

Status of Surface-Only Flux Algorithms (SOFA) Processing (Simple Surface Flux Models)

Shashi K. Gupta², David P. Kratz¹,
Anne C. Wilber², and Victor E. Sothcott²

¹NASA Langley Research Center
²Science Systems and Applications, Inc.

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Background

- CERES uses several simple surface flux models for computing SW and LW surface fluxes in addition to the detailed model used by SARB. These models are:

LPSA/LPLA:
Langley Parameterized
SW/LW Algorithm

		Model A	Model B	Model C
SW	Clear	Li et al.	LPSA	--
	All-Sky	--	LPSA	--
LW	Clear	Inamdar and Ramanathan	LPLA	Zhou-Cess
	All-Sky	--	LPLA	Zhou-Cess

References:

SW A: Li et al. (1993): *J. Climate*, **6**, 1764-1772.

SW B: Darnell et al. (1992): *J Geophys. Res.*, **97**, 15741-15760.

Gupta et al. (2001): *NASA/TP-2001-211272*, 31 pp.

LW A: Inamdar and Ramanathan (1997): *Tellus*, **49B**, 216-230.

LW B: Gupta et al. (1992): *J. Appl. Meteor.*, **31**, 1361-1367.

LW C: Zhou and Cess (2001): *J. Geophys. Res.*, **106**, 12477-12488.



Background (contd.)

- SW and LW Models A and B used since the beginning. Good results and validation shown for all Editions of TRMM and Terra data at earlier STMs. Also for Aqua-1A and -1B data.
- LW Model C introduced recently; Tested thoroughly. Will be used starting with Edition-3 processing.
- Focus of this presentation is on SW Model B - Staylor Model.
- A fast parameterization; developed in late 1980s and early 1990s. Uses TOA measurements, meteorology, and a few ancillary datasets.

