

AQUARIUS/SAC-D

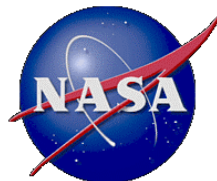
8th Aquarius/SAC-D Science Meeting

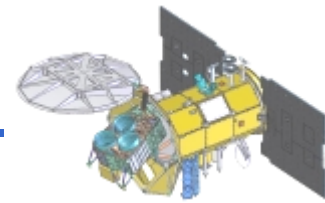
NIRST Preliminary Absolute Calibration Curve – 11 μm band

**Using data simulation and temperatures of JPL's
Lake Tahoe Validation Site**

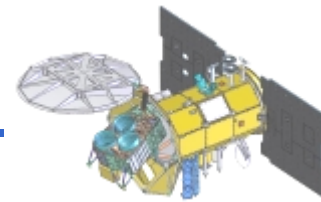
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CONAE
12-13 November 2013
Buenos Aires - Argentina





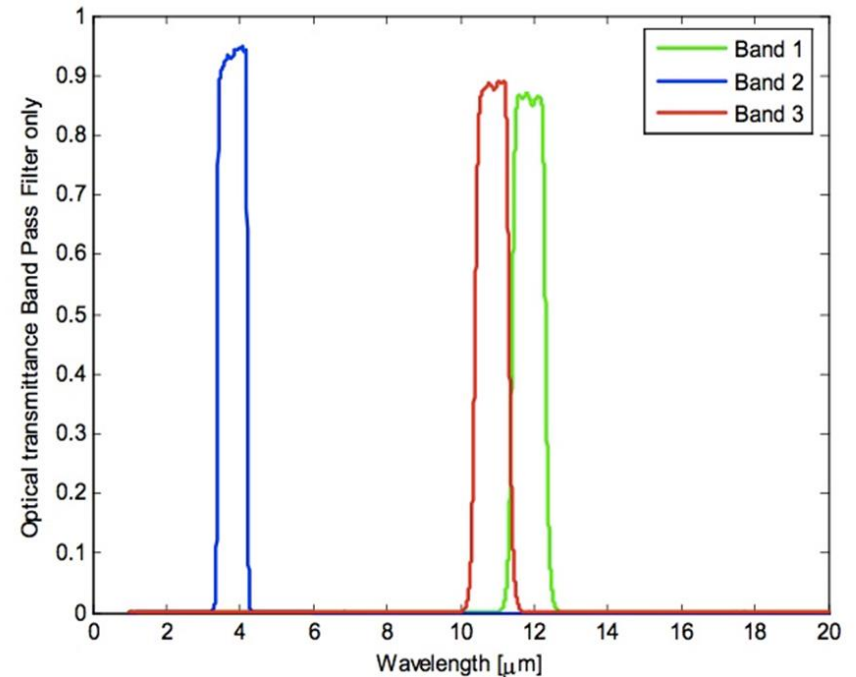
- A methodology to perform absolute calibration for NIRST on board the SAC-D/Aquarius satellite is presented here.
- At-sensor radiances of the thermal infrared 10.8 μm NIRST sensor band were simulated for a set of cloud free images acquired over Lake Tahoe for different seasons, within a selected period 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



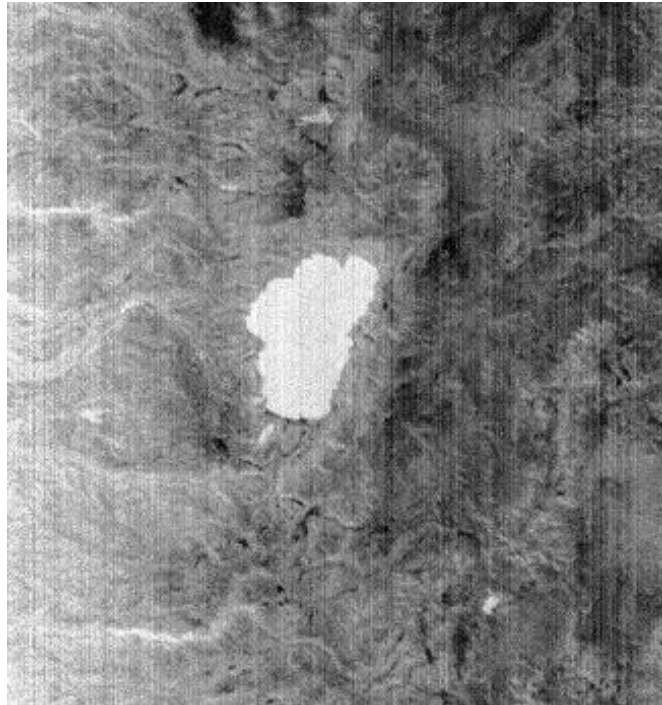
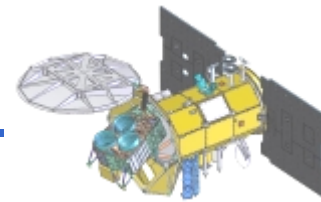
NIRST (New Infrared Sensor Technology) on board SAC-D/Aquarius Satellite

