted new paradigm:
 - If station data is more than 2 years in arrears
 - Contacted by BSRN Project Manager to discuss plan
 - If data not caught up in another year, station may be listed as "Inactive" until issue addressed, or "closed" if not addressed

Stations Changes: New Sites

- 1) Cape Baranova, Russia (CAP)
- 2) Newcastle, Australia (NEW)
- 3) Lulin, Taiwan (LLN)
- 4) Dongsha Atoll, Taiwan (DON)
- 5) Gurgaon, India (GUR)
- 6) Howrah, India (HOW)
- 7) Gandhinagar , India (GAN)
- 8) Tiruvallur, India (TIR)

Stations Changes: Closed

- 1) ****Boulder (Tower), USA, Station closed in July 2016**
- 2) **Chesapeake Light House, USA, November, 2016
- 3) Darwin (ARM), Australia, Station closed in January 2015
- 4) Eureka, Canada, Station inactive end of 2011, being revitalized
- 5) Ilorin, Nigeria, Inactive as of mid-2005, seeking funding
- 6) Momote (Manus), Papua New Guinea, Station closed late 2013
- 7) Nauru Island, equatorial western Pacific, Station closed late 2013
- 8) Regina, Canada, Station closed end of 2011
- 9) Rolim de Moura, Brazil, Station closed 2008
- 10)**Sede Boger, Israel, data end Sept 2012, station closed

Current Stations: 2016

Running, planned, and closed BSRN Stations, May 2016



State of the WRMC (Sept 2016): 9011 station-months available

Baseline Surface Radiation Network

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

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

																						_						
Station	Short name	Station scientist currently in charge	pre BSRN ⁴	1992 [•]	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009					14	2015	All
Alert	ALE	Christopher Cox (christopher.j.cox@noaa.gov)														5	12	12	12	12				+ C	ň			Х
Alice Springs	ASP	Bruce Forgan (B.Forgan@bom.gov.au)					12	12	12	12	12	12	11	12	12	12	12	12						14		7		Х
Barrow	BAR	David Longenecker (David.U.Longenecker@noaa.gov)		12	12	12	12	12	12	12	12	12	12	12	12	12				- 4				•				Х
Bermuda	BER	David Longenecker (David.U.Longenecker@noaa.gov)		12	12	12	12	12	12	12	12	12	12	12	10				- 1			J '		12	2			Х
Billings	BIL	Charles Long (chuck.long@noaa.gov)			4	12	12	12	12	12	12	12	11	-			- 1	r C	21		-		12	4				Х
Bondville	BON	John Augustine (John.A.Augustine@noaa.gov)					12	12	12	12	12	12			_	. 1					U							Х
Boulder, SURFRAD	BOS	John Augustine (John.A.Augustine@noaa.gov)					5	12	12	12	-					<u> </u>		-		12	6							Х
Boulder	BOU	David Longenecker (David.U.Longenecker@noaa.gov)		12	12	12	12	12	12						∖∙		_	12	12	12	12	12	12	12	12	12	7	Х
Brasilia	BRB	Enio Bueno Pereira (eniobp@cptec.inpe.br)										$\mathbf{\gamma}$	K	70	-			8	10	4	12	12	12	6	12	12	1	Х
Cabauw	CAB	Wouter Knap (knap@knmi.nl)							-								11	12	12	12	12	12	12	12	12	12	8	Х
Camborne	CAM	Jonathan Tamlyn (jonathan.tamlyn@metoffice.gov.uk)								()		-		12	12	12	12	12	12	12	1					12	7	Х
Carpentras	CAR	Thierry Duprat (thierry.duprat@meteo.fr)				_	-1		ינ			12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	6	Х
Chesapeake Light	CLH	Fred M. Denn (Frederick.M.Denn@nasa.gov)		1		0						8	12	11	12	12	12	12	12	12	12	12	12	12	12	12	8	Х
Cener	CNR	Xabier Olano (xolano@cener.com)	_	d		O															6	12	12	12	7	8	1	Х
Cocos Island	COC	Bruce Forgan (B.Forgan@bom.gov.au)	20		~ ~	-										3	10	8	12	12	12	12	12	9	4	12	3	Х
De Aar	DAA	Lucky Ntsangwane (lucky.ntsap										7	6	12	11	12	1											Х
Darwin	DAR	Charles Long (chuck le												10	12	12	12	12	12	12	12	12	12	12	12	10	1	Х
Desert Rock	DRA	John Augustin								10	12	12	12	12	12	12	12	12	12	12	6							Х
Concordia Station	DOM	Vite																12	12	12	12	2						Х
Darwin Met Office	DWN																			12	12	12	12	12	9	12	3	Х
Eureka	-																		4	12	12	12	12					Х
Southern Great P		_noaa.gov)				12	7	12	12	12	12	12	12	12	12	12	12	12	12	12	11	12	12	4				Х
Florianopo	7 7	gemc.ufsc.br)				6	12	12	10	12	12	9	12	12	12	12	12								4	12	6	Х
Fort Peck		Justine (John.A.Augustine@noaa.gov)					12	12	12	12	12	12	12	12	12	12	12	12	12	12	6							х
Fukuoka		nasao Omori (rrc-jma@met.kishou.go.jpp)																				9	12	12	12	12	7	Х
Goodwin Cree		John Augustine (John.A.Augustine@noaa.gov)					12	12	12	12	12	12	12	12	12	12	12	12	12	12	6							х
Gobabeb	GOB	Roland Vogt (roland.vogt@unibas.ch)																						8	12	12	8	х
Neumayer Station	GVN	Gert König-Langlo (Gert.Koenig-Langlo@awi.de)	121	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	1	х
Death		7.0.1			10	~	-			-				-			-											1

