Calibration and Validation of the SST Derived from GLI

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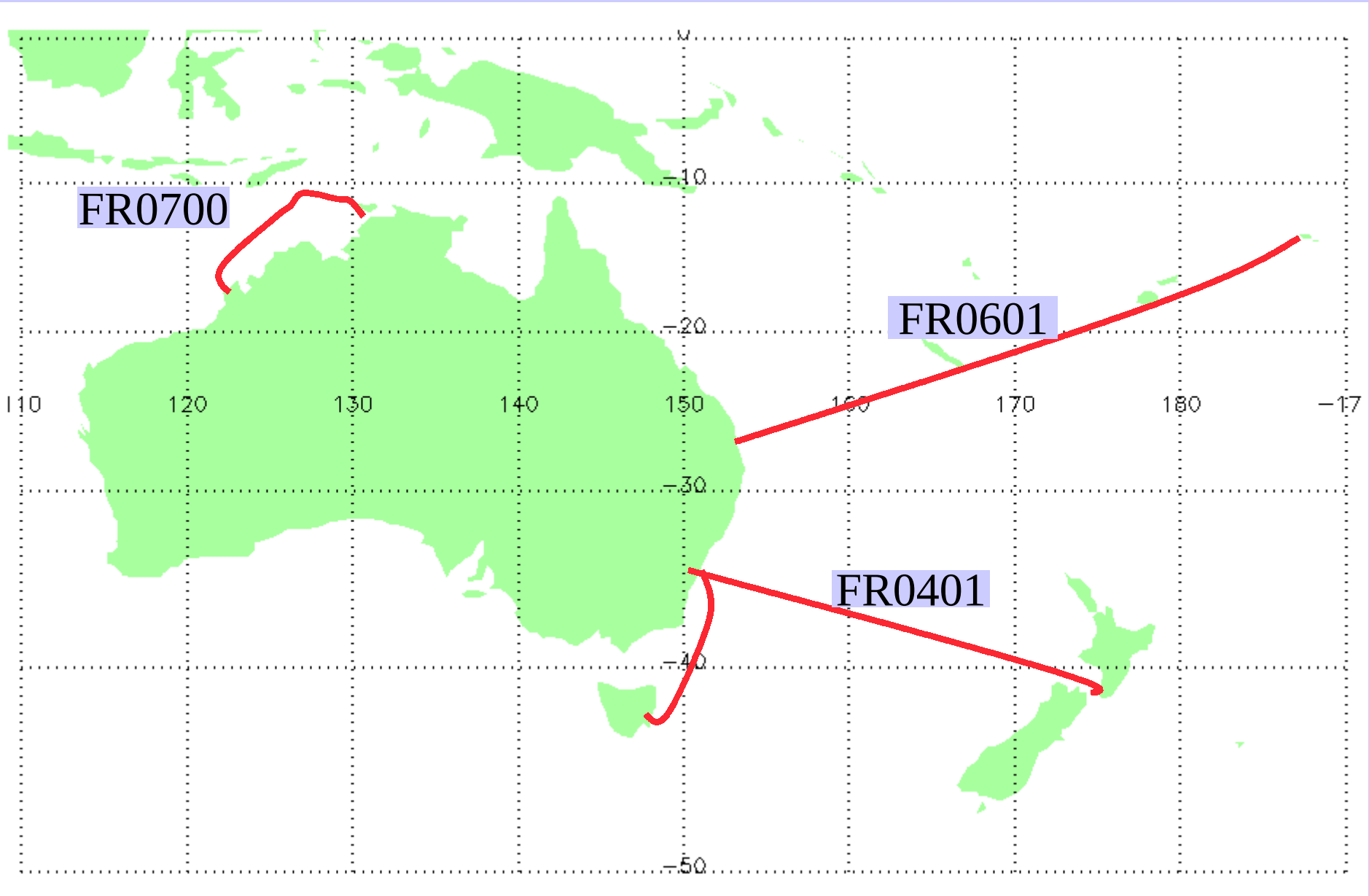
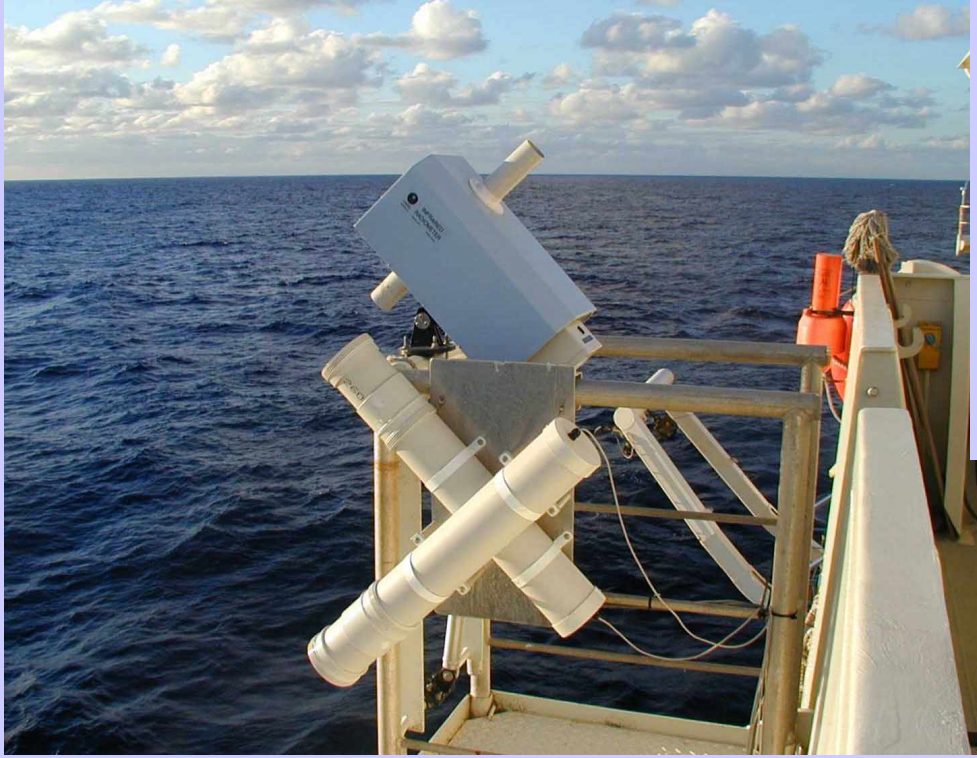
Progress during 2001