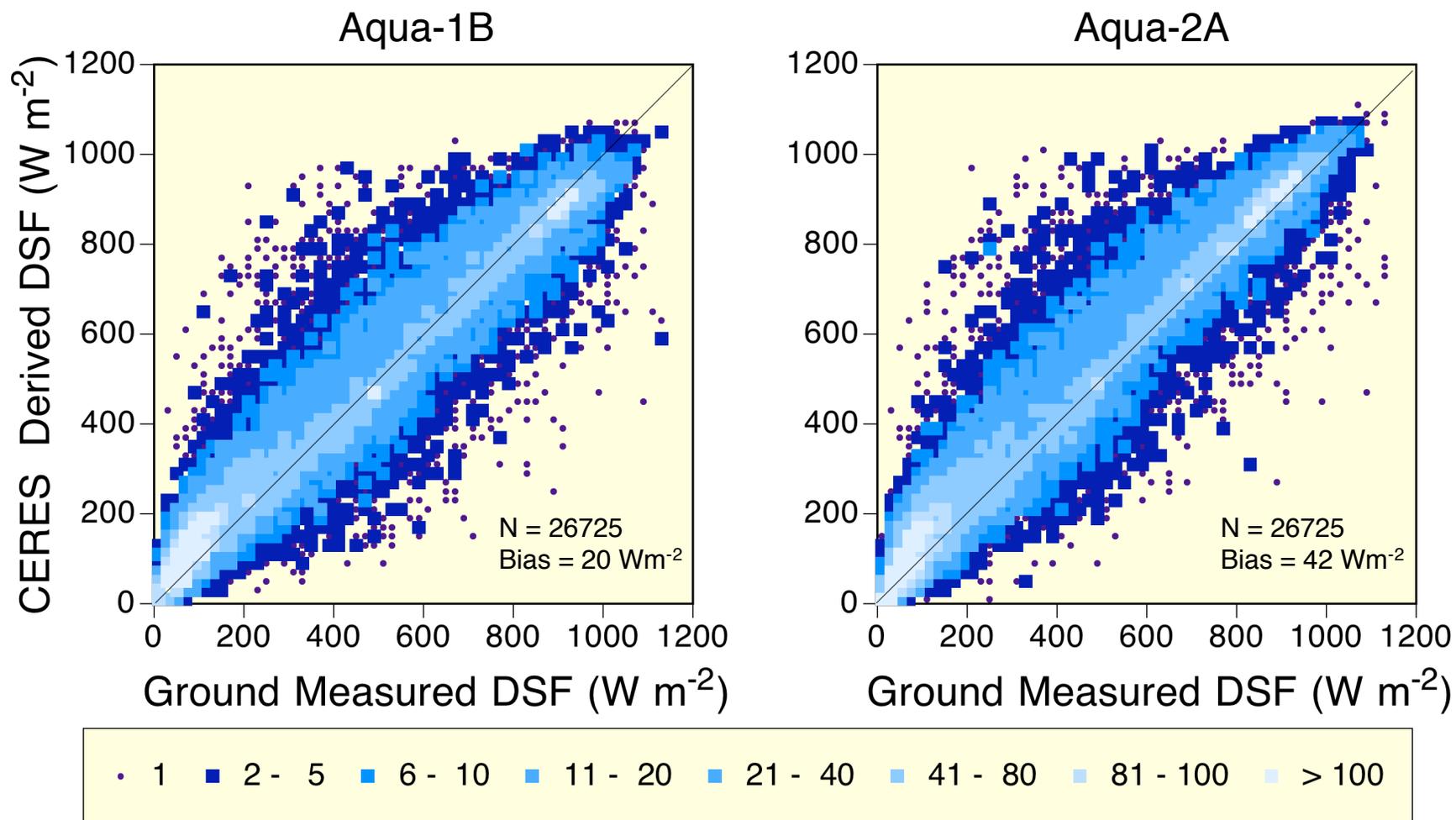


About SW Model B and Changes

- Ancillary datasets were becoming dated:
 - TOA clear-sky albedo climatology from ERBE data.
 - Aerosol properties from WCP reports from the 1980s.
- Between Aqua Edition-1B and -2A processing, we tried to make some changes to SW Model B.
- Ancillary datasets brought in from newer sources:
 - TOA clear-sky albedo climatology from Terra data.
 - Aerosol properties from MATCH products converted to broadband using spectral information from OPAC.
- Surface fluxes also affected by new ADMs through TOA fluxes.
- The results of these changes did not look good.



SW Model B Cloudy-Sky Surface Insolation (July 2002 - March 2005)



Validation of SW Model B SSF

Aqua-1B and -2A Comparison - Jul2002 - Mar2005

Sites # of Points		Aqua-1B	Aqua-2A
Continental 10881	Bias Wm^{-2} (%)	14.73 (2.99)	51.95 (10.55)
	σ Wm^{-2} (%)	91.4 (18.6)	89.8 (18.2)
Desert 2376	Bias Wm^{-2} (%)	-9.16 (-1.26)	42.31 (5.84)
	σ Wm^{-2} (%)	95.1 (13.1)	80.9 (11.2)
Coastal 1724	Bias Wm^{-2} (%)	32.66 (6.62)	49.41 (10.02)
	σ Wm^{-2} (%)	71.4 (14.5)	67.0 (13.6)
Island 3218	Bias Wm^{-2} (%)	63.73 (10.37)	76.93 (12.52)
	σ Wm^{-2} (%)	107.1 (17.4)	110.9 (18.0)
Ant-Arctic 8526	Bias Wm^{-2} (%)	16.11 (7.41)	14.98 (6.89)
	σ Wm^{-2} (%)	63.5 (29.2)	66.5 (30.6)
Global 26725	Bias Wm^{-2} (%)	20.10 (4.57)	42.14 (9.57)
	σ Wm^{-2} (%)	90.5 (20.6)	90.9 (20.7)

