

NIRST Preliminary Absolute Calibration Curve – 11 um band Using data simulation and temperatures of JPL's Lake Tahoe Validation Site

Marisa M. Kalemkarian; Marcelo E. Colazo and Hugo G. Marraco
maryse@conae.gov.ar – mcolazo@conae.gov.ar – hmarraco@conae.gov.ar
CONAE - Comisión Nacional de Actividades Espaciales - Argentina

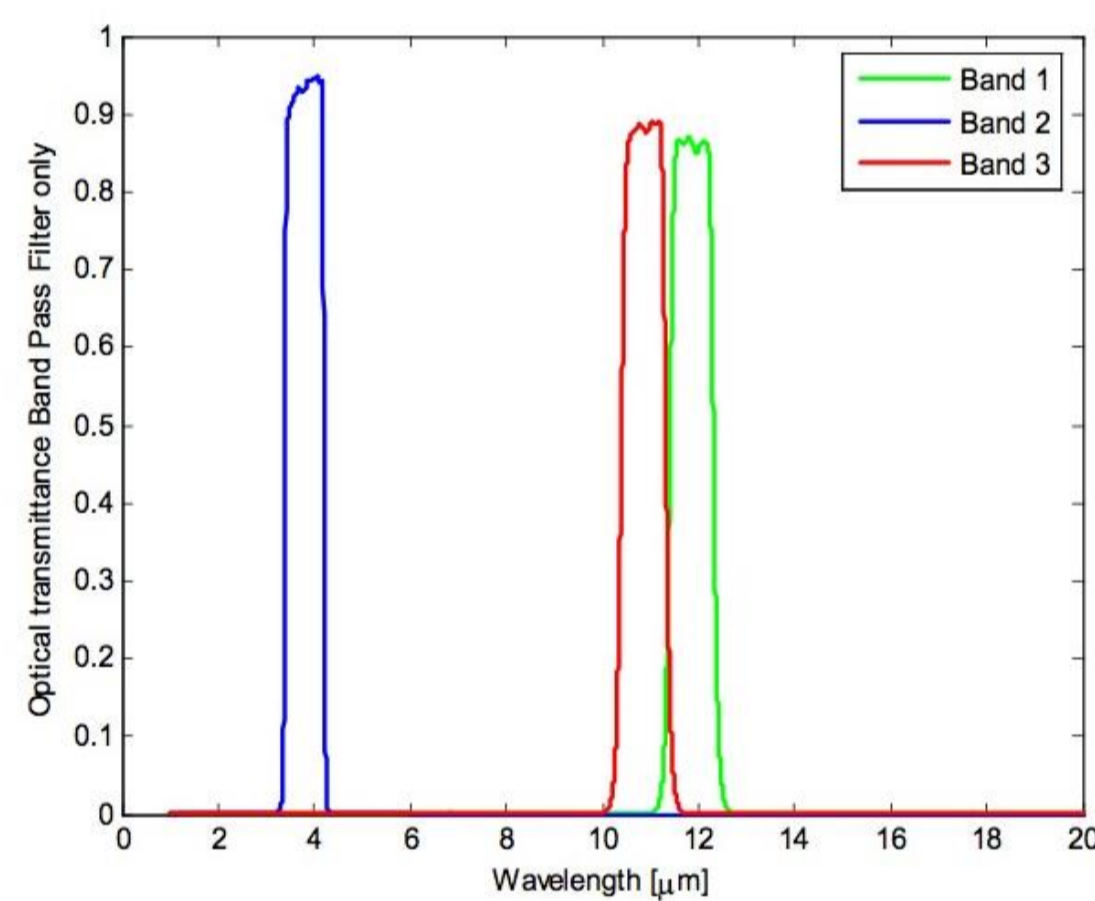
Abstract:

A methodology to perform absolute calibration for NIRST on board the SAC-D/Aquarius satellite is presented here. At-sensor radiances of the thermal infrared 10.8 μm NIRST sensor band were simulated for a set of cloud free images acquired over Lake Tahoe for different seasons, within a selected period of time that went from late August 2012 to early April 2013. The lake temperatures were obtained from Lake Tahoe Validation website run by the Jet Propulsion Laboratory (JPL/NASA). These temperatures were propagated to the equivalent at-sensor radiances by means of the radiative transfer code MODTRAN 4, using the sensor response function, and a standard atmosphere model. A linear relationship is assumed between the at-sensor radiances and the digital numbers (DN's) taken from NIRST acquisitions of the lake area. The correlation coefficient found was >0.95

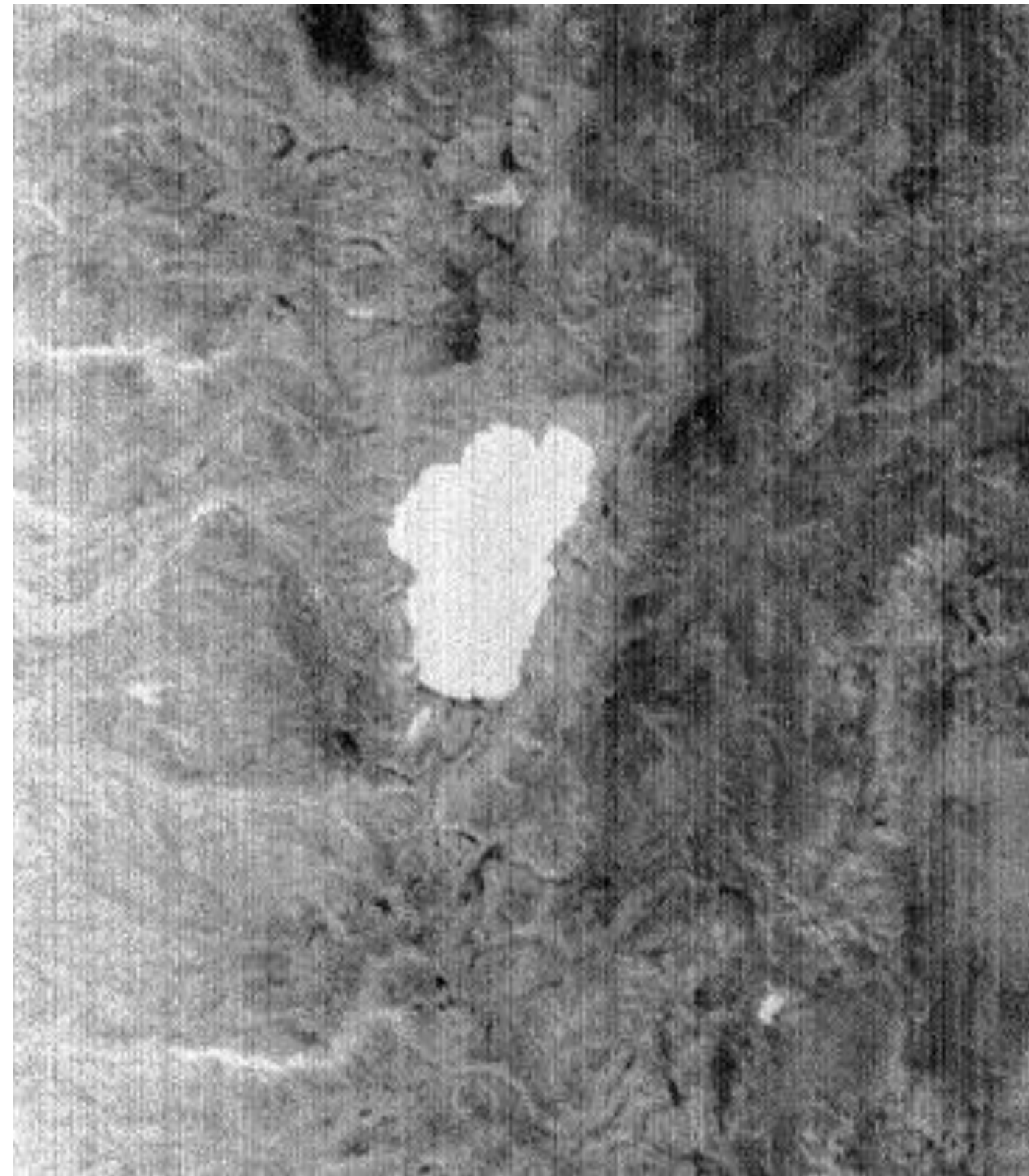
NIRST (New Infrared Sensor Technology) on board SAC-D/Aquarius satellite