- SST validation cruises FR0401 and FR0601
- Analysis of data for 3 cruises of RV FRANKLIN - FR0700, FR0401, FR0601
- Analysis of co-located MODIS and ATSR
- Participation in Second ESA MAVT rehearsal
- Participation in the Second Infrared Radiometer Calibration and Inter-comparison in Miami
- Miami results analysis
- Design of new Perth radiometer finalised
- New Townsville radiometer nearing completion


FR0700
FR0601
FR0401
-10
-20
-30
-40
-50
110
120
130
140
150
170
180
-17



Infrared radiometer measurements are complemented by regular meteorological data including balloon-borne radiosondes.

FRANKLIN ATSR-2 VALIDATION RESULTS 2000-2001

Cruise	Date	Time	Lat	Lon	Pix,Lin	T/S	Rad.	SST6	SST4	Nadir
FR0700	14/08/00	1423	-12.545	125.397	443,308	26.70	26.36	26.20	25.70	00.00
FR0401	15/05/01	2337	-35.193	155.508	380,391	19.75	19.70	00.00	00.00	19.54
	19/05/01	2311	-37.739	164.002	136,123	17.79	17.96	00.00	18.00	17.94
FR0601	09/07/01	1020	-15.554	-173.163	475,204	28.05	27.60	27.72	27.57	28.10
	16/07/01	1137	-23.176	168.106	427,221	23.13	23.01	23.32	23.79	23.24
	21/07/01	1220	-26.403	154.947	111,306	22.47	22.41	22.27	22.57	22.40