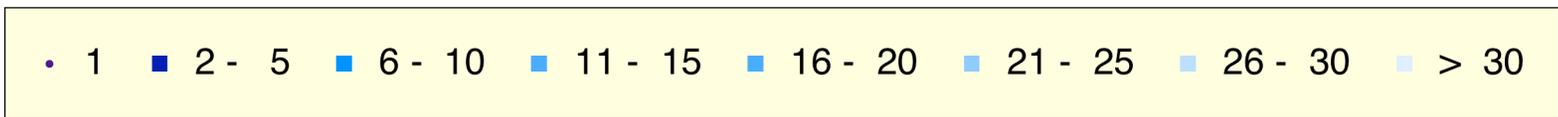
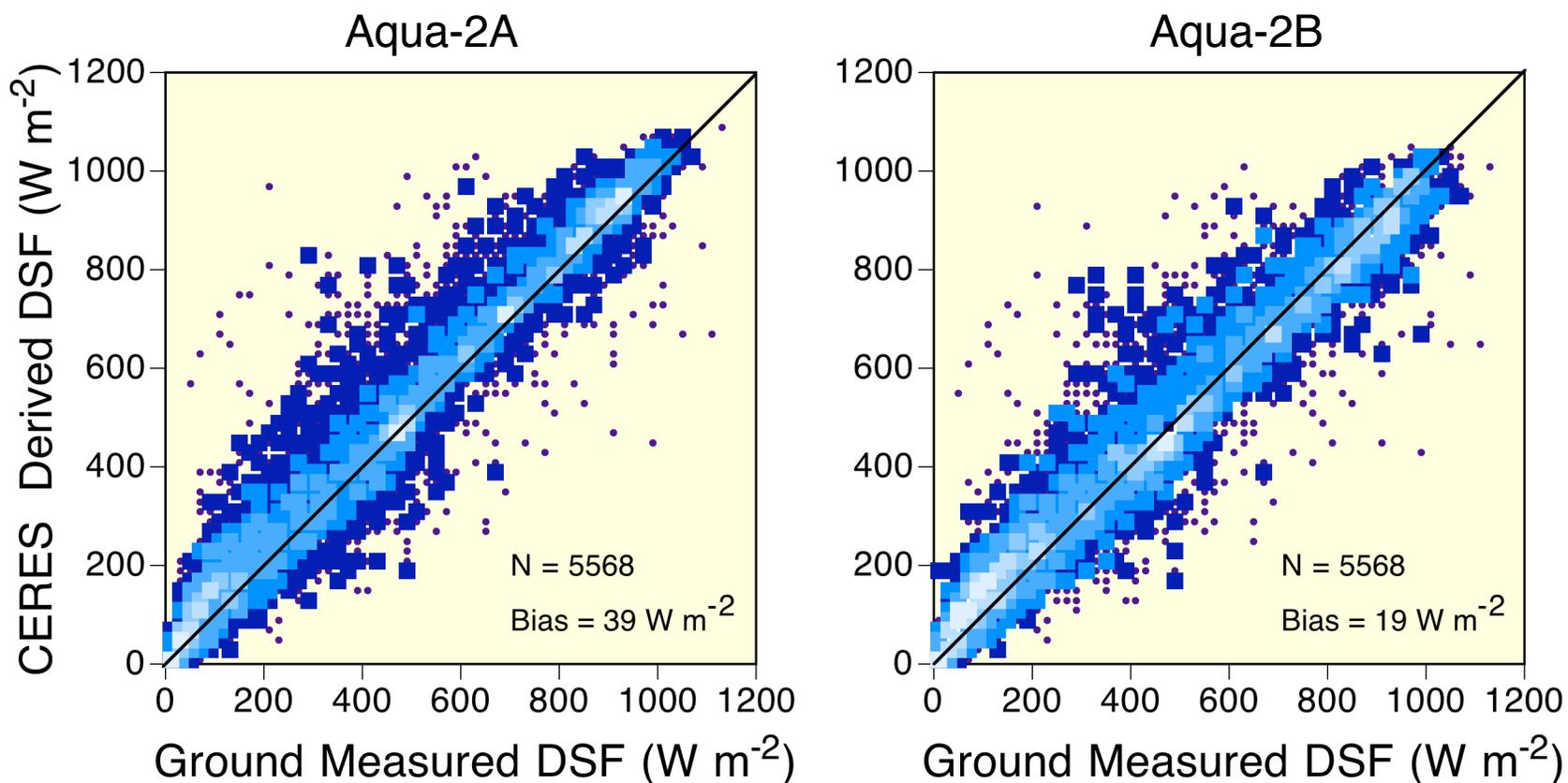


