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In-Flight Cross-Calibration of
ASTER/TIR and MODIS-N

1. Purpose

- Improve Absolute Radiometric (Temperature) Accuracy of ASTER/TIR (particularly in the low temperature region)

2. In-Flight Calibration Targets

<Conditions>

- 1) Low Temperature
 - 2) Spectrally Constant and High Emissivity
 - 3) Spatially homogeneous
 - 4) Smaller Atmospheric Effects (High elevation) (low humidity)
 - 5) Frequent visit by EOS-AM1
- >
- Snow/Ice Fields in Antarctica, Greenland
 - Temperature < 220 K
 - Snow Emissivity > 0.98
 - Elevation > 3 km
 - Homogeneity ????

- Top of Cumulonimbus

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In-Flight Cross-Calibration of
ASTER/TIR and MODIS-N

3. Spectral Bandpasses (μm)

ASTER	MODIS-N
(10) 8.125-8.475	
(11) 8.475-8.825	(28) 8.40-8.70
(12) 8.825-9.275	
(13) 10.25-10.95	(30) 9.58-9.88
(14) 10.95-11.65	(31) 10.76-11.28

4. Error Sources

- 1) Core Location Error
- 2) Different Spatial Resolution: 90m vs. 1000m
 - Spatial Averaging Errors
 - Inhomogeneity of the Targets
- 3) Different Spectral Bandpasses
 - Inconstant Emissivity of the Targets
 - Snow: $> 10.5\mu\text{m}$
 - Atmospheric Effects
 - Transmittance

We don't have AIRS on EOS-AM1.



MODIS-N, Atmospheric Model (LOWTRAN, Meteorological Research Institute's Mo

ASTER/TIR

- Ground Resolution: 90m
- Absolute Radiometric Accuracy Requirement:
 - 200 K~240 K: ±3 K
 - 240 K~270 K: ±2 K
 - 270 K~340 K: ±1 K
 - 340 K~370 K: ±2 K
- NEAT: 0.3 K

On-board Blackbody
270-340°K

MODIS-N

- Ground Resolution: 1000m
- Absolute Radiometric Accuracy Requirement: 1 %
- Typical Scene Temperature:
 - (28) 300 K
 - (30) 250 K
 - (31) 300 K
- NEAT:
 - (28) 0.05 K
 - (30) 0.25 K
 - (31) 0.05 K
- T...:
 - (28) 324 K
 - (30) 275 K
 - (31) 400 K

