Comparing CERES Fluxes with Fluxes Derived from the ARM Data Streams

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- The ARM data streams and our understanding of them are such that continuous production of cloud radiative properties and computation of flux profiles are now possible

- Here we compare the TOA fluxes derived using ARM data with similar quantities derived from CERES that have recently become available.

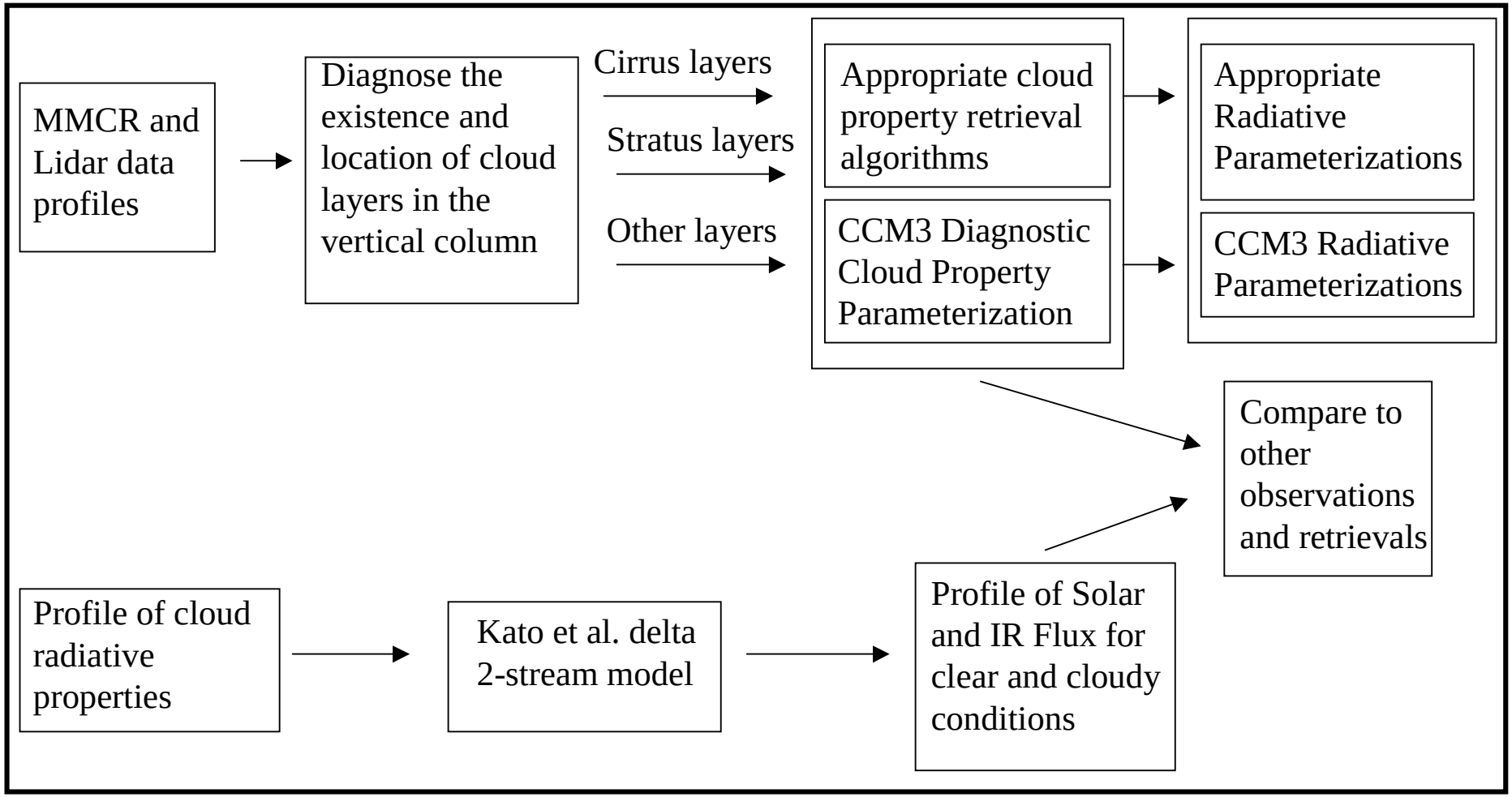
ARM Data Processing

Challenge: Combine multiple continuous data streams into a coherent description of the vertical column that would allow for continuous calculation of the instantaneous flux.

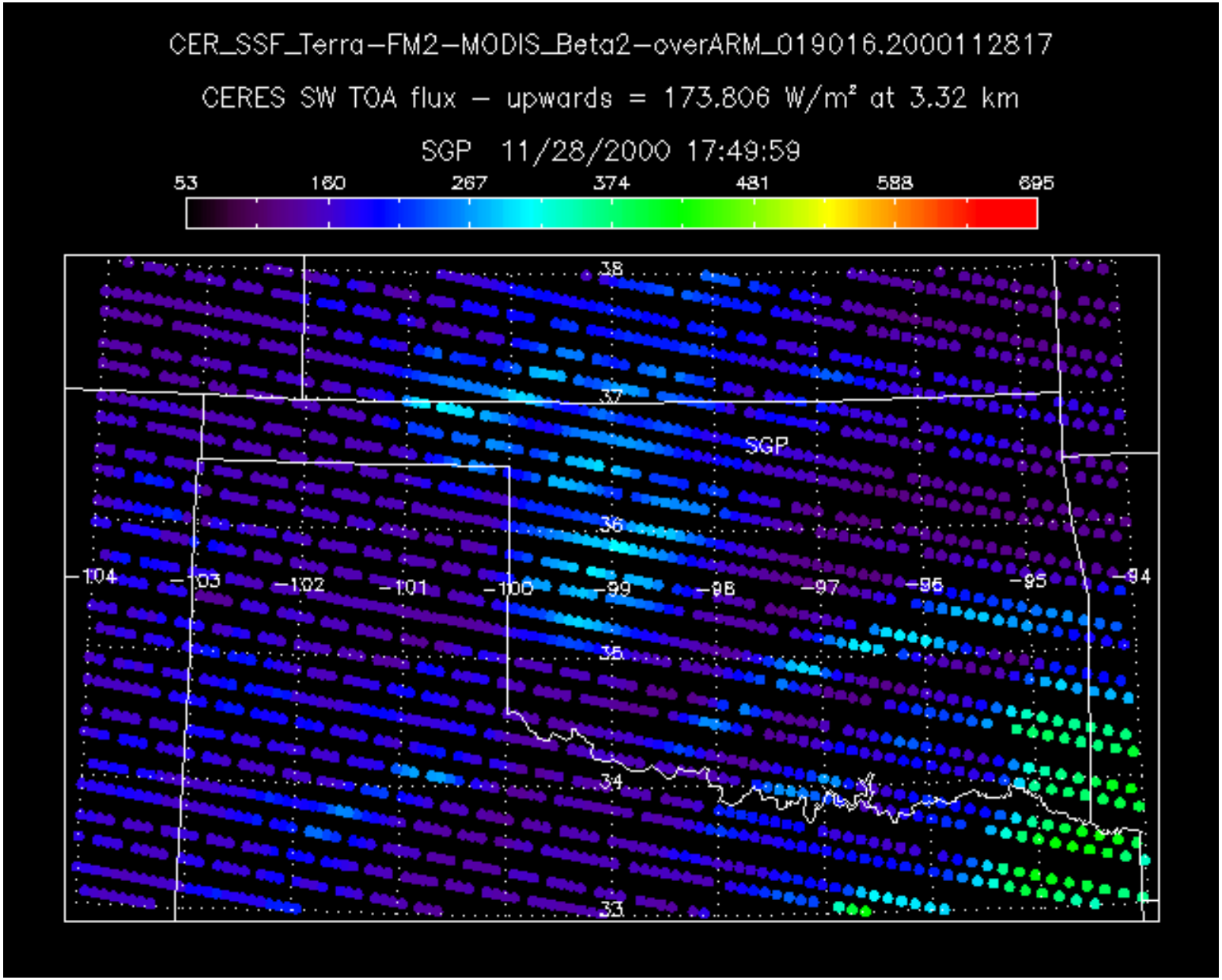
Input data streams: MMCR, MWR, Sonde, AERI, VCEIL, MPL, SMET, RL, …

