MCST – MODLAND

Eric F. Vermote –MODLAND representative

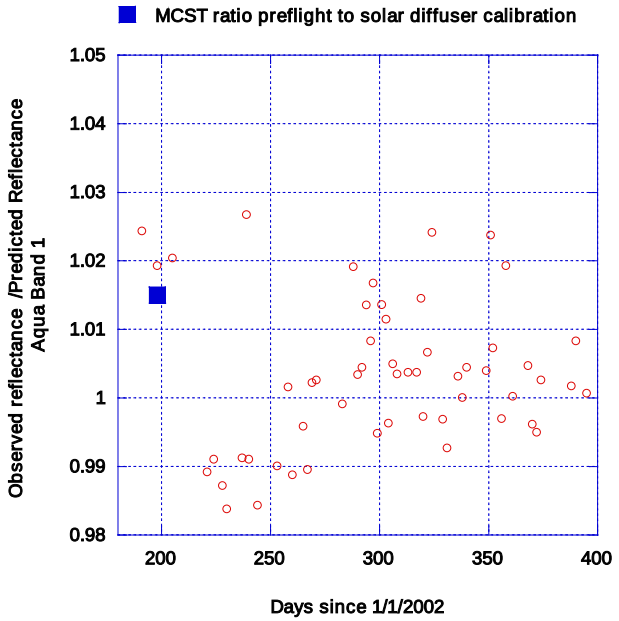
Organization

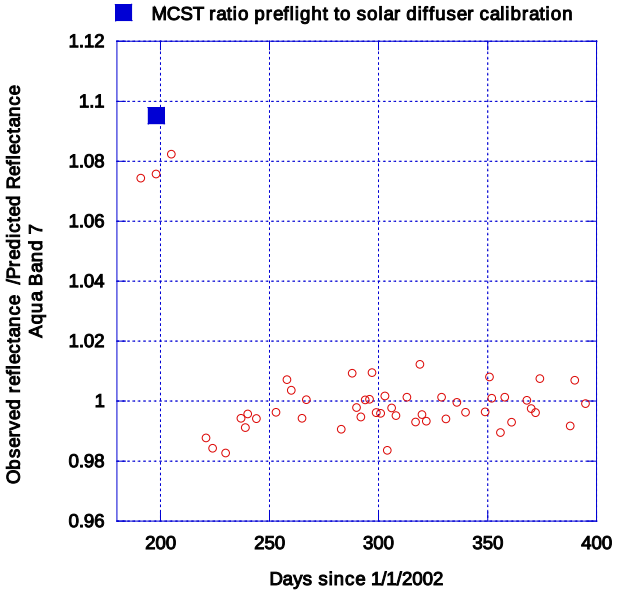
- MODLAND is working with MCST through bi-weekly meeting MSWG (Z. Wan, E. Vermote)
- E. Vermote have ad-hoc interactions with MCST through dedicated Point of Contact (Vincent Chiang)

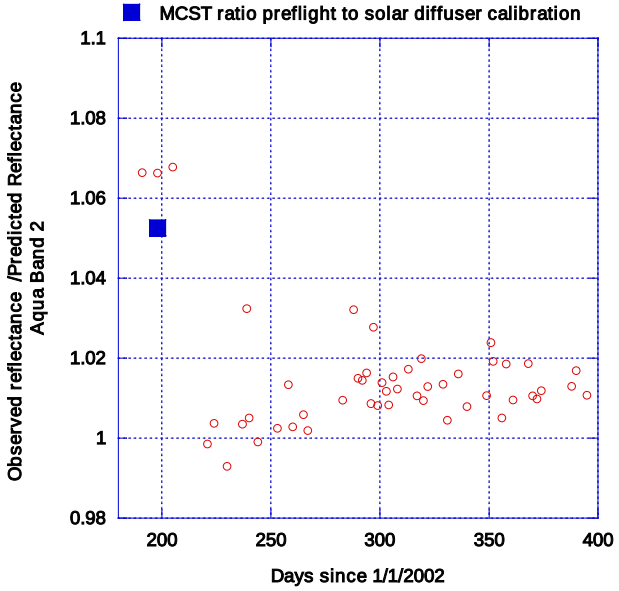
Issues being tracked

- Reflective bands calibration accuracy and stability (comparison Aqua-Terra on desert sites shows agreement 1-2%) band 1 and 2 – Green
- Striping in Terra SWIR (esp. Band7), several methods are being evaluated (eliminating noisy detector, atmosphere de-striping, Xtalk correction – MCST) – Yellow
- Band to Band registration Aqua YellowTerra Green
- Polarization correction/RVS to be used for aerosol inversion over Land at 412nm (characterization has been provided by MCST) – Yellow
- LWIR and MWIR performances (S. Hook) Green/Yellow

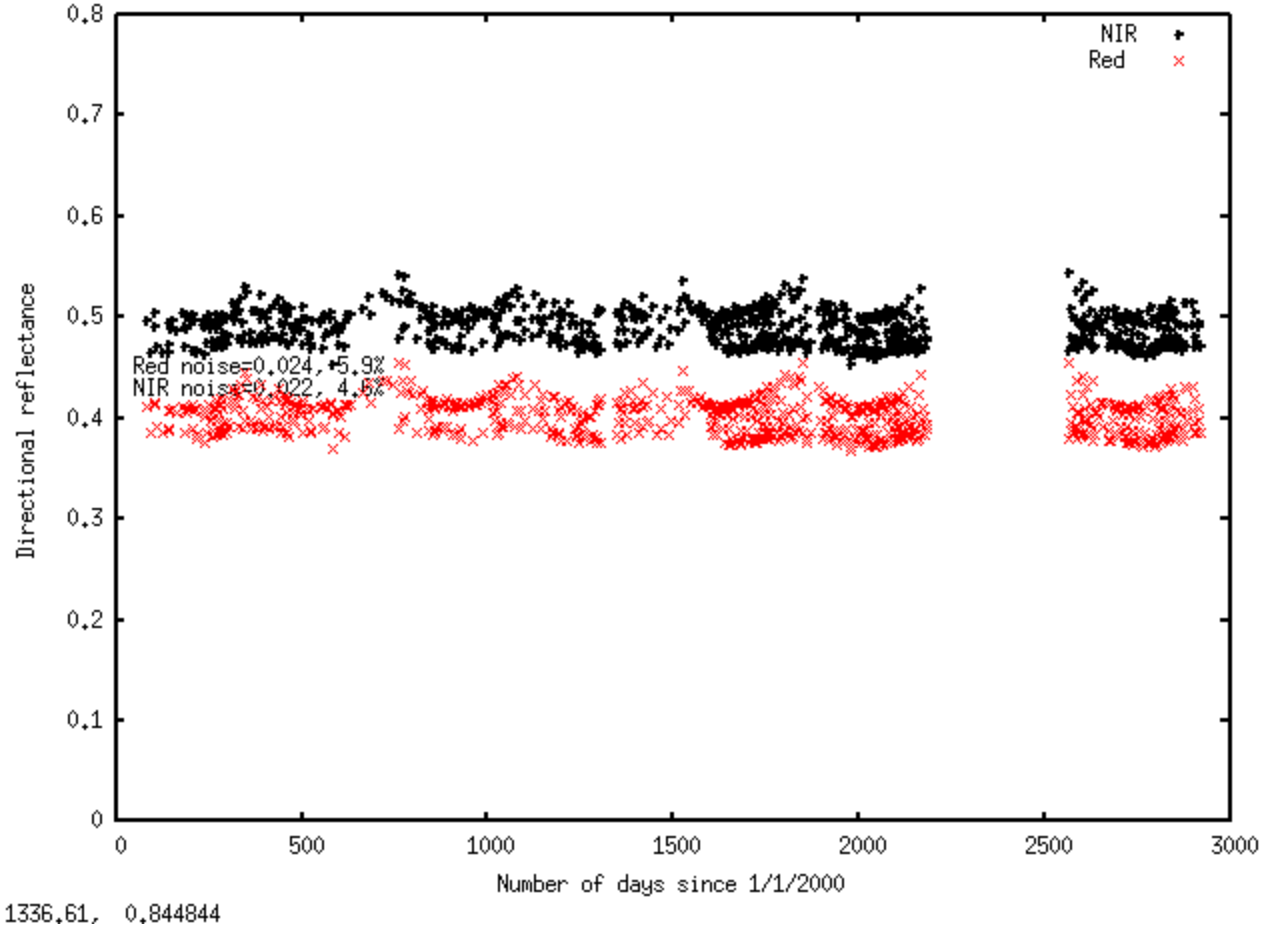
Independent reflectance calibration accuracy assessment



