

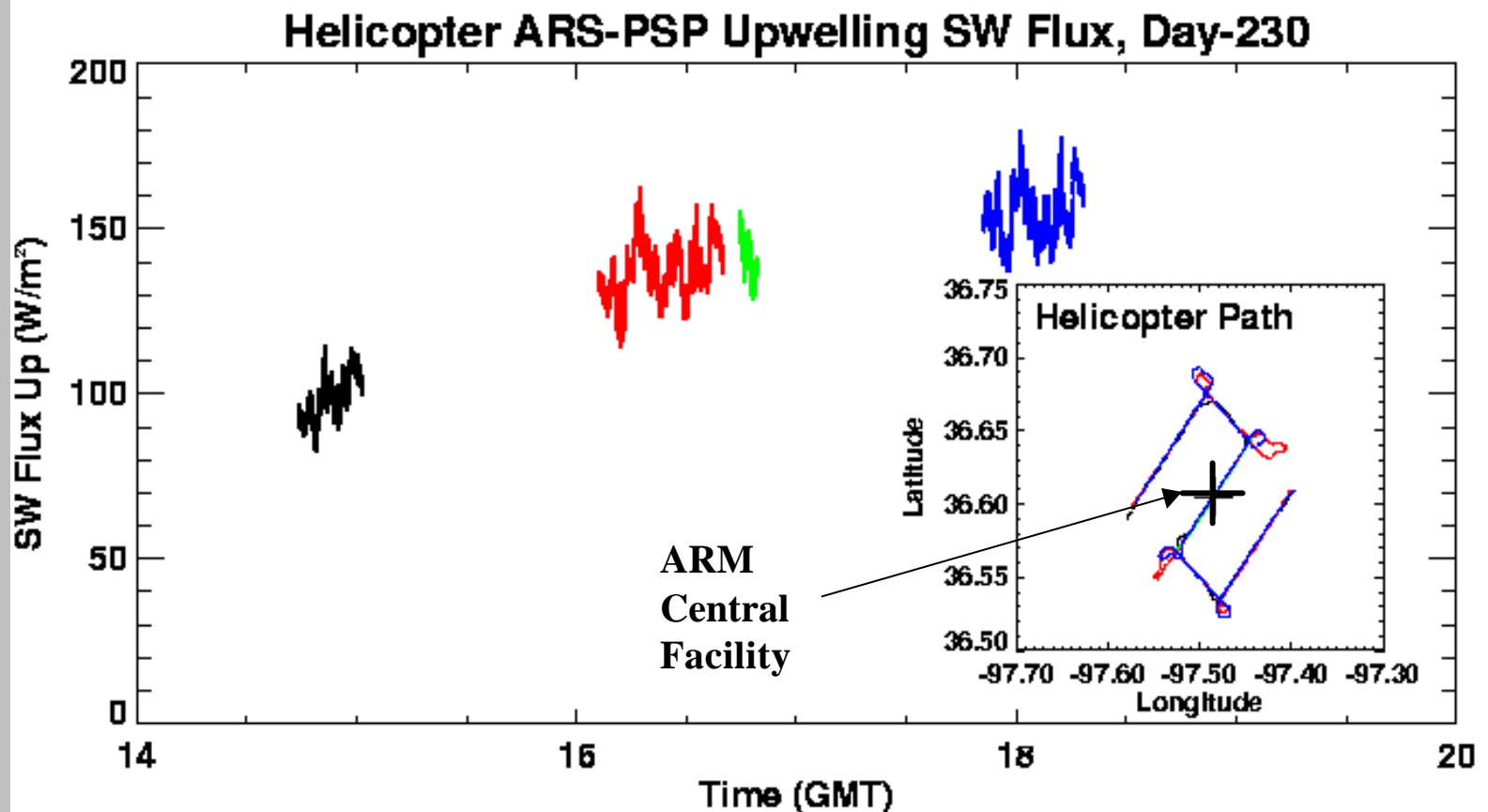
# **Comparison of Helicopter and SARB/CRS Derived Surface Albedo at ARM SGP**

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Goal: Survey the surface albedo in an area the approximate size of CERES footprint centered at ARM Central facility August 18 – 20, 1998, to better validate surface albedos derived for SARB processing.

(Comparisons with 10m tower observations are inadequate.)