Validation data streams: SIRS, and other radiometric quantities

The Integrated Cloud Product Flowchart



Case Studies: A cirrus event – 11/28/2000



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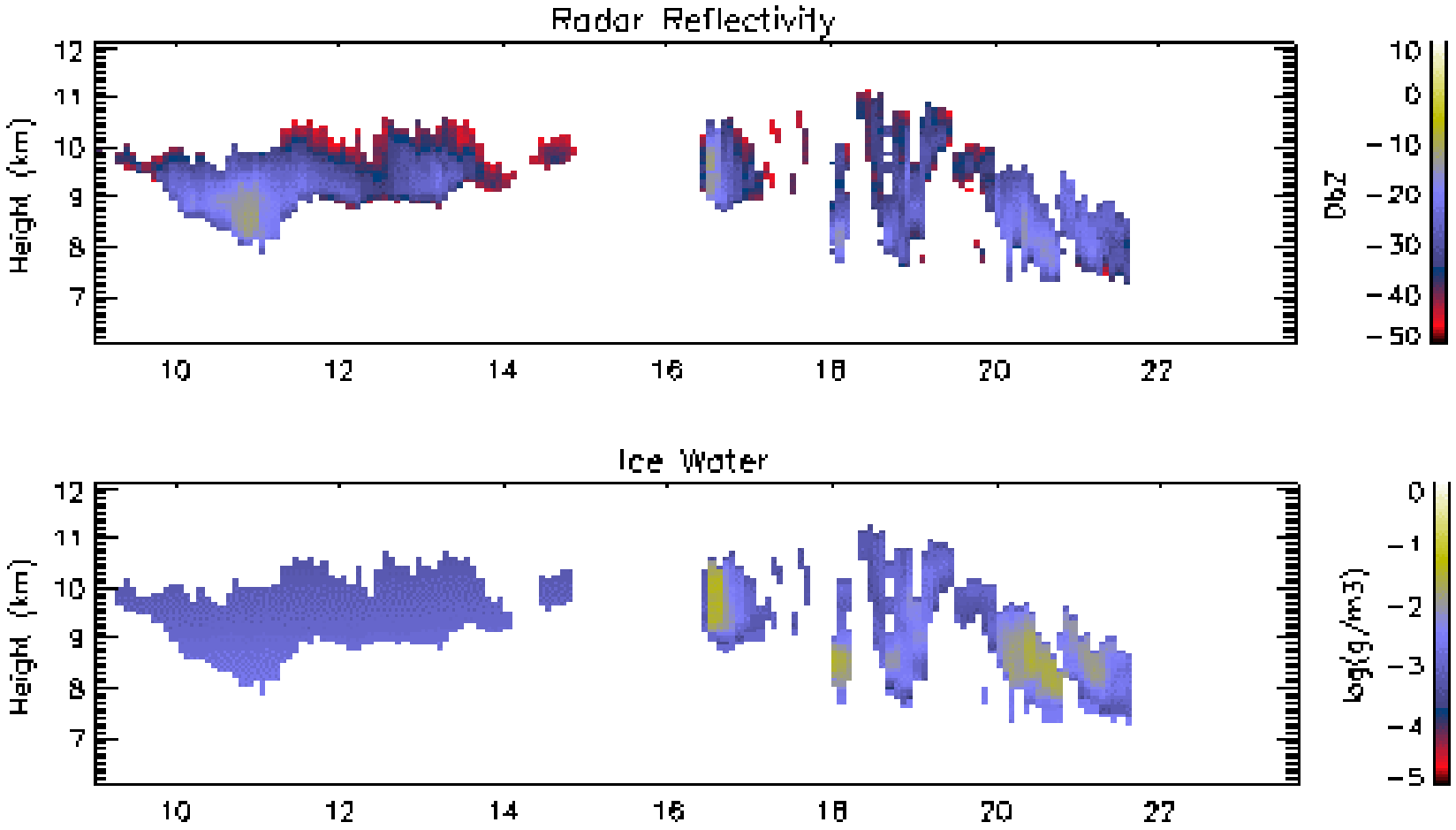

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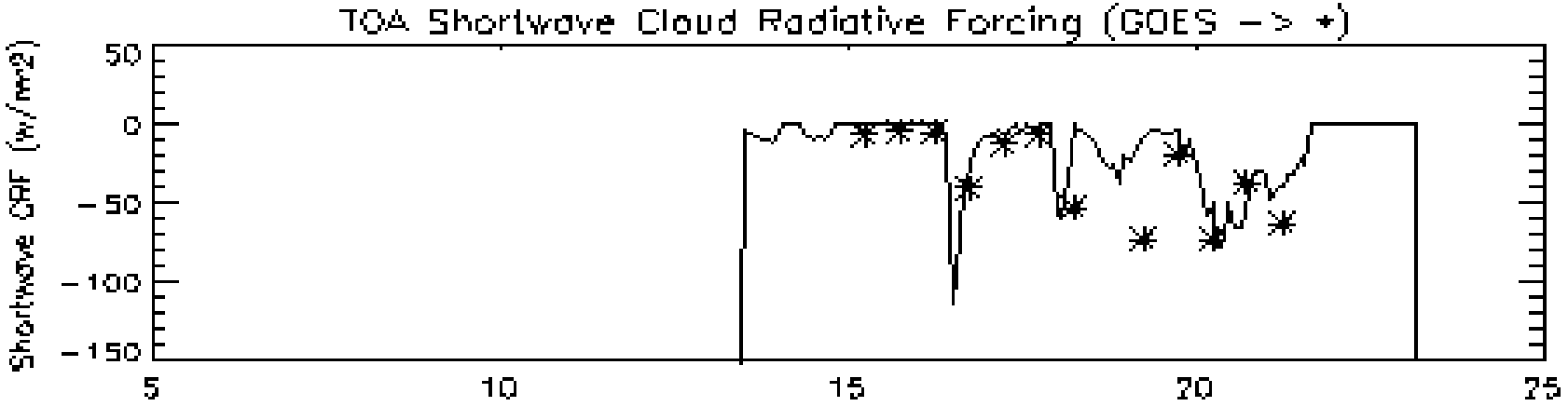
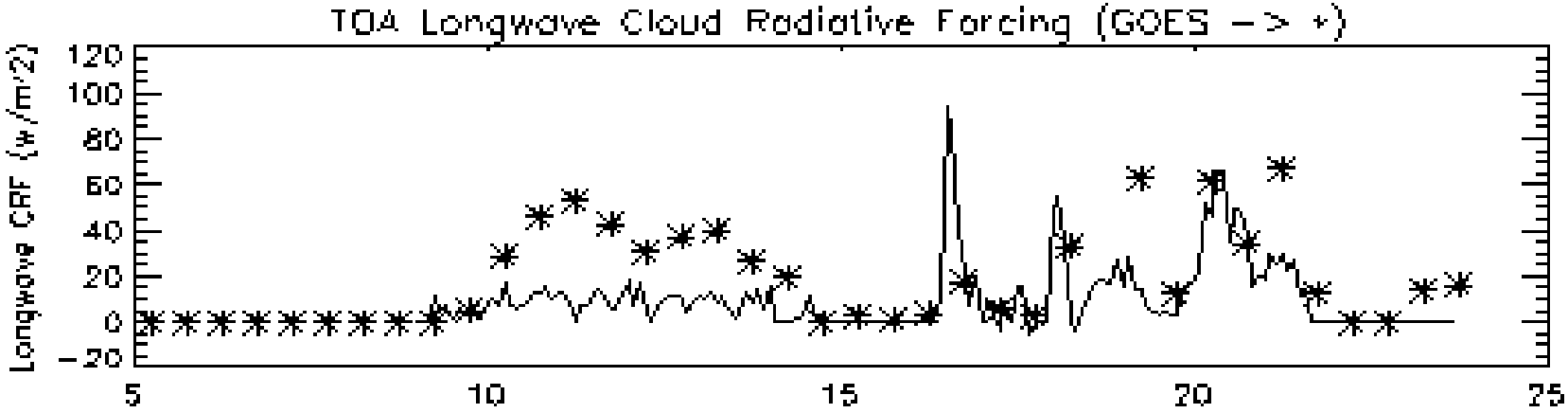
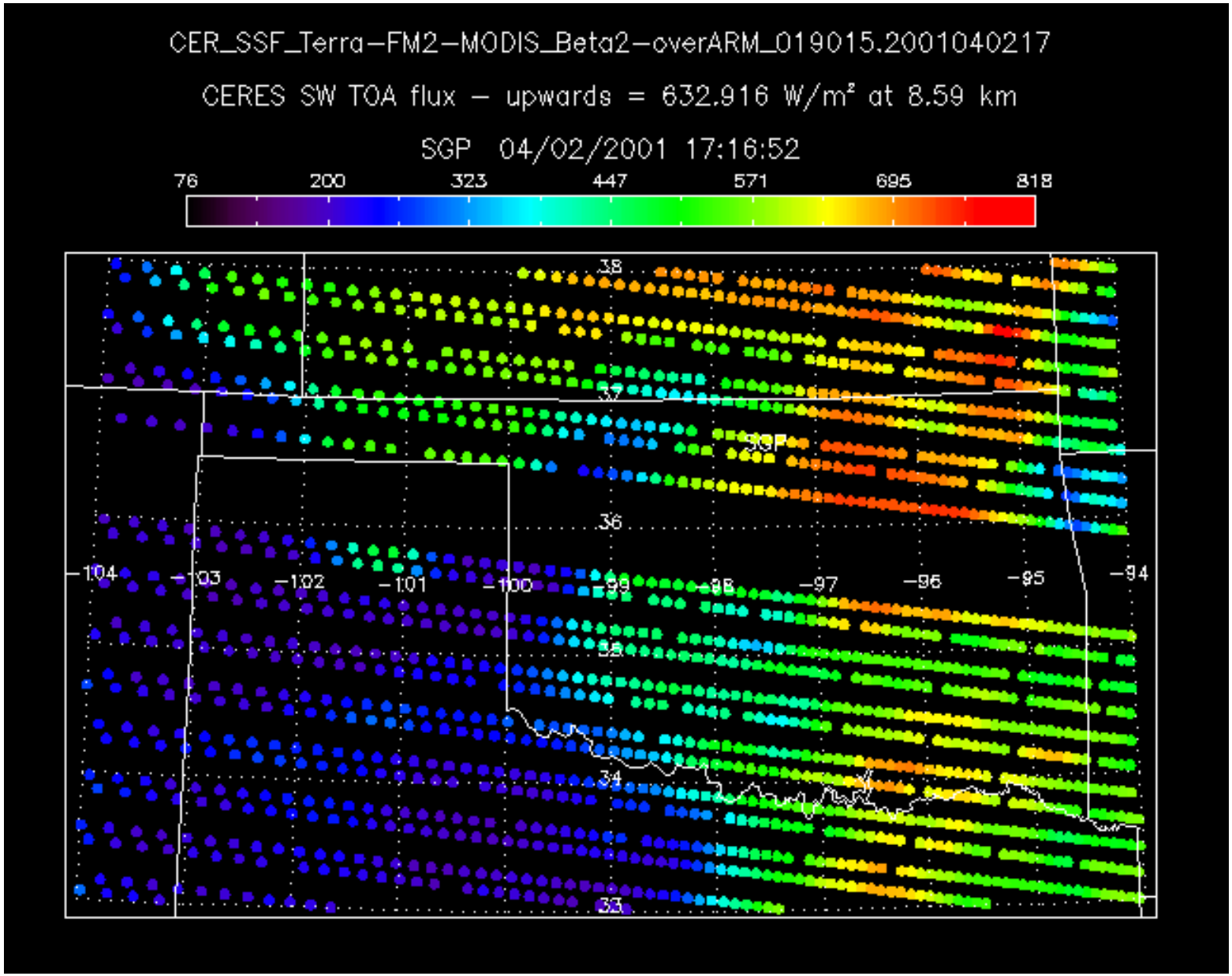