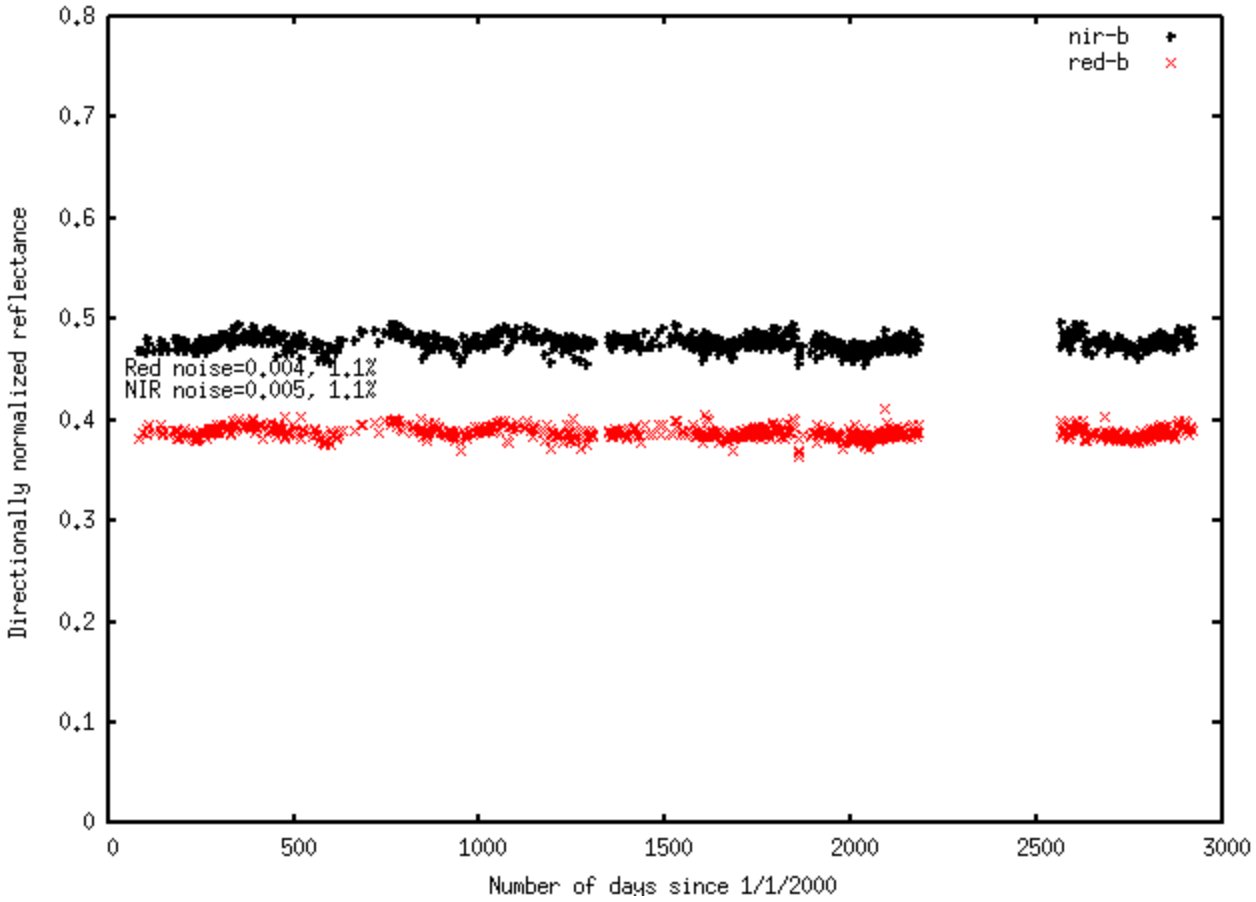




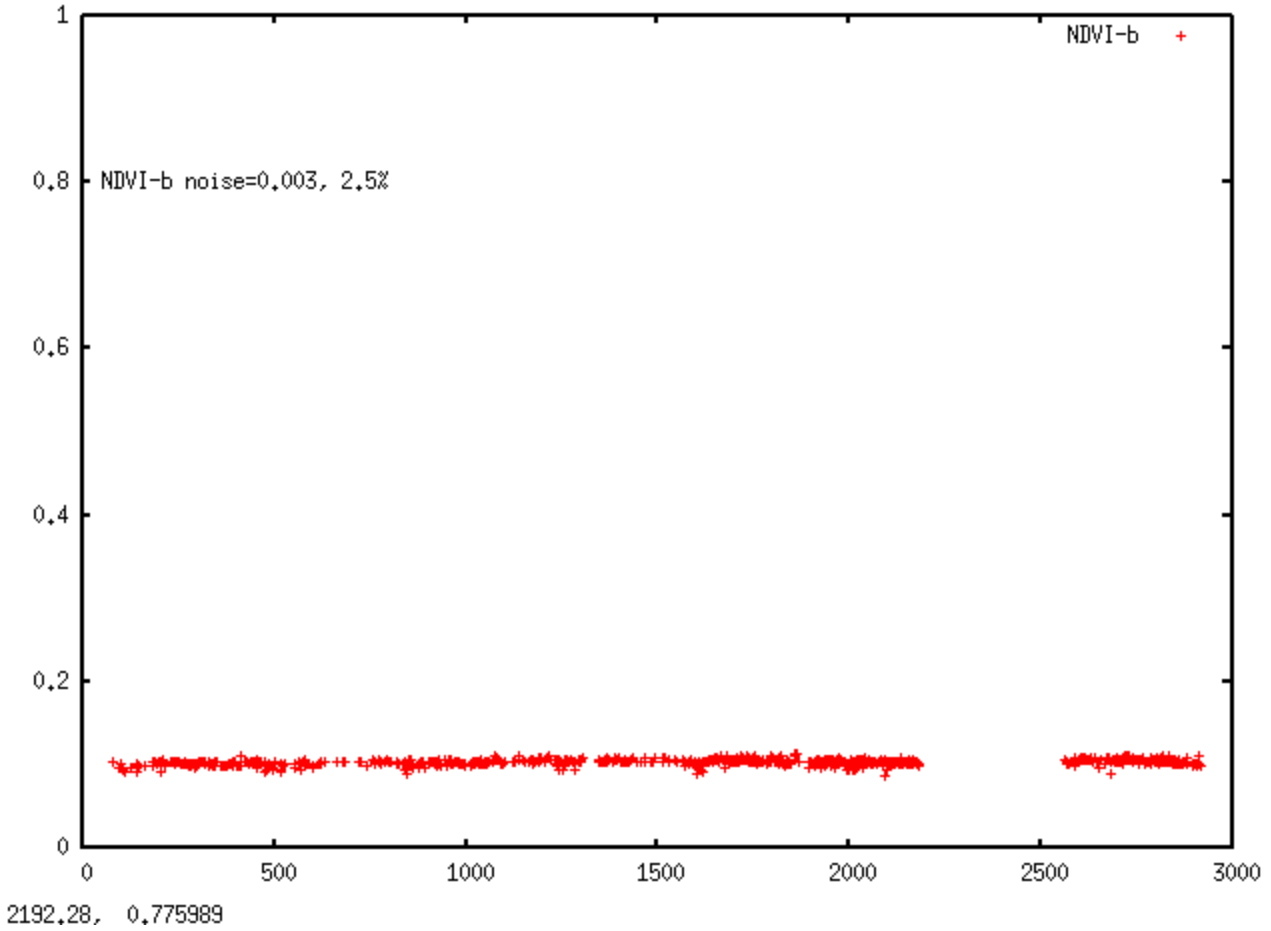
Terra band 1 and band 2 directional surface reflectance



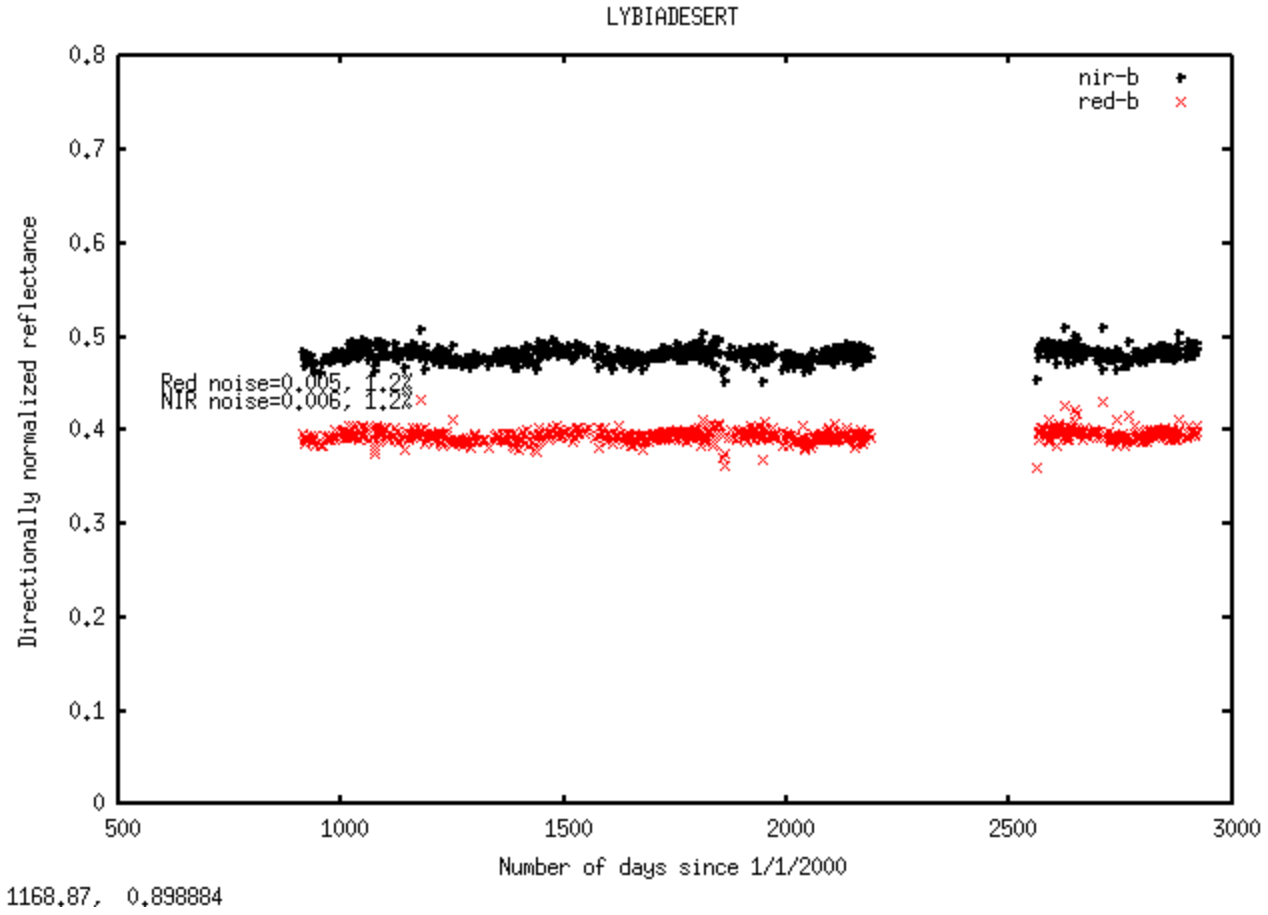
Terra band 1 and band 2 surface reflectance normalized for BRDF at nadir view and solar zenith angle of 45 degrees.



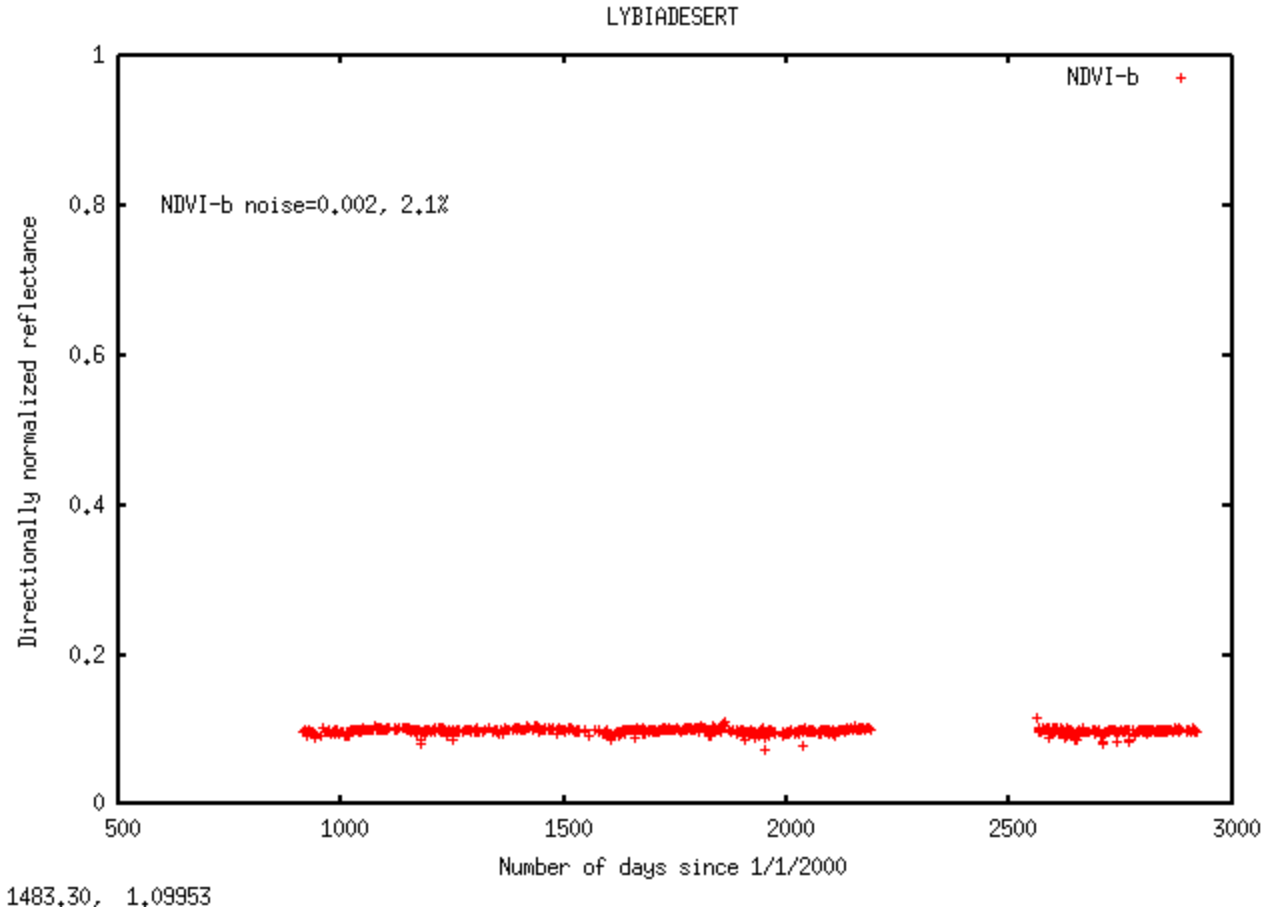
Terra NDVI computed from band 1 and band 2 surface reflectance normalized for BRDF at nadir view and solar zenith angle of 45 degrees.



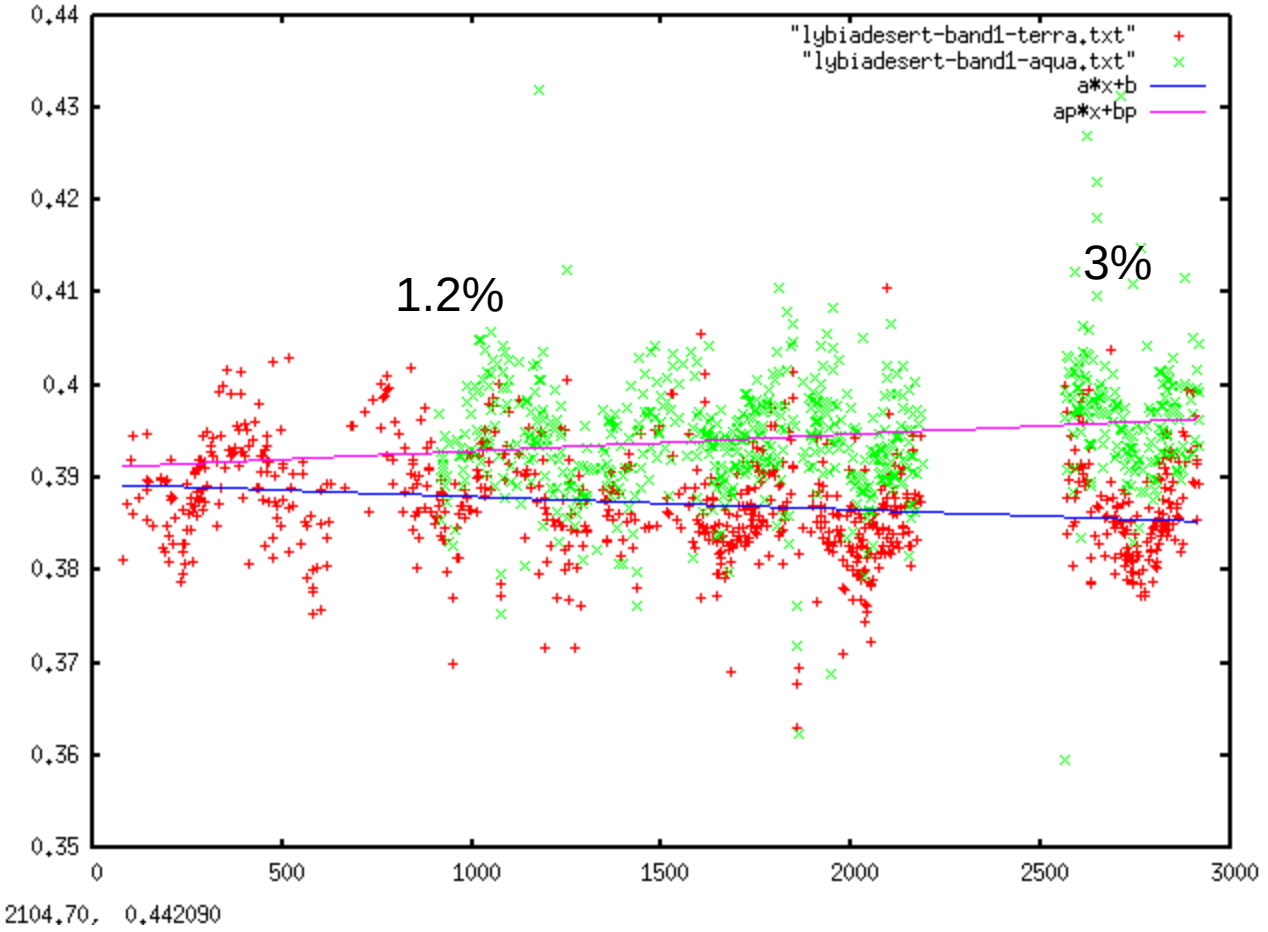
Aqua band 1 and band 2 surface reflectance normalized for BRDF at nadir view and solar zenith angle of 45 degrees.