**Fluxes at helicopter altitude during 4 flights on Aug. 18, 1998.**  
**Inset shows flight paths nearly identical.**  
**PSP sampled at 3 Hz.**  
**Each flight ~870mb.**



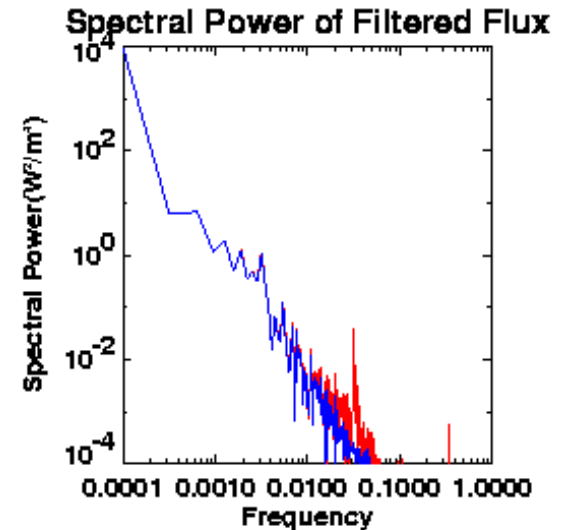
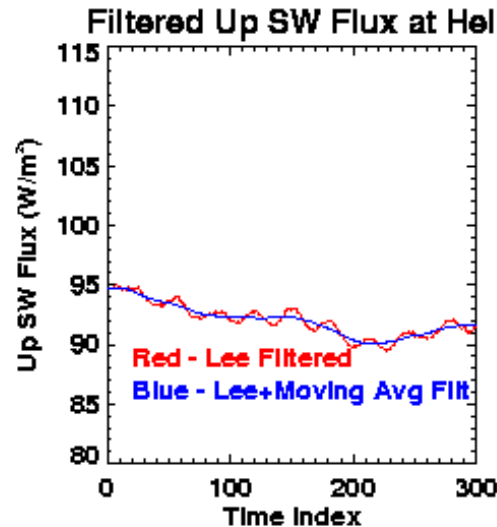
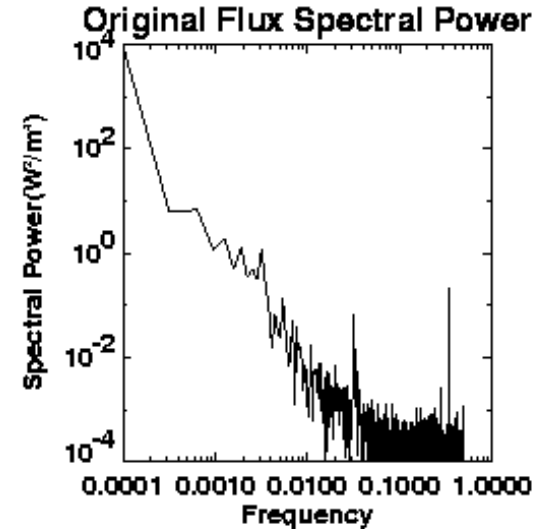
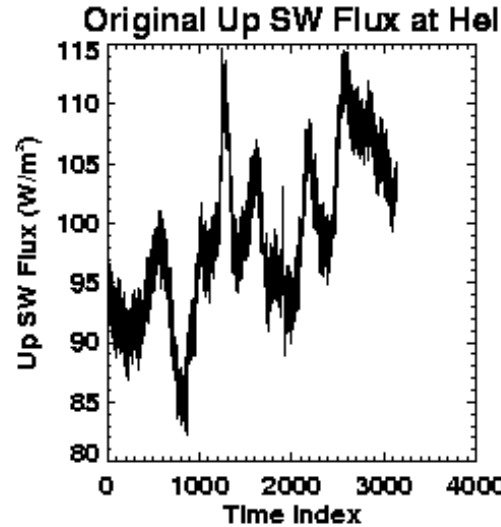
# Filtering Of SW Flux, Aug 18, 1998, Flight #1.

Original measured flux includes noise from electronics and helicopter motion (fugoid).

“Lee” filter is used to remove electronic noise.

“Moving Average” filter is used to remove noise from fugoid motion.