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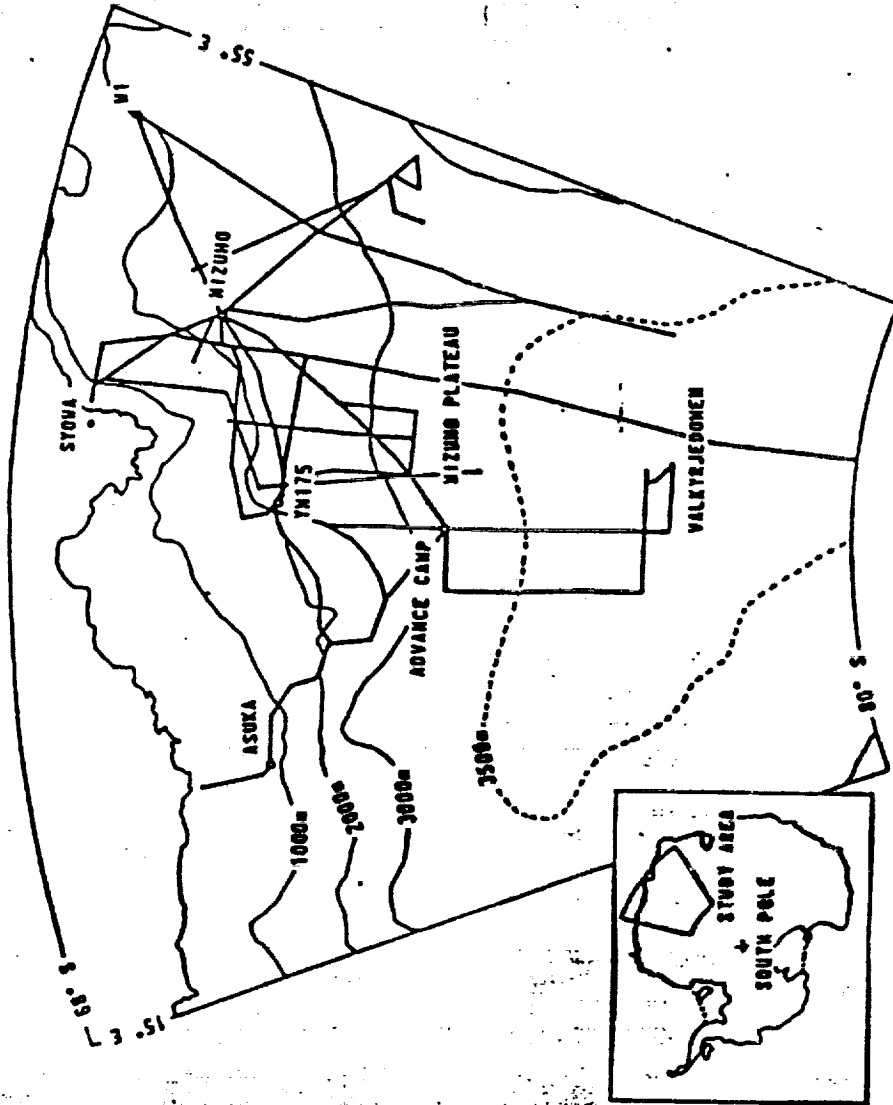
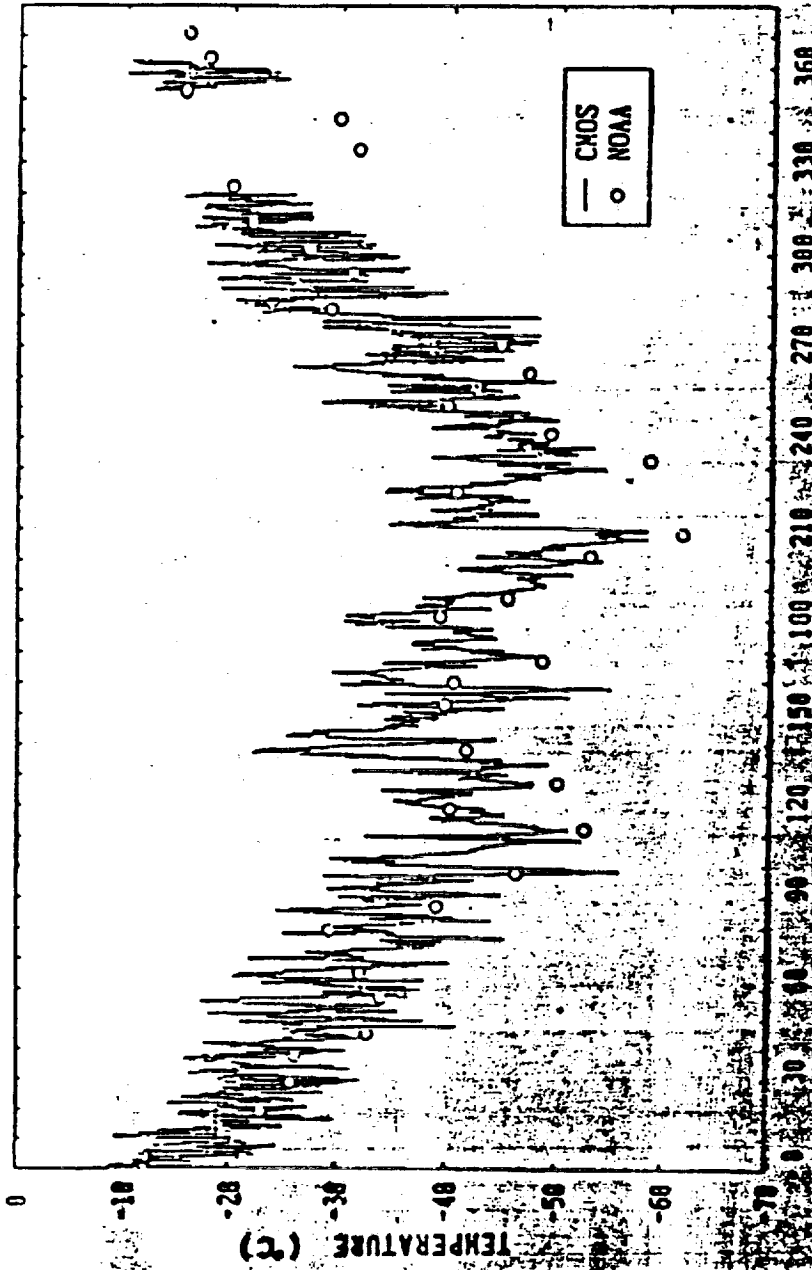


