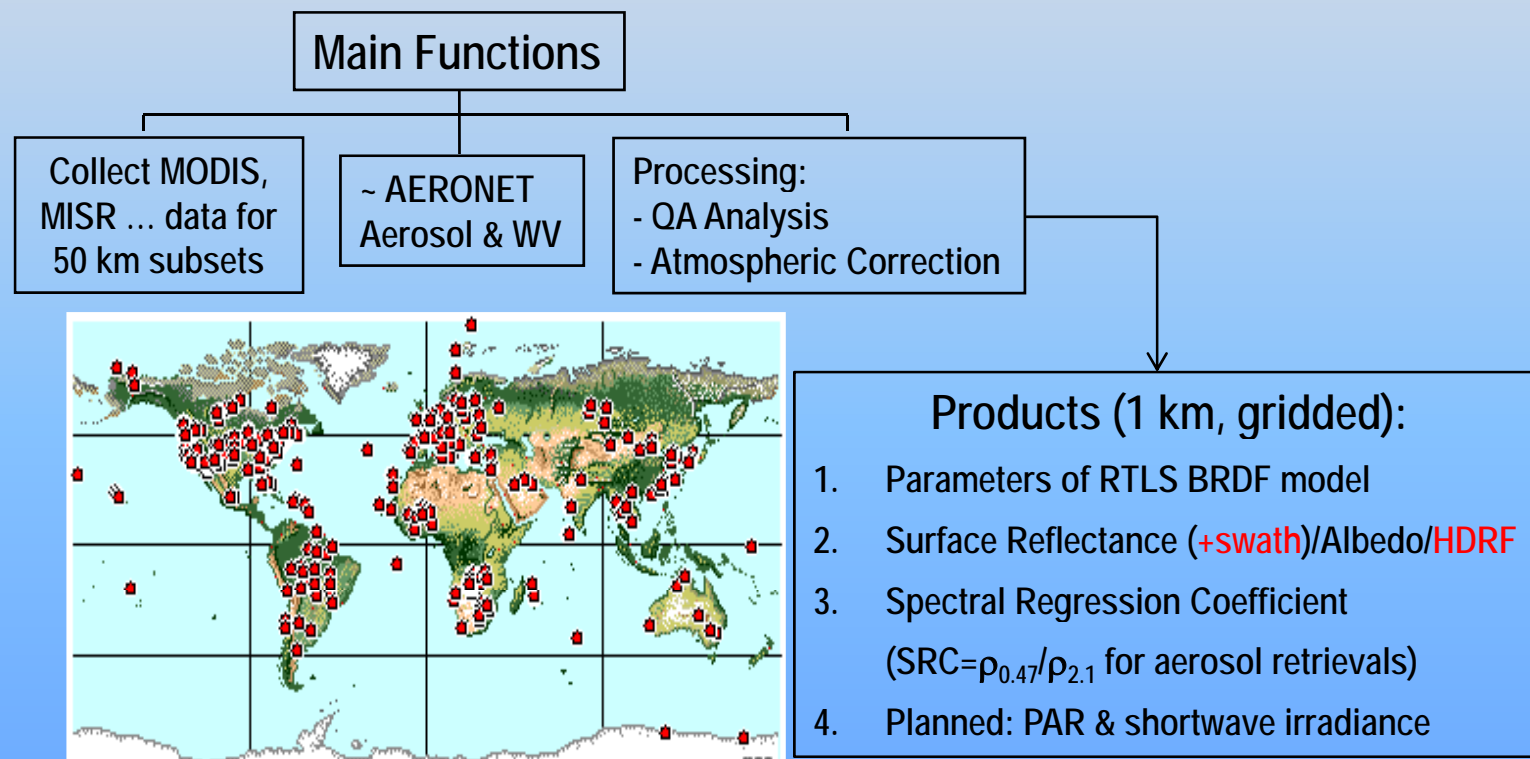


**Preliminary
Analysis of Relative
MODIS Terra-Aqua
Calibration Over Solar
Village and Railroad Valley
Sites Using ASRVN**

A. Lyapustin, Y. Wang, X. Xiong, A. Wu

AERONET-based Surface Reflectance Validation Network (ASRVN)

Challenges of SR validation: surface is *variable*, *upscaling* from ground/tower data to ~1 km satellite footprint is challenging; *field campaigns* are expensive and rare etc. ASRVN provides continuous val. data at satellite spectral and spatial resolution with great space/time statistics.

