SARB/CRS TOA & Surface Validation

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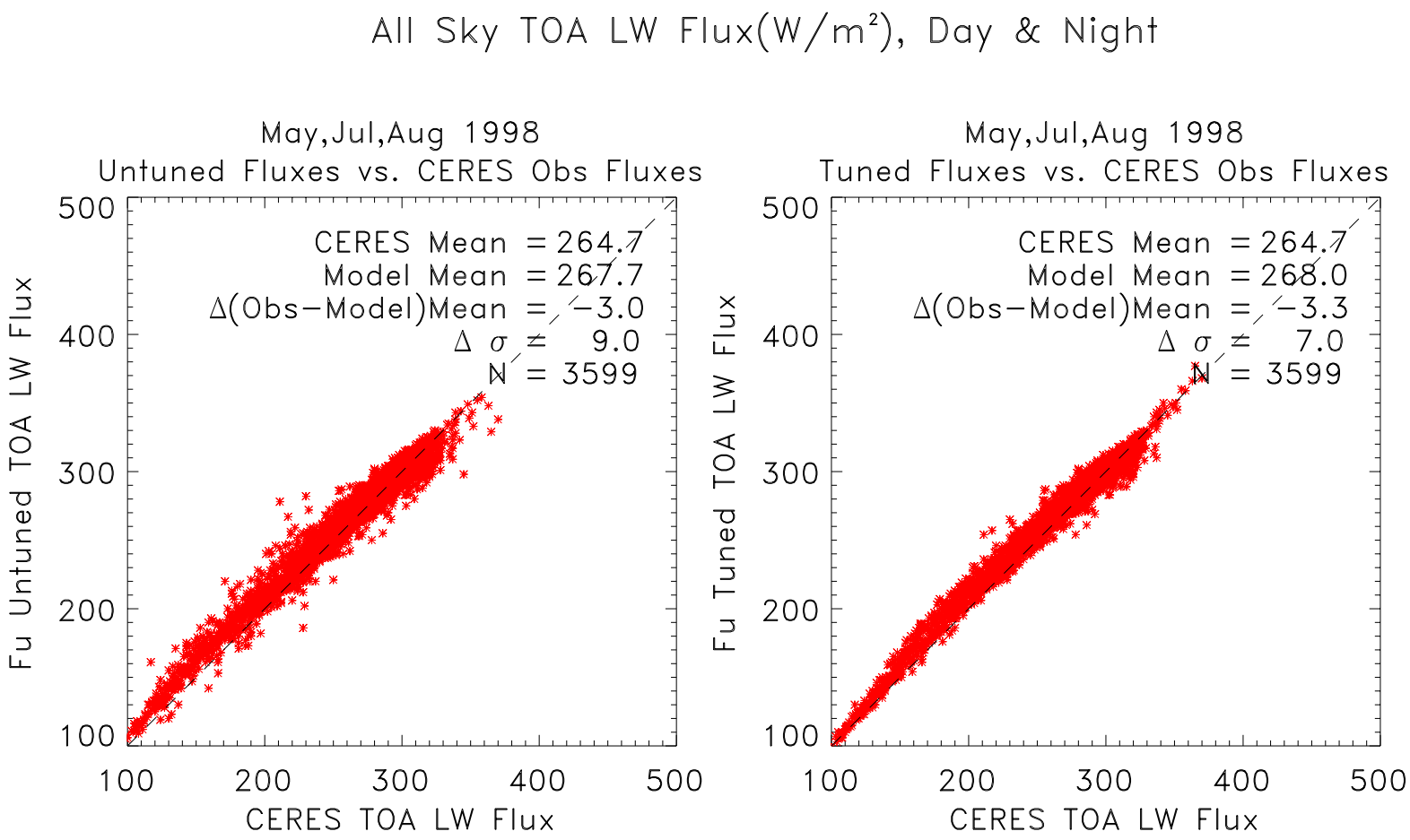
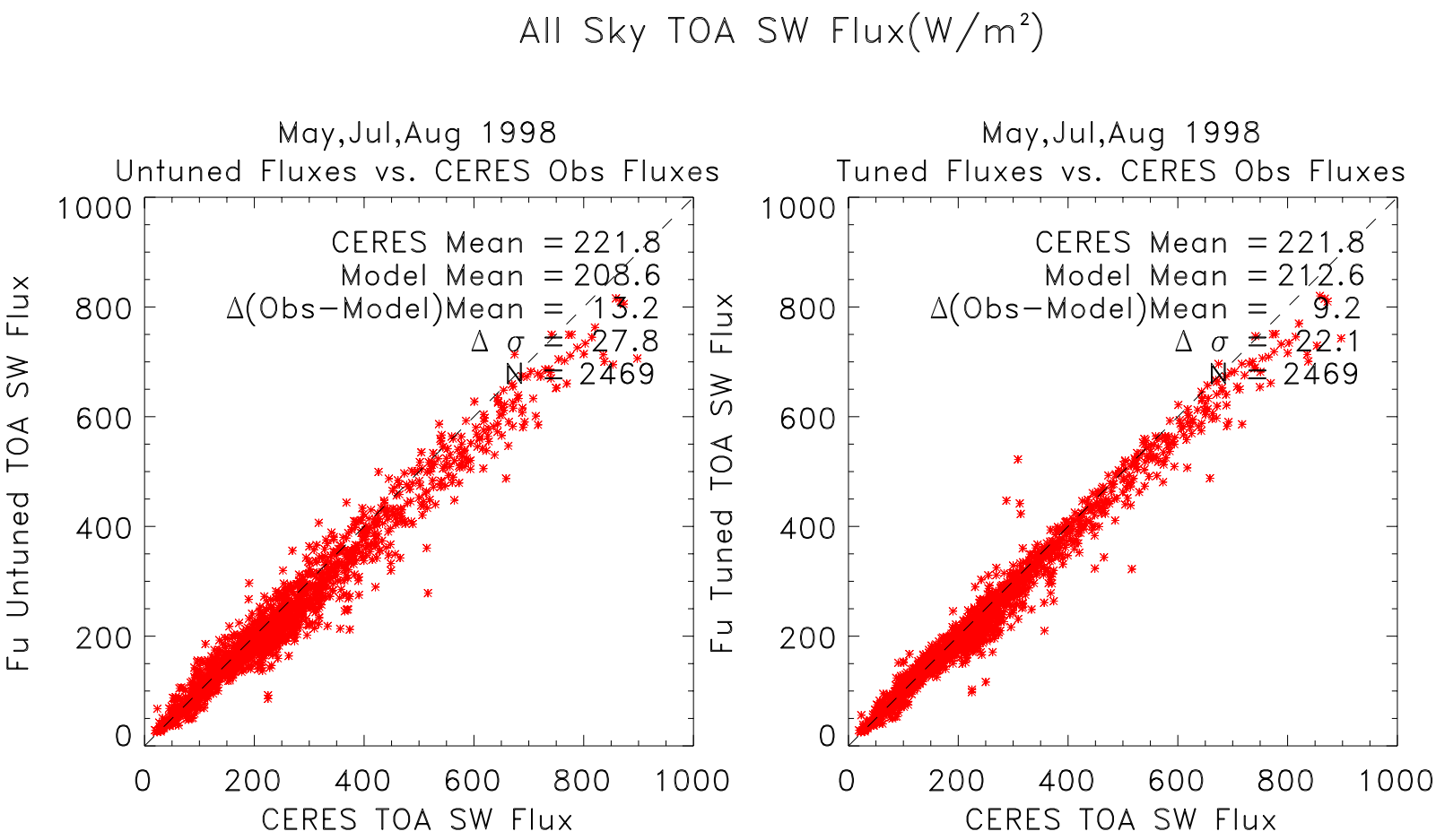
- ☆ **Subset of CRS where the footprints have been temporally located 15 minutes of a CAVE time step then the footprint closest to the surface site is selected for analysis.**
- ☆ **Time sample is from May, Jul, Aug 1998**
- ☆ **<u>All Sky</u> spatial subset:**