Figure 1. Map of study area and JARE traverse routes (1963-1987).

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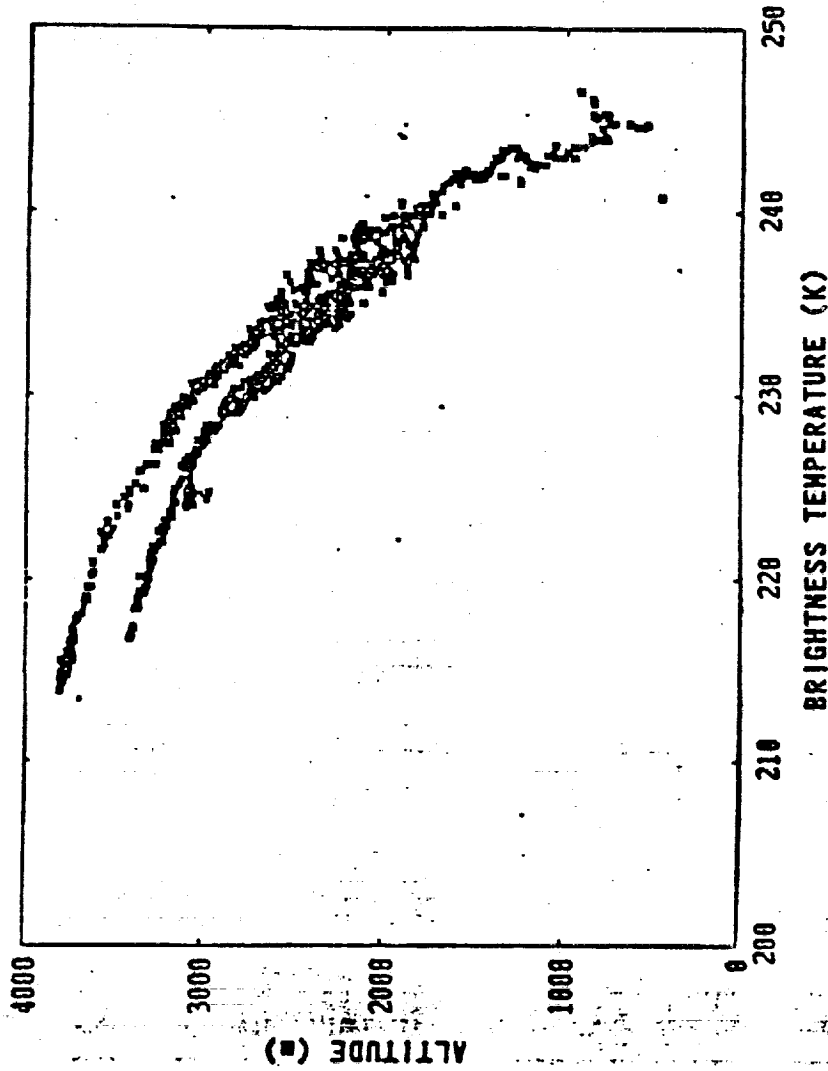


Figure 6. Average NOAA channel 5 brightness temperature plotted against the altitude of the traverse stations on the ice sheet.