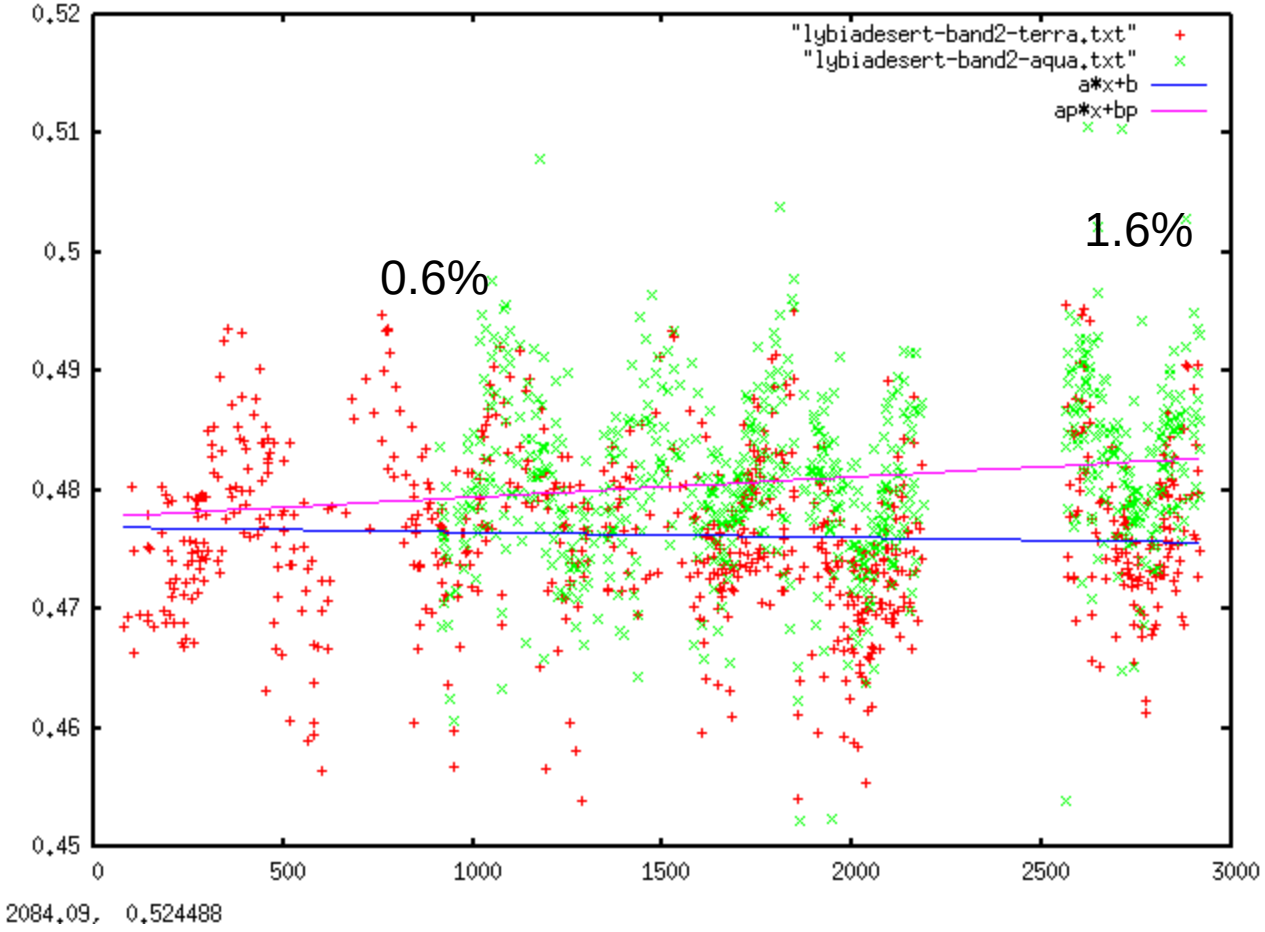
Aqua NDVI computed from band 1 and band 2 surface reflectance normalized for BRDF at nadir view and solar zenith angle of 45 degrees.