Total of 23 stations measure complete up and down radiation budget

Lauder	LAU	Bruce Forgan (B.Forgan@boni.gov.au)								9	12	12	12	12	12	12	12	12	12		12	12	12	12	9		^
Lerwick	LER	Jonathan Tamlyn (jonathan.tamlyn@metoffice.gov.uk)										12	12	12	12	11	11	12	5						12	8	х
Lindenberg	LIN	Klaus Behrens (Klaus.Behrens@dwd.de)			3	12	12	12	12	12	12	12	12	12	12	12	12	4									х
Langley Research Center	LRC	Fred M. Denn (Frederick.M.Denn@nasa.gov)																							1	8	х
Momote	MAN	Charles Long (chuck.long@noaa.gov)					3	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	10			х
Minamitorishima	MNM	Masao Omori (rrc-jma@met.kishou.go.jp)																			9	12	12	12	12	7	х
Nauru Island	NAU	Charles Long (chuck.long@noaa.gov)							2	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9			х
Ny-Ålesund	NYA	Marion Maturilli (Marion.Maturilli@awi.de)	5	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12		Х

Scientific Impact



BSRN Working Groups (Active)

- Infrared Working Group (Julian Gröbner)
- Spectral Working Group (Kathy Lantz)
- Broadband Shortwave Working Group (Allison McComiskey)
- Cold Climate Issues Working Group (Chris Cox)
- Uncertainties Working Group (Nicole Hyett ~ Interim Ian Dollery)
- Long-Term Data Sets Working Group (Martial Haeffelin)
- Archive Working (Gert König-Langlo)

Infrared WG Activities

Tasks for the period 2016-2018

- Address the consistency between pyrgeometers under wet climates with regard to high integrated water vapor,
- Investigate the use of either WISG or Blackbody based calibrations of pyrgeometers used to measure upwelling longwave irradiance,
- Gather information and investigate different methodologies for reevaluation of BSRN irradiance datasets in view of an eventual recalibration of BSRN radiometers,
- Compare pyrgeometer calibrations from different Institutes and investigate their consistency,
- Investigate the stability of pyrgeometers over time in view of applying recent calibrations to past datasets.