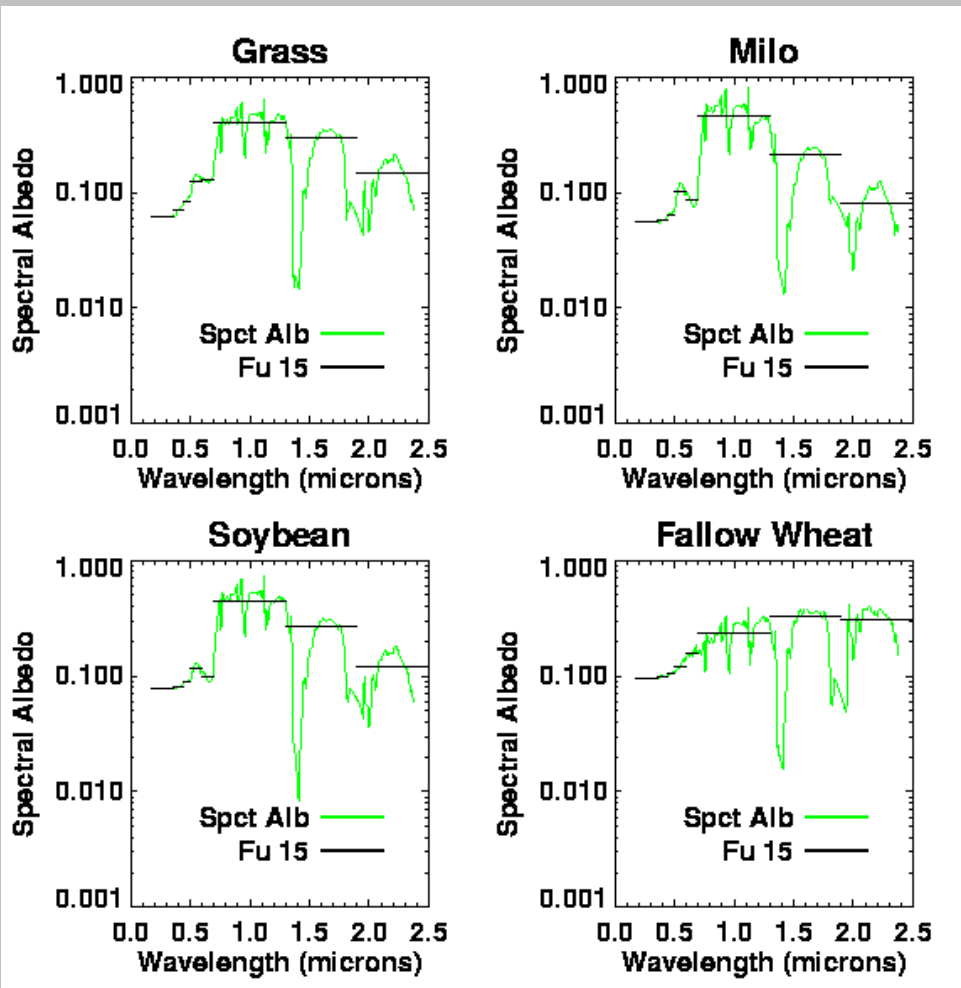
Day - 230, Flight Pattern - 1



## Modeling to retrieve surface albedos from helicopter observations.

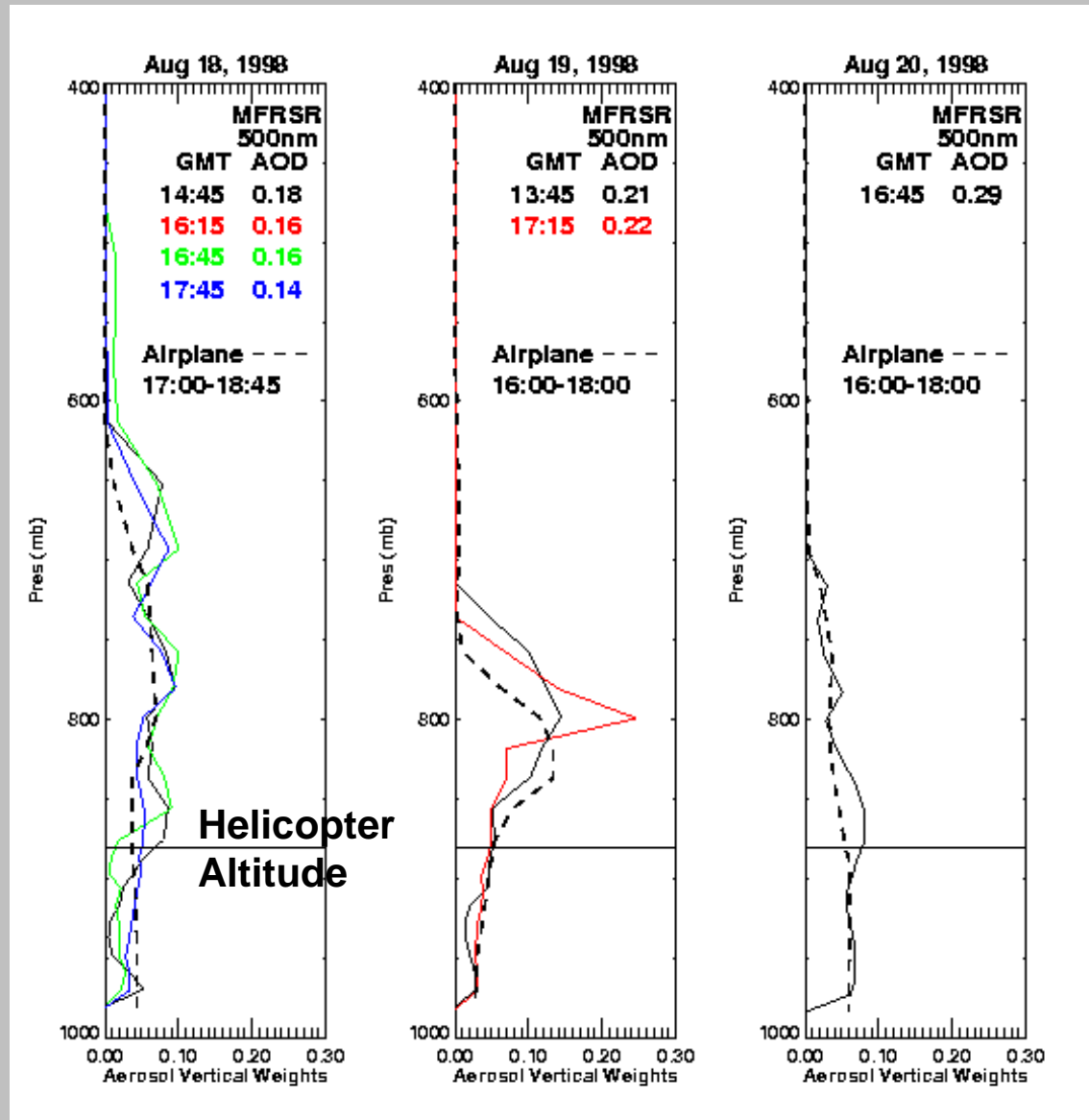
- Temperature, Water vapor, height, from GOES/AERI, ozone from MOA.
- Raman Lidar provides vertical profile of weights to distribute MFRSR spectral aerosol optical depths.
- MATCH (from CRS) provides aerosol constituents.
- Initial spectral surface albedo from CARE experiment.
  
- Use Fu & Liou to derive surface albedo.
  - Input initial guess of surface albedo.
  - Assume we know the aerosol.
  - Tune surface albedo so that model flux equals that measured by the helicopter
- Compare modeled fluxes
  - Surface with ARM/E13 Central Facility observations (Untuned.)
  - Compare tuned areal average of derived surface albedo with CERES/SARB CRS surface albedo.

Spectral surface albedo used was an average of original CARE spectral albedos over grass, milo, Soybeans and fallow wheat.



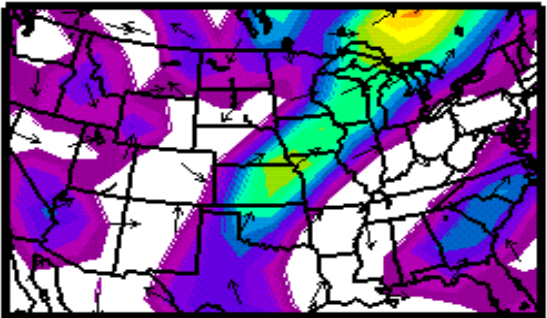
Vertical aerosol weighting profiles developed using Raman Lidar aerosol extinction profiles

18<sup>th</sup> and 19<sup>th</sup> most aerosol was above the level of the helicopter.