Follow-up and Readjustment

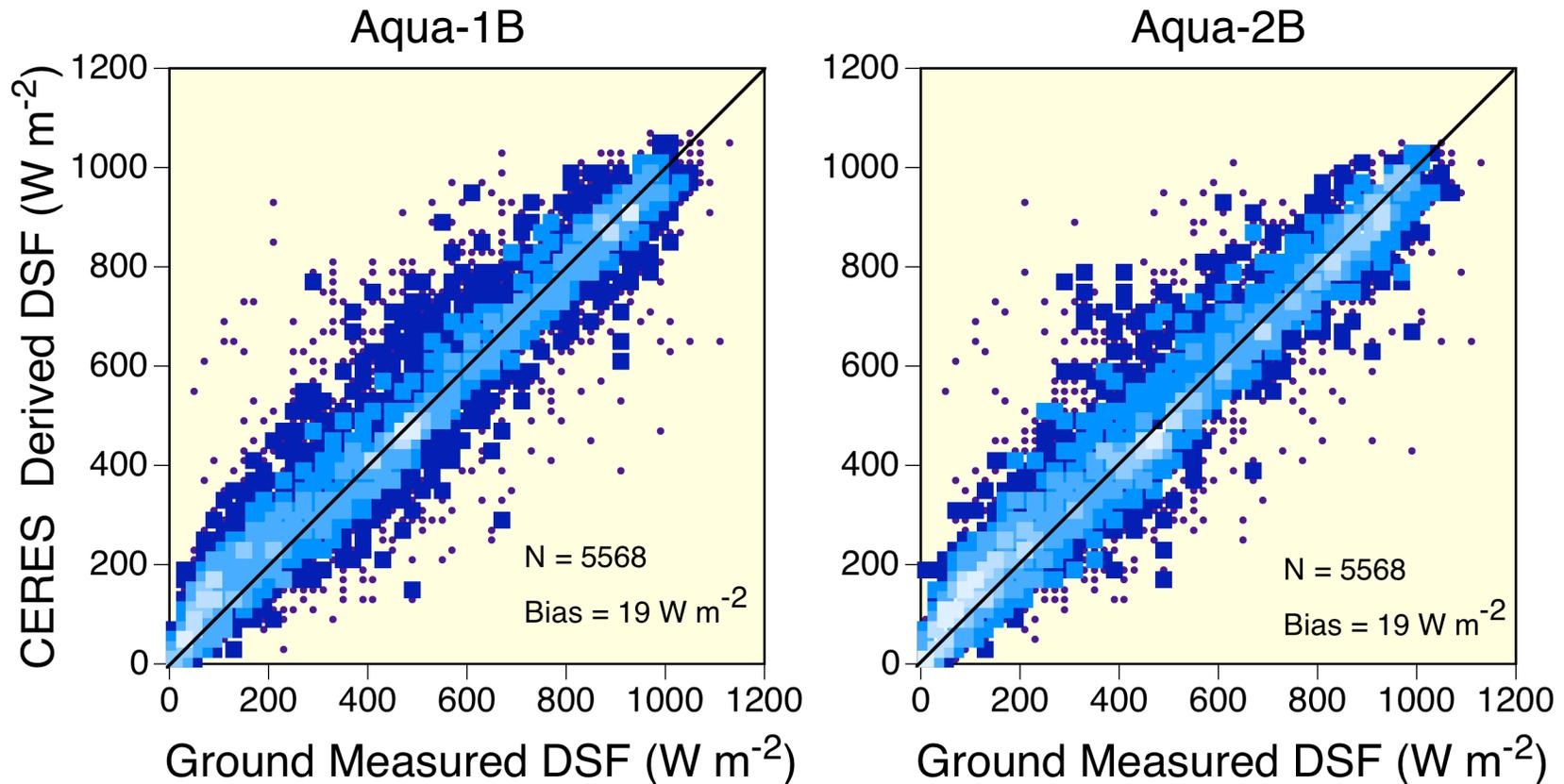
- Aerosol distribution and properties - Major contributors
- ADMs and TOA albedo climatology - Minor contributors
- Brought back old aerosol properties from WCP reports, while keeping new TOA albedo climatology and ADMs



SW Model B All-Sky Surface Insolation (July 2002 - June 2003)



SW Model B All-Sky Surface Insolation (July 2002 - June 2003)



SW Model B All-Sky Surface Insolation (July 2002 - June 2003)

		Aqua1B	Aqua2A	Aqua2B
	N	Bias Wm ⁻² (%)	Bias Wm ⁻² (%)	Bias Wm ⁻² (%)
Continental	2291	14.27 (2.87)	47.17 (9.48)	17.82 (3.58)
Coastal	360	32.14 (6.40)	47.49 (9.50)	33.02 (6.60)
Ant-Arctic	1689	10.15 (4.04)	9.95 (3.96)	10.28 (4.10)
Desert	631	7.46 (0.99)	44.61 (5.90)	2.38 (0.31)
Island	597	69.61 (11.60)	82.00 (13.67)	59.61 (9.94)
Global	5568	19.34 (4.17)	39.36 (8.49)	19.23 (4.15)



Summary and Concluding Remarks

- Errors that appeared in SW Model B fluxes in Aqua Edition-2A results have been corrected.
- Results from all other simple surface flux models remain the same as in Aqua Edition-2A.
- The efforts to replace old aerosol properties with newer, more realistic ones have not been abandoned.
- We will attempt to resolve these problems before Edition-3 processing begins and will keep you posted.



SW Model B All-Sky Surface Insolation (July 2002 - June 2003)