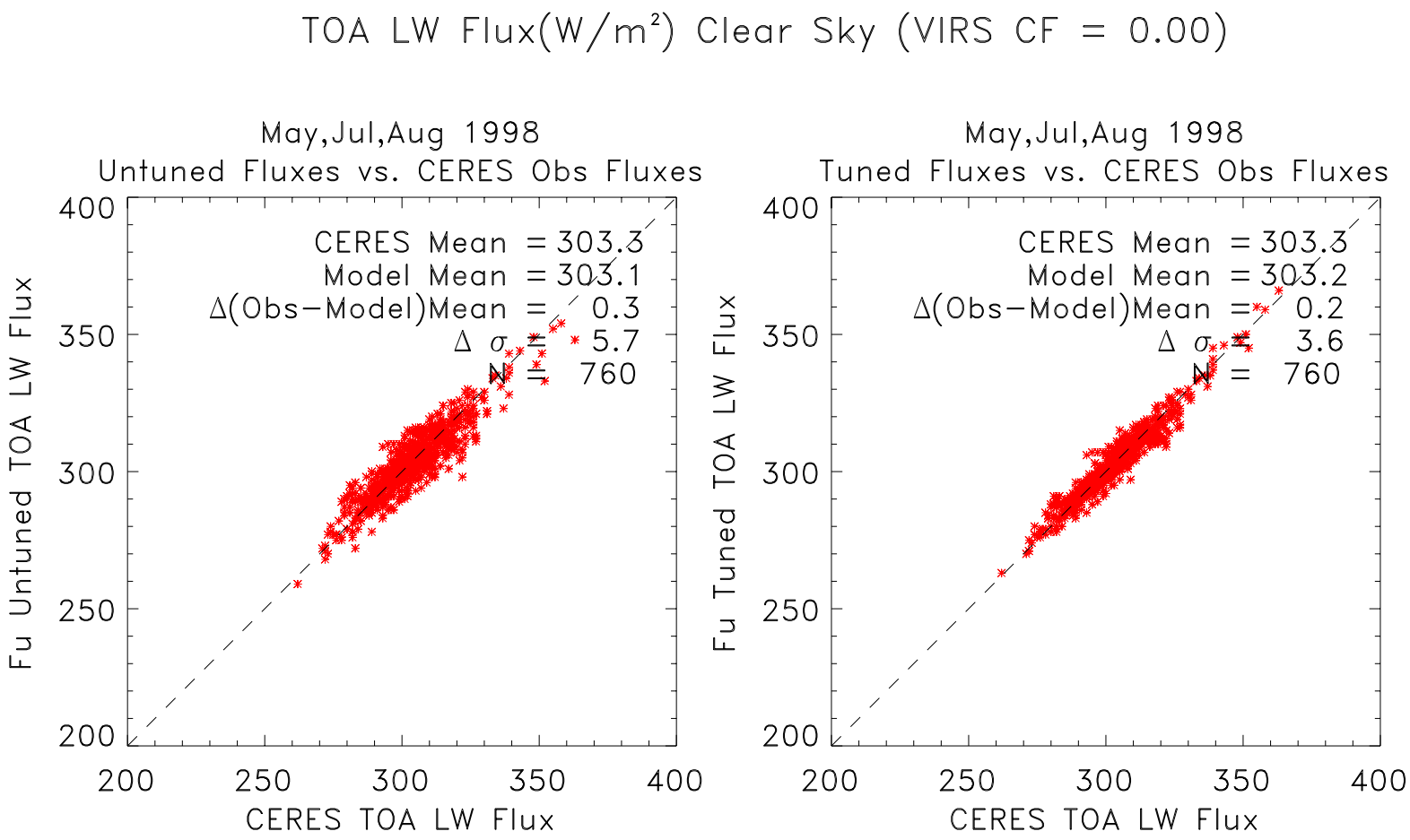
ARM/SGP	**– 2872**	**80%**	**(SGP, MAN)**
SURFRAD	**– 304**	**9%**	**(DRA, GWN)**
BSRN	**– 136**	**4%**	**(ILO, FLO, TAT)**
CMDL	**– 266**	**7%**	**(BER, KWA, SAM, MLO)**