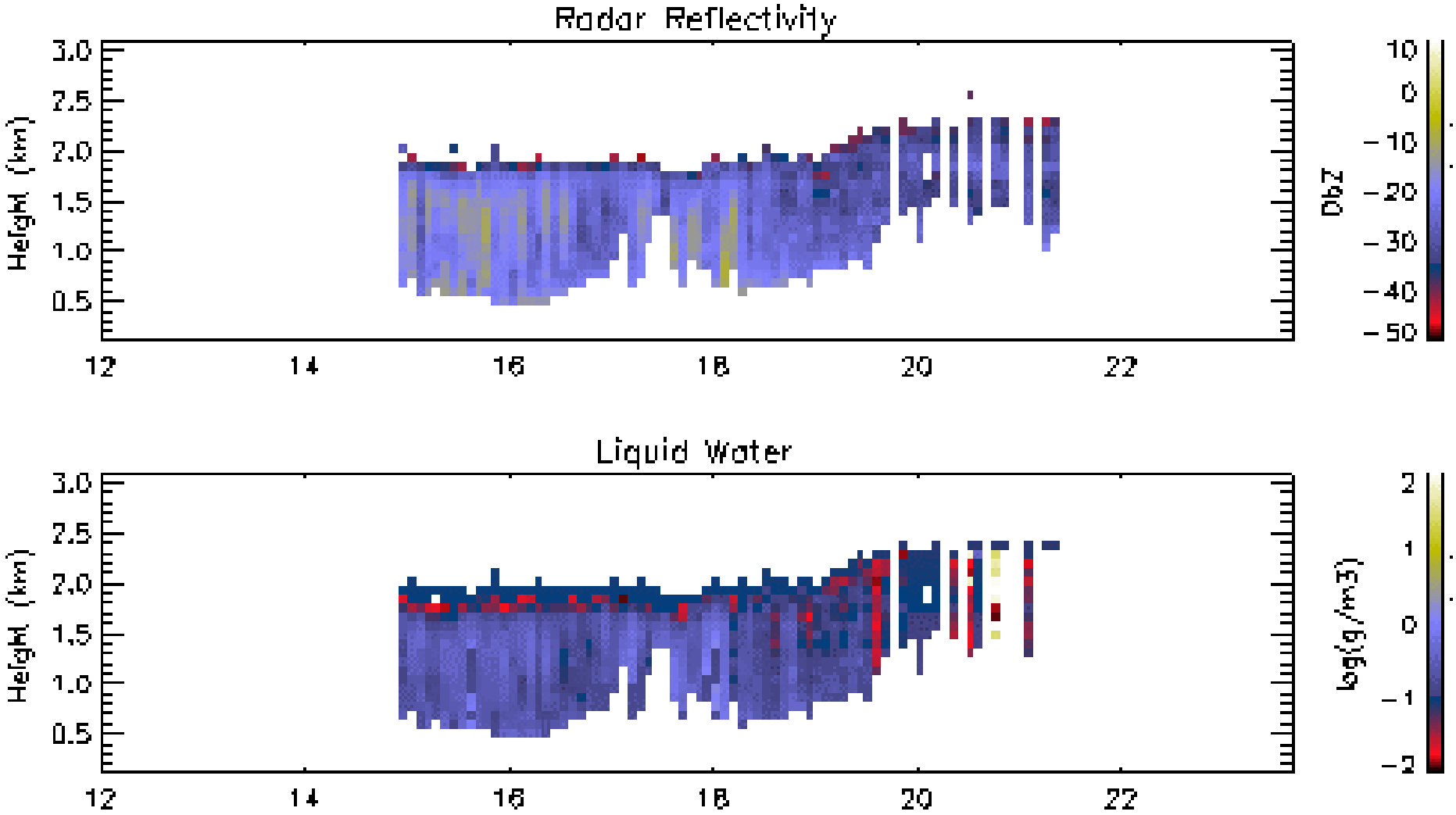


	IR Up	Solar Up
Terra CERES:	234	161
ARM ICP:	240	170
GOES 8:	253	166

Case Studies: A stratus event – 04/02/2001



Case Studies: A stratus event – 04/02/2001