Some Features:

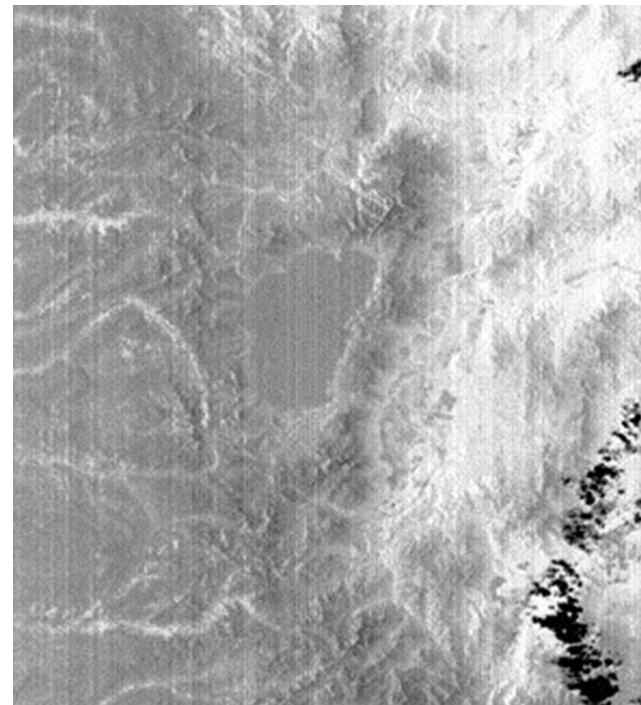
- **3 bands:** - LWIR Camera at 10.8 & 11.8 μm
- MWIR Camera at 3.8 μm
- **182 km swath**
- **350 m pixel size**
- **7 days revisit time**



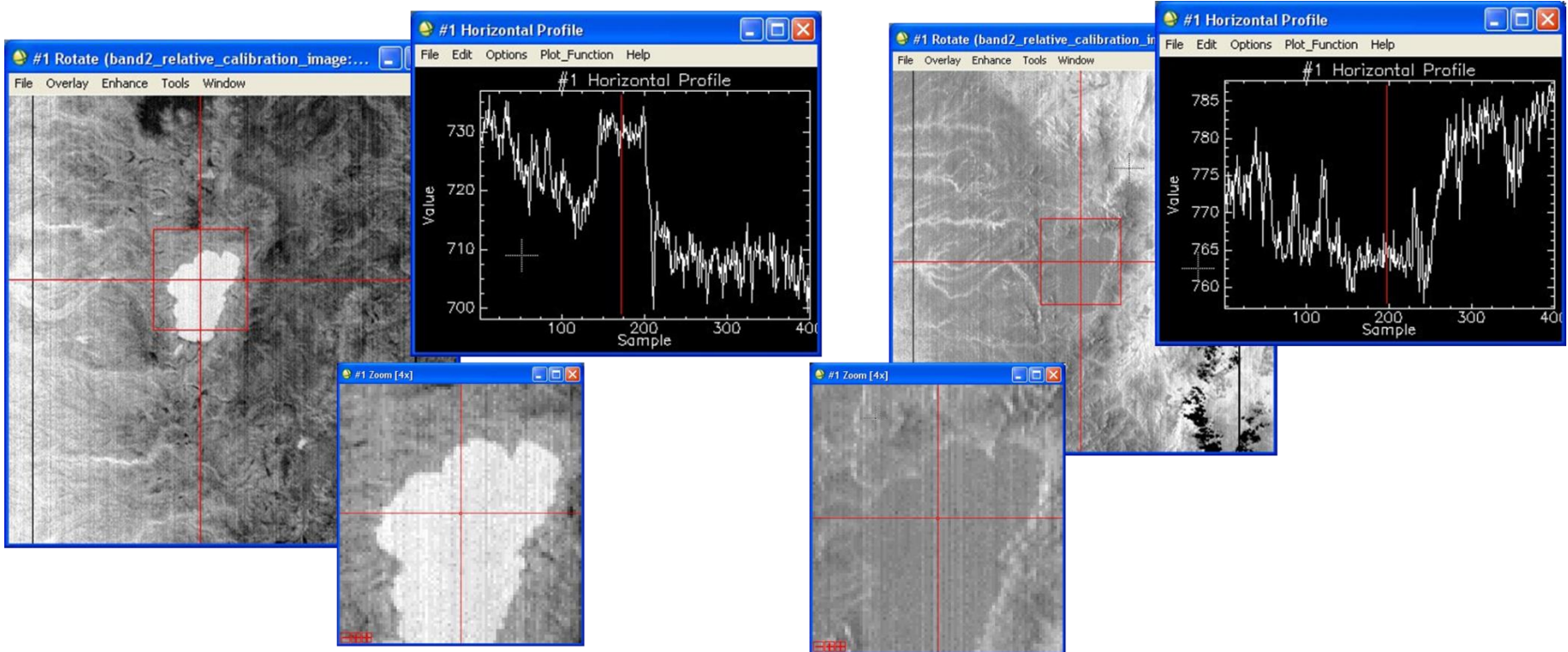
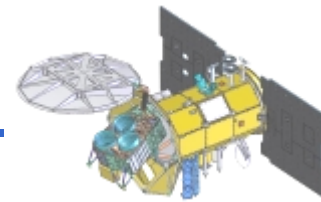
NIRST Spectral Response Function