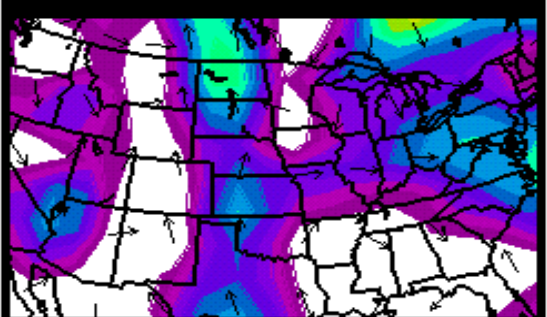


**NCEP – 850mb wind fields show prevailing SW to S flow.**

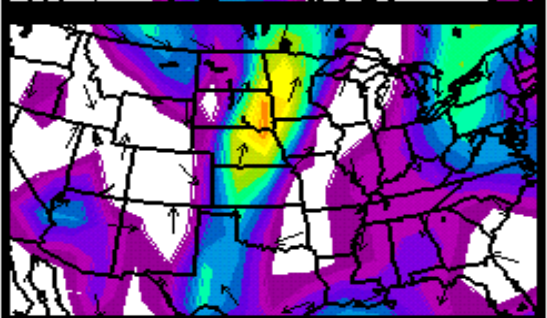
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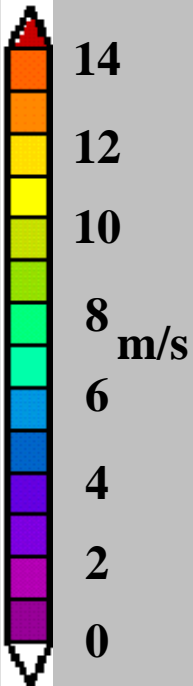
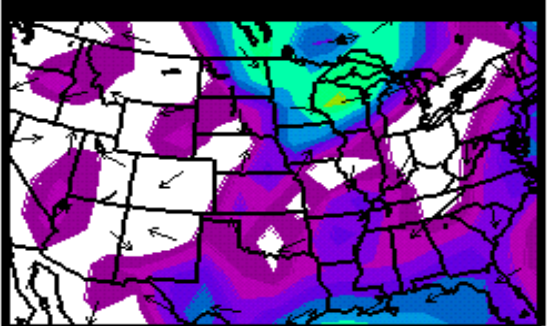
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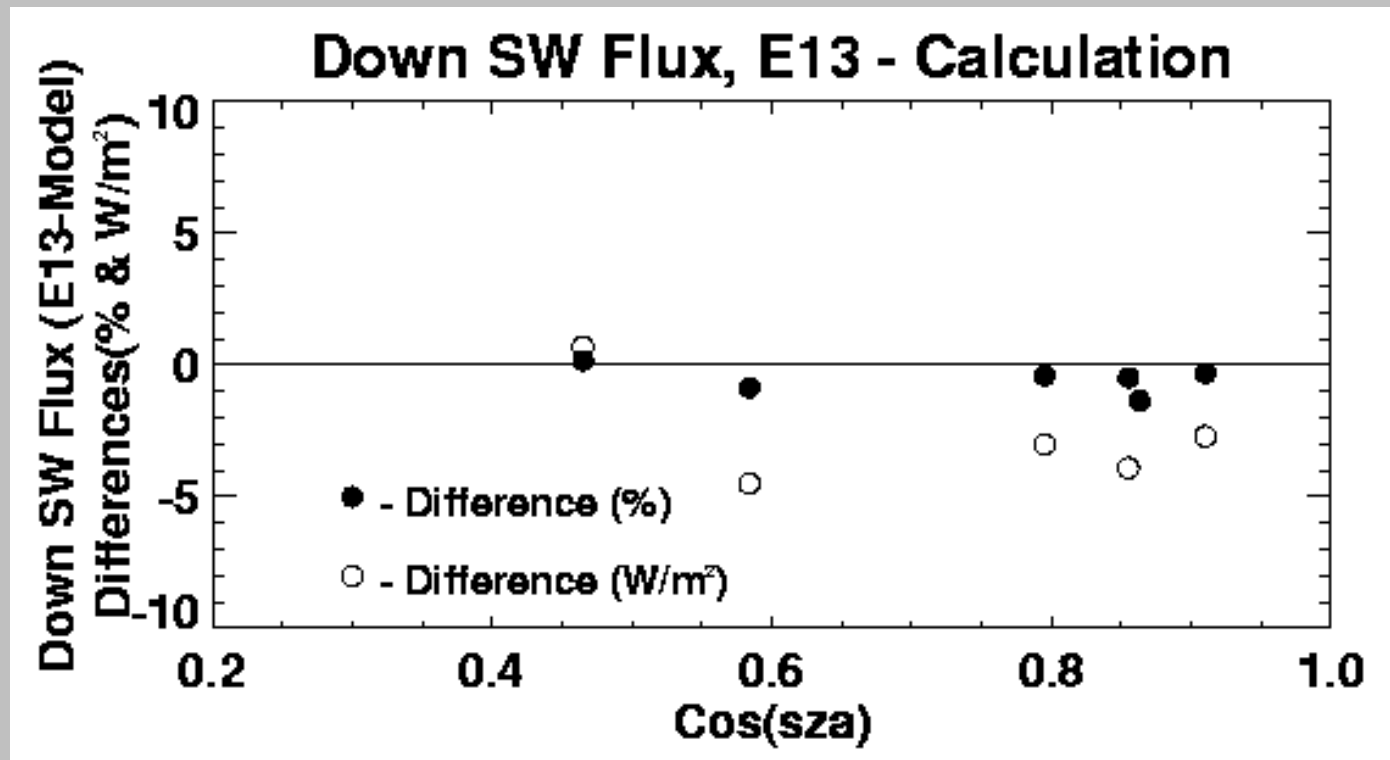
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### MATCH Aerosol Constituents (From CRS)

