

The Infrared Sky Imager: A new instrument at the ARM Southern Great Plains site

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Introduction

The Solmirus Corporation received funding by the U.S. Department of Energy to develop a diurnal sky cover (SC) data product utilizing the infrared radiometrically-calibrated data from their All Sky Infrared Visible Analyzer (ASIVA) instrument. Nighttime SC has long been a critical programmatic gap in ARM's observational data set and is an important factor in understanding the life cycle of clouds, one of the central themes of the ASR program. An ASIVA instrument has been purchased to fill this gap and has been in operation at the Southern Great Plains (SGP) site since May of 2014. In this poster we discuss the SC data products (both infrared and visible) that are currently available from this instrument entitled the Infrared Sky Imager (IRSI). We also discuss additional data products developed under the grant and their possible inclusion to the IRSI datastreams.

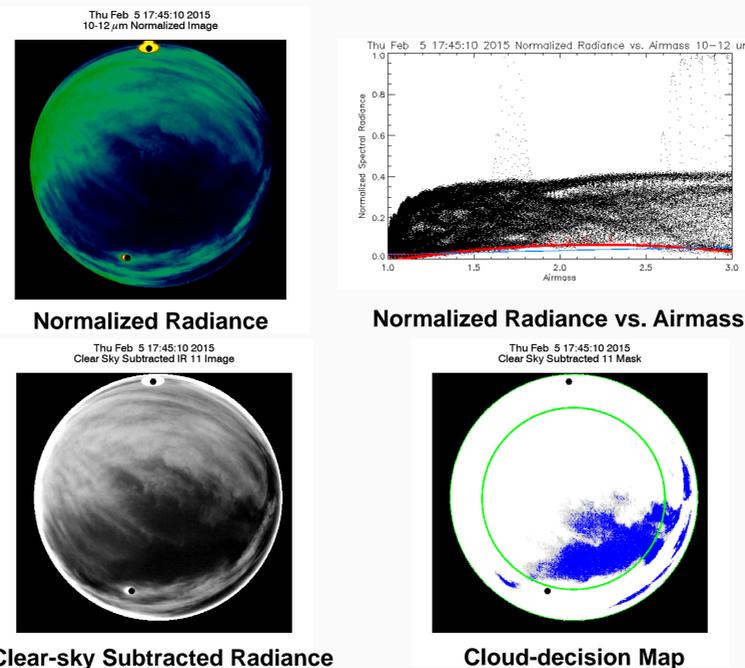
ASIVA Instrument at SGP



- ▶ Installed at ARM SGP in May of 2014.
- ▶ Infrared subsystem:
 - Detector: Uncooled microbolometer
 - Wavelength range: 8 – 14 μm
 - Filters: 10 – 12 μm (sky cover, brightness temperature) and 8 – 9 μm (color temperature and PWV)
 - Image resolution: 640 \times 512 pixel, 14-bit
 - Field of view: 180°
- ▶ Visible subsystem:
 - Detector: Interline cooled CCD (color) with electronic and mechanical shutter
 - Filters: Neutral density $\times 10^{-2}$ and $\times 10^{-4}$
 - Image resolution: 3296 \times 2472 pixel, 16-bit per color
 - Field of view: 180°

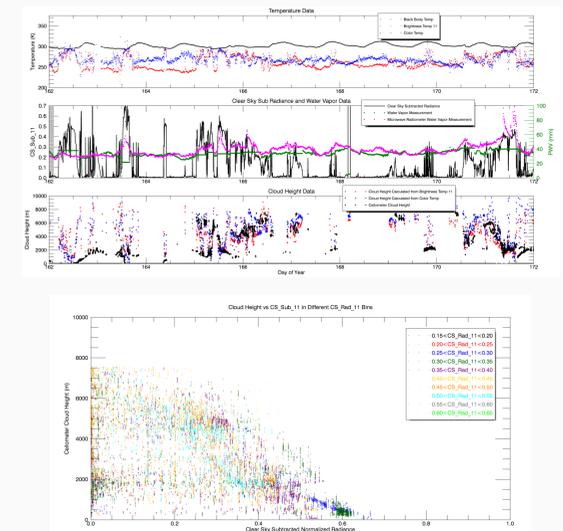
IR Sky Cover Determination

Clear-sky subtraction allows for determination of fractional sky cover.



Potential Data Products for IRSI

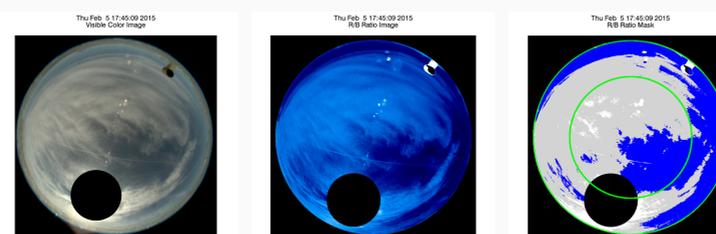
The IRSI instrument has the potential to provide other useful data products, which include sky/cloud temperature (brightness and color), PWV, cloud height, and cloud optical depth.



Compiled data from Solmirus' 2009 field campaign at SGP

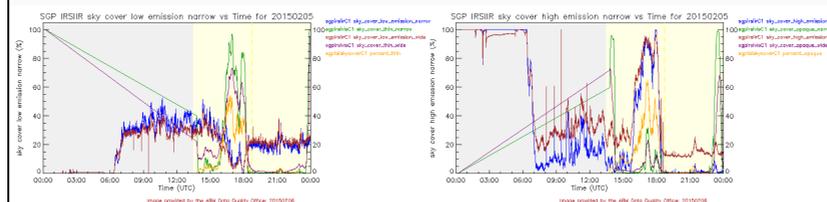
Visible Sky Cover Determination

Uses same basic method as Total Sky Imager (TSI) to determine fractional sky cover.



Sky Cover Statistics

Sky cover computed every 30 seconds.



Summary

- ▶ IRSI instrument installed and operational at SGP.
- ▶ Data are available from ARM Archive (sgpirsiirC1.b1, sgpirsiirskyimageC1.a1, sgpirsiirclmaskC1.a1, sgpirsivisC1.b1, sgpirsiviskyimageC1.a1, sgpirsiviscldmaskC1.a1).
- ▶ Refinement of cloud threshold values are being evaluated.
- ▶ Comparison with TSI sky cover data is under investigation.

Acknowledgements

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Reference

Klebe et al., "Ground-based all-sky mid-infrared and visible imagery for purposes of characterizing cloud properties", *Atmospheric Measurement Techniques*, (<http://www.atmos-meas-tech.net/7/637/2014/amt-7-637-2014.html>).