NIRST acquisition on January 5, 2013
over Lake Tahoe. Average lake
temperature :5.5° C
01:30 UTC



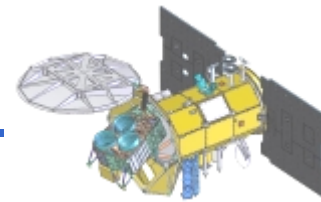
NIRST acquisition on August 25, 2012
over Lake Tahoe. Average lake
temperature :19.5° C
01:30 UTC



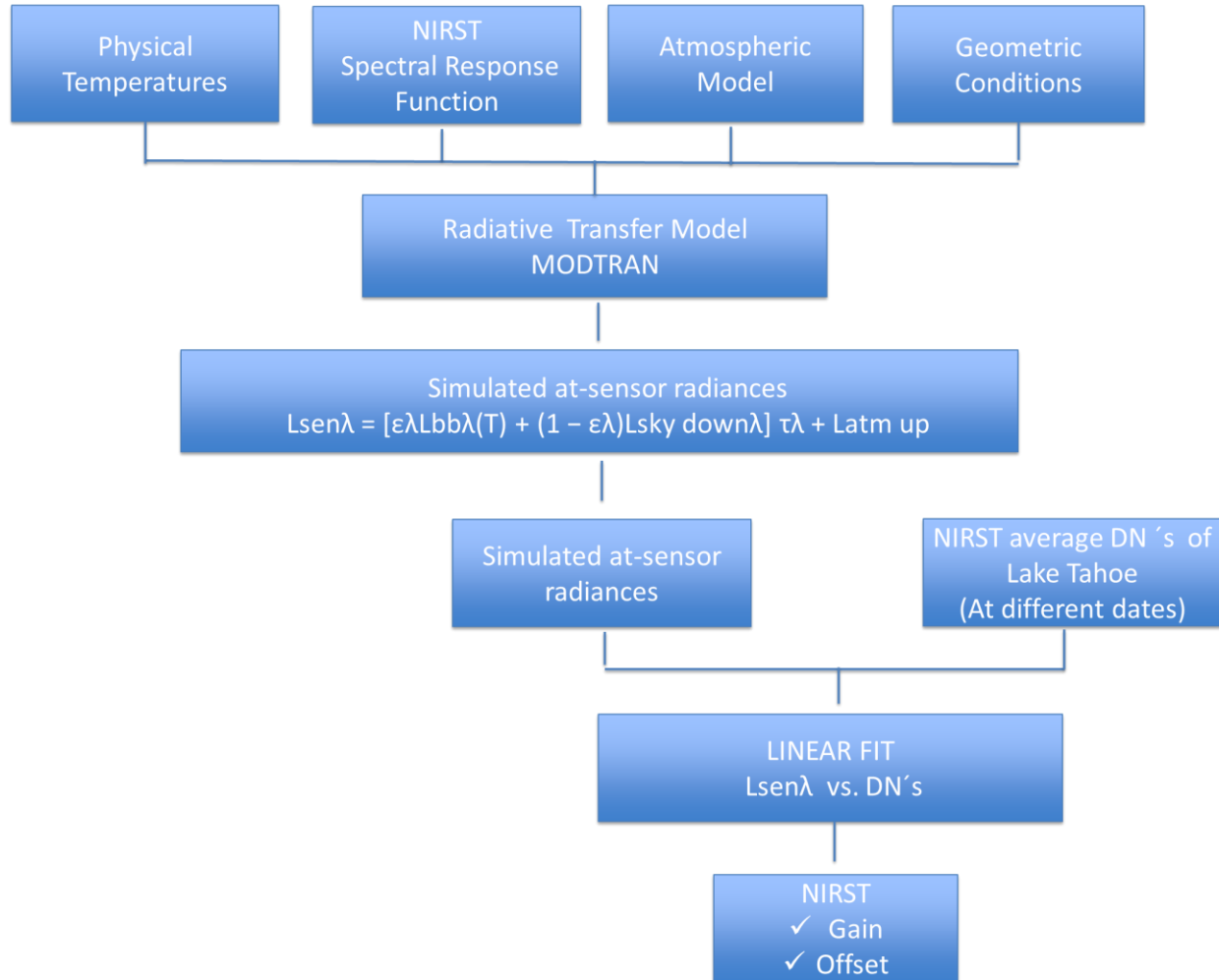
NIRST acquisition on January 5, 2013
 over Lake Tahoe. Average lake
 temperature :5.5° C
 01:30 UTC