Aerosol Type	% Each Day		
	18	19	20
0.5um dust	49%	47%	36%
Sulfates	35%	36%	46%
Continental	11%	12%	12%
Soot	4%	4%	4%
Insoluble	1%	1%	2%
Carbon			

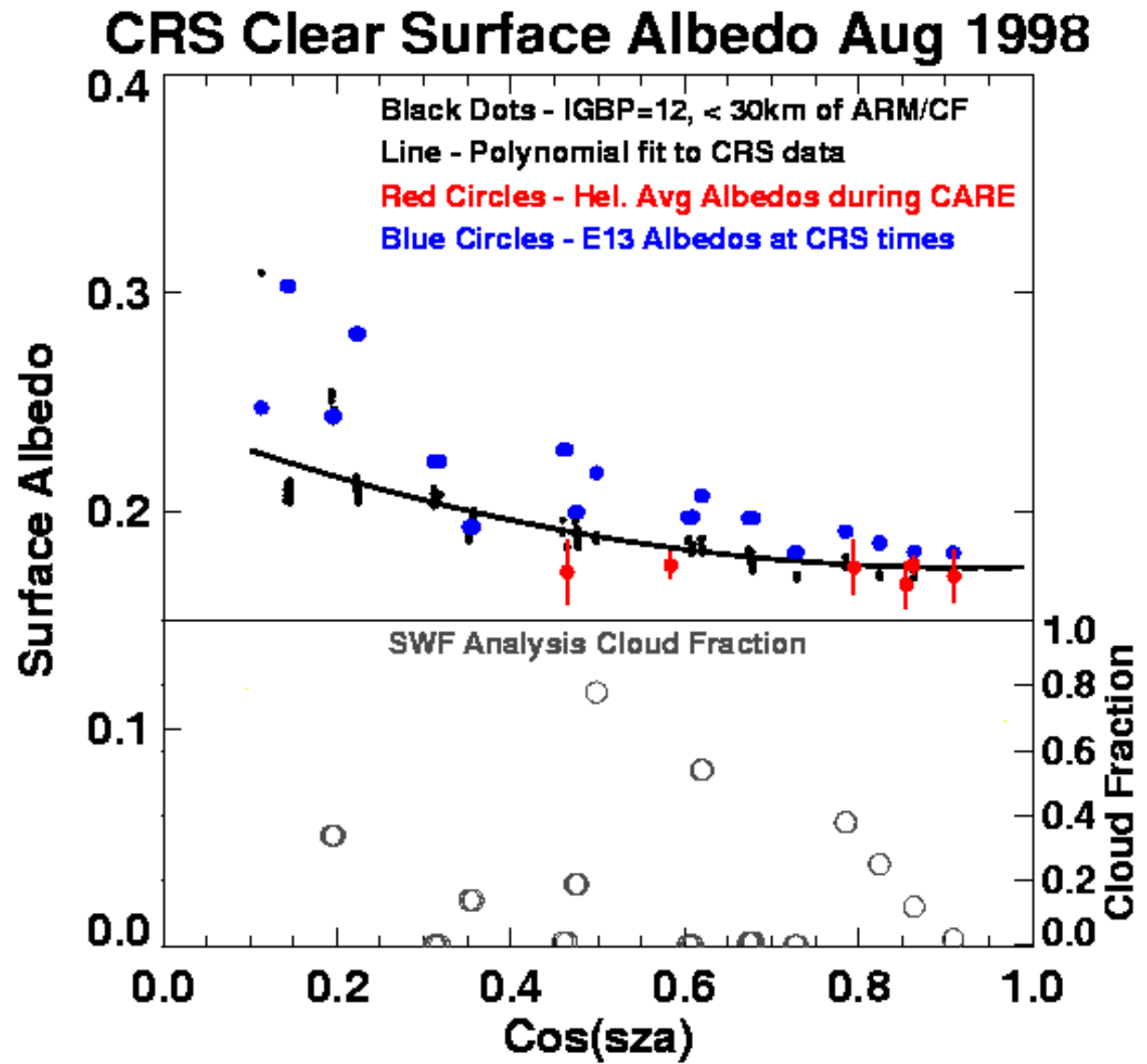
Comparison of E13 insolation with model is very good at time of helicopter passing over the Central Facility.  
(No tuning done in this result.)