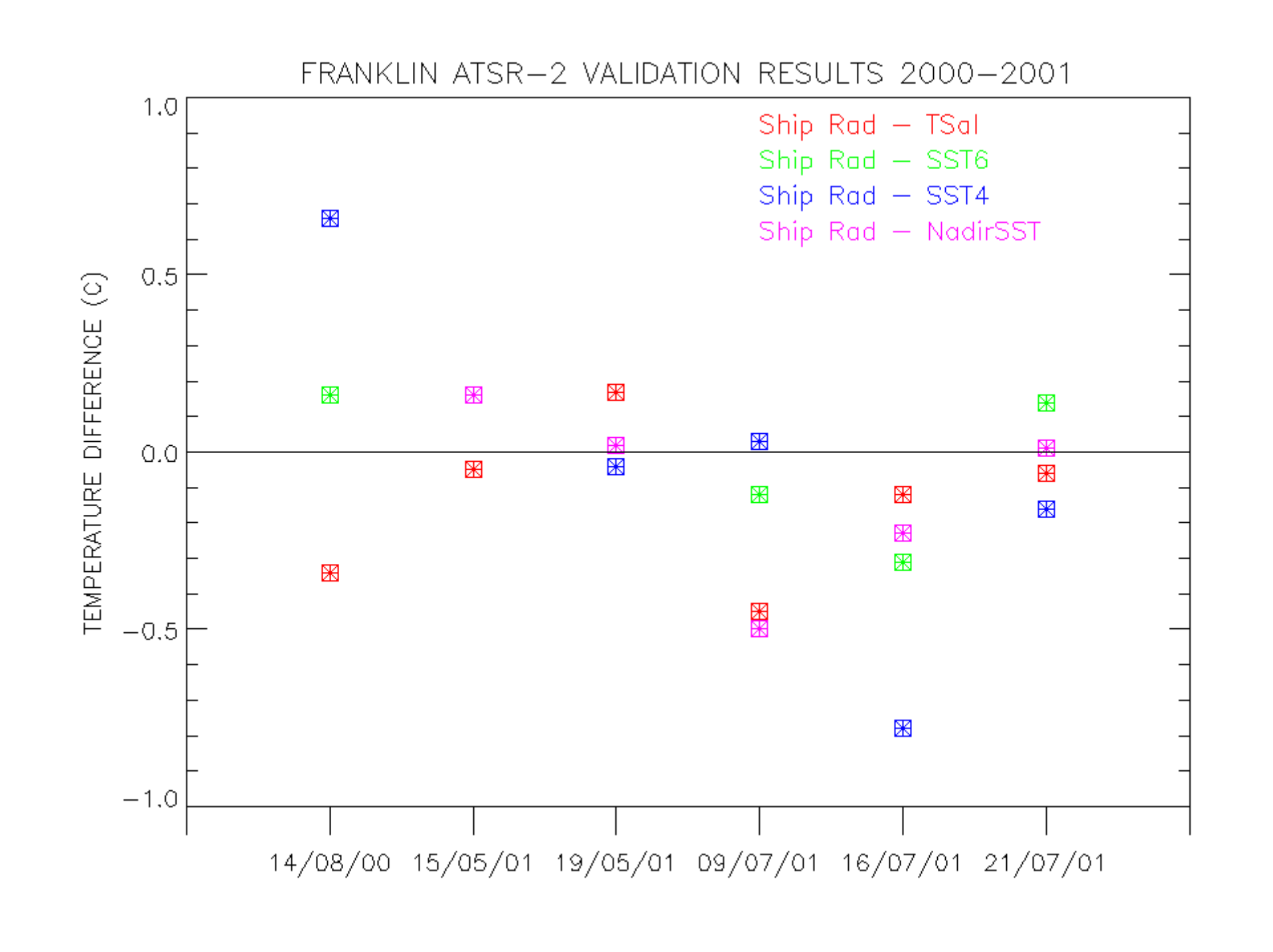
Notes:

1. SST4 and SST6 are 3x3 pixels averages. Nadir is from eyeballing a 5x5 area. T/S is ship's thermosalinograph, and Rad. is radiometer measurement with the sky correction added

