STATUS OF THE IZAÑA BSRN STATION IN JULY 2018

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The Izaña Atmospheric Observatory (IZA) is part of the World Meteorological Organization (WMO) Global Atmosphere Watch (GAW) programme and is managed by the Izaña Atmospheric Research Center (IARC) from the Meteorological State Agency of Spain (AEMET). It is located in the Tenerife Island (The Canary Islands; 28º18' N, 16º29' W, 2.367 m asl) above a quasi-permanent temperature inversion layer with excellent conditions for *in situ* and column measurements of trace gases and aerosols under "free troposphere" conditions. The environmental conditions (stable total column ozone, very low precipitable water vapour and low aerosols content) and the high frequency of clean and pristine skies made IZA an optimal site for calibration and validation activities. In fact, IZA is a WMO-CIMO Testbed for Aerosols and Water Vapor Remote Sensing Instruments and the WMO Regional Brewer Calibration Center for Europe (RBCC-E). The radiation site in Izaña is part of BSRN since March 2009. (http://www.bsrn.aemet.es/)

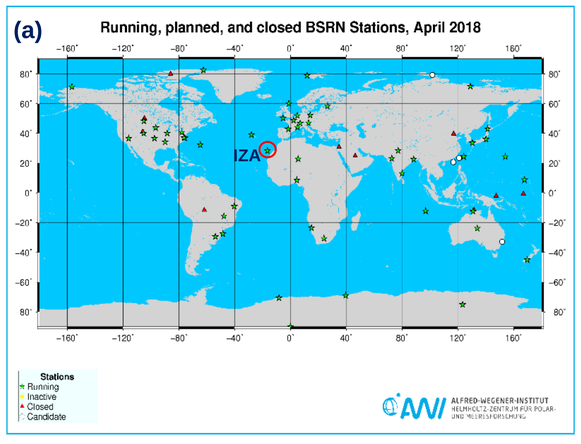
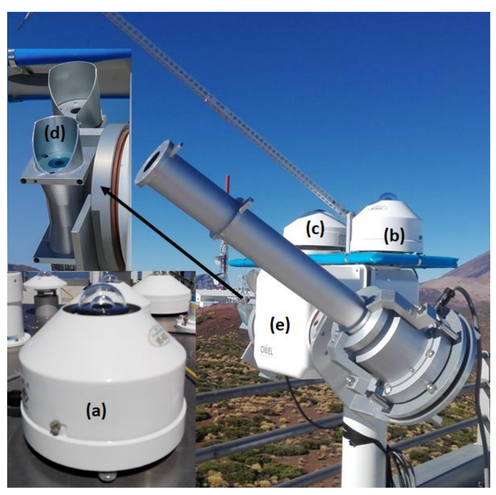


Figure 1.- (a) Location of the Izaña station (IZA) on a global map with all BSRN stations (http://bsrn.awi.de). (b) Izaña Atmospheric Observatory. Views from the Izaña radiation station: (c) Northern and Eastern Views (Azimuth 360°, Inclination 0 degrees; Azimuth 90°, Inclination 0°, respectively) (d) Southern and Western Views (Azimuth 180°, Inclination 0° and Azimuth 270°, Inclination 0°, respectively).

