14th BSRN Scientific Review and Workshop , Canberra, Australia 26-29 April 2016

Status of Tamanrasset BSRN station

Lamine Boulkelia
National Meteorological Office P.O.Box 31 Tamanrasset 11000 Algeria
Office::+213 29 314 673 Mobile:+213 551 967 389
lamine.boulkelia@gmail.com

INTRODUCTION

The Tamanrasset BSRN station (TAM) is part of the GAW Global Station couple site Assekrem/Tamanrasset which belongs to the National Meteorological Office of Algeria. It is located in desert rock region between equatorial and mid-latittude (lat.22° 47'N, long. 5° 31'E, alt. 1377 m.a.s.l.). The site of Hoggar is chosen for the geographical position, heigh altitude and excluded local anthropogenic pollution. GAW activities began in September 1994 when radiation (with a 3 mn step) is one of the main programs measuring solar shortwave radiation including UV-B. Since March 2000, the station was upgrated in the high accuracy BSRN network with the sponsor of STAR-CMDL-Boulder. Thus, it is provided with shaded Eppley diffuse PSP and shaded Eppley PIR with CR23X data logger. In addition to basic measurements (LR0100), ultraviolet measurements (LR0500), synop (LR1000) with upper air data (LR1100) from Airport station (8km in the West) and total ozone column (LR1200) are regulary transmitted on a monthly basis to the WRMC-BSRN hosted by AWI in Germany. At present, a total of 193 files have been already Accepted (March 2000-March 2016).

.

Fig.1. Location of Tamanrasset BSRN. Station.

INSTRUMENTS & MEASUREMENTS

BASIC MEASUREMENTS

-Direct Radiation (Eppley NIP Pyrheliometer).

-Global Radiation (Eppley PSP Global Pyranometer).

-Diffuse Radiation (Shaded Eppley PSP Pyranometer).

-Longwave Downward radiation LWDn (Shaded Eppley PIR Pyrgeometer).

Fig.2. Solar & thermal radiation instruments installed on the roof.

EXPANDED MEASUREMENTS

-Ultra violet measurements (YES UVB~1 Pyranometer).

-Meteorological synoptical observations (WMO,#60680).

-Radiosonde measurements (WMO,#60680).

-Total Ozone Column (Dobson Spectrophotometer#11).

Fig.3. UVB & Total Ozone.

OTHER MEASUREMENTS

The site allows some other measurements like Turbidity with Sun Photometer (since 1987), AOD with CIMEL Photometer - AERONET (In cooperation with AEMET-Spain since 2006) and Total Ozone & Spectral UV with Brewer Spectrophotometer (2011).

CALIBRATION

The calibration of solar instruments is done yearly in situ generally in January where weather conditions are excellent with an Automatic Absolute Cavity Solar Radiometer Model AHF (# 29225) and Model 406 Radiometer Control Box (# 9964). The results for BSRN components in 2016 are shown in the table below:

	K_{new}[µV/W/m^2]	K_{old}[µV/W/m^2]
Direct	7.73	7.72
Global	6.92	6.80
Diffuse	6.89	6.68

For this year global and diffuse coefficients Increase about 2% and 3% comparatively to 2015. while the NIP coefficient is more stable.

Fig.4. Pyrheliometer mounted on AHF Cavity & Radiometer Control Box.

RESULTS & APPLICATIONS

DAILY VARIATION The graphs highlights the daily behavior of solar and atmospheric radiation in desert environment. Also, in summer period from May to September, Tamanrasset is influenced by monsoon flux with an important cover sky and haze. Consequently, the direct decrease and diffuse increase rapidly have an opposite reaction to climate variability. In fact, the saisonnal variation of global and LWDn are more stable.This year the daily averages are: 22.17MJ(NIP), 7.75MJ(DIF), 23.92MJ (GLB) and 28.67MJ(LWDn).