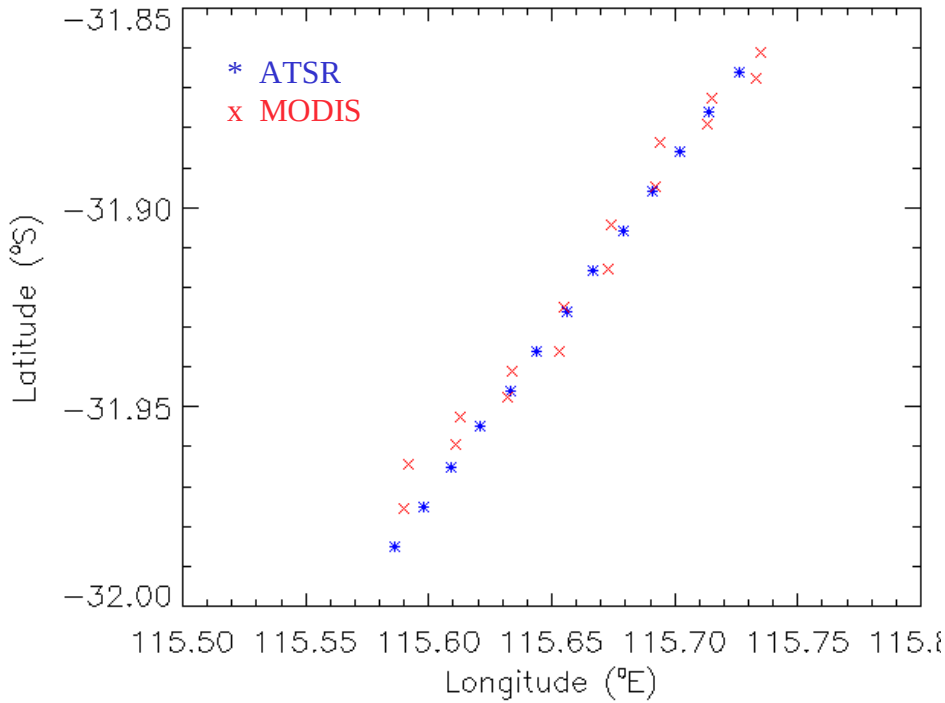
2. FR0700 No GSST available for Nadir SST
   DAR011 radiometer sky correction from radiosonde data

3. FR0401 Radiometer data from TASCOs.
   15/05/01 forward view offset by -158 pix does not cover ship location
   19/05/01 forward view offset by -158 pix and +10 lines

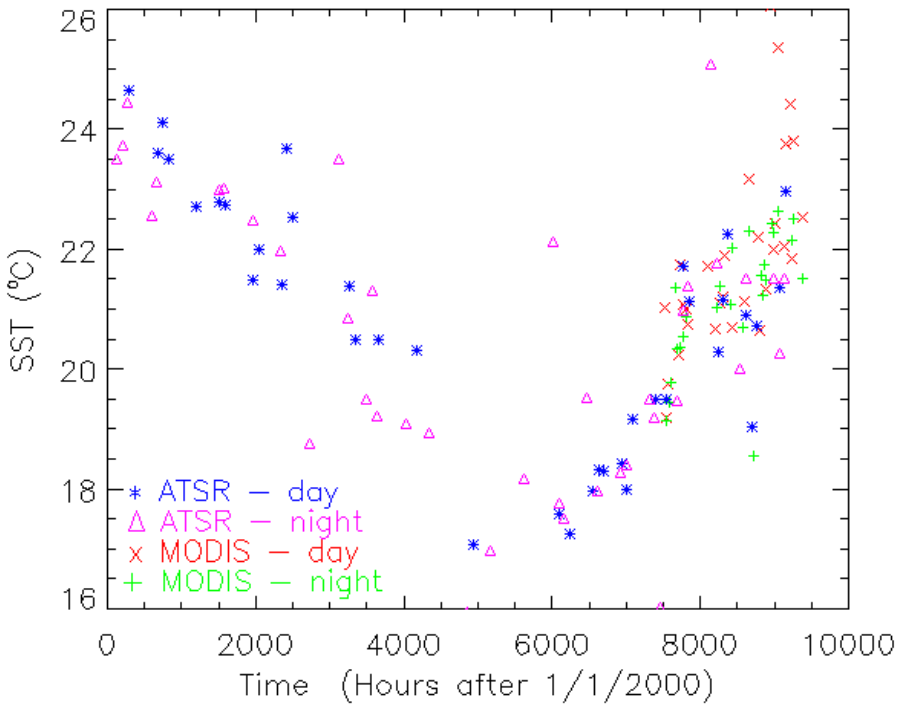
4. FR0601 Radiometer data from DAR011 with sky views for correction
   21/07/01 clear area viewed with DAR011 approx 50 mins before overpass
   ATSR forward views offset by -18 pixels and +3 lines