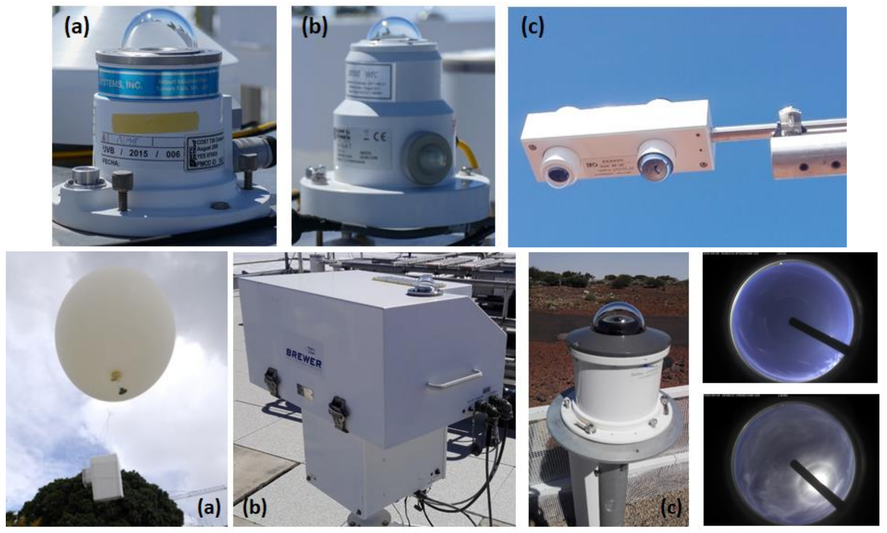
MEASUREMENTS AND INSTRUMENTS

The basic measurement programme included in the BSRN Program at IZA are global shortwave radiation (SWD), direct radiation (DIR), diffuse radiation (DIF) and longwave downward radiation (LWD) (Figure 2). The extended measurements include ultraviolet measurements (UV-A and UV-B), shortwave upward radiation (SWU) and longwave upward radiation (LWU) (Figure 3). Apart from the solar radiation measurements data from radiosondes (Figure 4) (vertical profiles of temperature, humidity and wind) and total ozone column thickness are included as ancillary information.



BASIC MEASUREMENTS

Figure 2.- Basic radiation instruments currently installed at IZA BSRN. (a) SWD: global shortwave radiation; EKO MS-802F pyranometer installed on a horizontal table, (b) DIF: diffuse radiation; EKO MS-802F pyranometer (c) LWD: downward longwave radiation; Kipp Zonen CGR4 pyrgeometer, (d) DIR: direct radiation; EKO MS-56 pyrheliometer, and (e) Owel INTRA 3 sun tracker.



EXTENDED MEASUREMENTS

Figure 3.- Extended radiation instruments currently installed at IZA BSRN. (a) UV-B: UVB radiation; Yankee YES pyranometer, (b) UV-A: UVA radiation; Kipp & Zonen UV-A-S-T and (c) SWU and LWU: net radiation; EKO net radiation MR-60.

OTHER MEASUREMENTS

Figure 4. Other instruments currently used at IZA BSRN (a) radiosonde profiles, (b) Brewer spectrophotometer and (c) All-Sky SONA camera (Automatic Cloud Observation System) installed at IZA and images taken by the camera.

BSRN RECOMMEND QUALITY CONTROL (QC)

The IZA Quality Control (QC) procedure has two main parts: the recommend BSRN controls and the comparison with radiative transfer model (RTM) simulations. The first QC step is to apply the QC criteria recommended by WRCM. These QC criteria are based in checking the measurements are within certain limits: physically possible (PPL), extremely rare (ERL) and the comparison of various irradiance components (Figure 5). The second QC steps consists on the comparison of instantaneous and daily radiation measurements with RTMs (Figure 6 and Table 1).

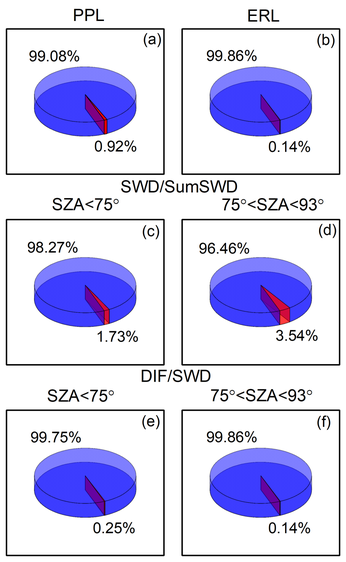


Figure 5.- Percentage of missing data (red color) and good quantities (blue color) according to the physically possible (PPL) and extremely rare limits (ERL), and comparison of various radiance components (SWD, SumSWD and DIF) at IZA between 2009 and 2017.