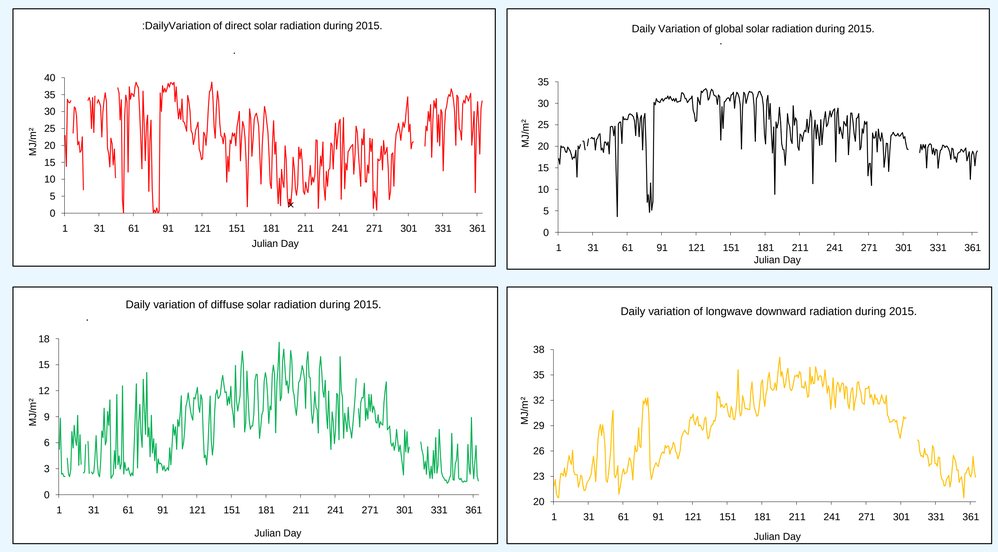
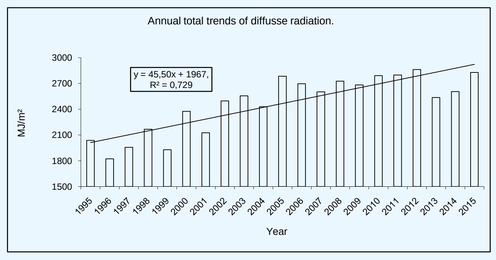


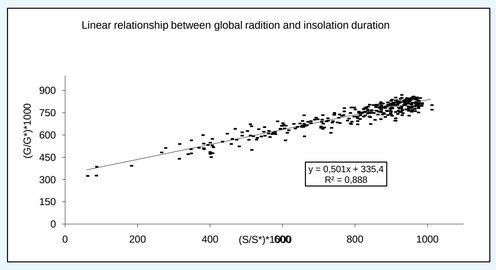
Fig.5. Daily variation of BSRN parameters

SOME APPLICATIONS

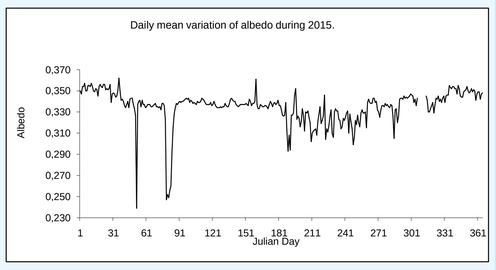
•The interannual trends of annual totals shows that diffuse energy increase lineary since 2000 due probably to the change of methode of measure from shadow band to shade disk.



•To quantify the relationship between solar global radiation and duration of insolation, we use the normalised relation G/G*=f(S/S*) , where G* is the daily extraterrestrial global and S* is the daily theoretical insolation.



•The daily mean values of albedo are comprised between 24% (min.abs) on instable day of 21st February and 36% on the 5th of the same month..The annual average is 34%.



• Except few days per year net radiation is frequently in excess in desertic region.. Incoming SW and LW radiation are often greater than outcoming ones. The total budget Is about 431 kWh/m2 or 1.18 kWh/day.

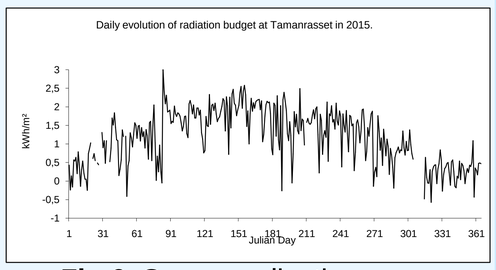


Fig.6. Some applications.

CONCLUSION

Measuring radiation and atmospheric parameters in desert environment is a good opprtunity for sciientific community to understand the behavior of climate in this special area but more cooperation is needed especially in radiation modelling and quality control.