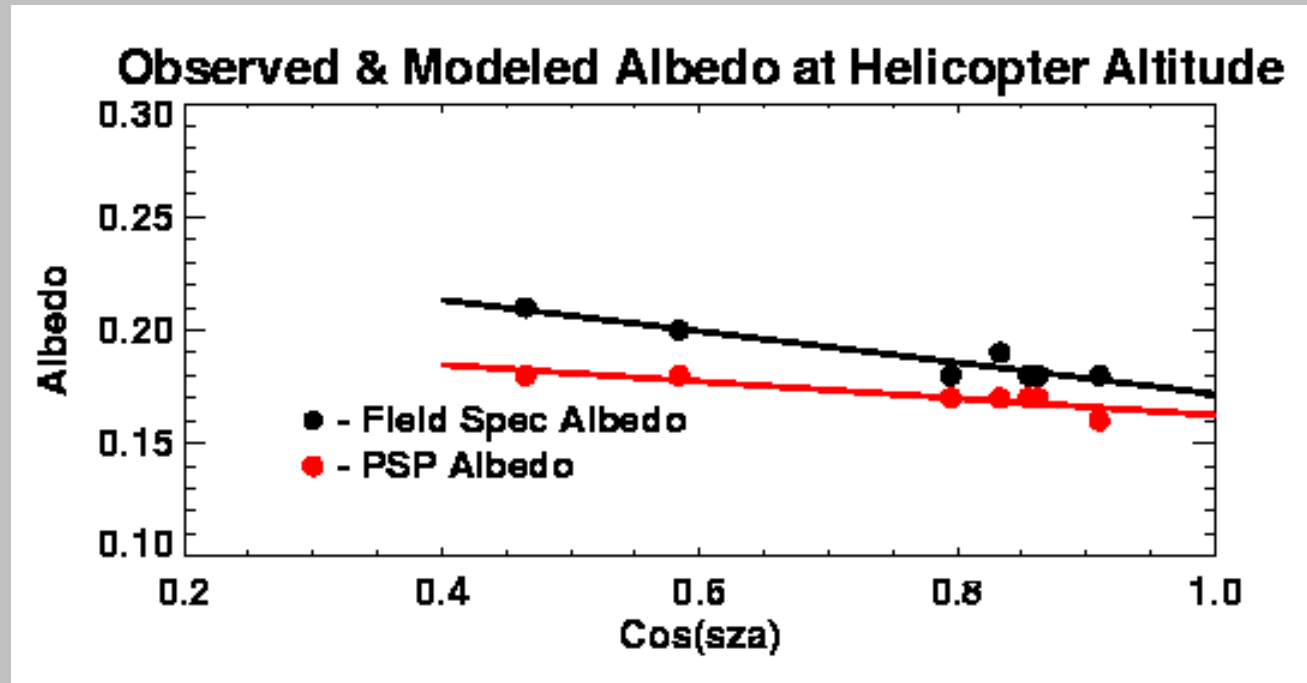


# Flight path average compared to CERES derived surface albedos.

Comparison between CRS, E13, and helicopter averaged Surface albedos show best comparison is with helicopter.