- ☆ **<u>Clear Sky</u> spatial subset:**

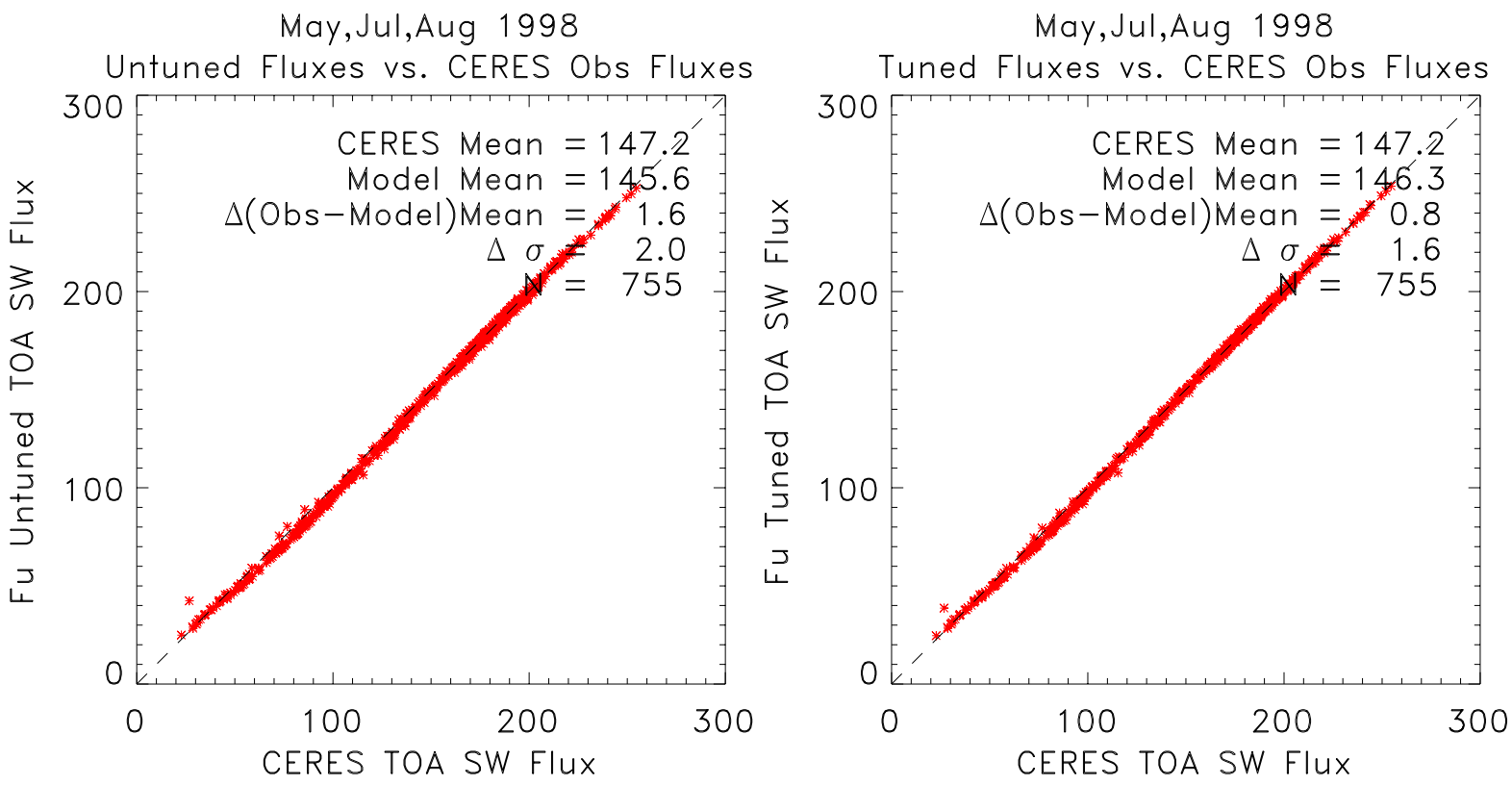
ARM/SGP	**– 278**	**86%**	**(SGP, MAN)**
SURFRAD	**– 47**	**14%**	**(DRA, GWN)**
BSRN	**– 0**	**0%**	**(ILO, FLO, TAT)**
CMDL	**– 0**	**0%**	**(BER, KWA, SAM, MLO)**


All Sky TOA LW Flux(W/m²), Day & Night
May,Jul,Aug 1998
Untuned Fluxes vs. CERES Obs Fluxes
CERES Mean = 264.7
Model Mean = 267.7
Δ(Obs−Model)Mean = −3.0
Δ σ = 9.0
N = 3599
Fu Untuned TOA LW Flux
CERES TOA LW Flux
May,Jul,Aug 1998
Tuned Fluxes vs. CERES Obs Fluxes
CERES Mean = 264.7
Model Mean = 268.0
Δ(Obs−Model)Mean = −3.3
Δ σ = 7.0
N = 3599
Fu Tuned TOA LW Flux
CERES TOA LW Flux
100
200
300
400
500