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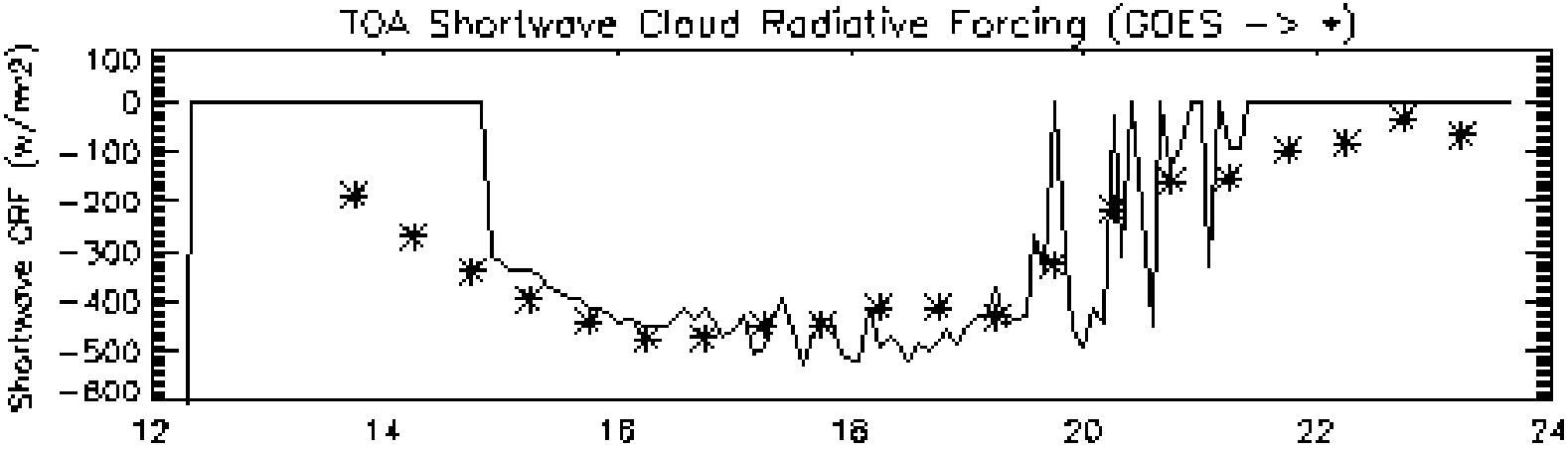
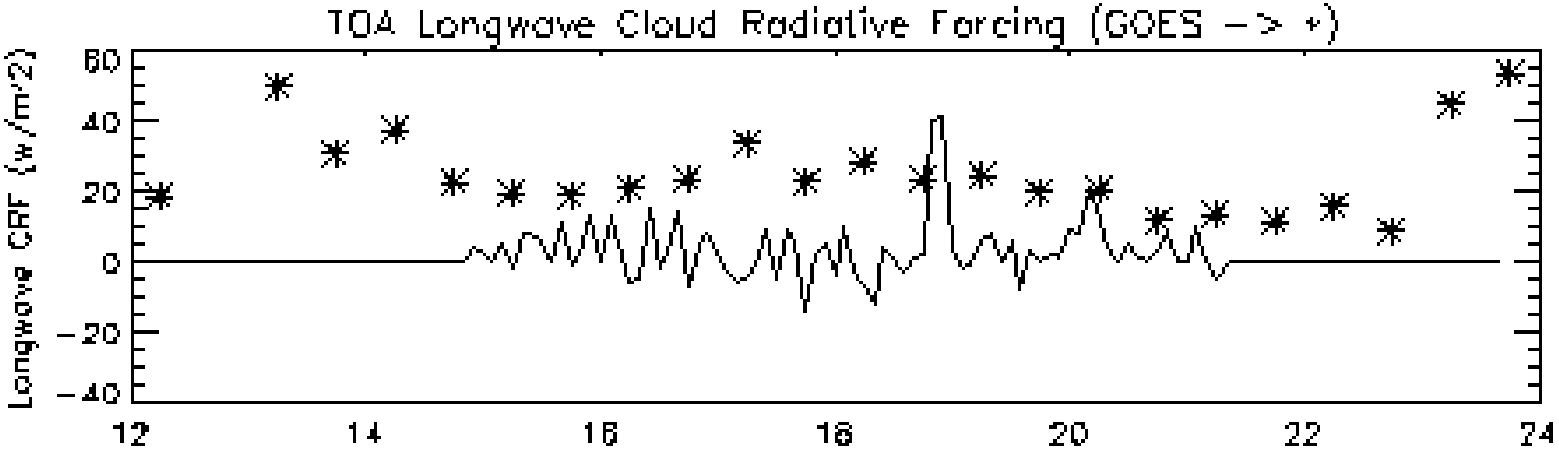
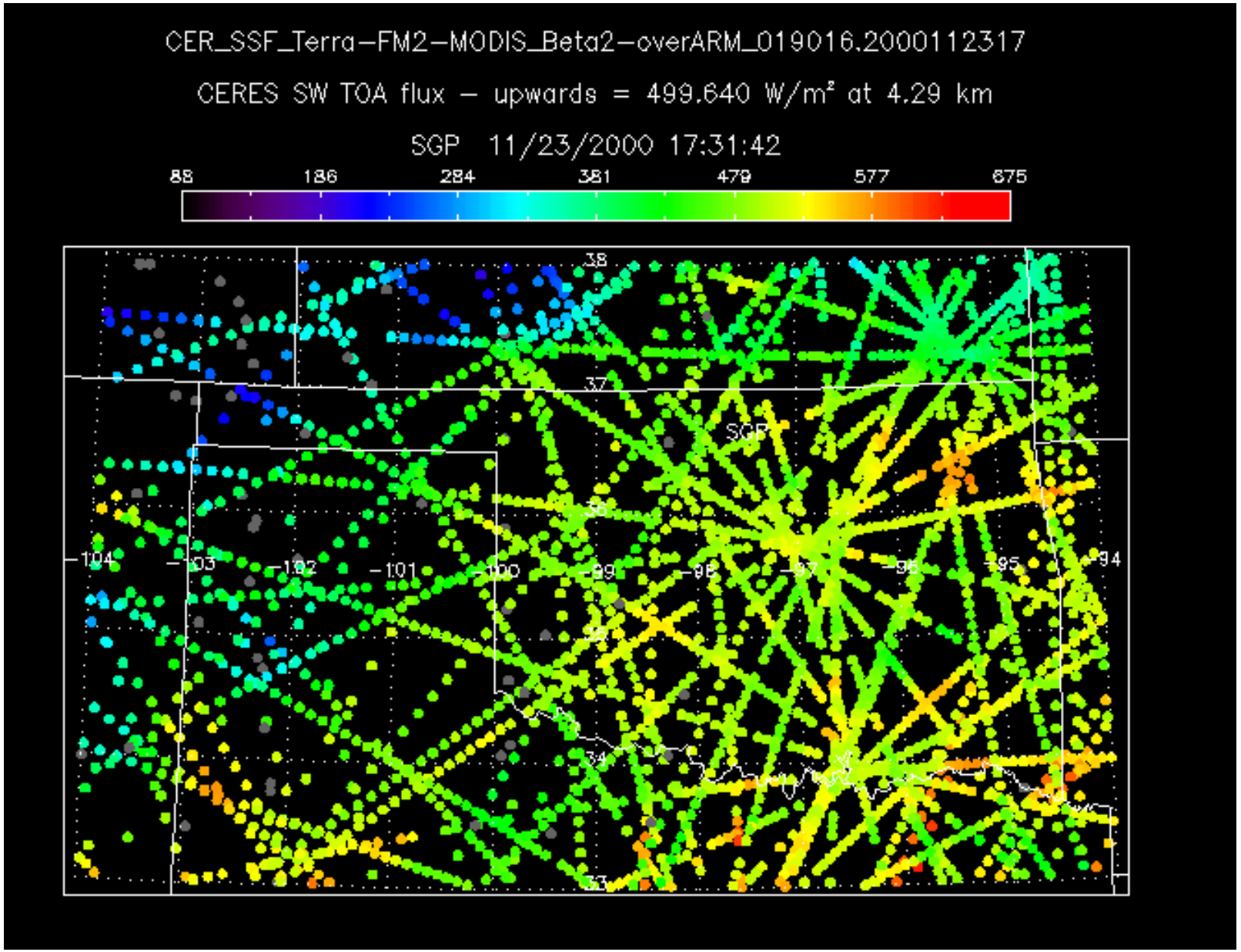