FRANKLIN ATSR-2 VALIDATION RESULTS 2000-2001
Ship Rad - TSal
Ship Rad - SST6
Ship Rad - SST4
Ship Rad - NadirSST
TEMPERATURE DIFFERENCE (C)
1.0
0.5
0.0
-0.5
-1.0
14/08/00
15/05/01
19/05/01
09/07/01
16/07/01
21/07/01

MODIS/ATSR-2 Data Comparison on Perth Transect

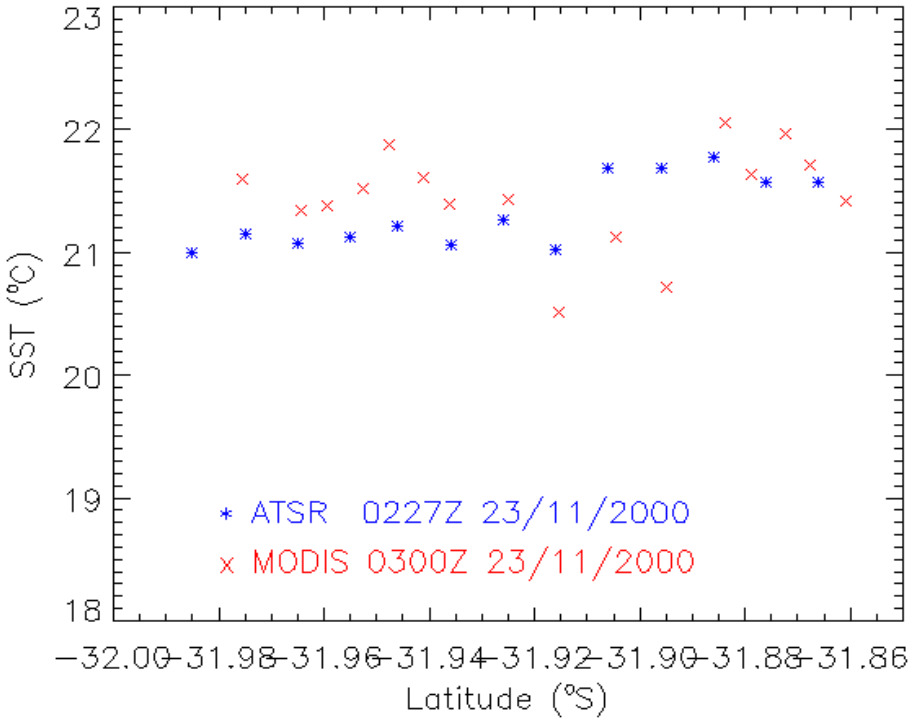


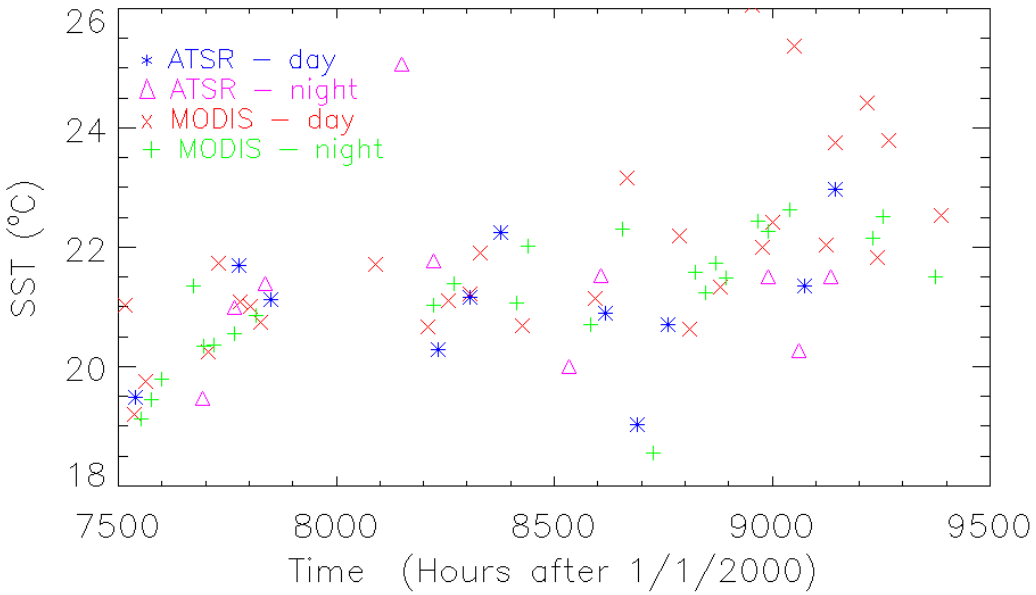
Pixel navigation



Day and night values for 13 months

Transect data for the same hour





December ‘00 to January ‘01

Second Infrared Radiometer Calibration and Inter-comparison

- RSMAS, University of Miami
- 28 May - 2 June, 2001
- 15 participants
- 8 different radiometers
- 5 black body targets
- Inter-comparison at sea over 2 days

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Objectives

- Using the new NIST Transfer Radiometer (TXR) to characterize black body calibrators used by various groups to calibrate their own radiometers.
- Calibrate all radiometers against NIST trace-able black body calibrators
