

SSM/I vs TMI Intercomparisons

Tom Wilheit

Texas A&M University

Input data provided by CSU -
Result of their FCDR effort

Two years used 2002 and July 2005 through June 2006 (X-CAL year)

3 Satellites F13, F14, F15

Matchups courtesy of UCF--Thanks

Two algorithms used:

Analysis (GDAS) Based

Fitting (7 or 9 TMI channels as input)

Results averaged over whole data set and Lowest Quartile of TMI 21V

Calibration Reference TMI Version 7

Filters Applied

3σ filter (corresponding channels within 3σ of average difference)

GDAS surface temperature/pressure not crazy

TMI samples > 79

SSM/I samples > 59

Salinity > 30ppt (i.e. GDAS thinks it's ocean)

TMI 10H < 120K (TMI thinks it's ocean)

(no corresponding filter for SSM/I)

Sigma < 2K for V pol channels, 3K H pol channels

Skip forward 3 minutes in TMI time after each matchup used.

No more than 400 samples/month

SSM/I BIAS wrt TMI (K)

	19V	19H	22V	37V	37H	89V	89H
F13 XCAL YEAR							
FIT7	0.59	1.22	3.11	0.43	1.18	0.26	0.55
σ	0.02	0.01	0.04	0.02	0.04	0.03	0.04
FIT9	0.58	1.21	3.12	0.42	1.18	0.26	0.54
σ	0.03	0.02	0.05	0.03	0.05	0.04	0.05
GDAS	0.59	1.22	3.06	0.43	1.20	0.23	0.53
σ	0.03	0.02	0.06	0.04	0.05	0.05	0.06
F13 2002							
FIT7	0.42	1.18	2.91	0.22	1.09	0.13	0.27
σ	0.03	0.04	0.05	0.03	0.06	0.05	0.06
FIT9	0.41	1.17	2.92	0.21	1.09	0.13	0.27
σ	0.03	0.04	0.04	0.03	0.06	0.05	0.06
GDAS	0.42	1.17	2.88	0.22	1.09	0.12	0.26
σ	0.04	0.04	0.05	0.03	0.06	0.05	0.06
@	204	142	237	217	160	265	238

SSM/I BIAS wrt TMI (K) II

	19V	19H	22V	37V	37H	89V	89H
F14 XCAL YEAR							
FIT7	0.85	1.55	3.38	0.73	1.48	0.46	0.89
FIT9	0.84	1.54	3.39	0.72	1.48	0.46	0.89
GDAS	0.85	1.55	3.34	0.73	1.50	0.44	0.88
F14 2002							
FIT7	0.61	1.40	3.27	0.58	1.53	0.45	0.81
FIT9	0.61	1.40	3.28	0.58	1.53	0.46	0.81
GDAS	0.62	1.39	3.27	0.59	1.54	0.45	0.80
F15 XCAL YEAR							
FIT7	0.50	1.14	3.09	0.42	1.21	0.34	0.63
FIT9	0.50	1.14	3.09	0.42	1.21	0.34	0.63
GDAS	0.51	1.15	3.07	0.44	1.23	0.32	0.61
F15 2002							
FIT7	0.36	1.10	2.95	0.29	1.18	0.27	0.54
FIT9	0.35	1.10	2.96	0.28	1.17	0.28	0.54
GDAS	0.37	1.09	2.96	0.30	1.18	0.26	0.52
@	204	142	237	217	160	265	238

SSM/I BIAS wrt TMI (K)

bottom quartile TMI 21V

	19V	19H	22V	37V	37H	89V	89H
F13 XCAL YEAR							
FIT7	0.68	1.47	2.69	0.43	1.23	0.11	0.18
σ	0.03	0.01	0.05	0.02	0.04	0.03	0.04
FIT9	0.67	1.47	2.68	0.42	1.24	0.10	0.19
σ	0.04	0.02	0.06	0.03	0.05	0.05	0.06
GDAS	0.67	1.47	2.45	0.42	1.23	0.11	0.18
σ	0.04	0.02	0.06	0.04	0.05	0.05	0.06
F13 2002							
FIT7	0.51	1.49	2.50	0.21	1.23	-0.05	0.00
σ	0.03	0.03	0.05	0.03	0.06	0.05	0.06
FIT9	0.51	1.49	2.49	0.21	1.24	-0.06	0.00
σ	0.03	0.03	0.05	0.03	0.06	0.05	0.06
GDAS	0.51	1.48	2.30	0.20	1.23	-0.04	-0.02
σ	0.03	0.03	0.05	0.03	0.06	0.05	0.06
@	190	121	213	207	144	250	209

SSM/I BIAS wrt TMI (KELVINS) II

bottom quartile TMI 21V

	19V	19H	22V	37V	37H	89V	89H
F14 XCAL YEAR							
FIT7	0.93	1.71	2.88	0.67	1.35	0.26	0.47
FIT9	0.93	1.72	2.87	0.67	1.36	0.25	0.48
GDAS	0.92	1.72	2.67	0.67	1.36	0.26	0.47
F14 2002							
FIT7	0.76	1.69	2.76	0.58	1.51	0.21	0.42
FIT9	0.76	1.69	2.75	0.57	1.51	0.21	0.43
GDAS	0.76	1.68	2.63	0.57	1.51	0.22	0.41
F15 XCAL YEAR							
FIT7	0.58	1.26	2.57	0.41	1.10	0.11	0.15
FIT9	0.58	1.26	2.57	0.41	1.10	0.11	0.15
GDAS	0.58	1.26	2.38	0.42	1.10	0.13	0.14
F15 2002							
FIT7	0.39	1.19	2.39	0.27	1.07	0.02	0.10
FIT9	0.39	1.19	2.38	0.26	1.08	0.02	0.11
GDAS	0.40	1.18	2.26	0.27	1.06	0.04	0.09
@	190	121	213	207	144	250	209

Conclusions

Offsets were expected since FCDR used different Reference

Different methods gave almost identical results

Should have been the same for all 3 sensors—they weren't quite

Secular drift?

Even with an effort like CSU FCDR, there is still a job for X-CAL to do