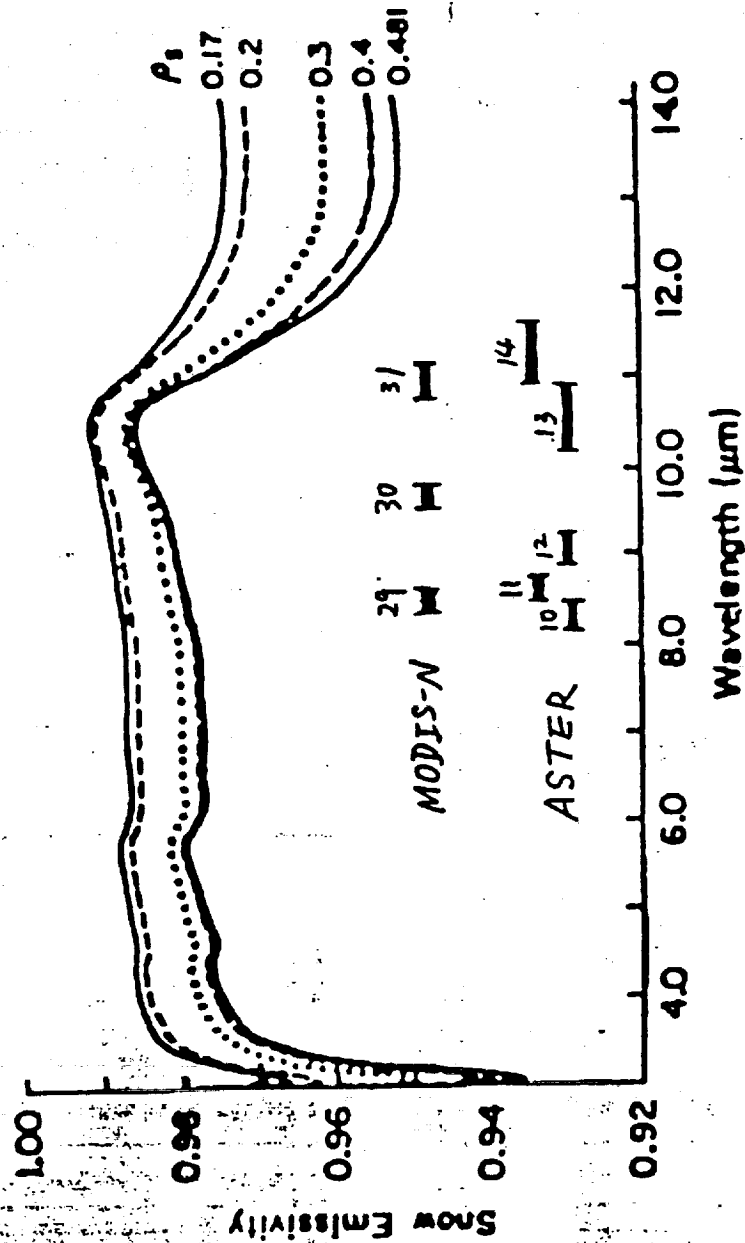


Fig. 17. Emissivity as a function of wavelength for various snow densities, according to the model of Berger [1979]. (Figure 7 of Berger [1979].)