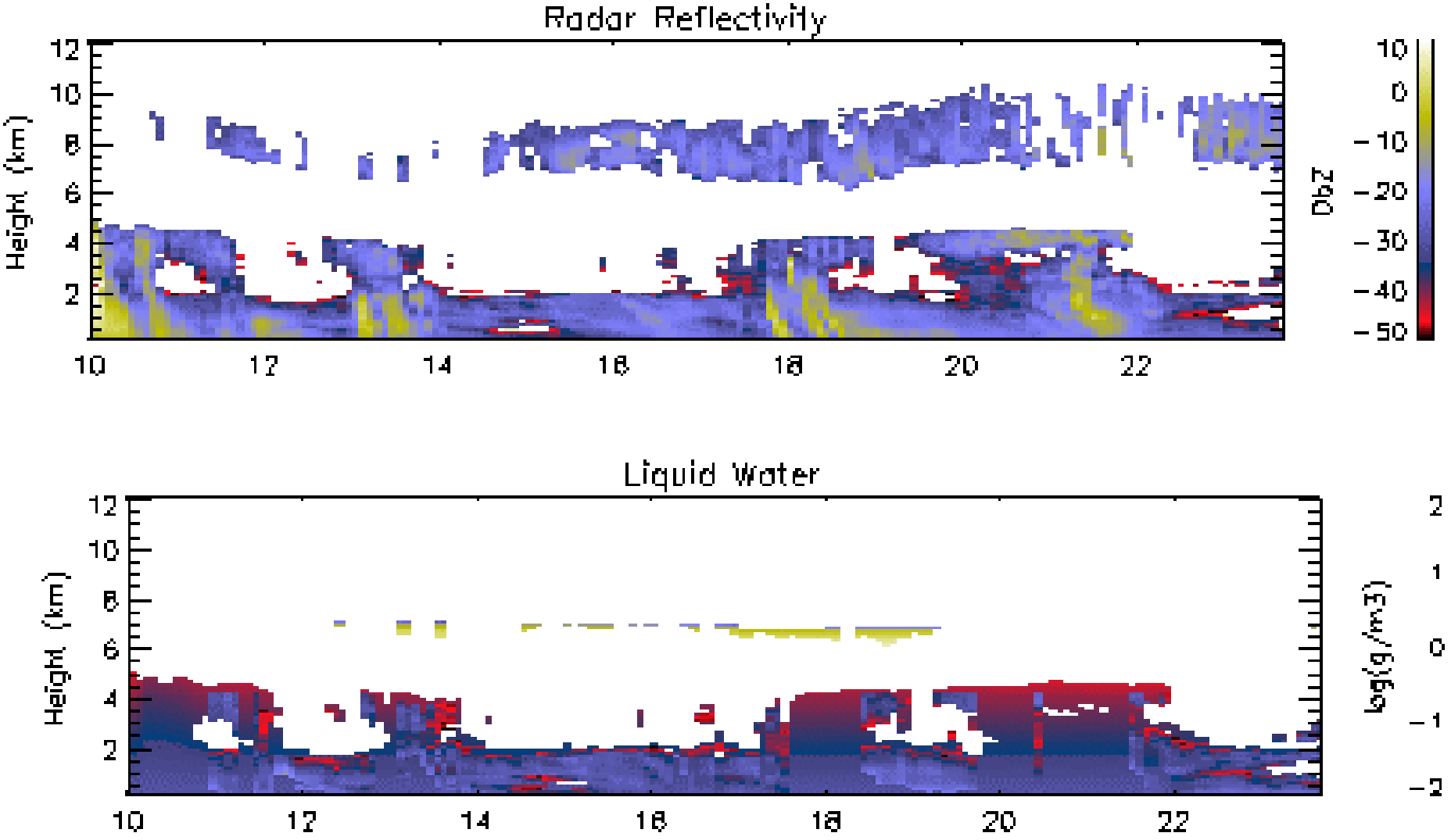


	IR Up	Solar Up
Terra CERES:	247	630
ARM ICP:	251	625
GOES 8:	238	625

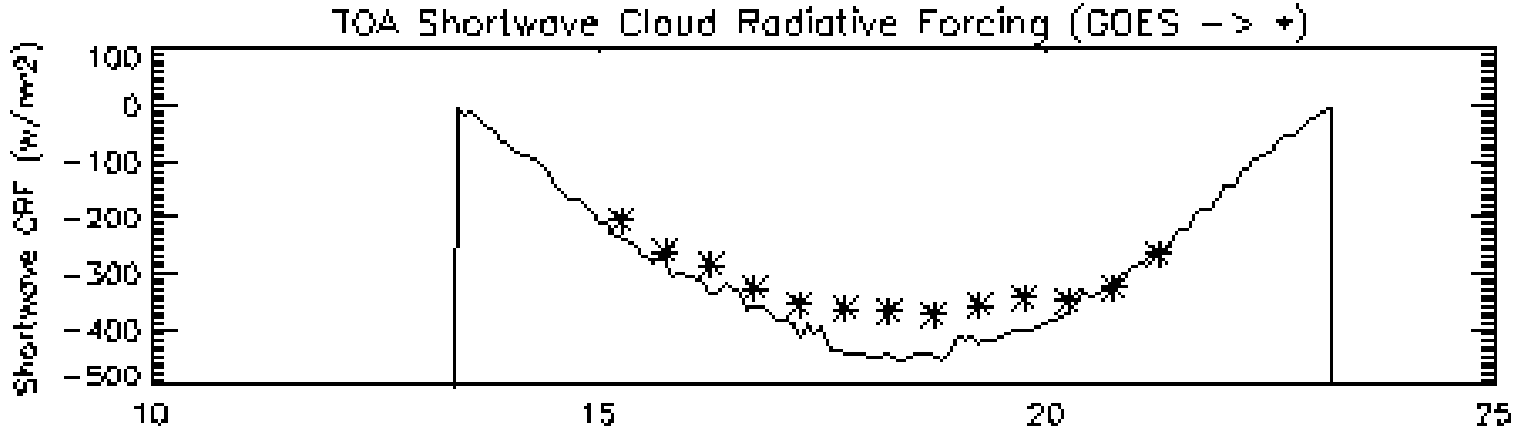
Case Studies: A messy event – 11/23/2000

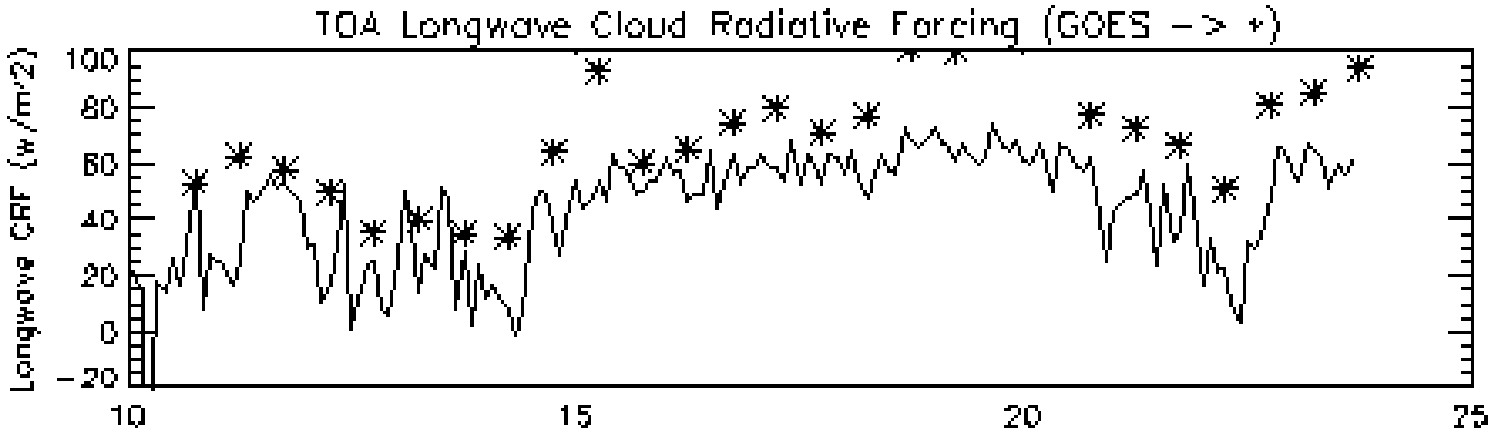


Case Studies: A messy event – 11/23/2000



Case Studies: A messy event – 11/23/2000





	IR Up	Solar Up
Terra CERES:	173	524
ARM ICP:	179	500
GOES 8:	183	509

Getting beyond case studies,

Examine the statistics of CERES TOA fluxes compared to the ICP results: November 2000 through April 2001