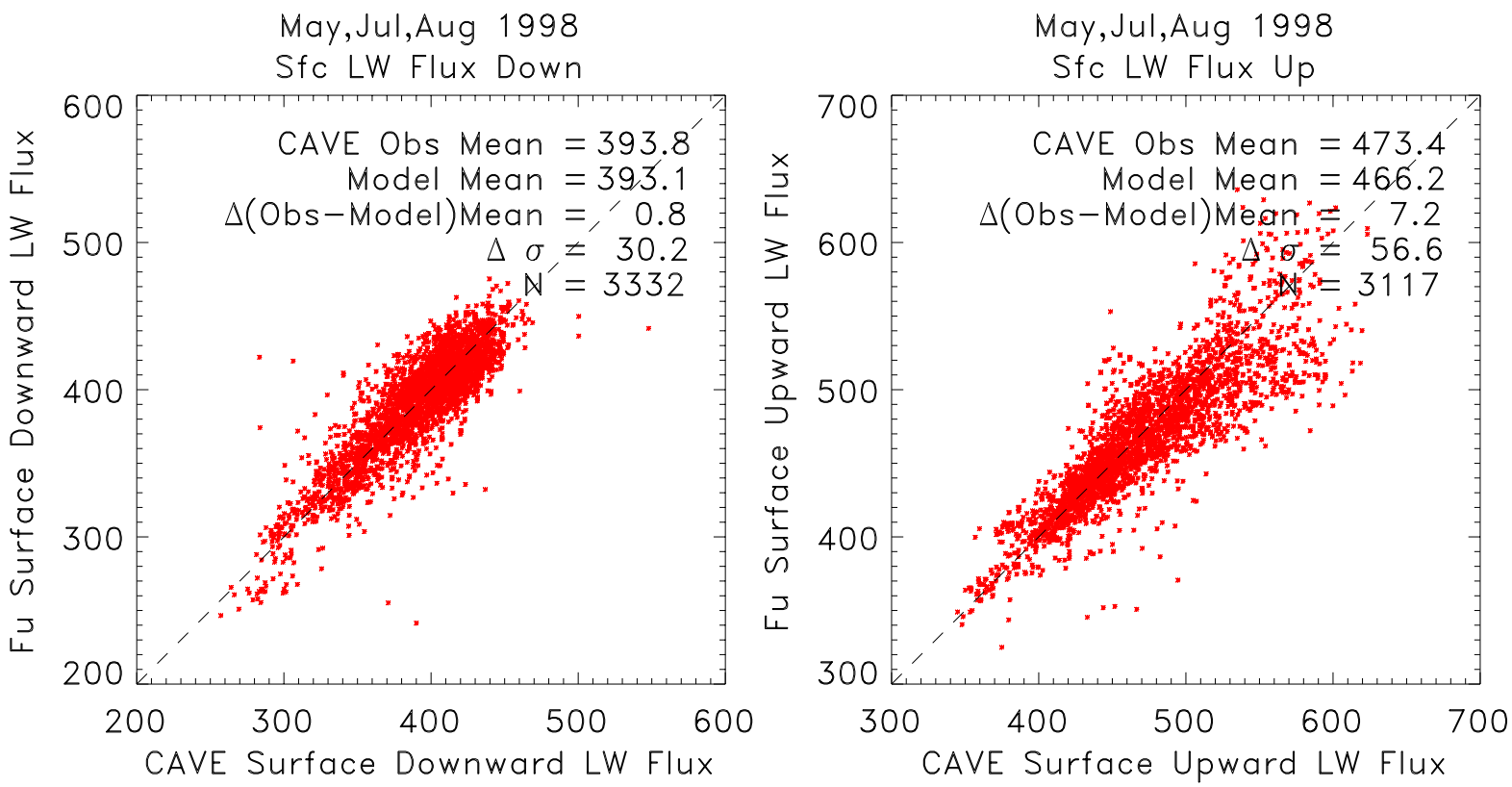

All Sky TOA SW Flux(W/m²)
May,Jul,Aug 1998
Untuned Fluxes vs. CERES Obs Fluxes
CERES Mean = 221.8
Model Mean = 208.6
Δ(Obs−Model)Mean = 13.2
Δ σ = 27.8
N = 2469
Fu Untuned TOA SW Flux
CERES TOA SW Flux
May,Jul,Aug 1998
Tuned Fluxes vs. CERES Obs Fluxes
CERES Mean = 221.8
Model Mean = 212.6
Δ(Obs−Model)Mean = 9.2
Δ σ = 22.1
N = 2469
Fu Tuned TOA SW Flux
CERES TOA SW Flux
0
200
400
600
800
1000


TOA LW Flux(W/m²) Clear Sky (VIRS CF = 0.00)
May,Jul,Aug 1998
Untuned Fluxes vs. CERES Obs Fluxes
CERES Mean = 303.3
Model Mean = 303.1
Δ(Obs−Model)Mean = 0.3
Δ σ = 5.7
N = 760
Fu Untuned TOA LW Flux
CERES TOA LW Flux
May,Jul,Aug 1998
Tuned Fluxes vs. CERES Obs Fluxes
CERES Mean = 303.3
Model Mean = 303.2
Δ(Obs−Model)Mean = 0.2
Δ σ = 3.6
N = 760
Fu Tuned TOA LW Flux
CERES TOA LW Flux
200
250
300
350
400