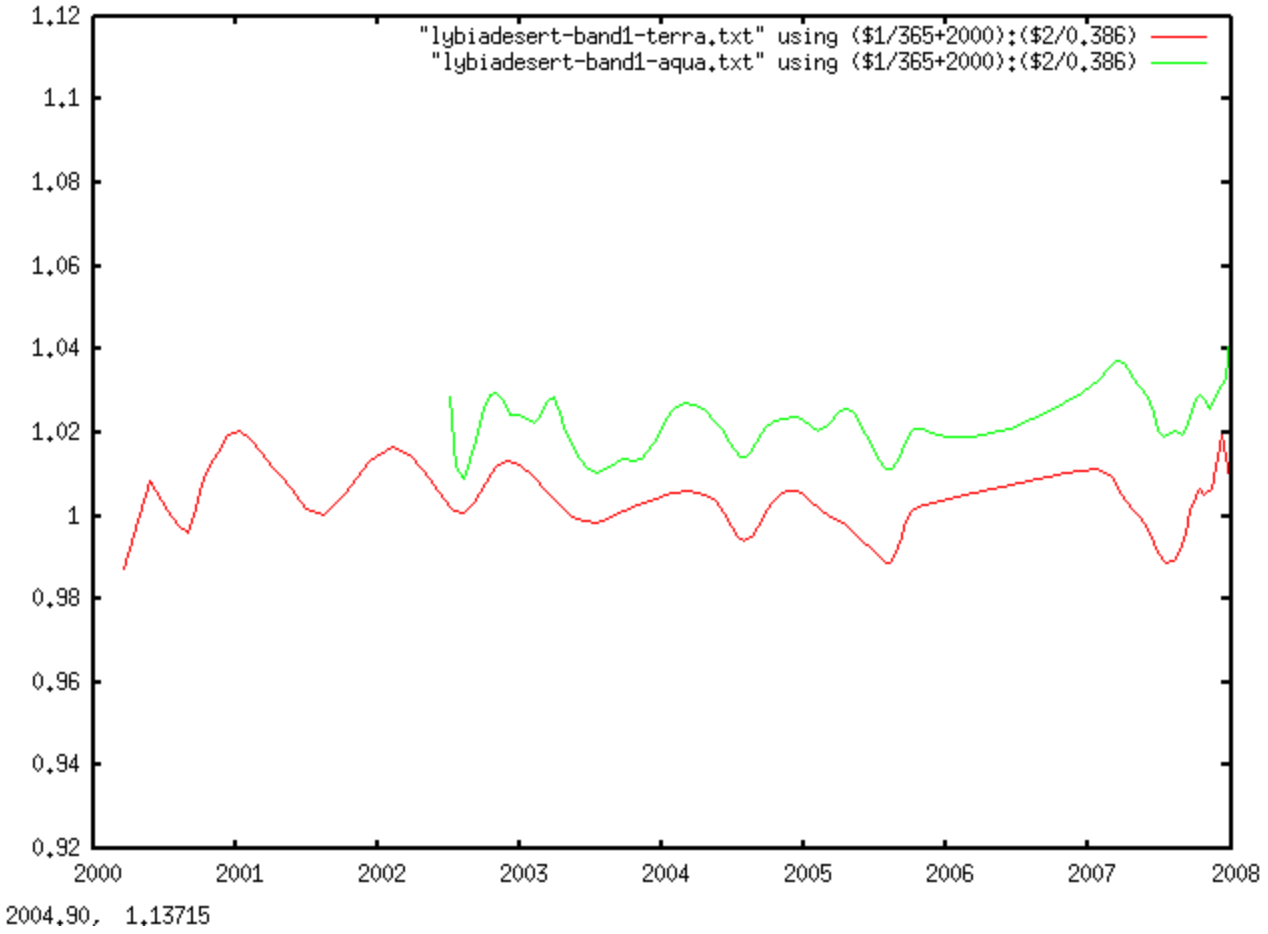
Comparison of Terra and Aqua band1



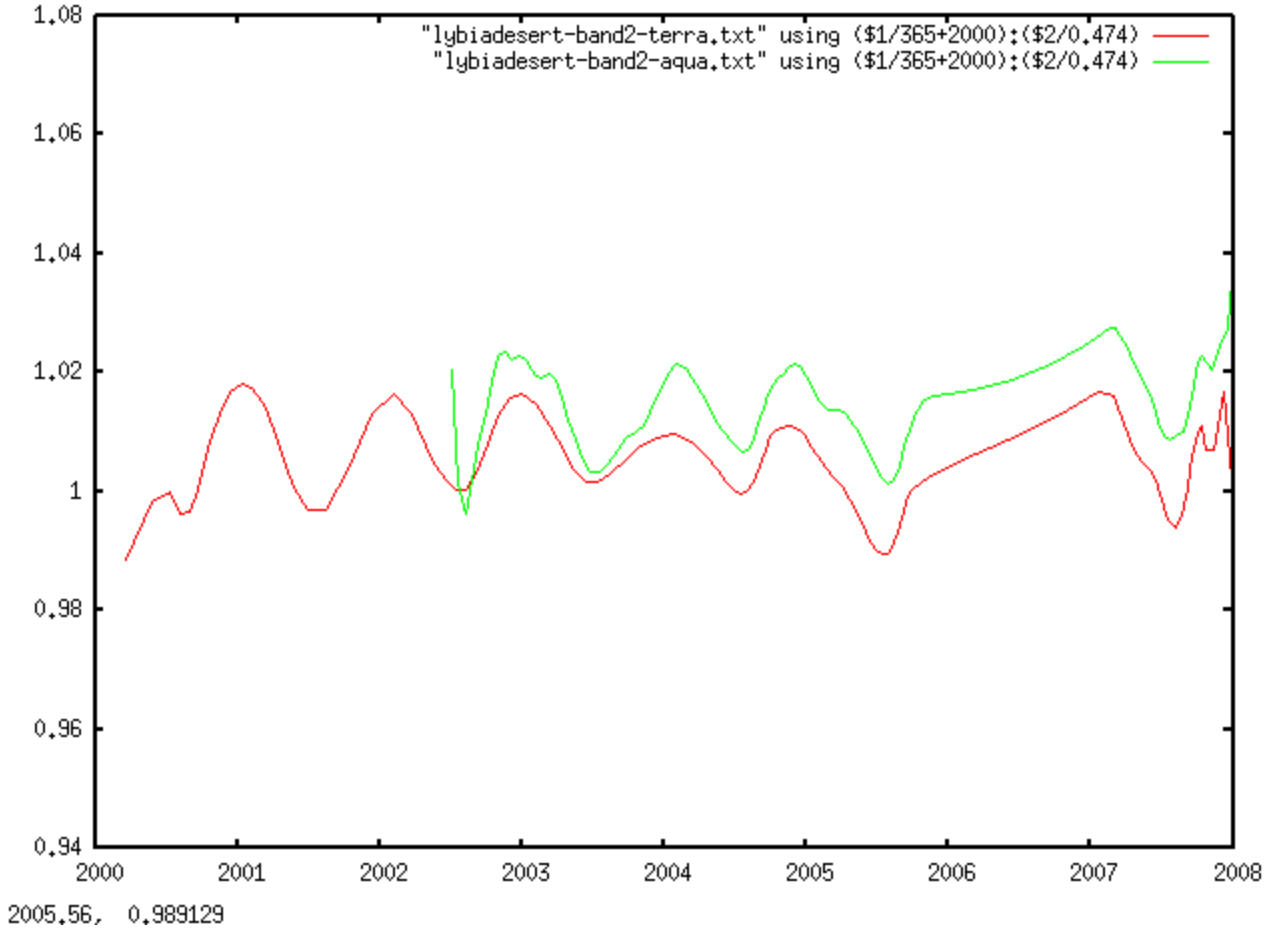
Comparison of Terra and Aqua band2



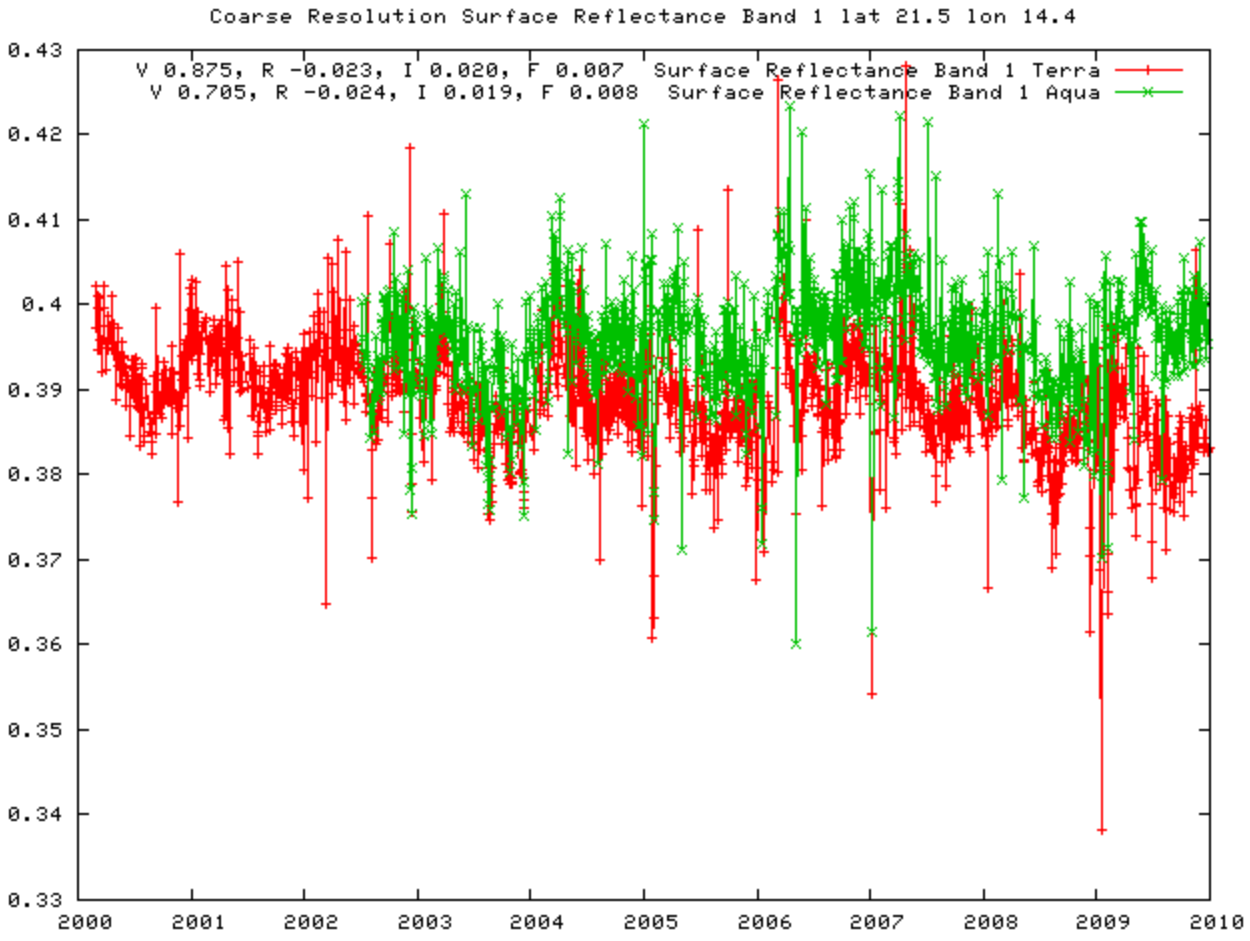
Band 1 smooth data



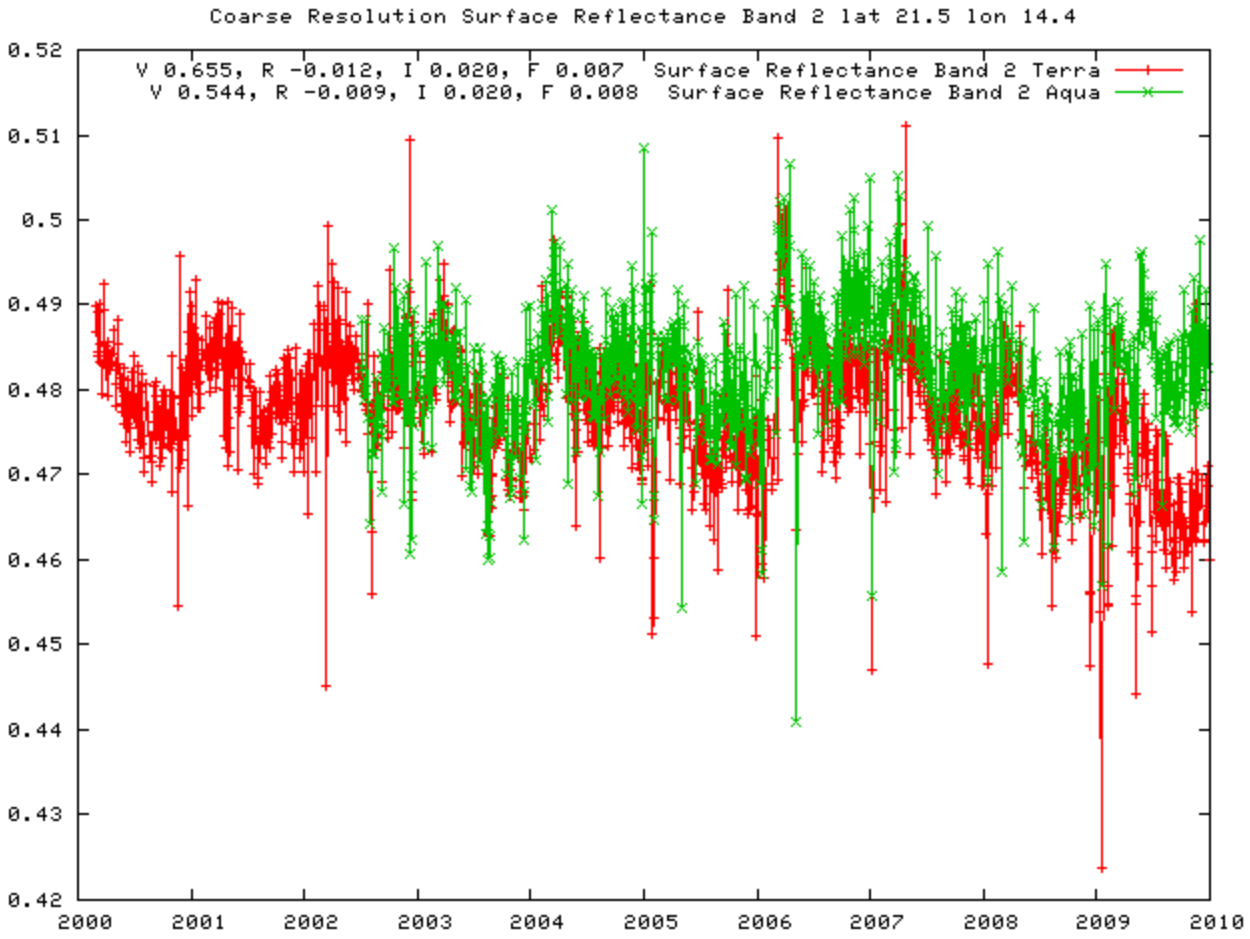
Band 2 smooth data



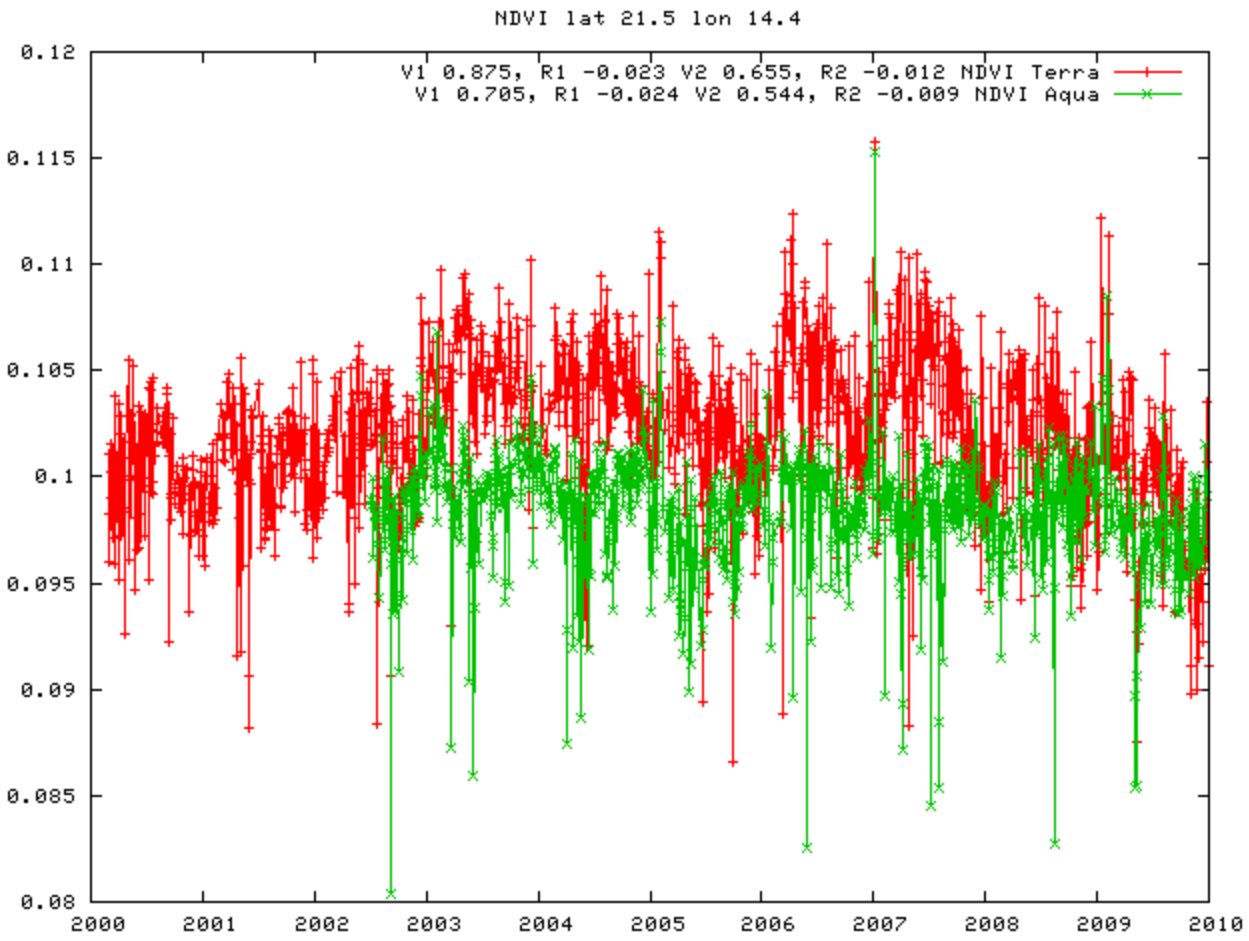
Band 1 Terra-Aqua



Band 2 Terra-Aqua



NDVI Terra-Aqua

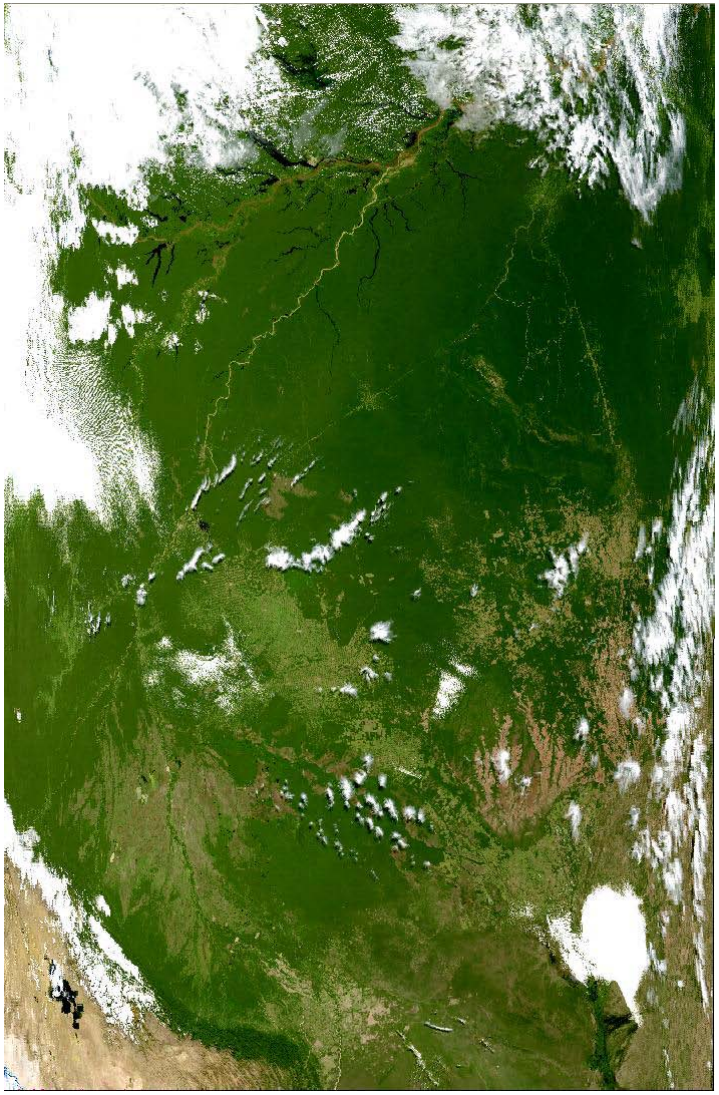


Conclusion

- Could be a systematic difference between Aqua and Terra due to overpass time (10h30 versus 1h30pm)

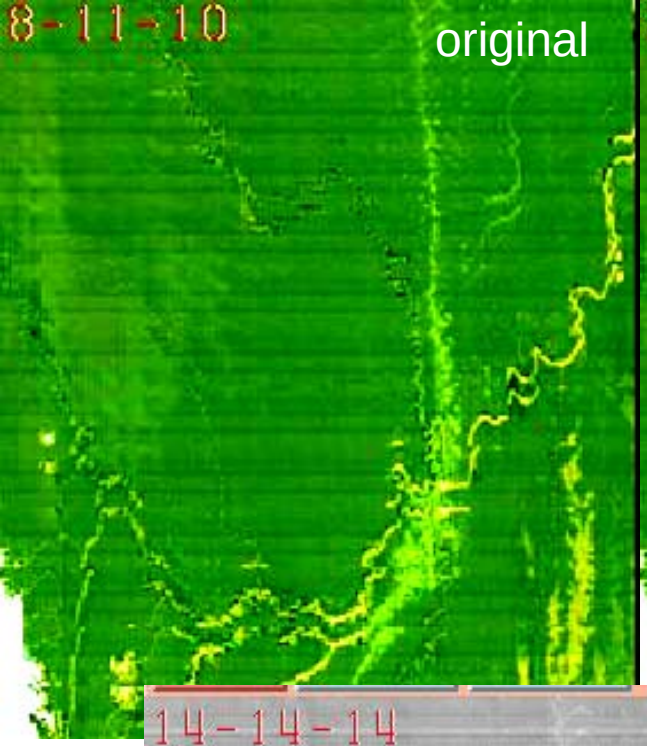
De stripping evaluation (Terra)