Infrared WG Activities

- #3 Gather information and investigate different methodologies for re-evaluation of BSRN irradiance datasets in view of an eventual recalibration of BSRN radiometers
 - I. Reda (various pyrgeometer equations),
 - L. Vuilleumier (reprocessing 1-min vs 1-sec),
 - S. Nyeki (investigate reprocessing methodologies and potential Wvp dependency)
- #5 Investigate the stability of pyrgeometers over time in view of applying recent calibrations to past datasets.
 - J. Michalsky, Eppley PIRs appear very stable, new cals applied to older data within +/- 2 Wm⁻²
 - I. Reda, 6 PIRs blackbody sensitivity changes of 1% or less over a period of 7 seven years
 - PMOD/WRC, mostly stable instruments but some sensitivity changes of up to 2% can occur, individual instrument dependent

Point 5: Information provided by J. Michalsky



Over 20 blackbody calibrations performed over the period of 15 years show differences in the downwelling IR of ±2 Wm^{-2,} independently on how the instrument was exposed (laboratory or hot and cold environments)







BSRN Cold Climate Issues Working Group

 Carry out an ice mitigation strategy inter-comparison campaign



- An organizational meeting was held at NOAA on Aug 29, 2016
- Barrow, Alaska identified as an accessible polar location that experiences the types of icing conditions impacting BSRN-CCIWG field measurements, has the necessary facilities/ resources, and includes a long-established BSRN station
 A 6-12 month campaign is tentatively scheduled at Barrow

for 2018-2019



BSRN Cold Climate Issues Working Group

- Collaboration between NOAA PSD and GMD, discussed at August 29 meeting
- Initial deployment of the station may coincide with the ice-mitigation campaign

 Develop a mobile radiometric inter-comparison station for cross-site validation



Cold Climate Interactions

- BSRN will participate in the polar prediction project (
 - http://www.polarprediction.net/yopp.html)
 - BSRN polar sites should be up-to-date in the archive ahead of YOPP (mid 2017 2019)

Intercomparison of Infrared Radiation References campaign

- Proposed for fall 2017, ARM SGP site
 - Has multitude of observation resources
- PMOD IRISs, NREL ACP, WISG-referenced
- Trying to resurrect original ASR, but doubtful
- Coordinate with Radiation Scales Task Team for WMO/CIMO
 - Investigate traceability of above plus PMOD and NREL Black Body reference units

IRIS: Infrared Integrated Sphere Radiometer (PMOD/WRC) ACP: Absolute Cavity Pyrgeometer (NREL) WISG: World Infrared Standard Group ASR: Absolute Sky-scanning Radiometer

BSRN Archive

- Denoted as the <u>World Radiation Monitoring</u> <u>Center</u>
- Since 2008 operated by the Alfred Wegener Institute for Polar and Marine Research (AWI), Germany
 - Under the direction of <u>Dr. Gert Koenig-Langlo</u> who is retiring this coming June
- Happy to report that AWI director Karin Lochte agreed to continue support
- WRMC data curator Dr. Amelie Driemel is the designated successor

Summary

- BSRN includes 59 stations with contributed data
 - > 750 station-years of observations
 - Dispersed from 90° S through 82° N
- 8 new sites have been provisionally approved
- Increasing recognition, use, and scientific impact

Thank You!

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Following are extra

Cold Climate Interactions



Several BSRN stations in the International **Arctic Systems** for Observing the **Atmosphere** (IASOA) **Radiation Working Group**

BSRN Objectives

- Monitor the surface shortwave and longwave radiative components and their changes with the best methods and instrumentation currently available (*Detailed observations*)
 - Spatially and climatologically diverse sampling
- Provide accurate data for the calibration of satellite-based estimates of the surface radiative fluxes (*Global coverage*)
- Produce high quality observational data for validating the theoretical computations of radiative fluxes by models (<u>Climate prediction</u>)

BSRN Objectives

- Not only to carry out the measurements, but also to improve fundamental measurement capabilities.
 - Goal is to provide the highest possible quality data from continuously-operated long-term field sites.
- BSRN has developed instrumentation, calibration, and operating practices that fulfill highest specifications
 - McArthur L.J.B. 2004: Baseline Surface Radiation Network (BSRN). Operations Manual. WMO/TD-No. 1274, WCRP/WMO.
- Volunteer organization, with stations sponsored by host organizations and governments