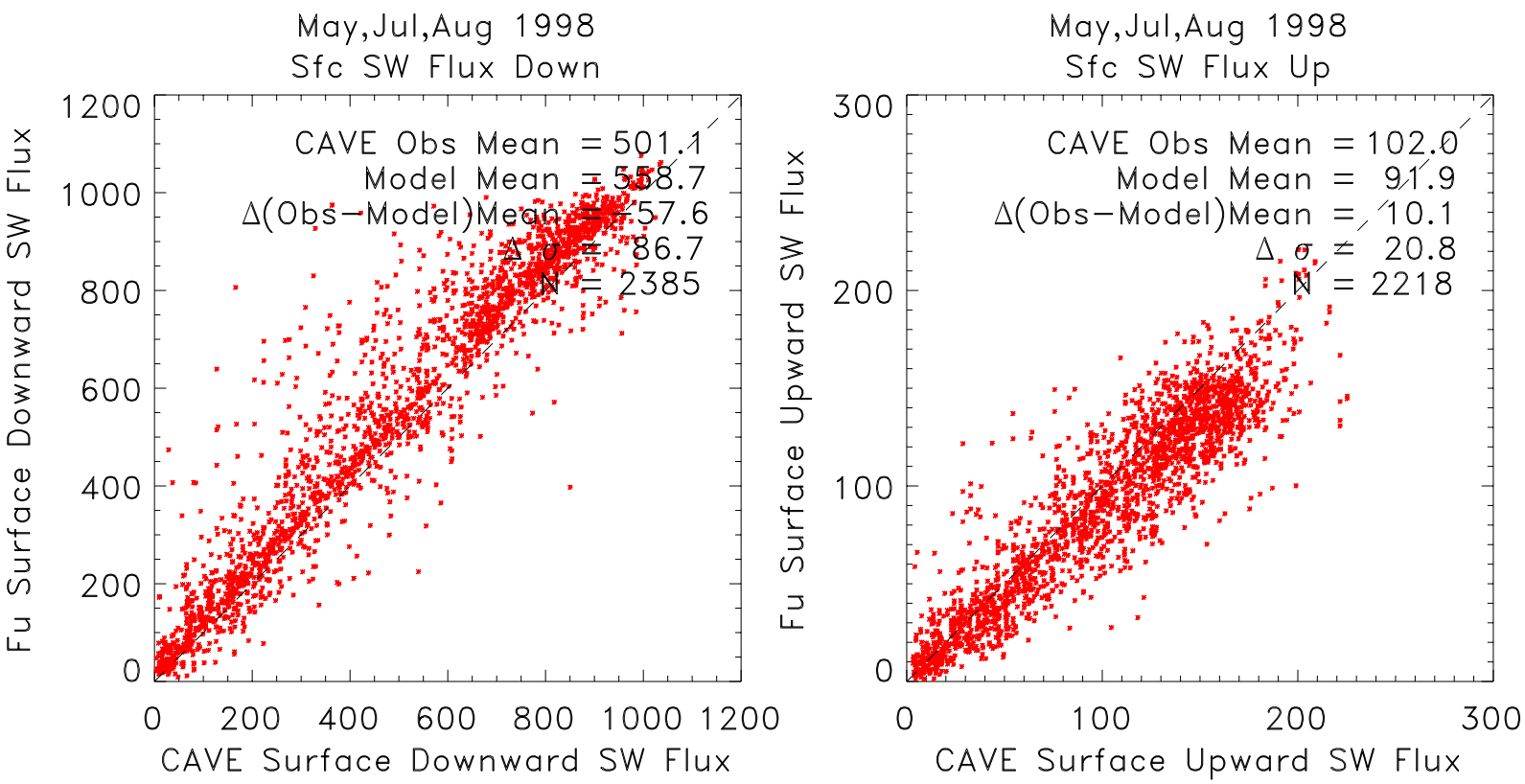
TOA SW Flux(W/m²) Clear Sky (VIRS CF = 0.00)



All Sky Surface LW Flux (Day & Night)
CERES/SARB UnTuned Calculations Matched to CAVE Surface Observations



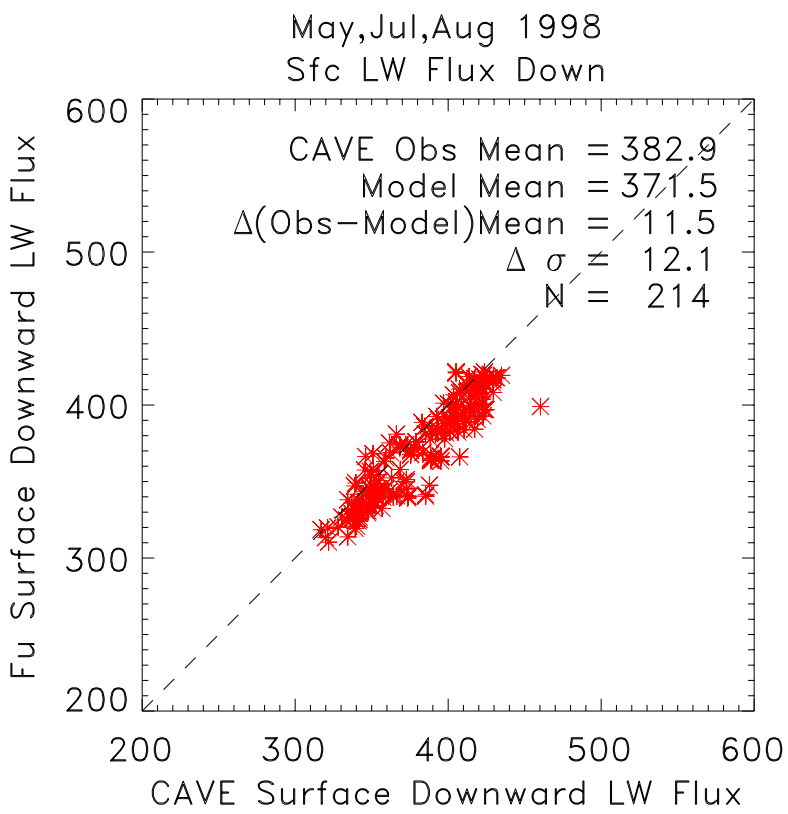
All Sky Surface SW Flux
CERES/SARB UnTuned Calculations Matched to CAVE Surface Observations