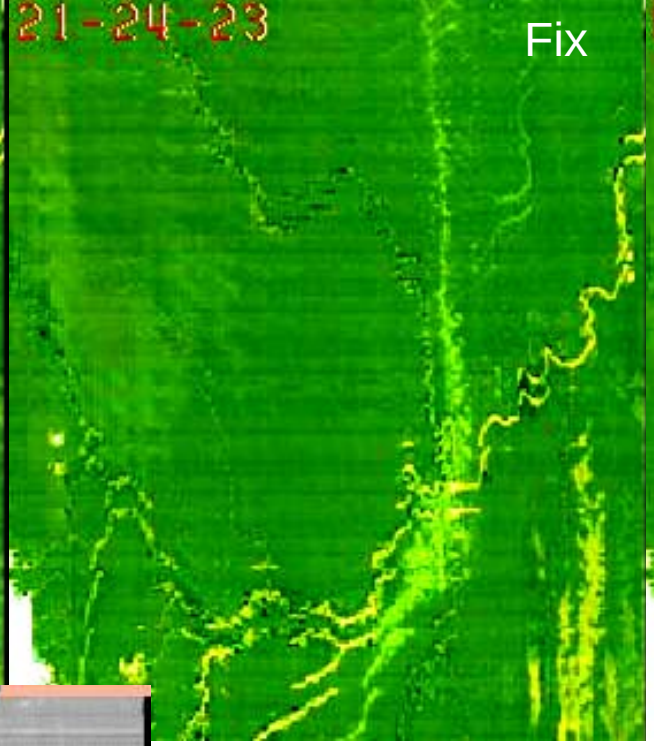
Test granule

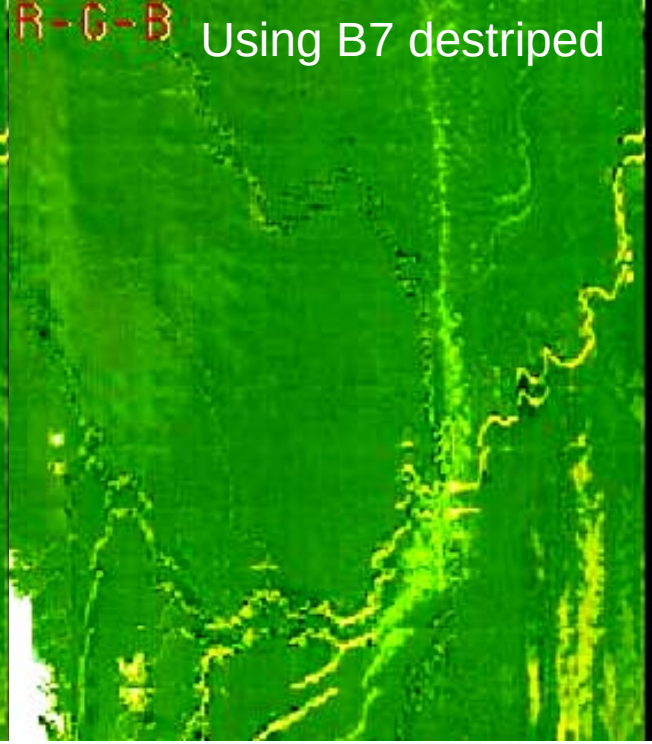


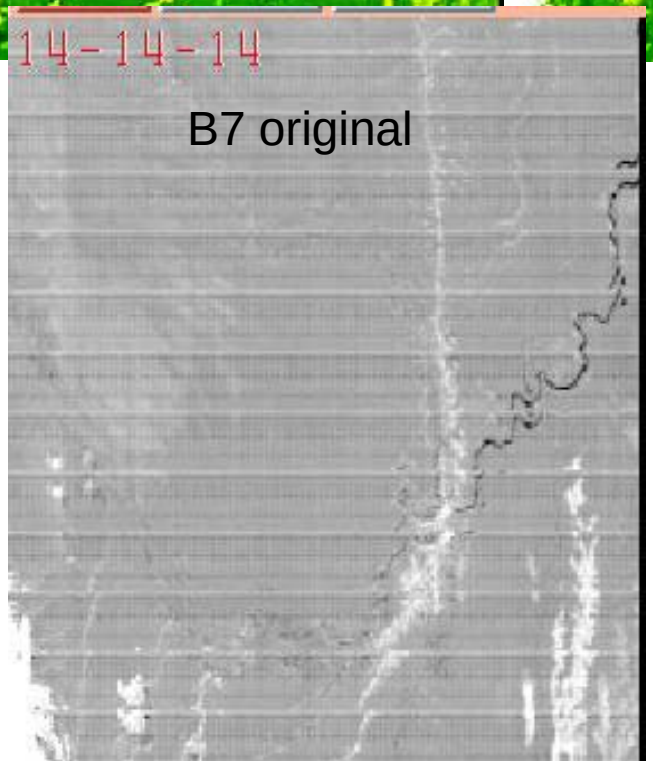
- Compare original data to:

  -the fix in surface reflectance (ignoring some noisy detector in band 7)
  -The de-stripped Level 1B provided by atmosphere



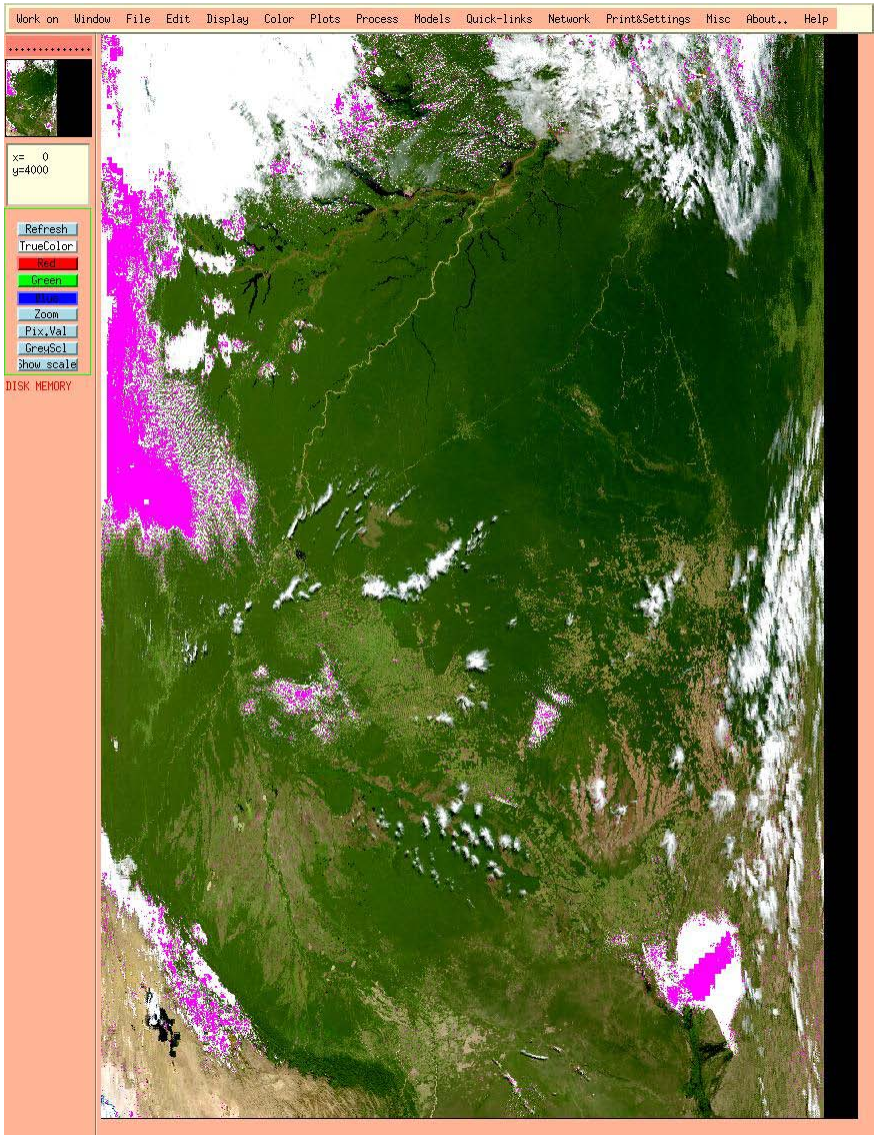






The improvement by the “fix” is still showing stripes (but reduced),
The version using the Level 1B de-stripped provided by atmosphere does not show any stripe.

Pixels with change >0.005 in band 1 are masked in Magenta

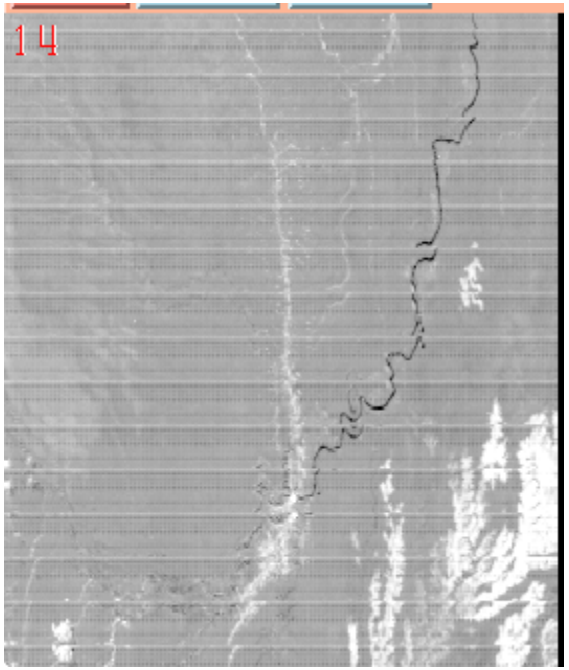


Overall the impact of using destriped L1B is less than 0.005 in band 1 (less than quoted accuracy)
for the cloud free pixels

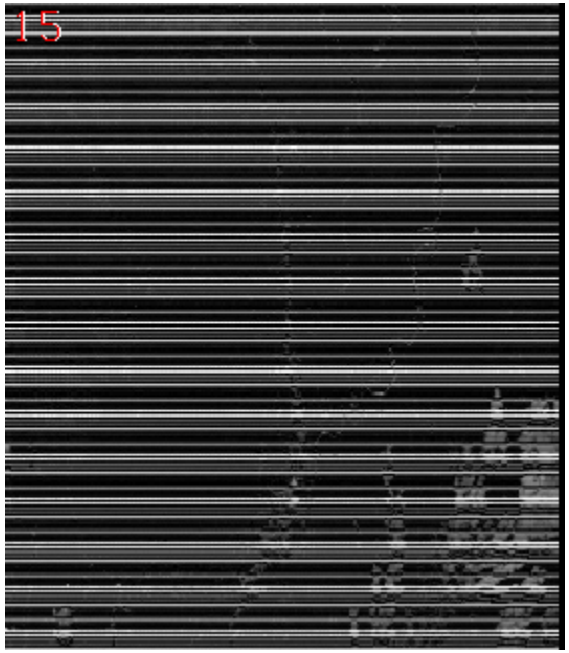
The performance of de-striping is very good over uniform areas

1(red), 4 (green), 3(blue)

Band 7 (original)



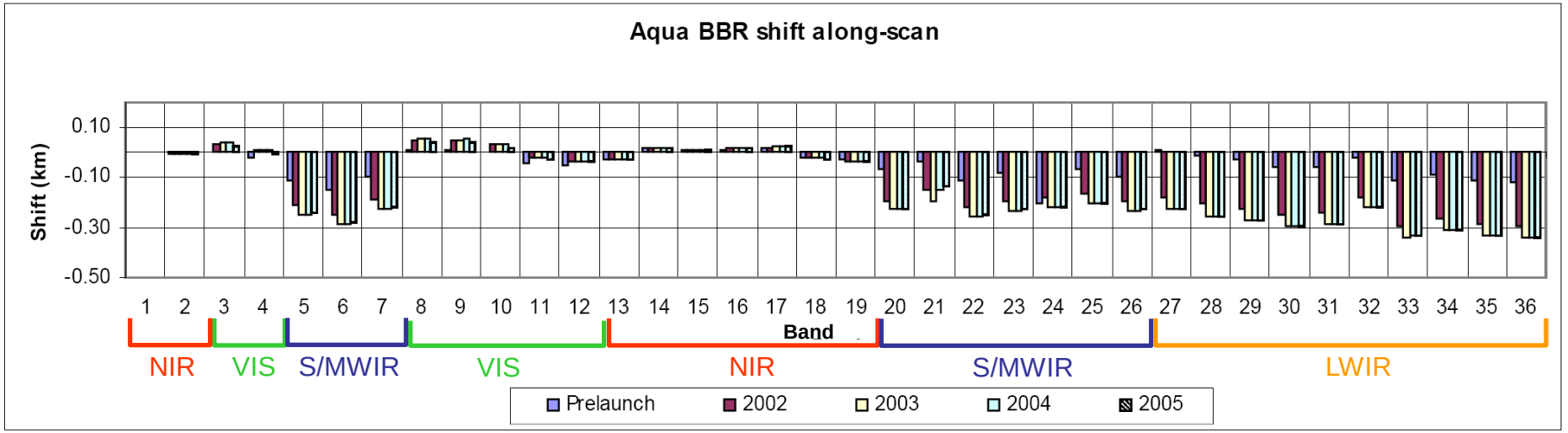
Band 7 (original-destriped)

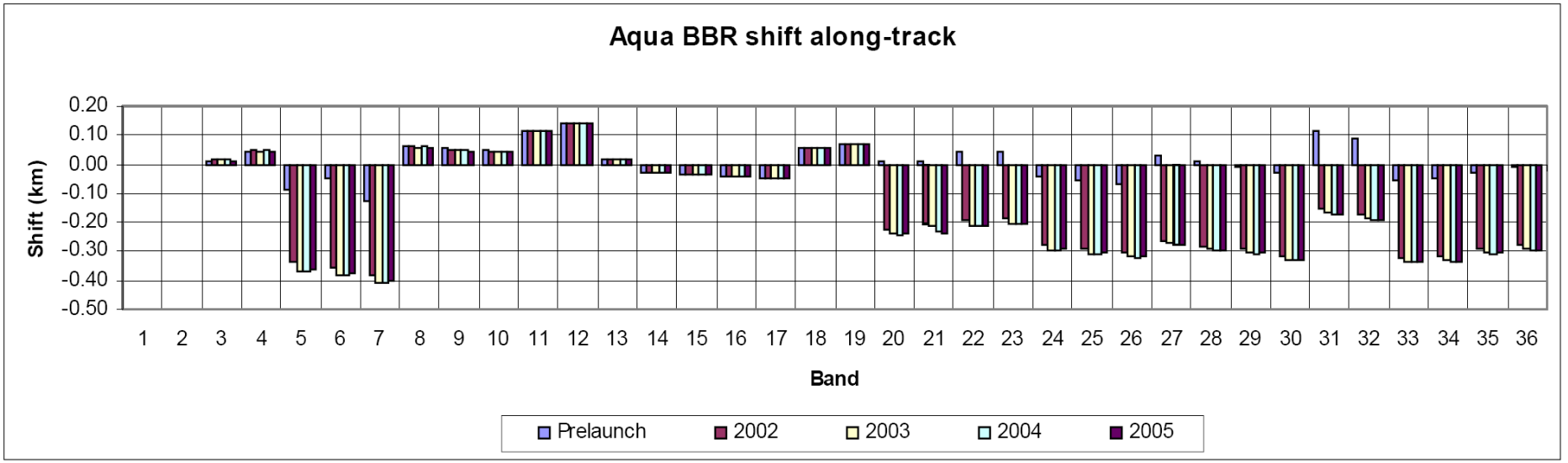


Conclusion

- The atmosphere destriping algorithm has been sucessfully used in land collection 5 and will be used in collection 6.