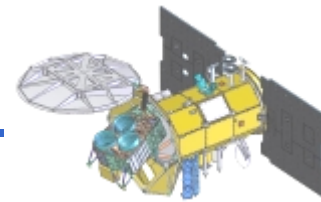
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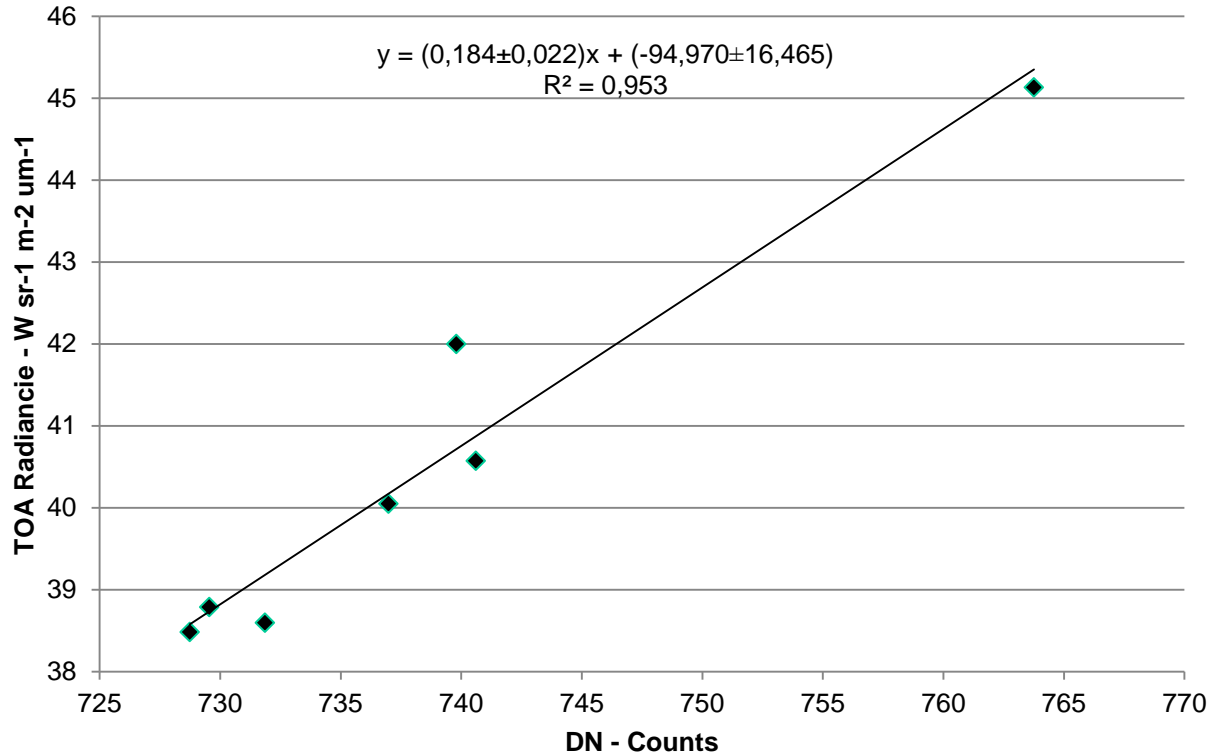


NIRST Absolute Calibration Procedure:

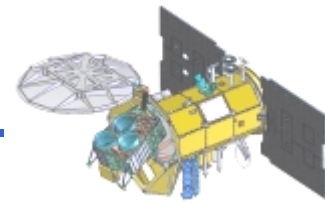




Absolute Calibration Curve - 11 um



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