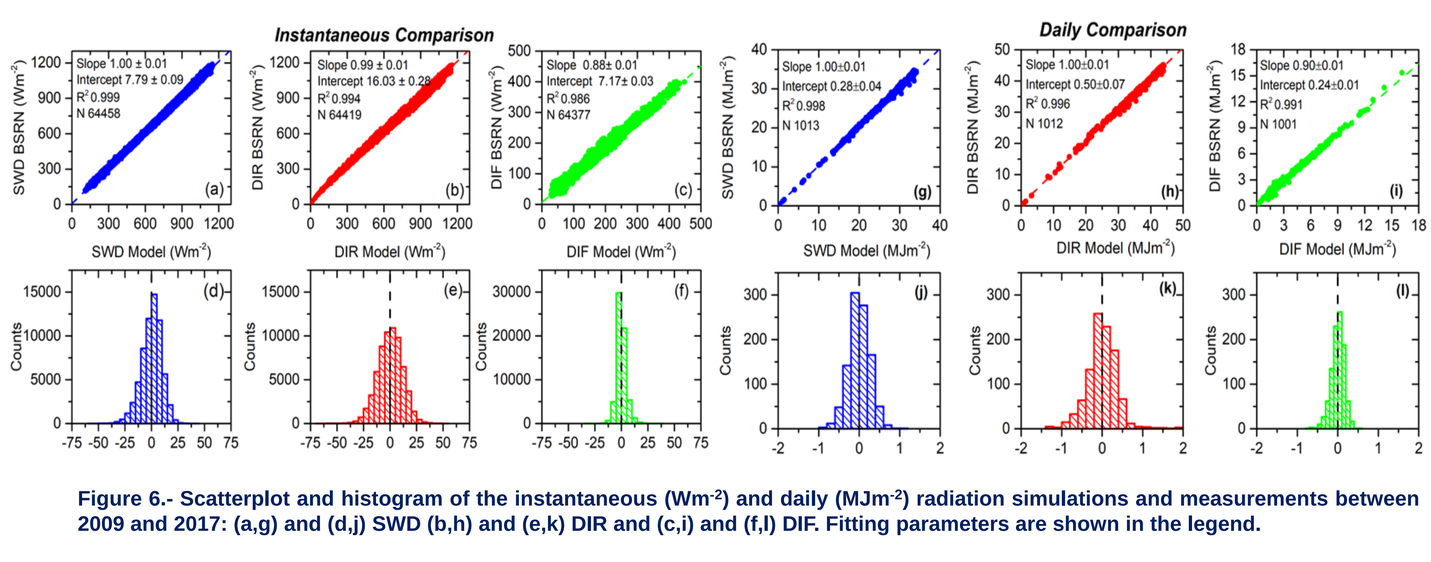


Figure 6.- Scatterplot and histogram of the instantaneous (Wm^{-2}) and daily (MJm^{-2}) radiation simulations and measurements between 2009 and 2017: (a,g) and (d,j) SWD (b,h) and (e,k) DIR and (c,i) and (f,l) DIF. Fitting parameters are shown in the legend.

Table 1.- Statistics of the bias between instantaneous and daily simulations and measurements at IZA BSRN for the period 2009-2017 (in %). MB, mean bias; STD, standard deviation and RMSE, root mean square error.