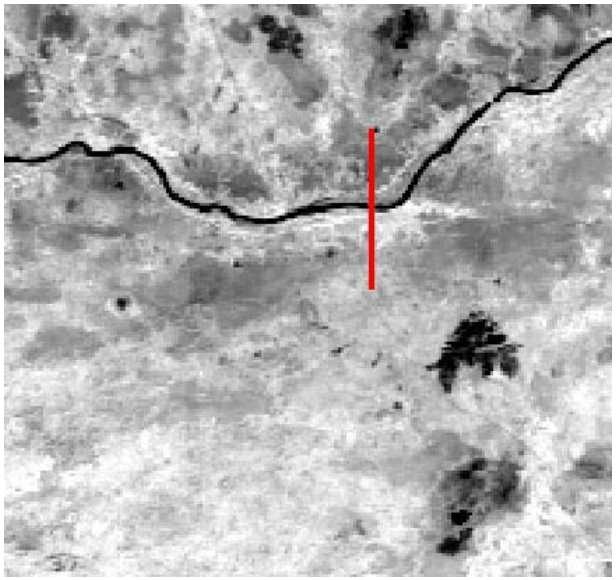
MODIS/Aqua Band-to-band Registration Performance





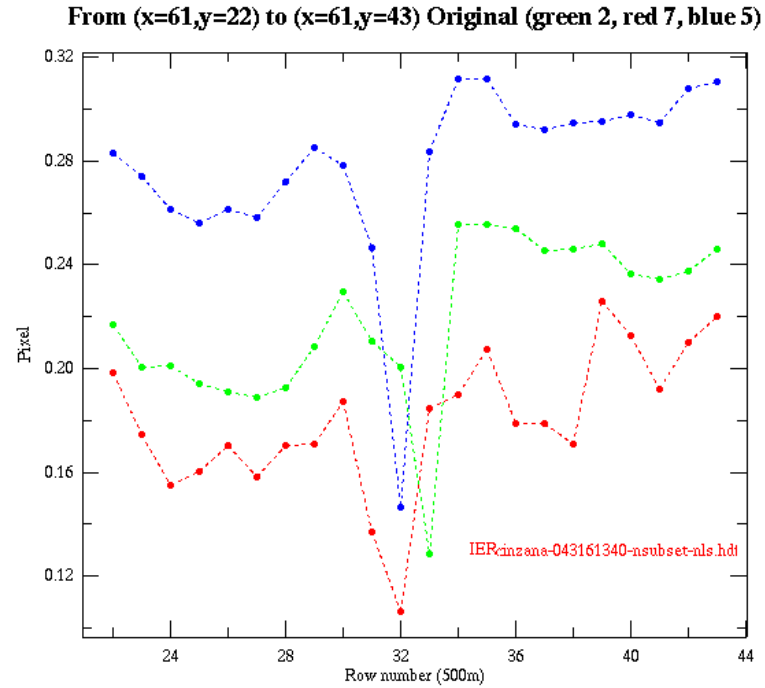
Source: MODIS ST Meeting – Calibration Workshop, J. Xiong, March 2005 (slide 31)

Misregistration on 500m bands

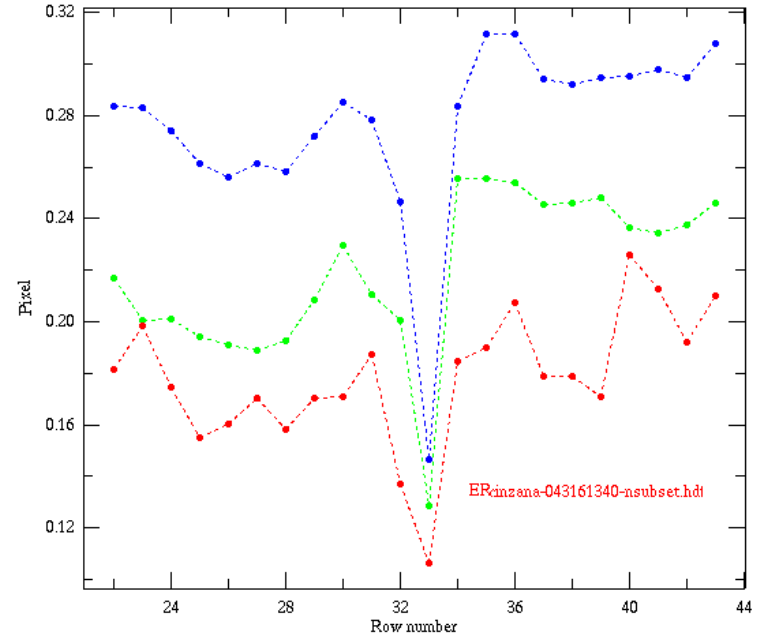


Reflectance transect along Track on a L1B subset

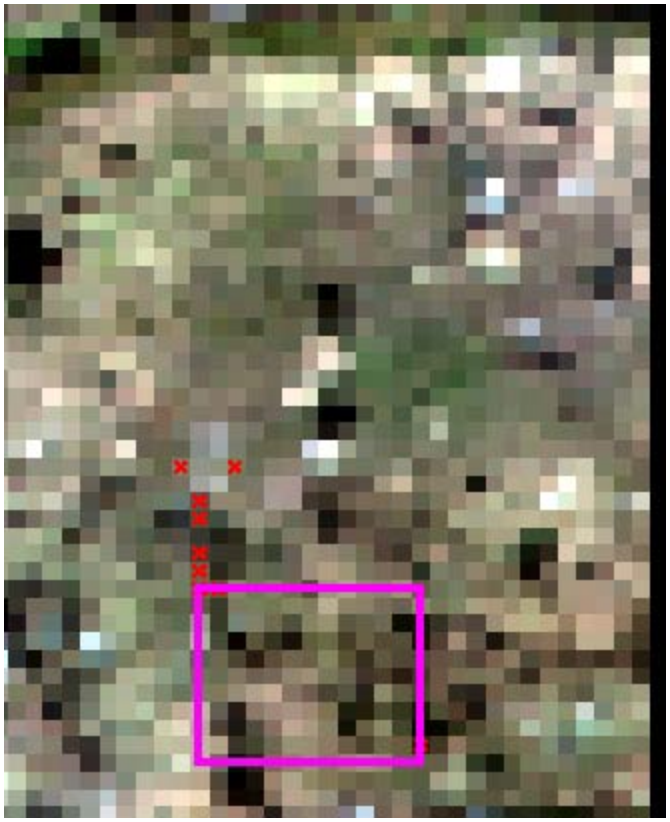
Original L1B data



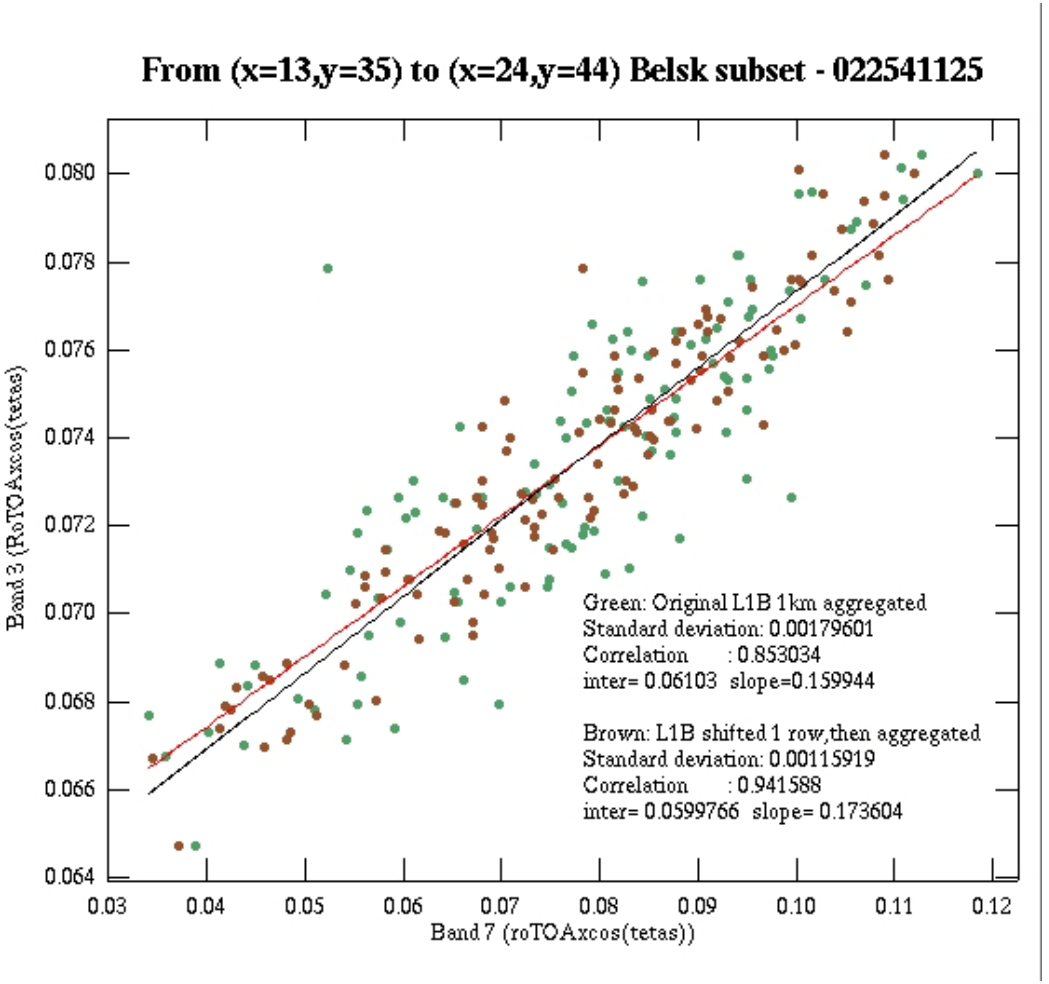
Shifted 500m L1B data



Impact on the aerosol product (relationship band 3 band 7)



band 3 and band 7 are plotted against each other in the sub area inside the magenta box