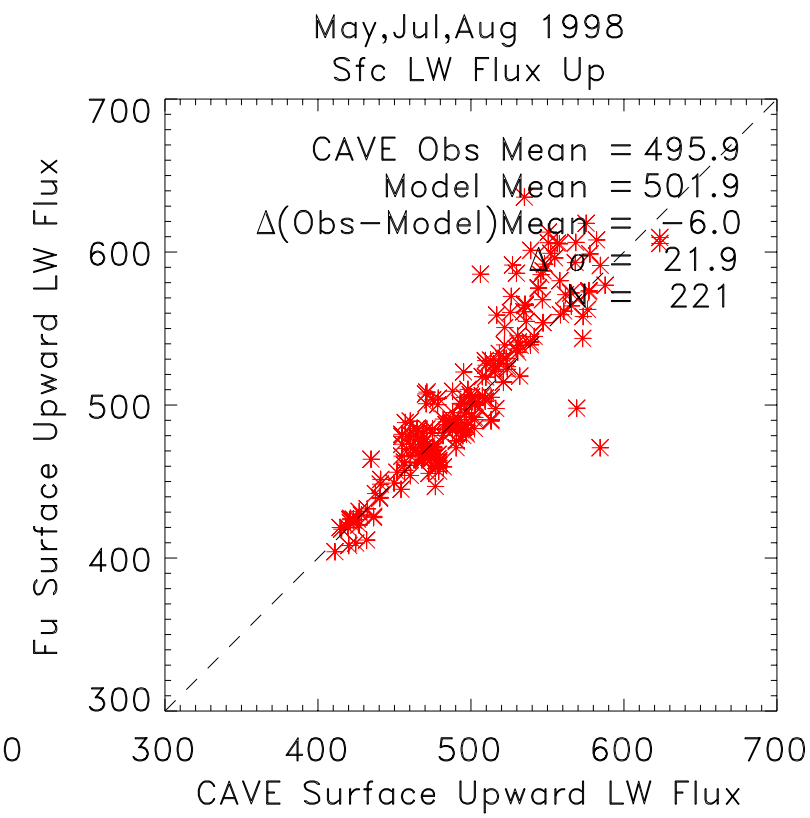


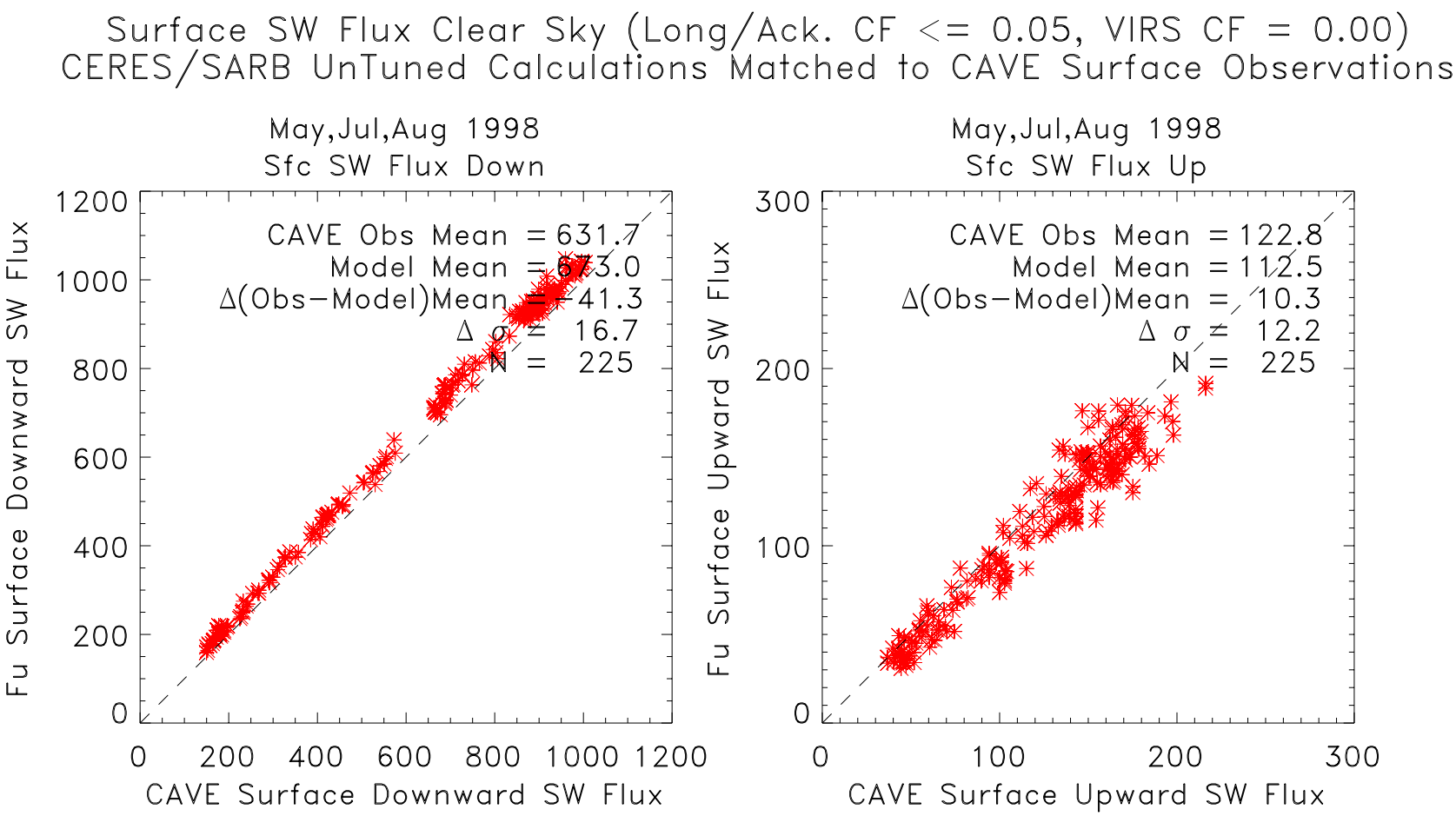
Surface All Sky CAVE vs CRS Subset

	Downward Flux			Upward Flux		
	N	Bias (Obs−Mod) (W/m^2), (%)	Std Dev (Obs−Mod) (W/m^2)	N	Bias (Obs−Mod) (W/m^2), (%)	Std Dev (Obs−Mod) (W/m^2)
Sfc LW Untuned	1274	−3.1, (1%)	19.0	1209	0.5, (0%)	19.8