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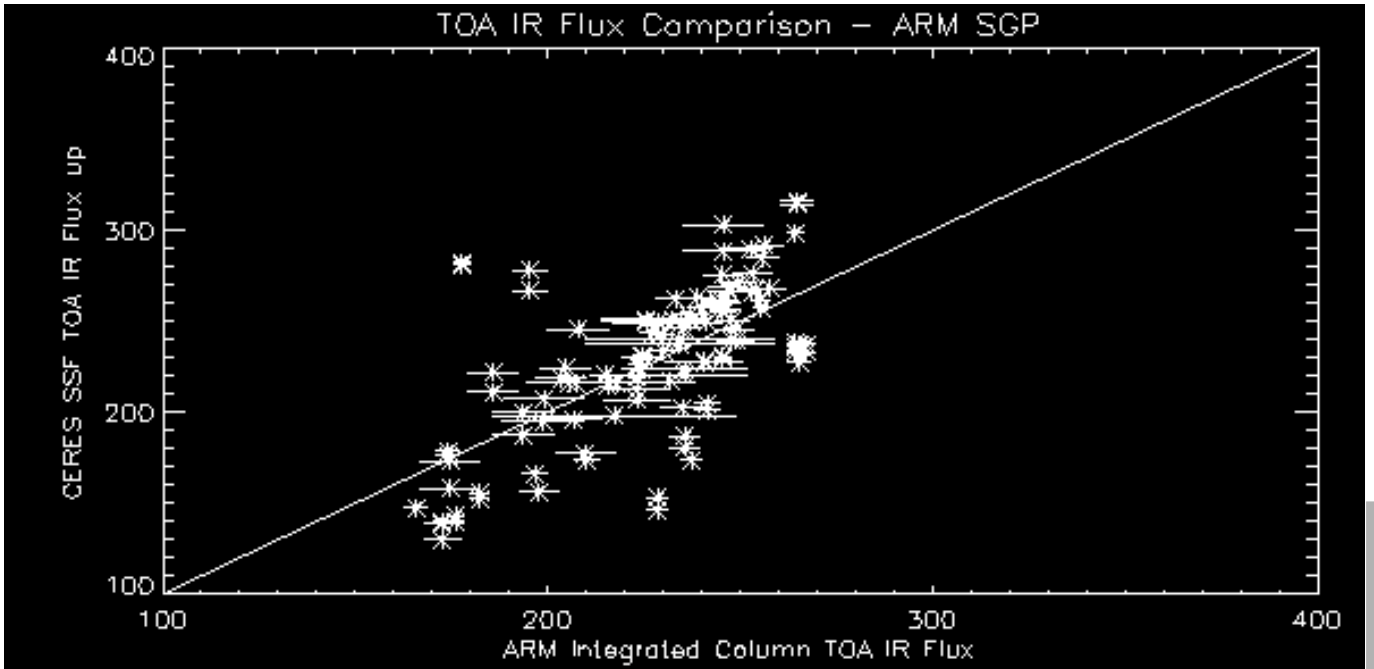
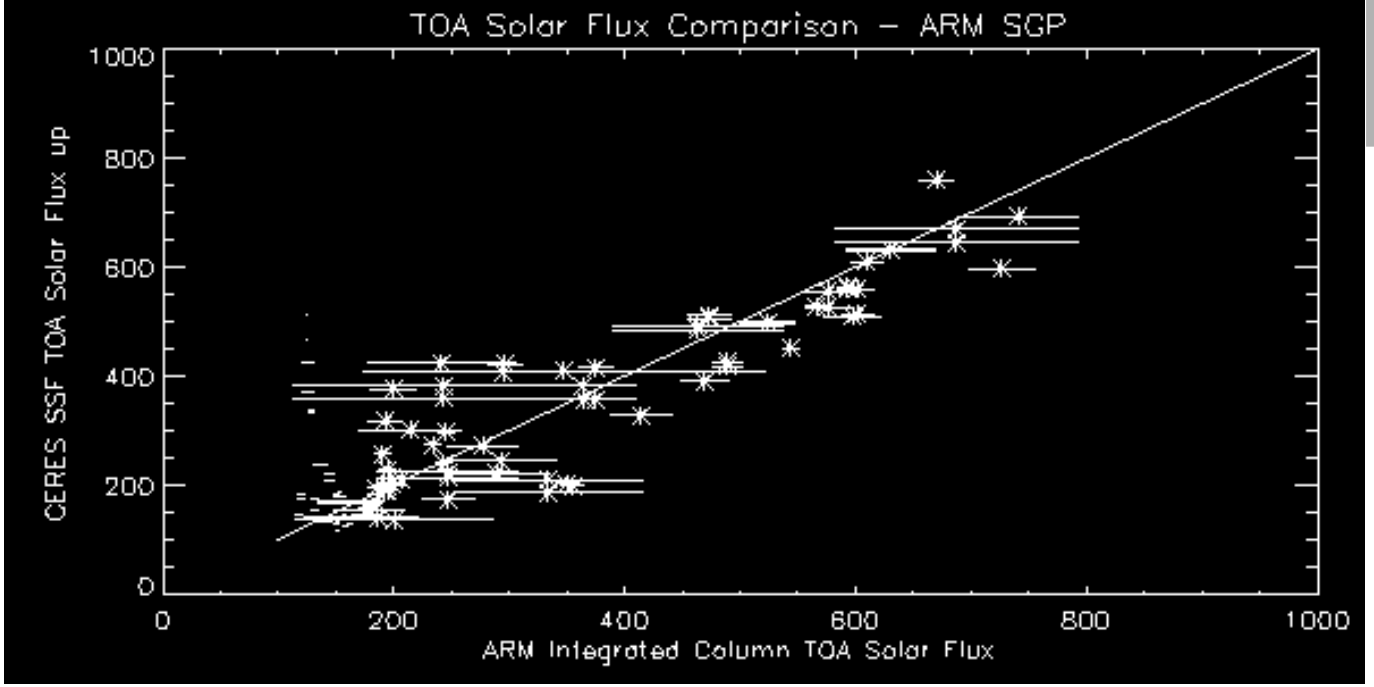
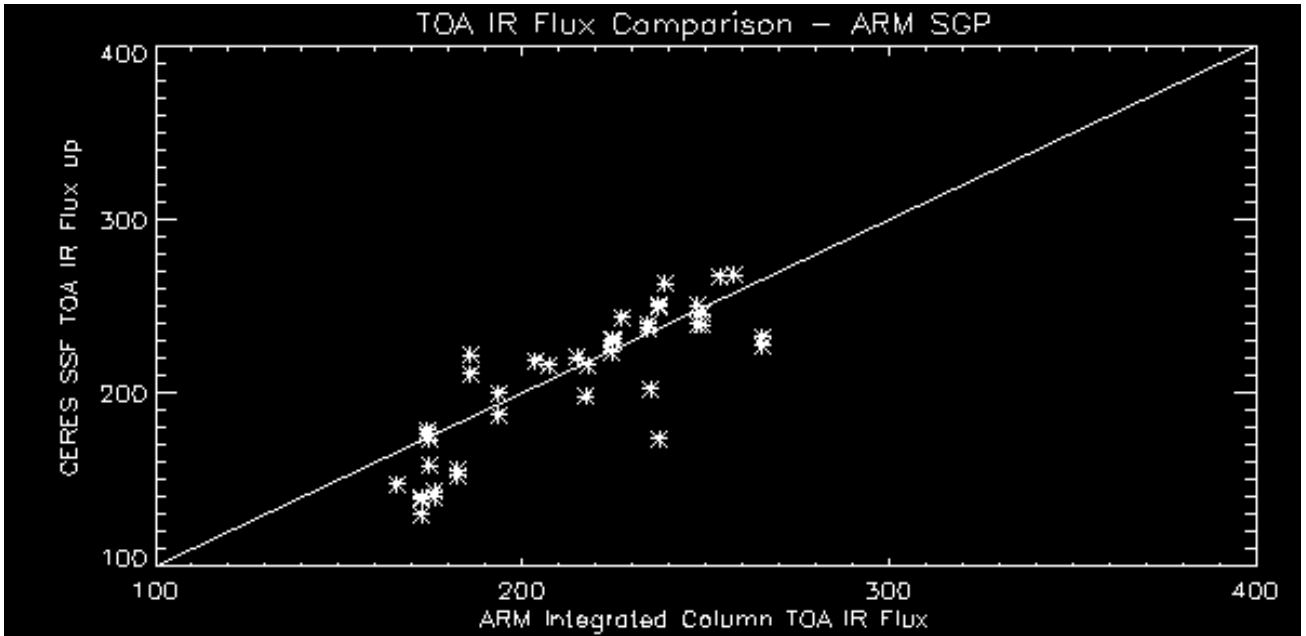