	MB(%)		STD(%)		RMSE(%)	
	Instantaneous	Daily	Instantaneous	Daily	Instantaneous	Daily
SWD	-1.68	-1.24	2.26	1.03	2.28	1.58
DIR	-1.57	-1.82	1.92	1.17	2.00	2.07
DIF	0.08	0.84	7.90	8.69	9.89	9.11

BSRN DATA SERIE AT IZA

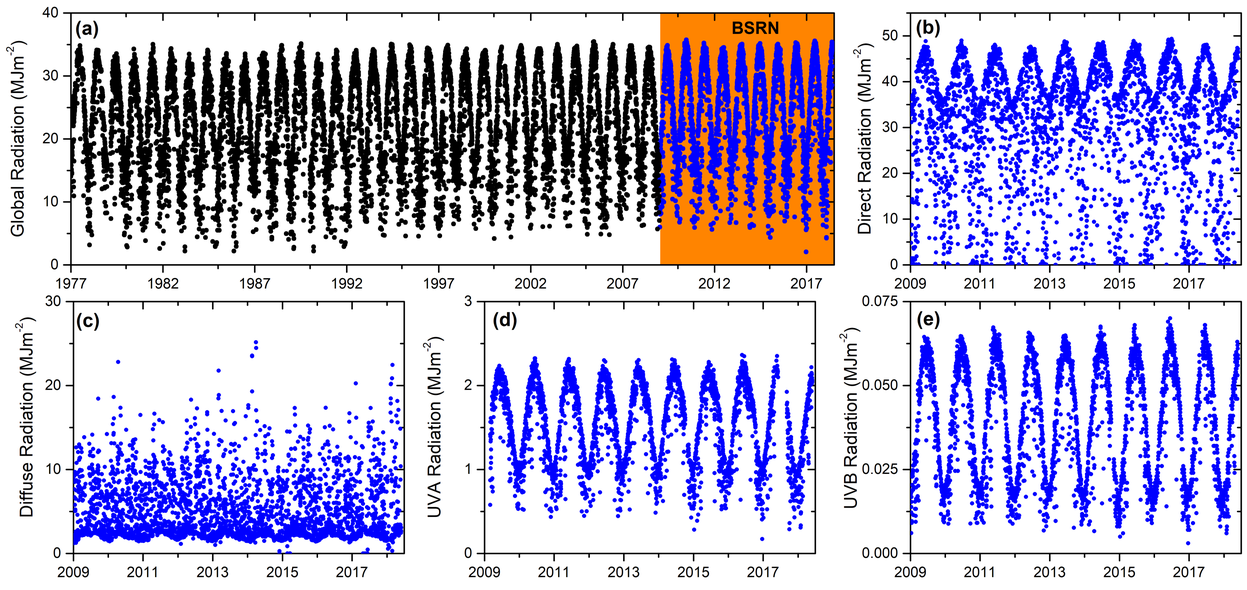


Figure 7.- Daily values (MJm^{-2}) of (a) global, (b) direct, (c) diffuse, (d) UVA and (e) UVB radiation at IZA BSRN.

IZA BSRN PEER-REVIEWED SCIENTIFIC PAPERS

- García, R. D., Cuevas, E., Ramos, R., Cachorro V.E., and Redondas, A. 2018. Status of the Izaña BSRN station: 2009-2017, Geosci. Instrum. Method. Data Syst., In preparation.
- García, R. D., Barreto, A., Cuevas, E., Gröbner, J., García, O. E., Gómez-Peláez, A., Romero-Campos, P. M., Redondas, A., Cachorro, V. E., and Ramos, R. 2018,Comparison of observed and modeled cloud-free longwave downward radiation (2010–2016) at the high mountain BSRN Izaña station, Geosci. Model Dev., 11, 2139-2152, doi:10.5194/gmd-11-2139-2018.
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- García, R. D., García, O. E., Cuevas, E., Cachorro, V. E., Barreto, A., Guirado-Fuentes, C., Kouremeti, N., Bustos, J. J., Romero-Campos,P.M.,anddeFrutos,A.M.2016. Aerosol optical depth retrievals at the Izaña Atmospheric Observatory from 1941 to 2013 by using artificial neural networks, Atmos. Meas. Tech., 9, 53-62, doi:10.5194/amt-9-53-2016.
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