Sfc LW Tuned	1274	−3.4, (1%)	19.1	1209	2.3, (0%)	19.2
Sfc SW Untuned	2385	−57.6, (11%)	86.7	2218	10.2, (10%)	20.8
Sfc SW Tuned	2385	−54.1, (11%)	85.4	2217	9.6, (9%)	20.2

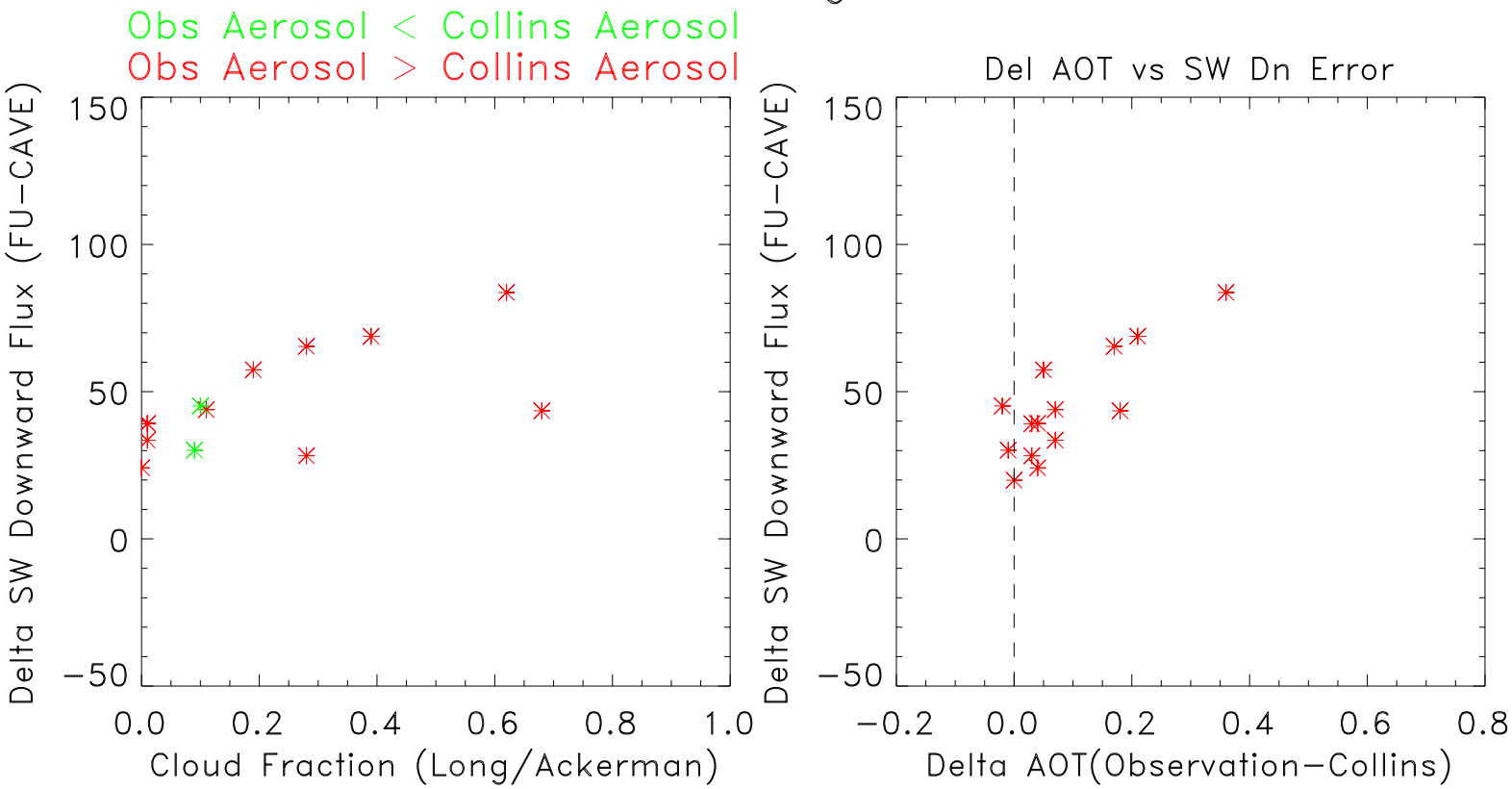
Surface LW Flux Clear Sky (Long/Ack. CF <= 0.05, VIRS CF = 0.00) Daytime
CERES/SARB UnTuned Calculations Matched to CAVE Surface Observations

