Total Downwelling SW IR Loss Correction at ARM Sites

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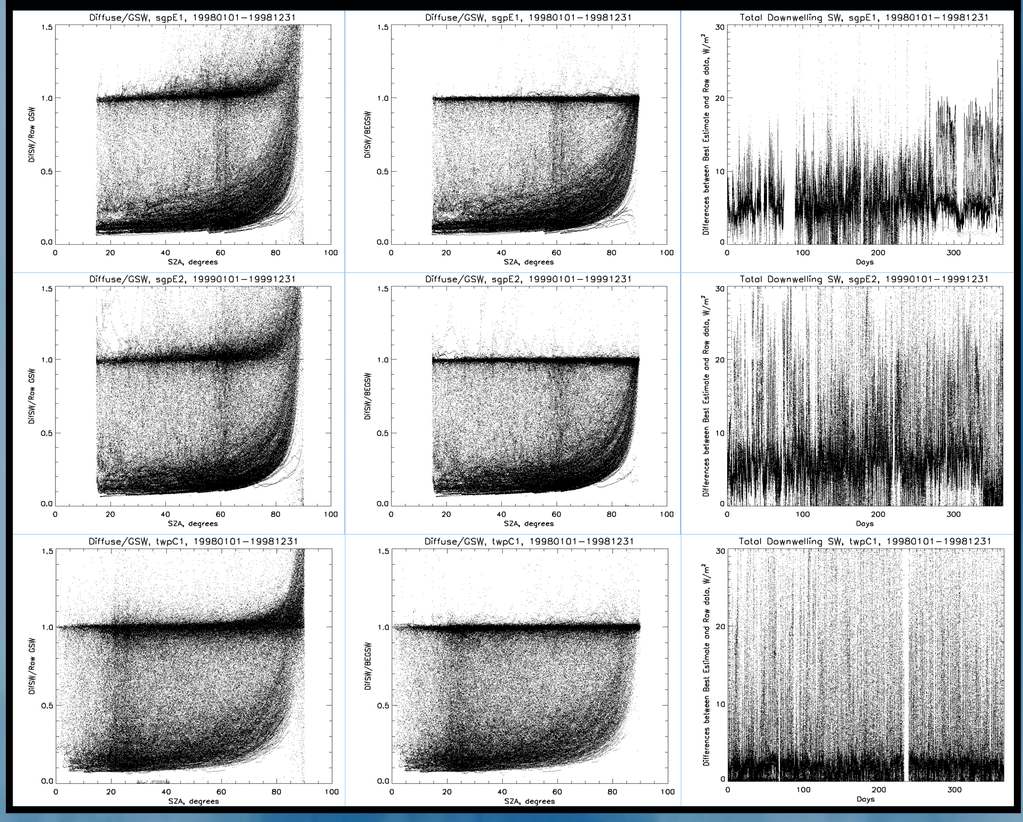
Introduction

Recent study has indicated that the unshaded Eppley PSP global shortwave (GSW) measurements in ARM suffer IR loss at about the same level as that for the historical shaded Eppley PSP diffuse SW measurements. Thus a VAP is being developed to apply the same IR loss correction methodology that has been developed for the Diffuse Correction VAP (DiffCorr1Dutt) to the unshaded PSP measurements. The result of this VAP will be available on a yearly basis, these particular output will then be immediately fed into the QCRad VAP (QCRad1Long) and will be distributed as “c2” and “s2” level files through the ARM ARCHIVE.

Ratio of Diffuse over GSW at various ARM sites at different times. Left plots: corrected diffuse over uncorrected GSW; Middle plots: corrected diffuse over corrected GSW; Right plots: time series of GSW correction. No apparent seasonal variation shows in the amount of corrections