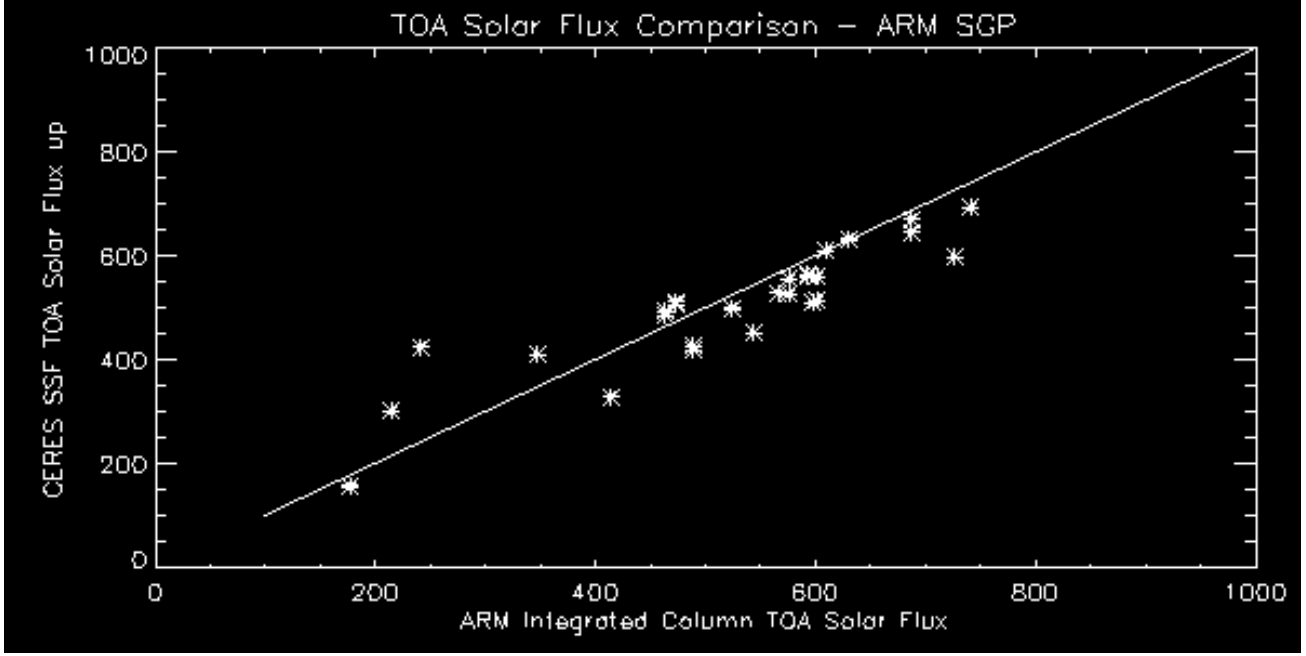


All data,
clear and cloudy,
all view zenith

	IR	Solar
R	0.67	0.91
RMS	31	56
Bias	1%	0.6%

Comparing CERES Fluxes with Fluxes Derived from the ARM Data Streams

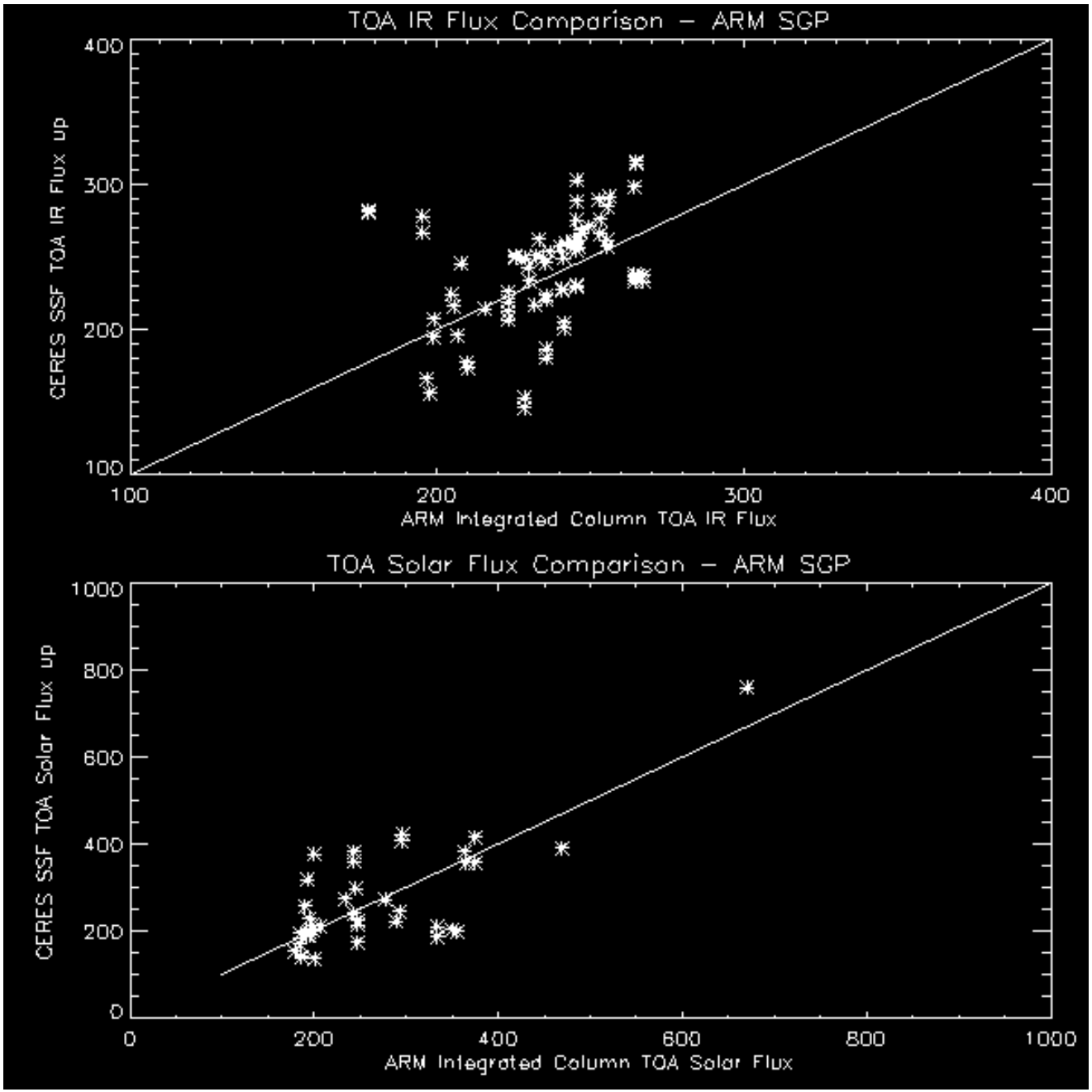




Cloudy cases, retrieved microphysics, and all view zenith

	IR	Solar
R	0.85	0.91
RMS	23	56
Bias	-4%	-1%

Comparing CERES Fluxes with Fluxes Derived from the ARM Data Streams



Cloudy cases,
CCM microphysics,
and all view zenith

	IR	Solar
R	0.39	0.74
RMS	35	57
Bias	-1.5%	1.2%

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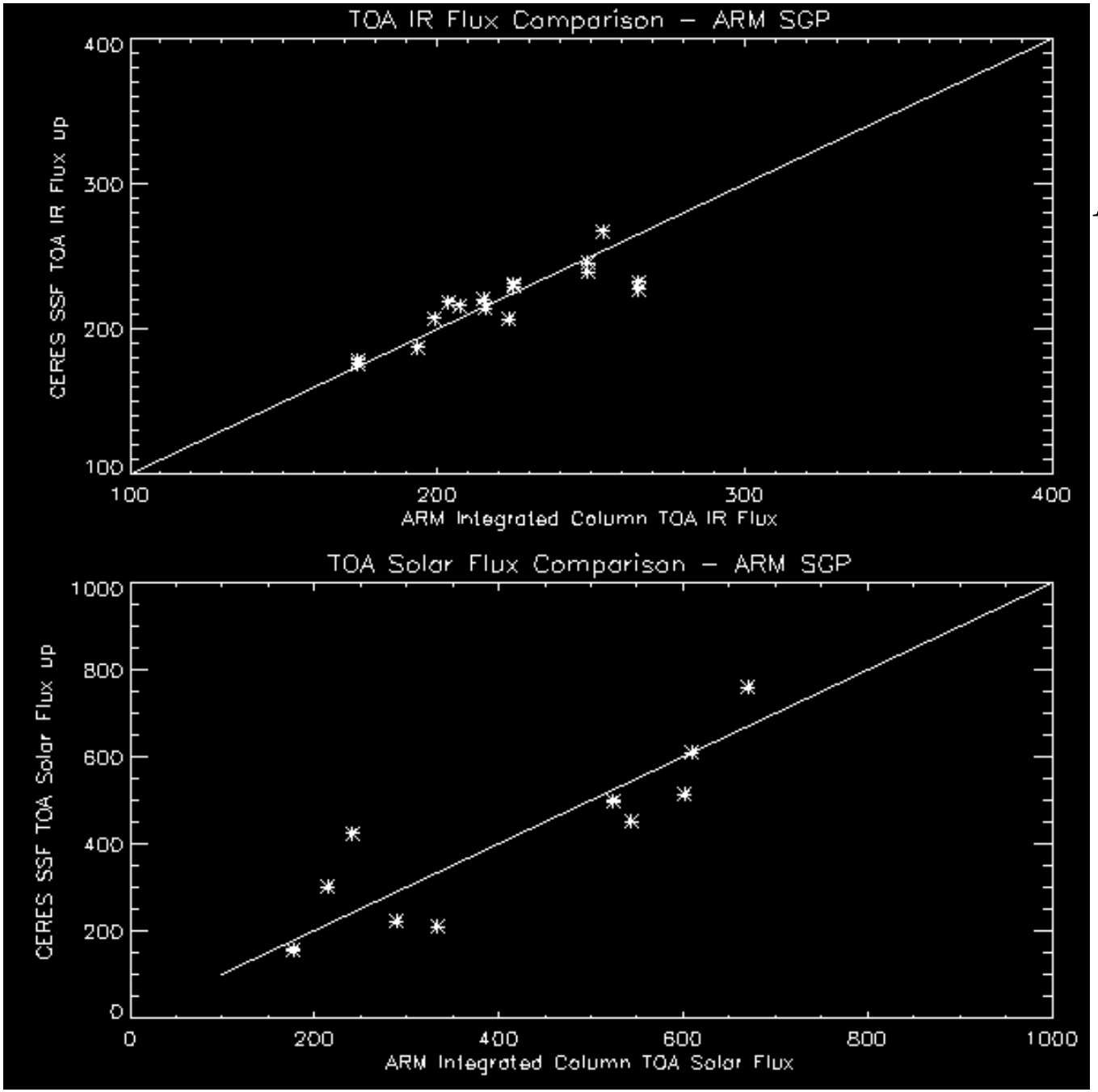
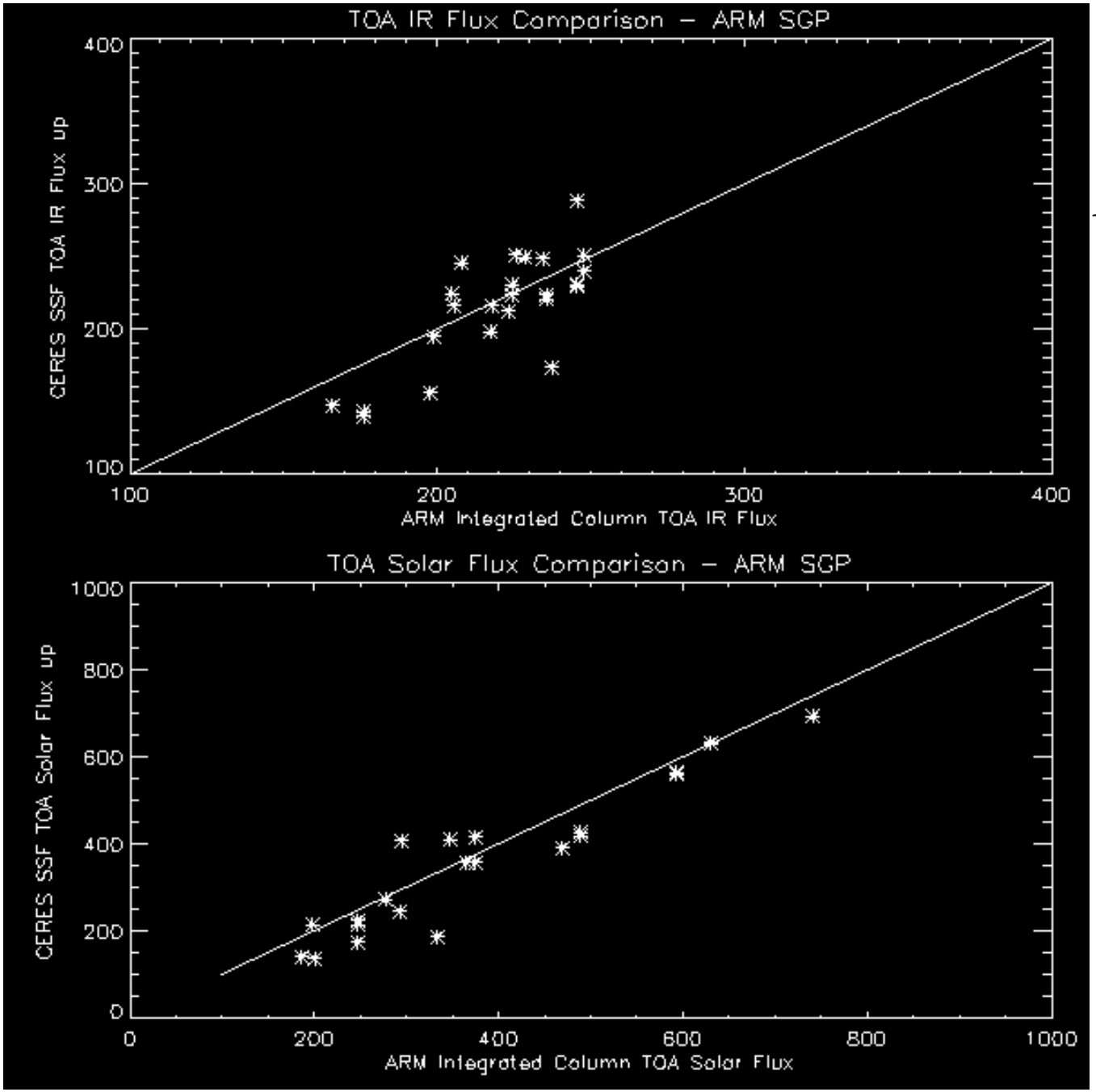


All Cloudy cases, view zenith < 20

	IR	Solar
R	0.85	0.89
RMS	14	73
Bias	0.5%	1.%

Comparing CERES Fluxes with Fluxes Derived from the ARM Data Streams



All Cloudy cases, view zenith 30-50

	IR	Solar
R	0.77	0.94
RMS	24	55
Bias	-2%	-7%

ALL	IR	Solar
R	0.67	0.91
RMS	31	56
Bias	1%	0.6%

Ret Cld	IR	Solar
R	0.85	0.91
RMS	23	56
Bias	-4%	-1%

< 20	IR	Solar
R	0.85	0.89
RMS	14	73
Bias	0.5%	1.%

CCM	IR	Solar
R	0.39	0.74
RMS	35	57
Bias	-1.5%	1.2%

30-50	IR	Solar
R	0.77	0.94
RMS	24	55
Bias	-2%	-7%

Summary

- Developed a tool (to be applied to all ARM sites) that integrates available data streams into a continuous description of the physical state of the instantaneous atmospheric column over the ARM sites.

- Available satellite-based retrievals compare reasonably to calculations.

- Work in progress…