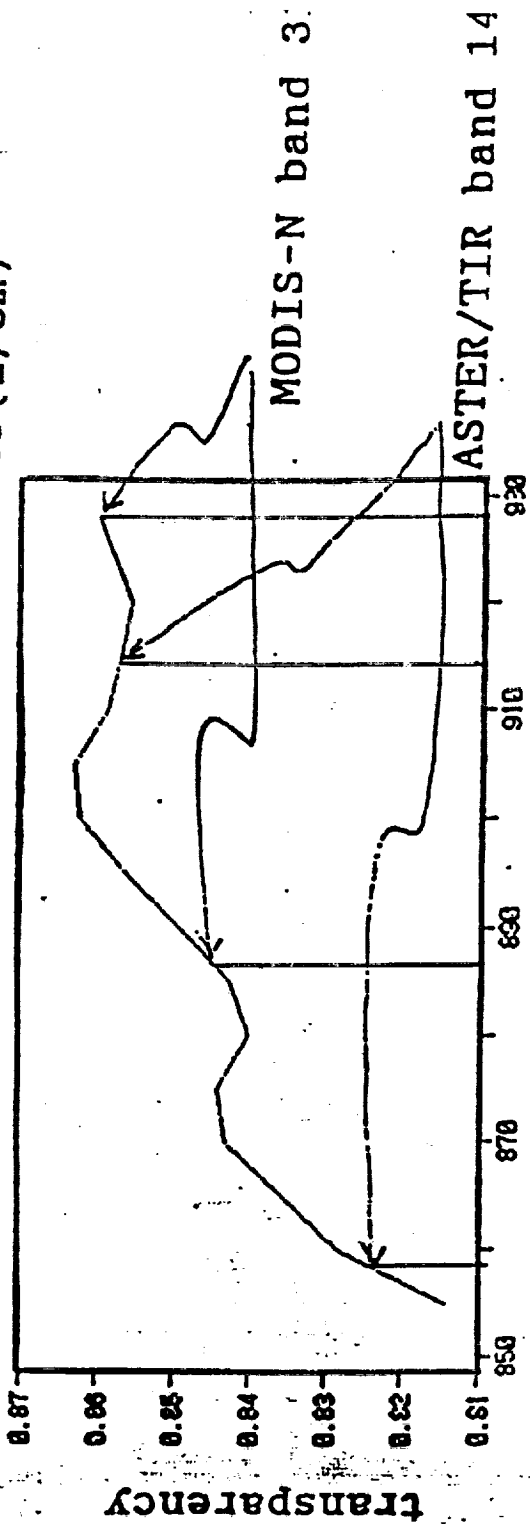
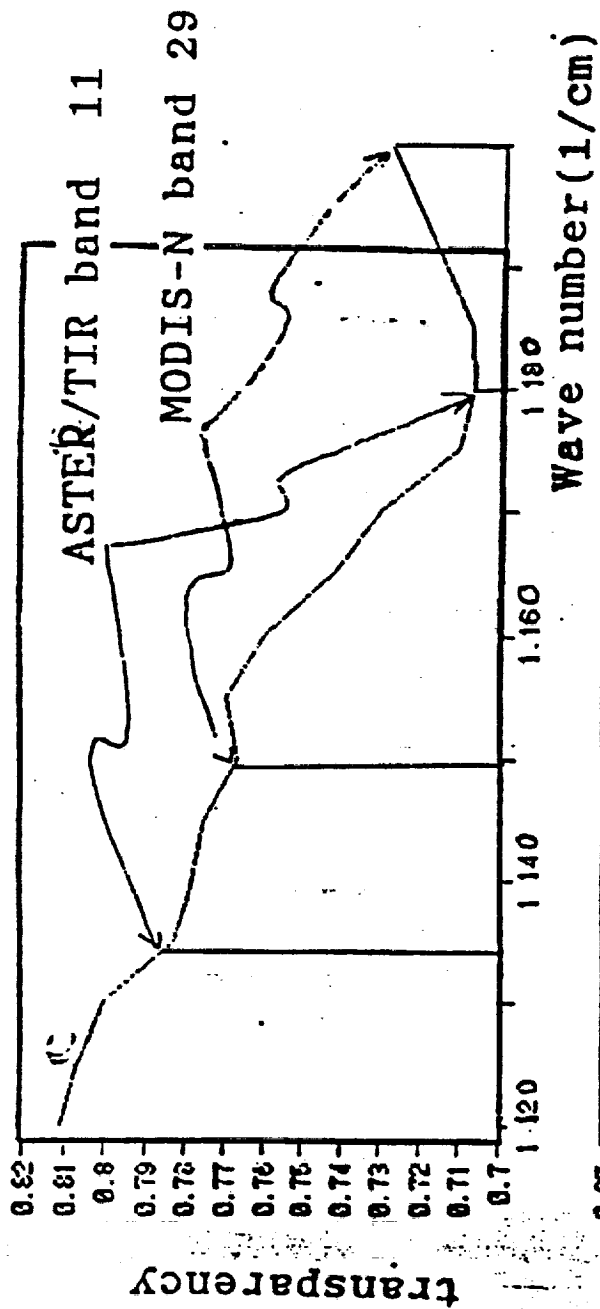


Fig. 1 The atmospheric transparencies for ASTER/TIR band 11 and MODIS-N band 29 and ASTER/TIR band 14 and MODIS-N band 31