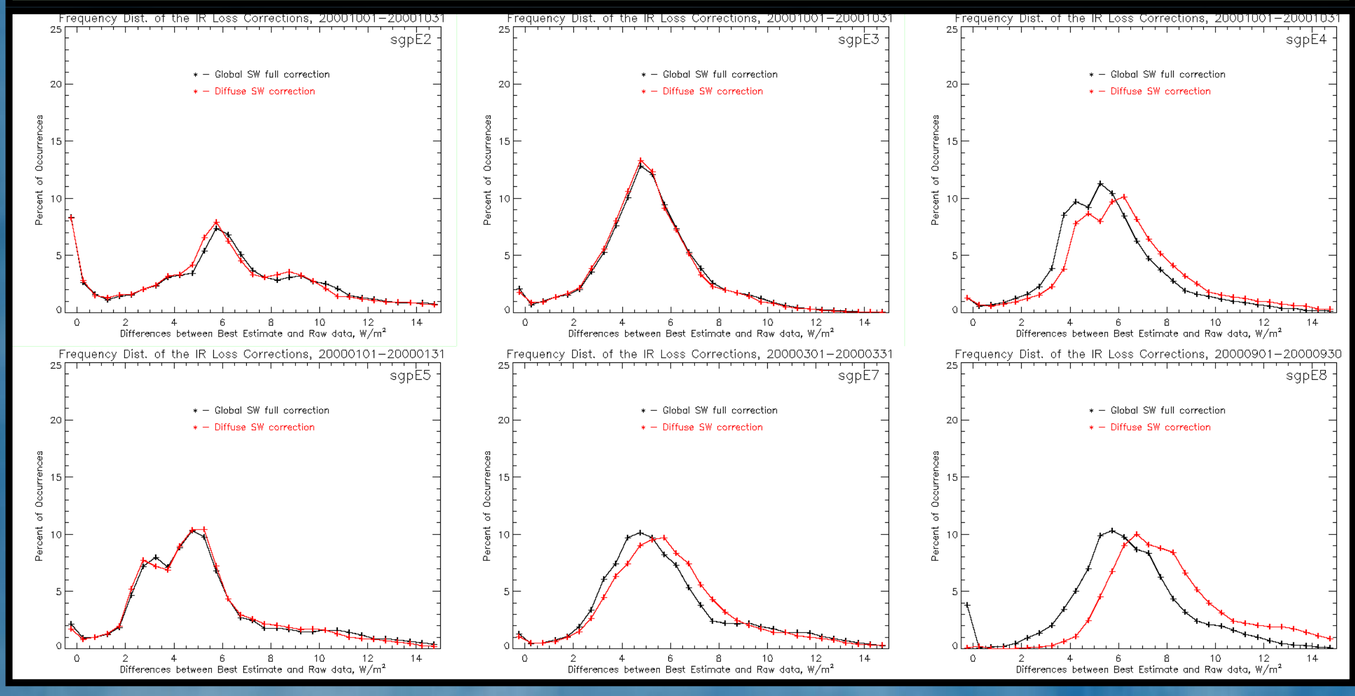


IR loss correction for GSW data

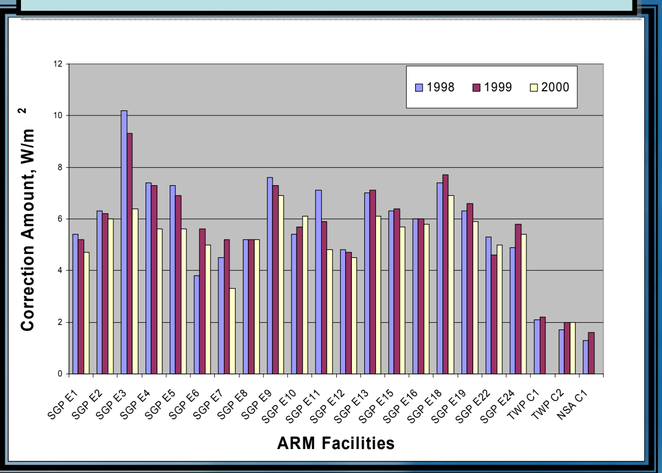
- Night time GSW data are compared with collocated pyrgeometer detector fluxes
- Data are divided into two modes when correction coefficients are calculated:
  - Dry mode: RH < 80 and detector flux < -100 Wm^{-2}
  - Moist mode: RH >= 80 and detector flux >= -100 Wm^{-2}
- Radiometers are replaced each year, coefficients are calculated for each radiometer

  Note: RH = relative humidity

Frequency Distribution of GSW and diffuse corrections at various ARM sites and times. These figures show that the GSW corrections are nearly the same magnitude and frequency as diffuse corrections. Small differences are due to the specific IR loss characteristics of individual instruments.



GSW corrections from 1998 to 2000 at various ARM facilities. The figure shows that the corrections at TWP and NSA sites are less than half of the corrections at SGP sites



Summary

- **Radiometers are replaced each year, correction coefficients are calculated yearly for each radiometer**
- **GSW corrections are about the same magnitude as PSP diffuse corrections**
- **GSW corrections for TWP and NSA are about half those for SGP**
- **No apparent seasonal changes in the corrections**
- **DATA will be feed back to QCRad VAP for reprocessing and distributed as “c2” and “s2” level files through ARM ARCHIVE**

REFERENCES

Younkin, K. and C. N. Long, (2004): Improved Correction of IR Loss in Diffuse Shortwave Measurements: An ARM Value Added Product, Atmospheric Radiation Measurement Program Technical Report, ARM TR-009, Available via http://www.arm.gov/publications/techreports.stm.

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