- Compare radiometer performance under real sea-going conditions on the R/V Walton Smith in local waters off Miami.

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Infrared Radiometers

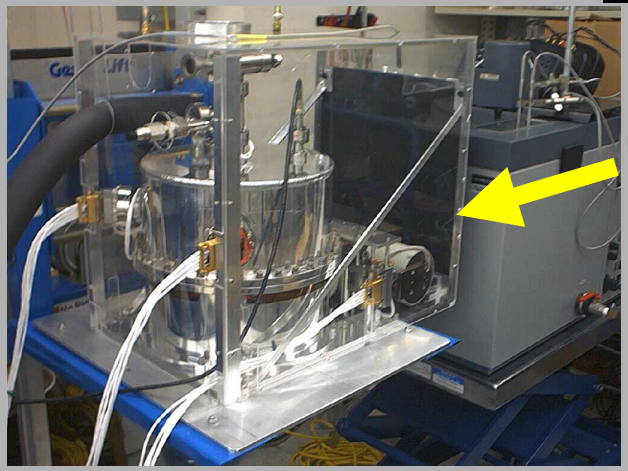
Instrument	Institution	Lab.	Sea	P.I.
TXR (Transfer radiometer)	NIST, USA	Yes	No	J. Rice
M-AERI	RSMAS, U. Miami.	No	Yes	P. Minnett
SISTeR	RAL,UK.	Yes	Yes	T. Nightingale
DAR011	CSIRO, Australia.	Yes	Yes	I. Barton
CIRIMS	APL, U. Washington.	No	Yes	A. Jessup
ISAR-5	JRC, EEC.	Yes	Yes	C. Donlon
Nulling radiometers	NASA JPL	Yes	Yes	S. Hook
Tasco (off-the-shelf)	CSIRO, Australia	Yes	Yes	I. Barton

Black Body Calibrators

Instrument	Institution	P.I.
NIST-Certified & Designed Black Body Target	RSMAS, U. Miami	P. Minnett
NIST Standard Black Body Target	NIST, USA	C. Johnston
CASOTS black body	JRC, EEC	C. Donlon
Portable Black Body Target	APL, U. Washington	A.Jessup
JPL Black Body Calibrator	NASA-JPL	S. Hook

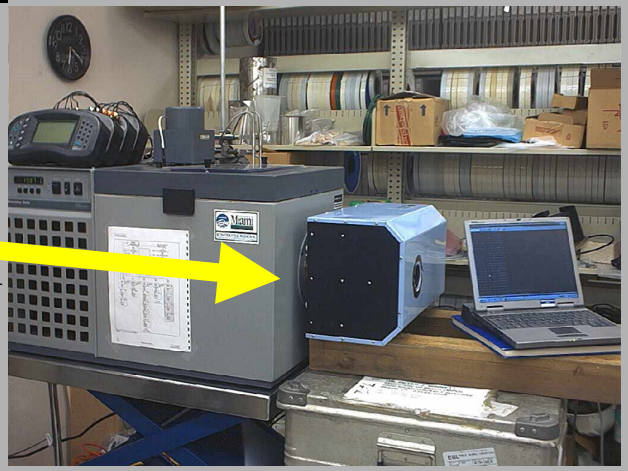
Measurements in the laboratory and at sea

Instruments in the lab.