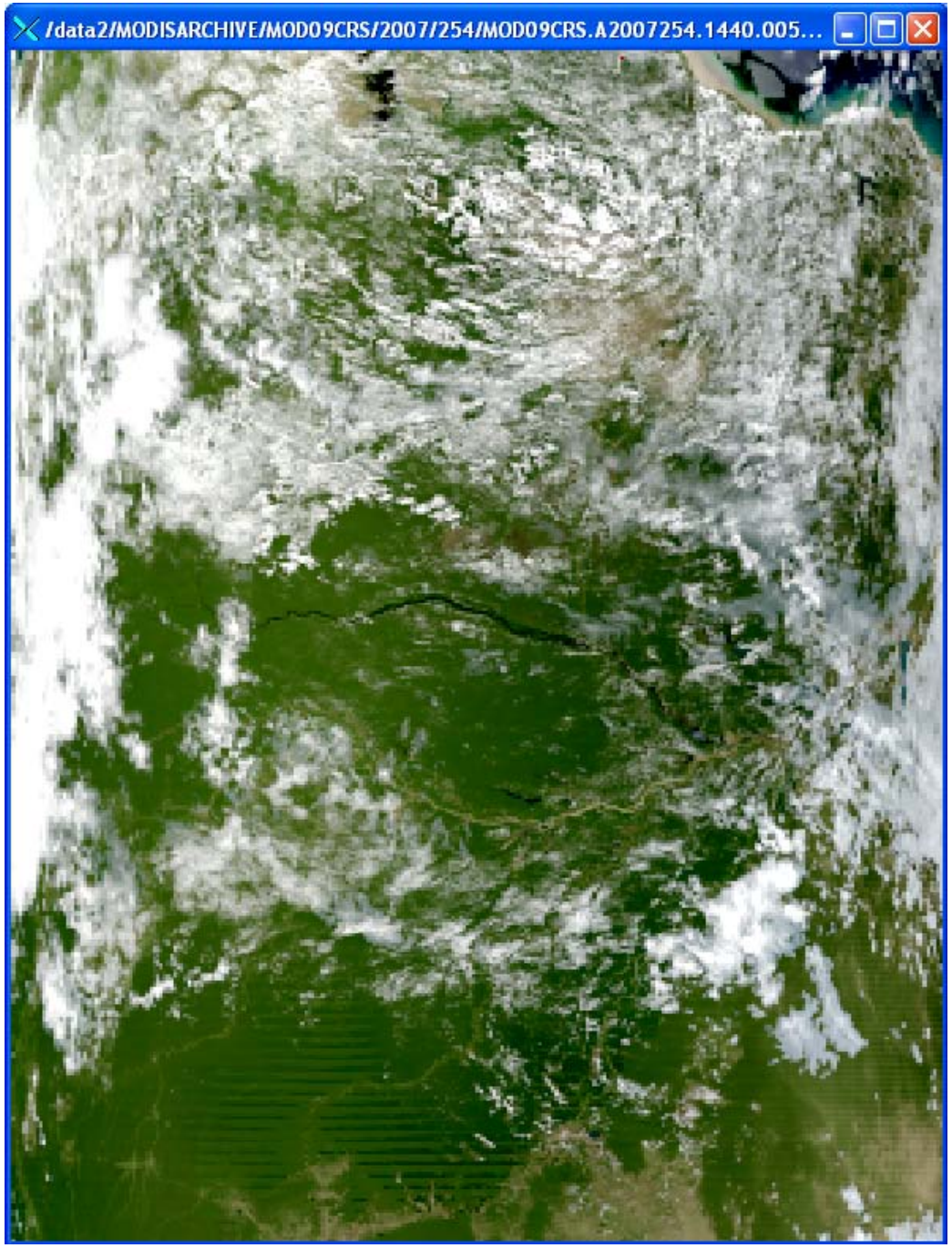


Shifting one row (500m) improves the correlation (from 0.85 to 0.94) decreases the Standard deviation (from 0.018 to 0.012) and has a impact on the slope (used in the aerosol retrieval)

Aqua BBR fixes

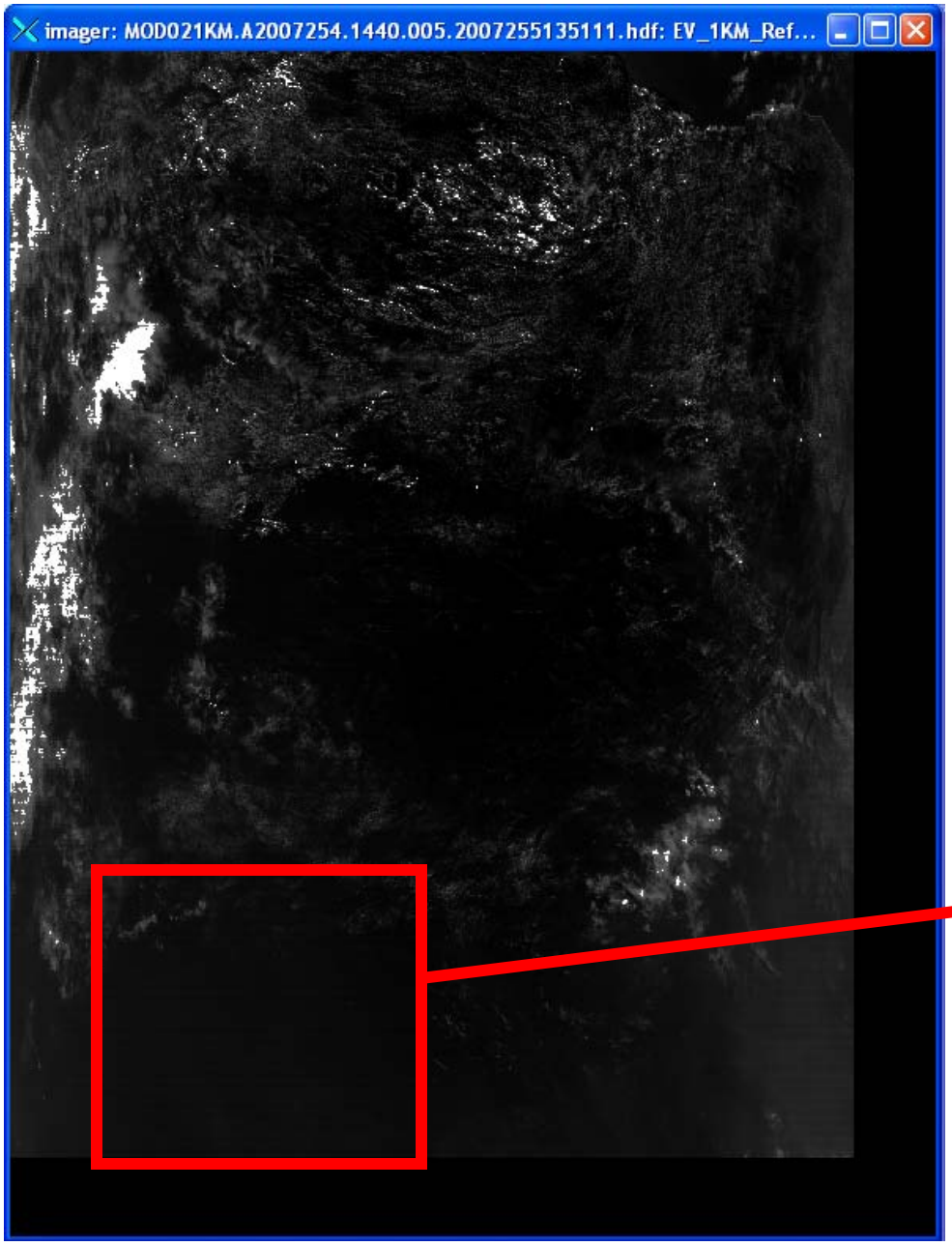
- Software fixes (shifting 1row and accounting for earth rotation) has been performed along track to improve the band to band registration of bands 5-6-7 with bands 1,2,3,4 prior to aerosol retrieval

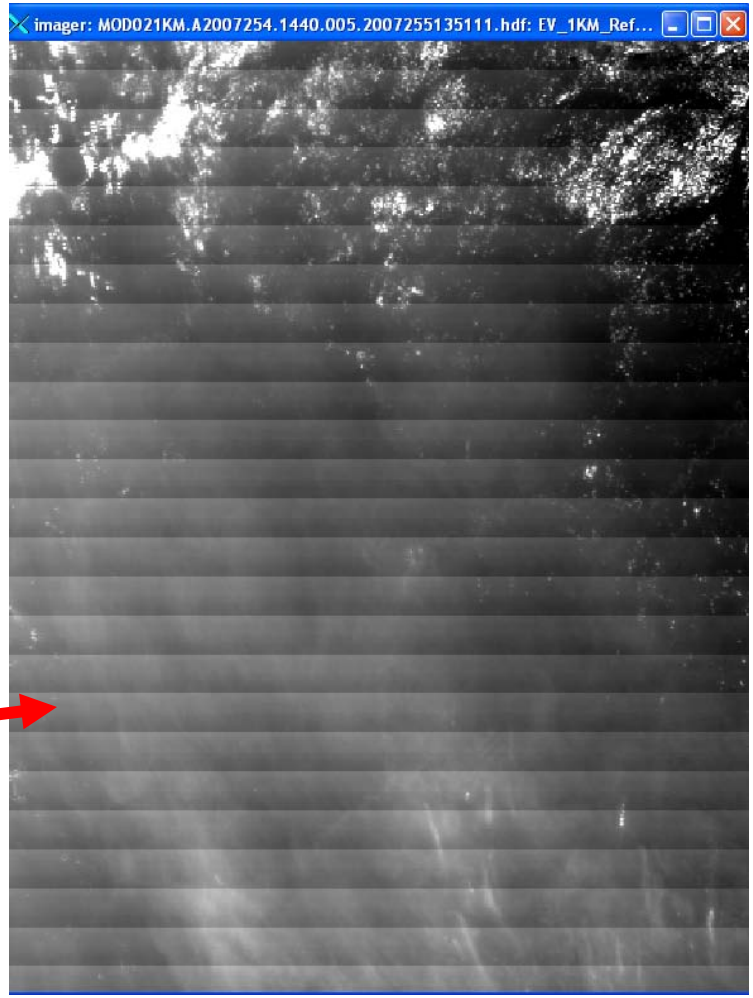
Polarization effect at 412nm depending on mirror side for Terra (band 8)



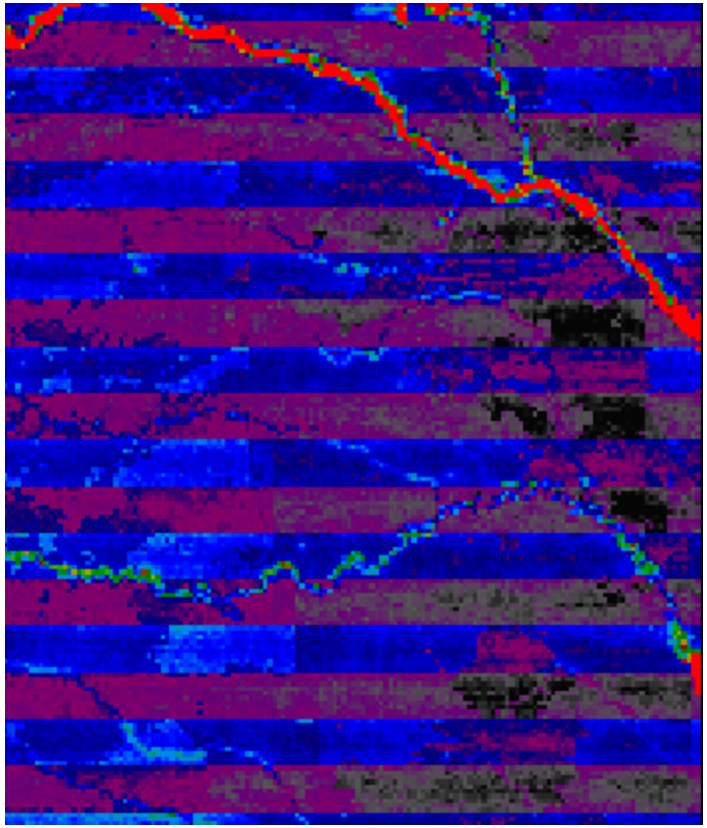
- Pbs detected over the rain forest at high aerosol level (between 0.8-1.2): band 8 noise make the aerosol model switch to high to low absorption