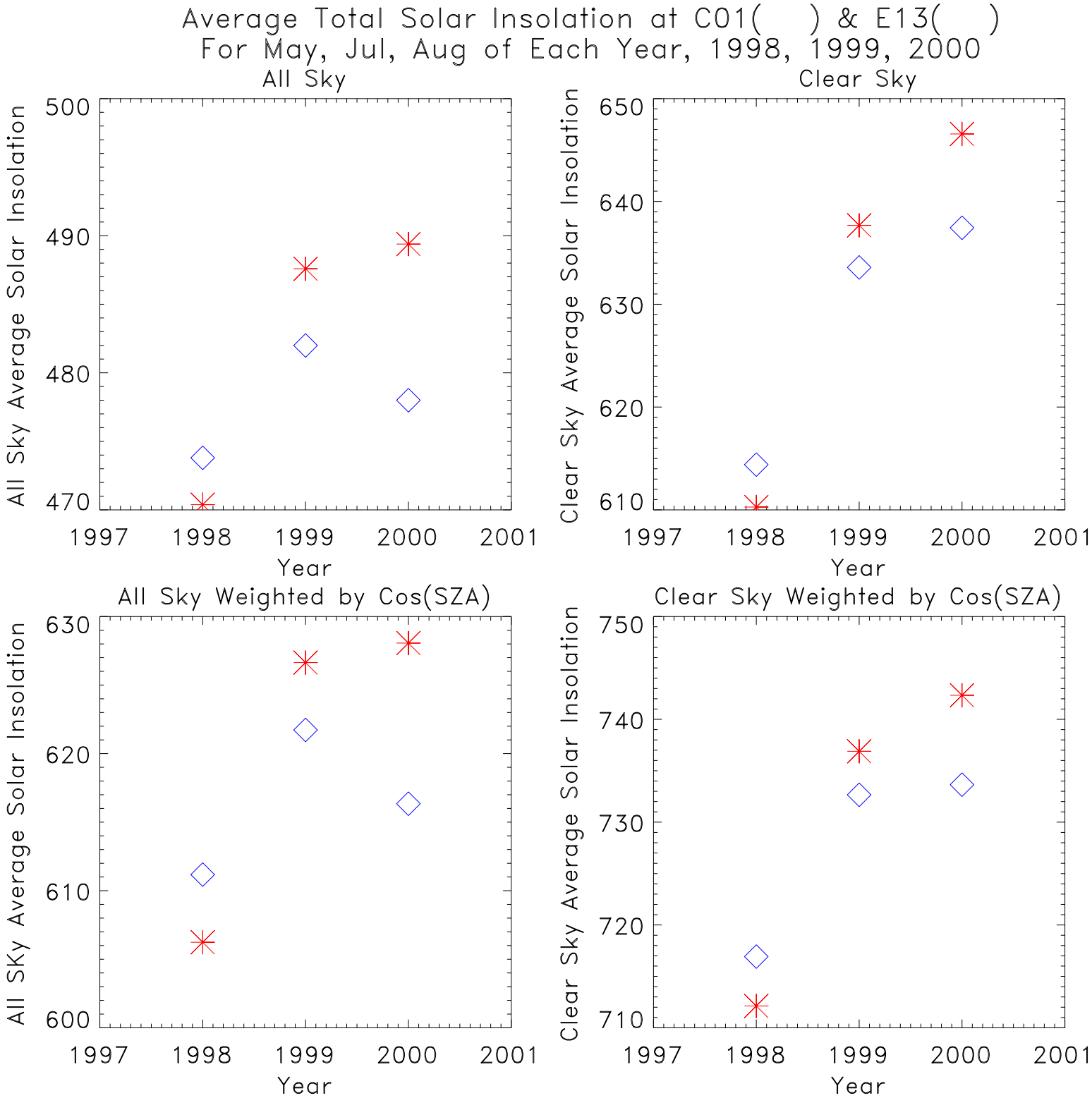





Surface SW Flux Clear Sky (Long/Ack. CF <= 0.05, VIRS CF = 0.00)
CERES/SARB UnTuned Calculations Matched to CAVE Surface Observations
May,Jul,Aug 1998
Sfc SW Flux Down
CAVE Obs Mean = 631.7
Model Mean = 673.0
Δ(Obs−Model)Mean = −41.3
Δ σ = 16.7
N = 225
Fu Surface Downward SW Flux
CAVE Surface Downward SW Flux
0
200
400
600
800
1000
1200
May,Jul,Aug 1998
Sfc SW Flux Up
CAVE Obs Mean = 122.8
Model Mean = 112.5
Δ(Obs−Model)Mean = 10.3
Δ σ = 12.2
N = 225
Fu Surface Upward SW Flux
CAVE Surface Upward SW Flux
0
100
200
300

CERES VIRS Clear Sky Compared to In-Situ Cloud & Aerosol Observations
CERES/SARB SW UnTuned Calculations Matched to CAVE Surface Observations
Jul, Aug 1998




Average Total Solar Insolation at C01( ) & E13( )
For May, Jul, Aug of Each Year, 1998, 1999, 2000
All Sky
All Sky Average Solar Insolation
500
490
480
470
1997
1998
1999
2000
2001
Year
Clear Sky
Clear Sky Average Solar Insolation
650
640
630
620
610
1997
1998
1999
2000
2001
Year
All Sky Weighted by Cos(SZA)
All SKy Average Solar Insolation
630
620
610
600
1997
1998
1999
2000
2001
Year
Clear Sky Weighted by Cos(SZA)
Clear Sky Average Solar Insolation
750
740
730
720
710
1997
1998
1999
2000
2001
Year

Surface Clear Sky CAVE vs CRS Subset
(Long/Ackerman CF <= 0.05, VIRS CF= 0.0)

	Downward Flux			Upward Flux		
	N	Bias (Obs−Mod) (W/m^2), (%)	Std Dev (Obs−Mod) (W/m^2)	N	Bias (Obs−Mod) (W/m^2), (%)	Std Dev (Obs−Mod) (W/m^2)
Sfc LW Untuned	214	11.5, (3%)	12.1	221	−6.0, (1%)	21.9
Sfc LW Tuned	214	12.8, (4%)	12.4	221	2.8, (0%)	22.6
Sfc SW Untuned	225	−41.3, (7%)	16.7	225	10.3, (8%)	12.2
Sfc SW Tuned	225	−42.1, (7%)	17.0	225	9.7, (8%)	12.3