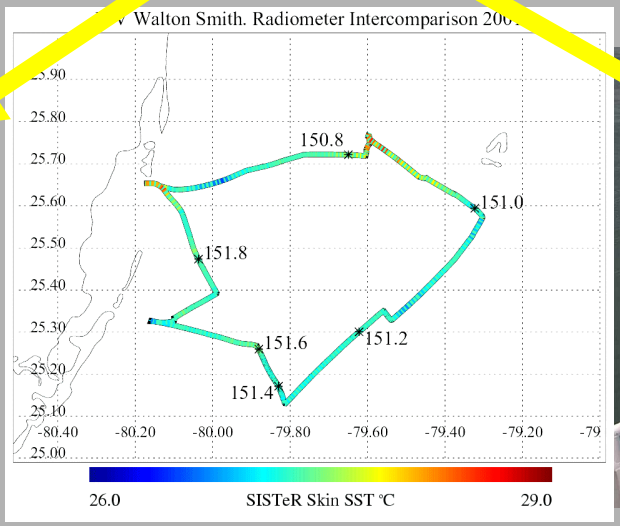


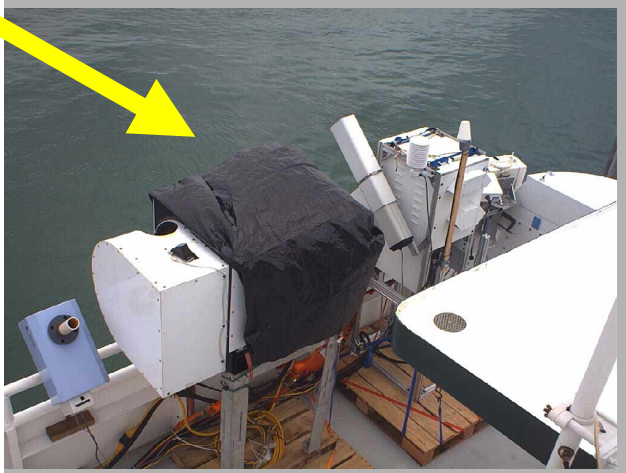
TXR & RSMAS BB

RSMAS BB & DAR011



Instruments at sea





Track of the Walton-Smith


JPL on bow
SISTeR
ISAR
CIRIMS
M-AERI
TASCO
DAR011

Preliminary Results

Means and standard deviations of the differences between pairs of radiometers for the entire cruise period.

Radiometer pair	Mean of difference (K)	Std. Devn. of difference (K)	Number of points
MAE-ISA	0.002	0.135	80
MAE-SIS	0.046	0.066	144
MAE-JPL	0.108	0.115	148
MAE-DAR	-0.009	0.077	149
ISA-SIS	0.000	0.101	79
ISA-JPL	0.127	0.142	81
ISA-DAR	0.007	0.115	80
SIS-JPL	0.053	0.099	144
SIS-DAR	-0.054	0.075	144
JPL-DAR	-0.113	0.111	149
TAS-SIS	-0.001	0.157	24
TAS-JPL	0.069	0.196	24
TAS-DAR	-0.054	0.163	23

Preliminary Conclusions

- The radiometers can be used to validate land surface temperatures and the level of ~0.1K, and most can be used to validate SST at the <0.1K level
- Further analysis should reduce systematic differences between the radiometers
- Experimental procedure during the Intercomparison will allow NIST-traceability and specification of absolute accuracies of validation data taken with these radiometers.

Future activities

- Commissioning of the new Townsville radiometer.
- Installation of new Perth radiometer
- Comparison between the DAR011, Perth, and Townsville radiometers. This will provide trace-ability to the NIST standard Black Body Calibrator.
- Detailed analysis of the Miami results

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