Band 8/ Band 8 details



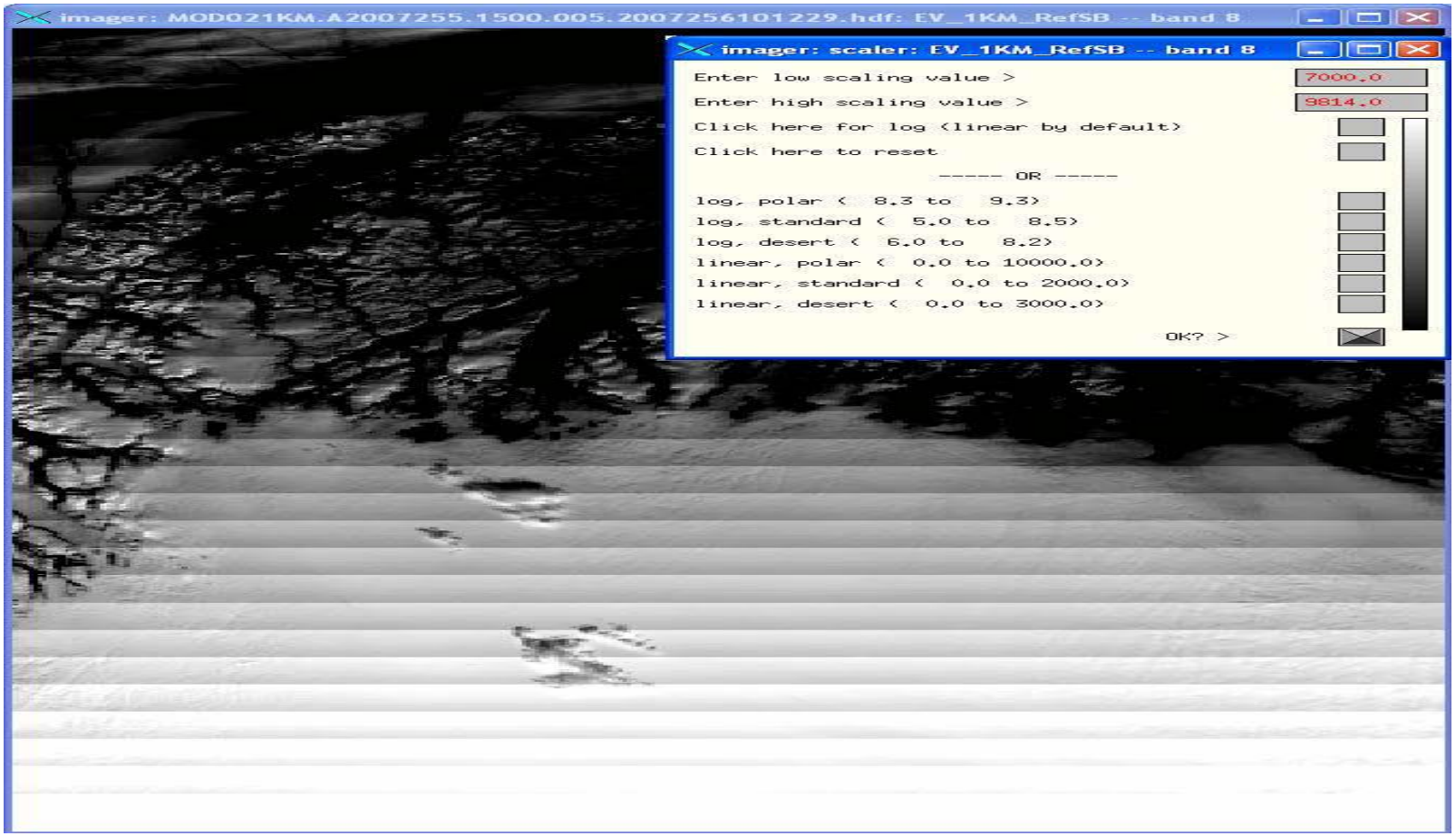


Terra, Band 8 (412nm) Mirror side calibration artifact

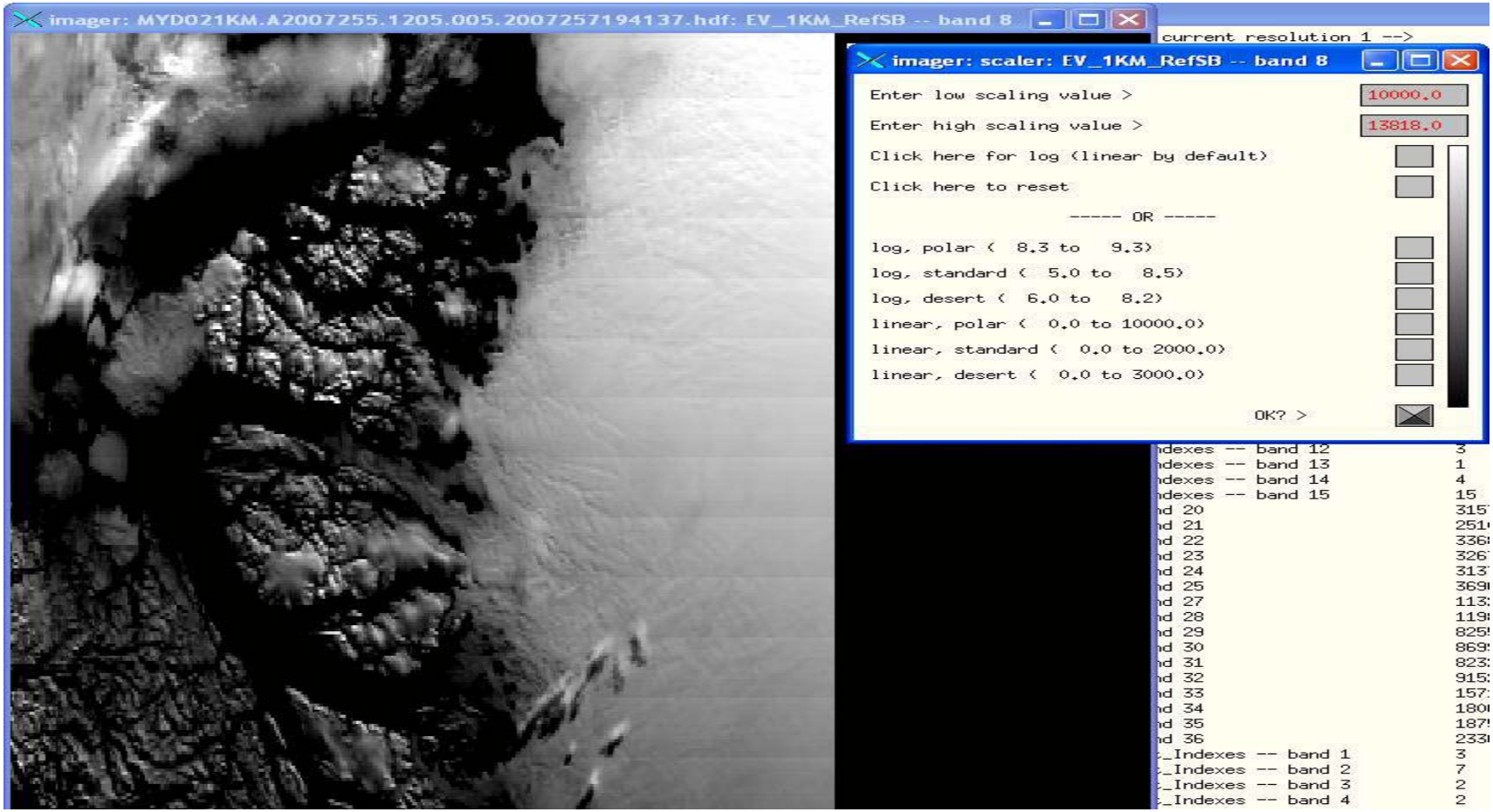


Surface reflectance in band 8, changing From +0.007 to -0.003 over a forest area in south America.

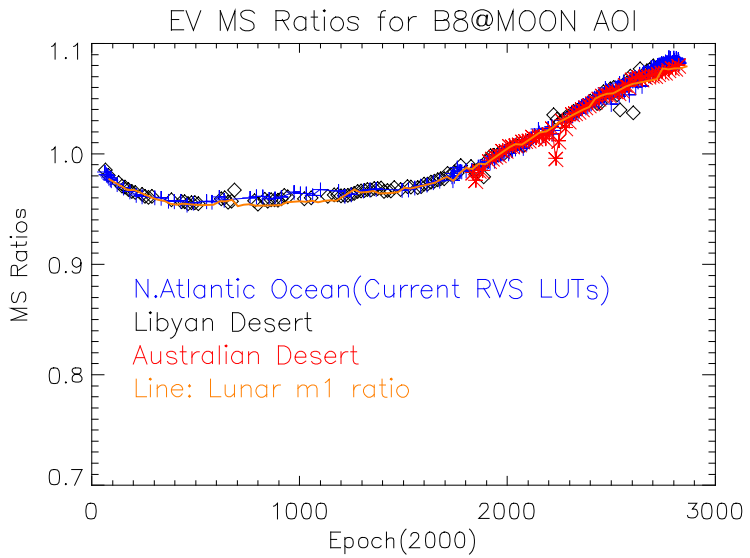
Mirror side effect in Terra band 8 despite mirror side equalization also visible over snow/ice target (polar zone)

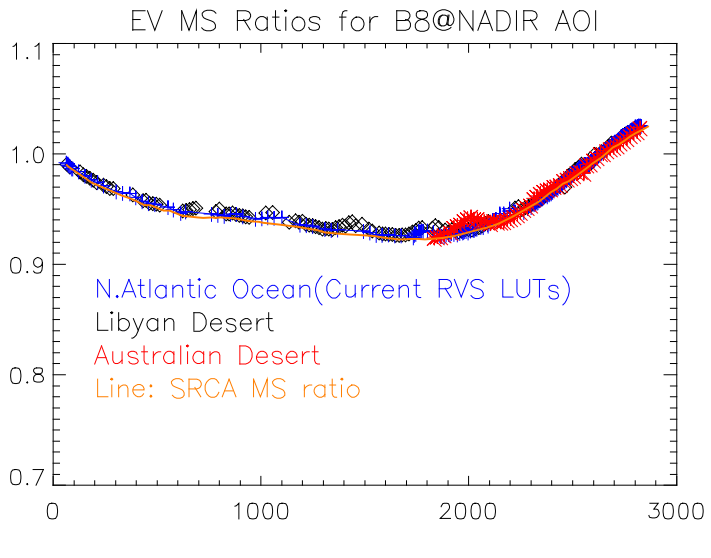


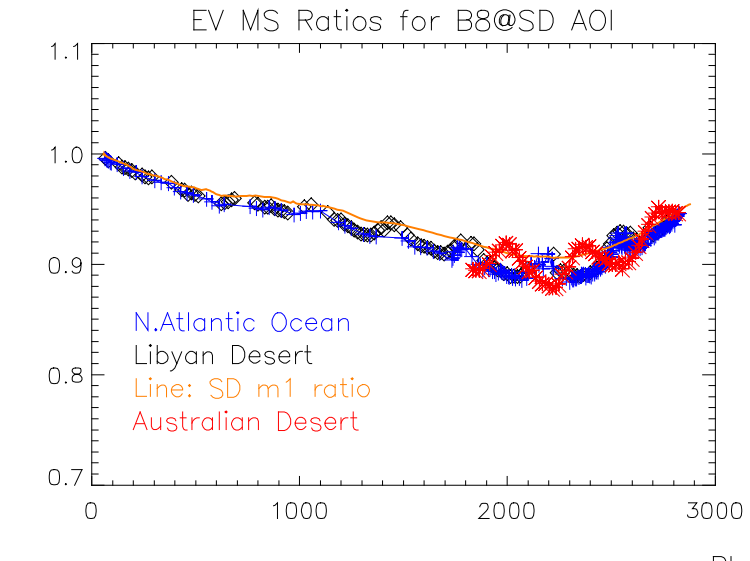
This is not apparent on Aqua data

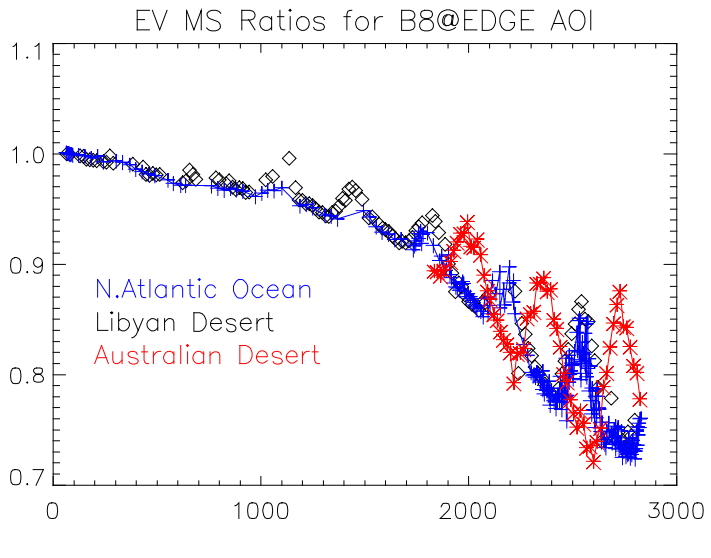


Terra Mirror side ratio is dependent on AOI (fine) but Australian and Lybian desert give different ratio at EDGE AOI

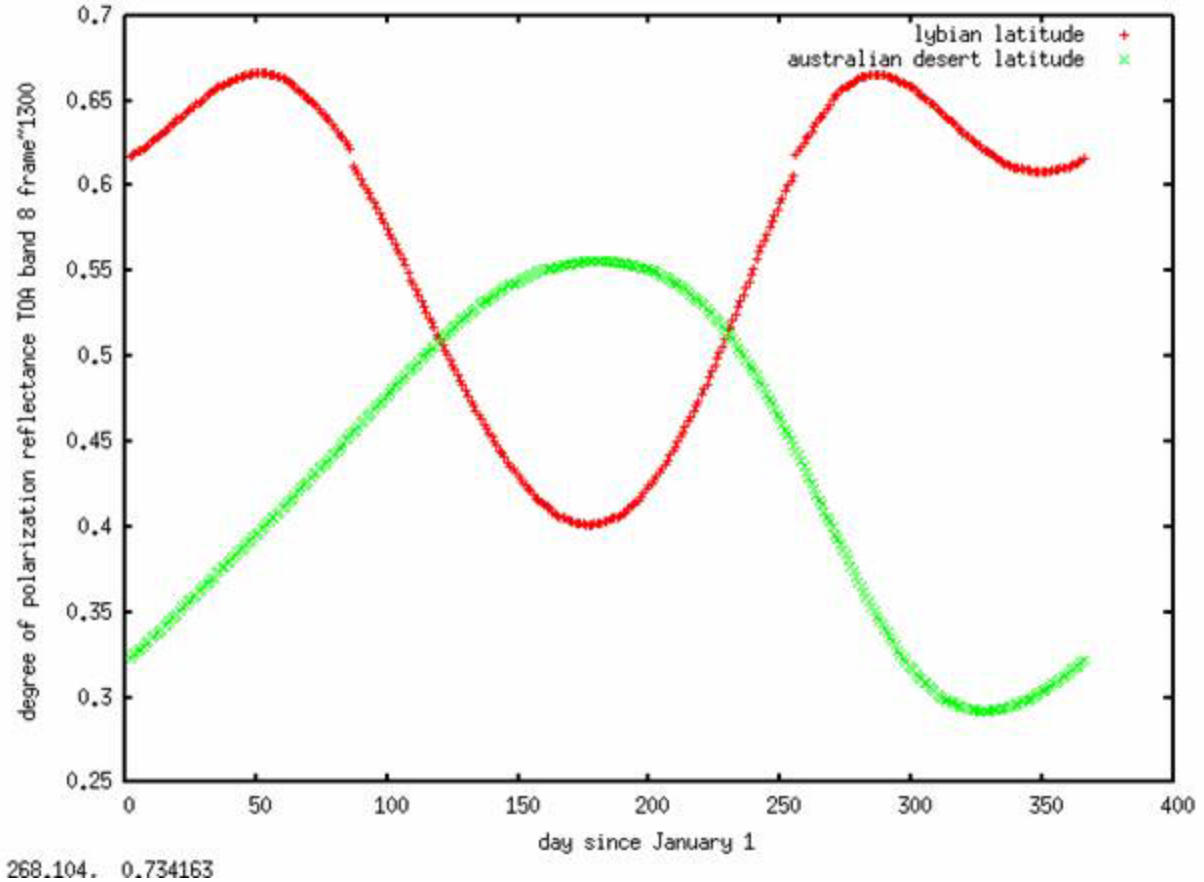








Polarization simulation over desert sites may explain the previous results: The polarization over Lybia and Australia are out of phase



Conclusion on polarization

- Need to implement polarization correction for Terra especially since 2005 (went up from 5% to 30%)