Some Features:

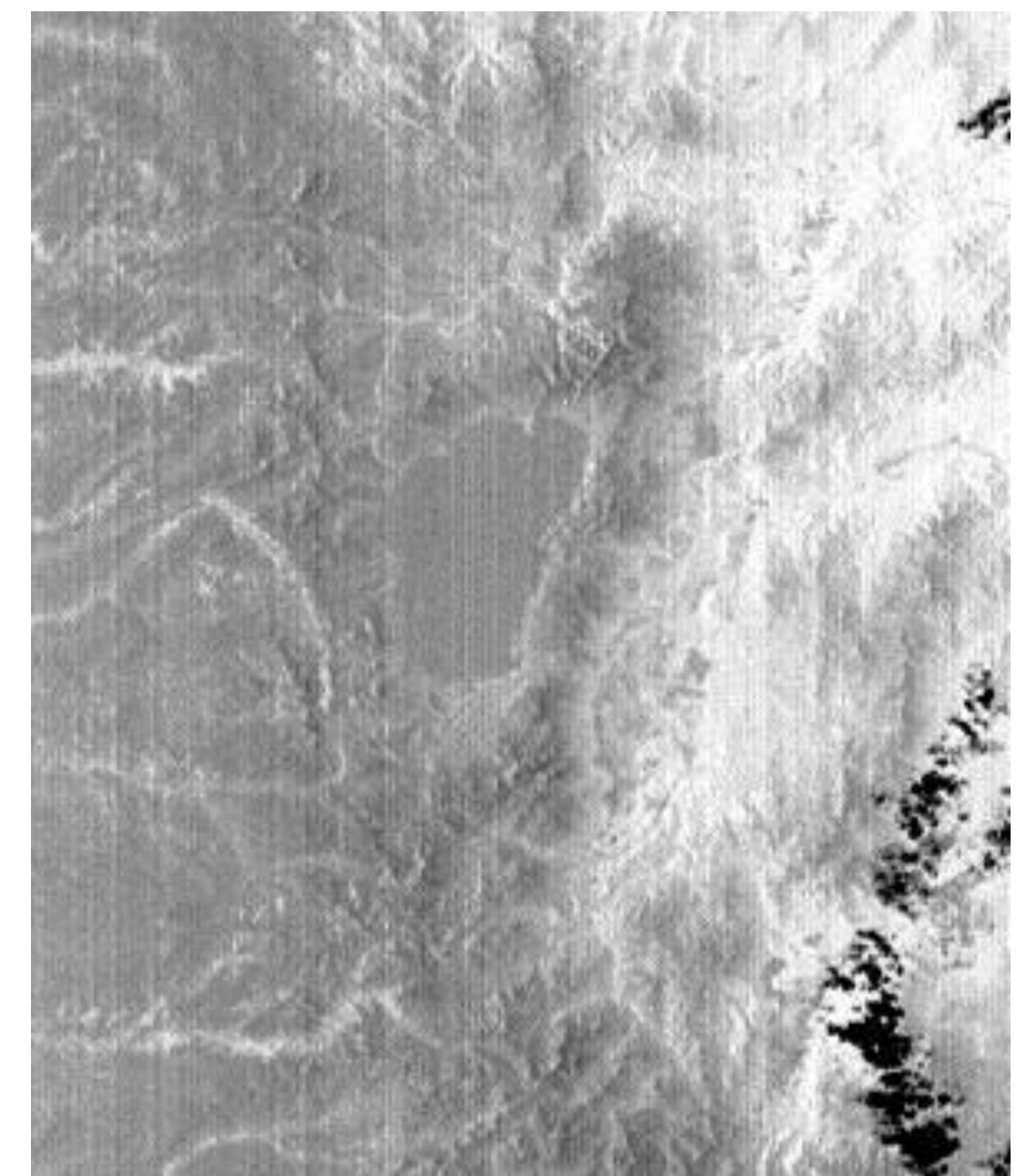
- 3 bands: - LWIR Camera at 10.8 & 11.8 μm
- MWIR Camera at 3.8 μm
- 182 km swath
- 350 m pixel size
- 7 days revisit time
- Spectral Response Function:



NIRST 2013-01-05

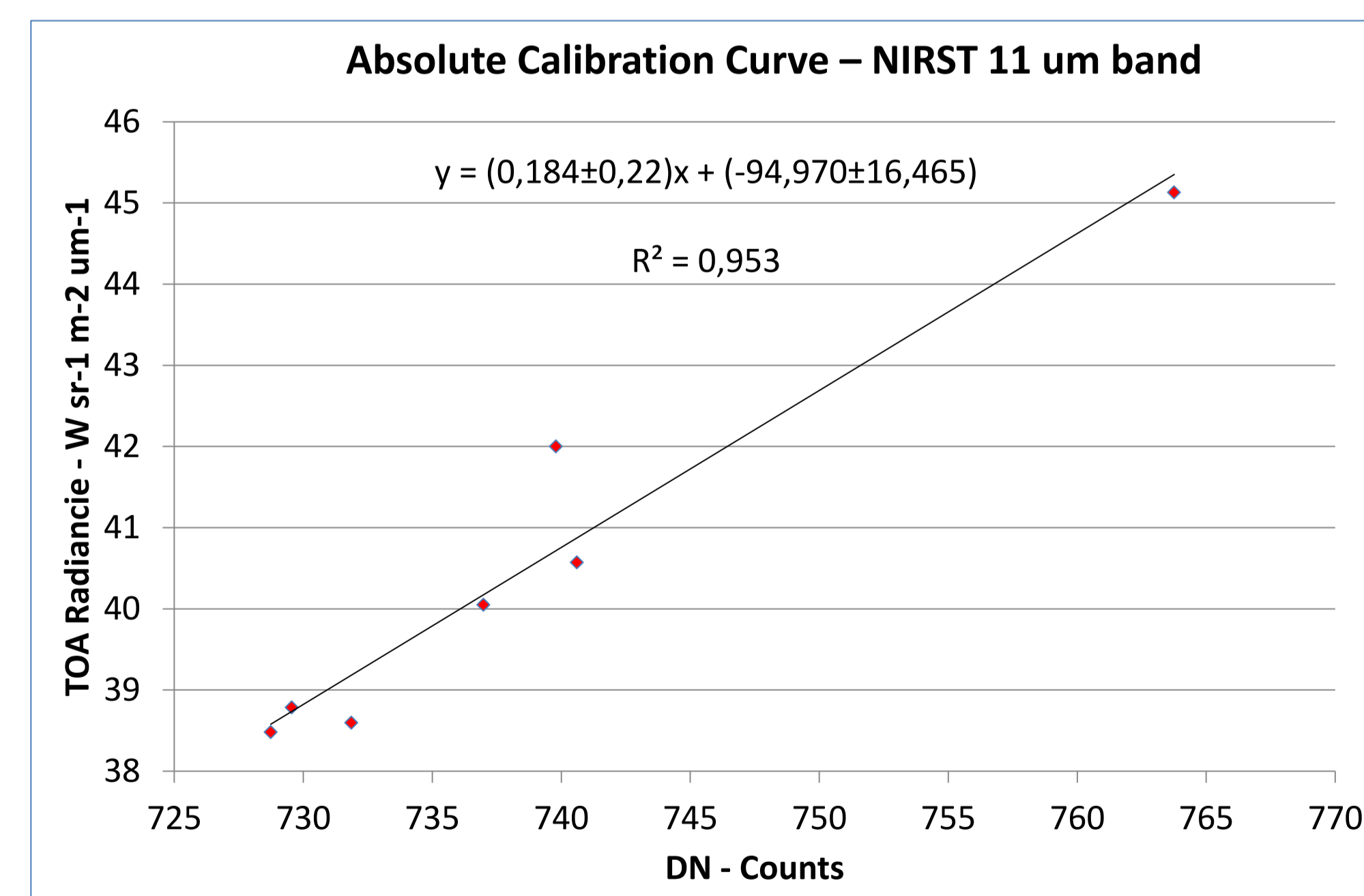
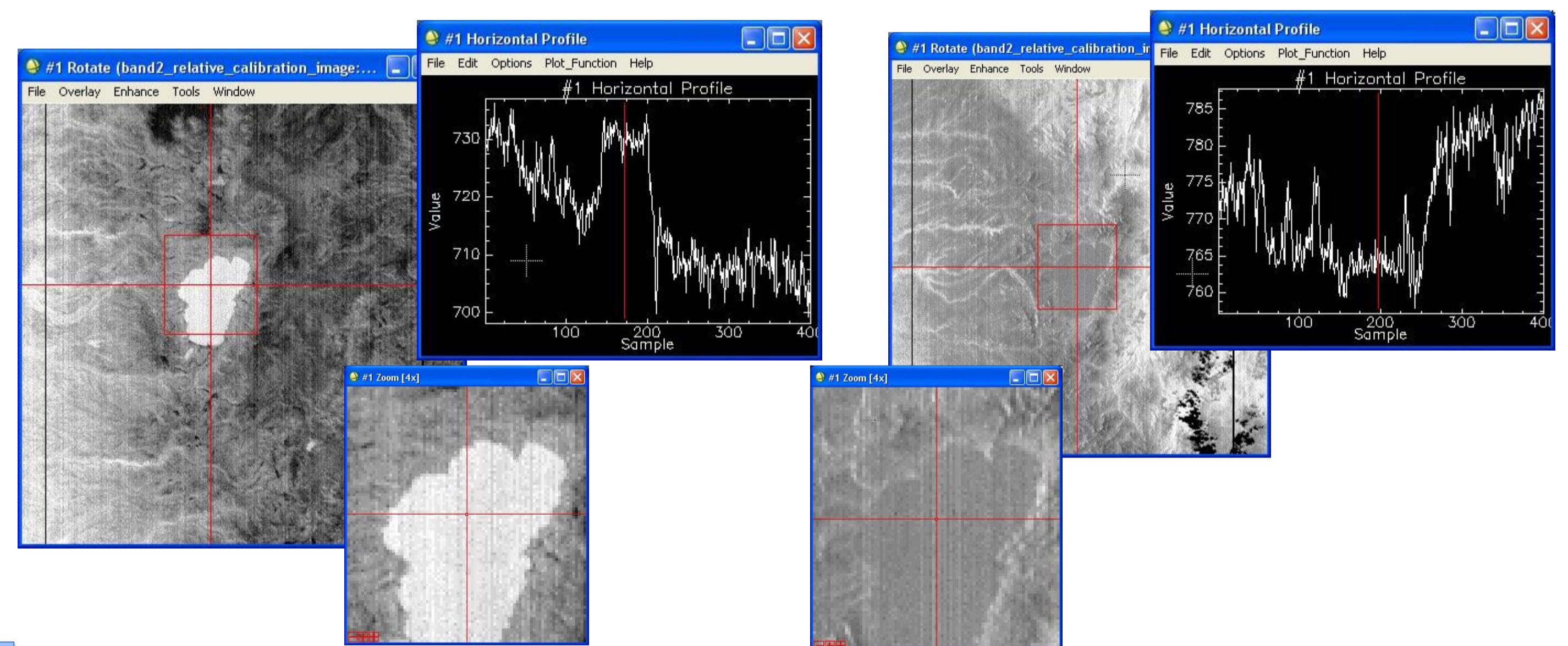
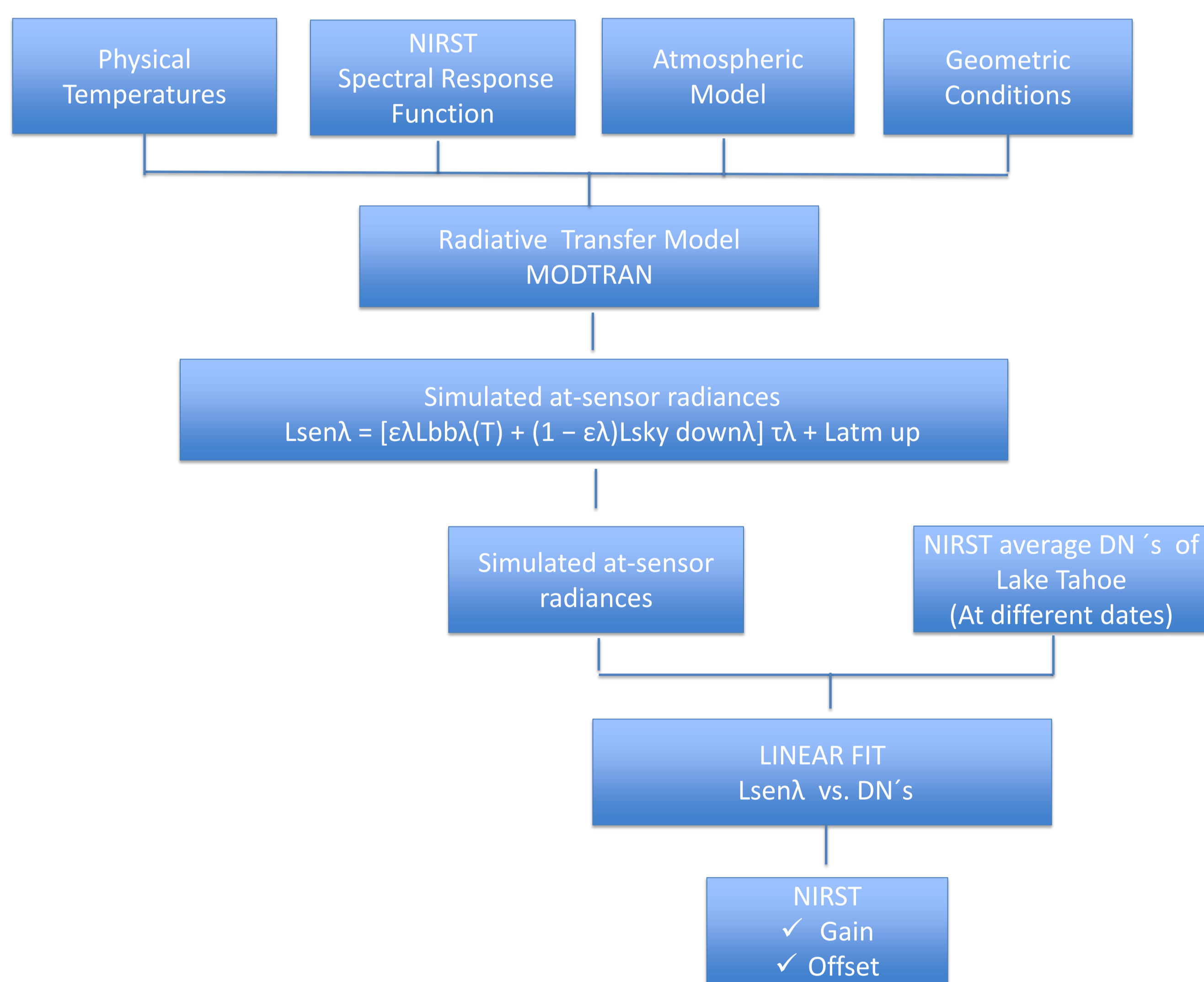


NIRST 2012-08-0



To the left, NIRST acquisition on January 5, 2013 over Lake Tahoe. Average lake temperature :5.5°C
To the right, NIRST acquisition on August 25, 2012 over Lake Tahoe. Average lake temperature :19.5°C
01:30 UTC – Below some profiles are shown:

NIRST Absolute Calibration Procedure:



Error estimation:

Error (y) = 0.838 → Error (Tb) = 1.72 °C
(error in TOA Rad)

Considerations and discussion:

- Lake water emissivity used: 0.985
- Standard Atmospheric conditions for each season
- Good linear first approximation – not validated yet
- Next steps:
 - Refine Atmospheric Conditions
 - Validation
- Physical Temperatures from Lake Tahoe Validation Web Site – JPL/NASA (by Simon J. Hook)