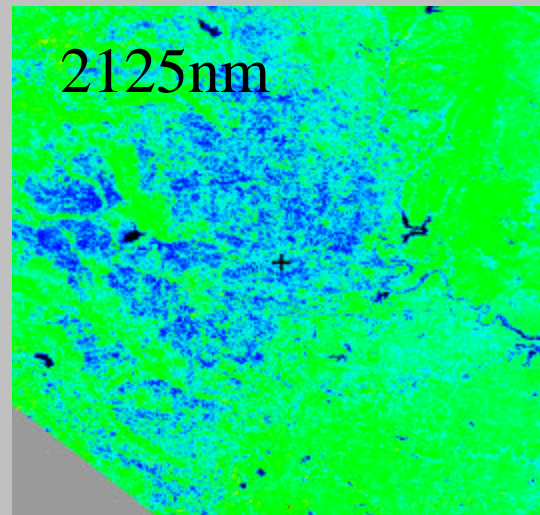
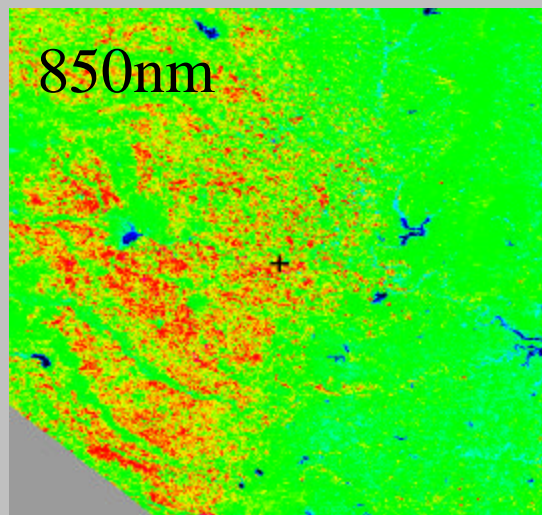
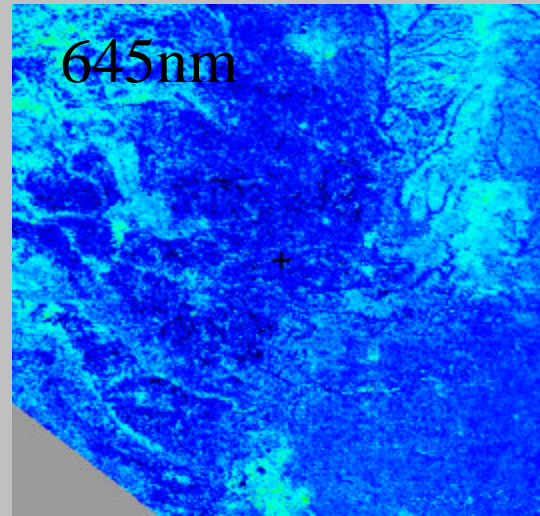
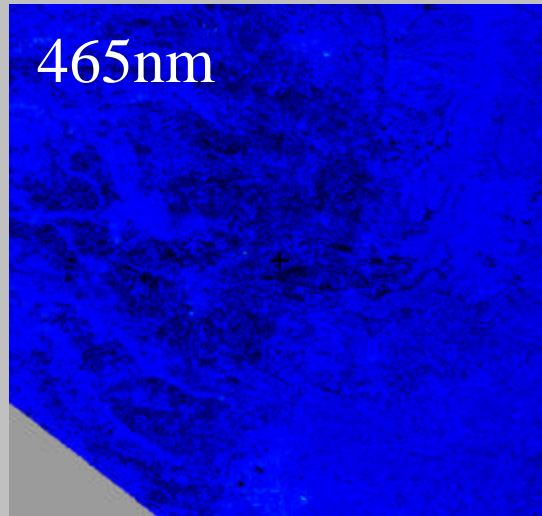
Comparison of albedo at helicopter altitude of PSP and Field spectrometer shows the PSP did not observe a change in surface albedo w.r.t. solar zenith angle.



# MODIS Spectral Albedos (MOD43B3)

(these are actually reflectance.)

Gridded, 1km, 16day Product, 7 Channels, 3 Broadband



# Example of Black Sky (Direct) and White Sky (Diffuse) Truth lies in between.

Surface  
Albedo

0.10

0.08

0.06

0.04

0.02

0.00