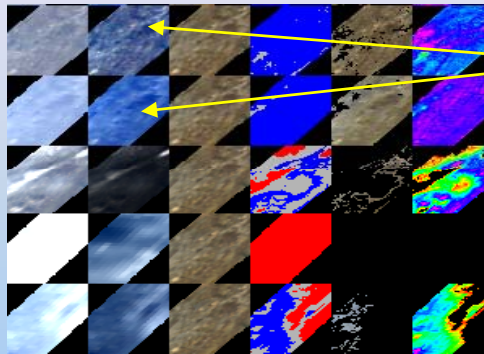


Wang, Y., A. Lyapustin, J. Privette, B. Holben et al., ASRVN Science and Validation Dataset, TGARS, 2009.

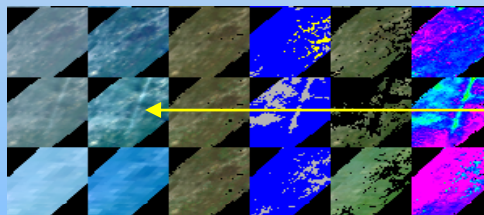
Lyapustin, A., Y. Wang, R. Kahn, J. Xiong et al., Analysis of MODIS-MISR calibration differences using surface albedo around AERONET sites and cloud reflectance. RSE, 107, 12-21.

ASRVN: Quality Assurance - I

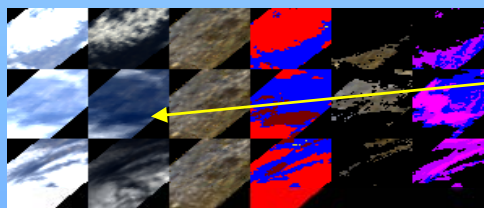
MODIS
TOA RGB NBRF CM BRF AOD



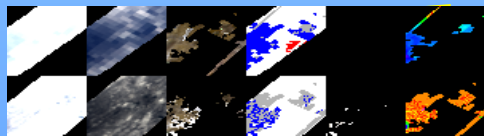
*Cloud Mask:
Reproducible spatial pattern
indicates clear conditions*



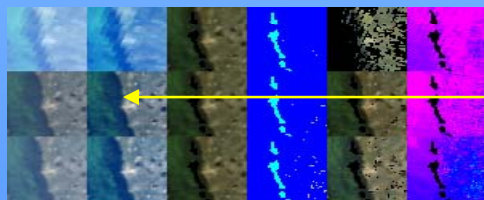
*Aerosol Filter detects
contrails, thin cirrus cloud and
non-homogeneous aerosols*



Cloud Shadows



Snow
Mask



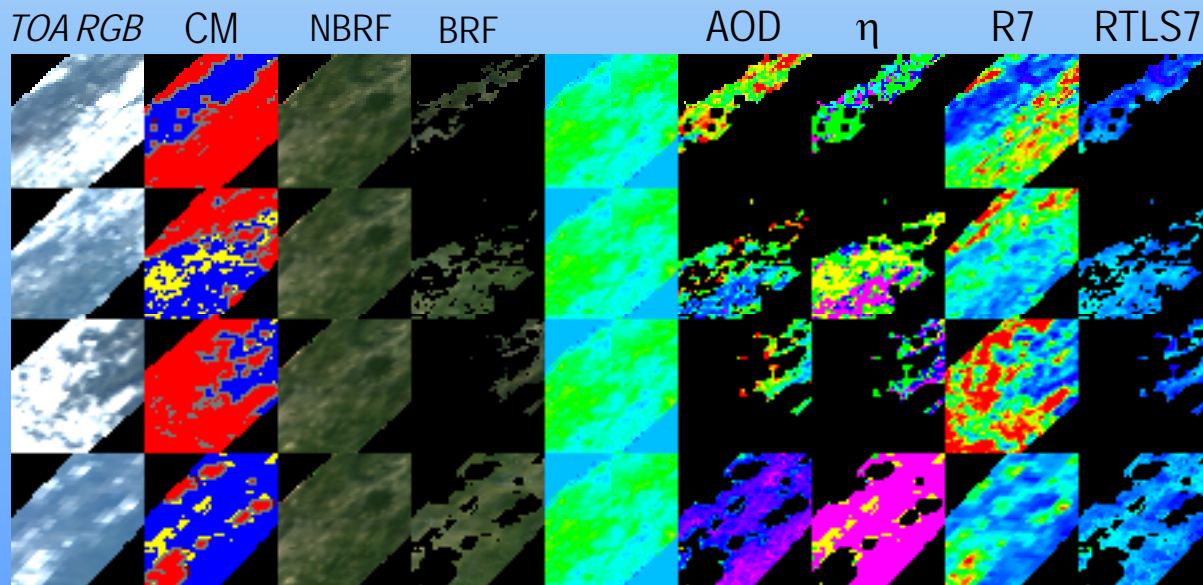
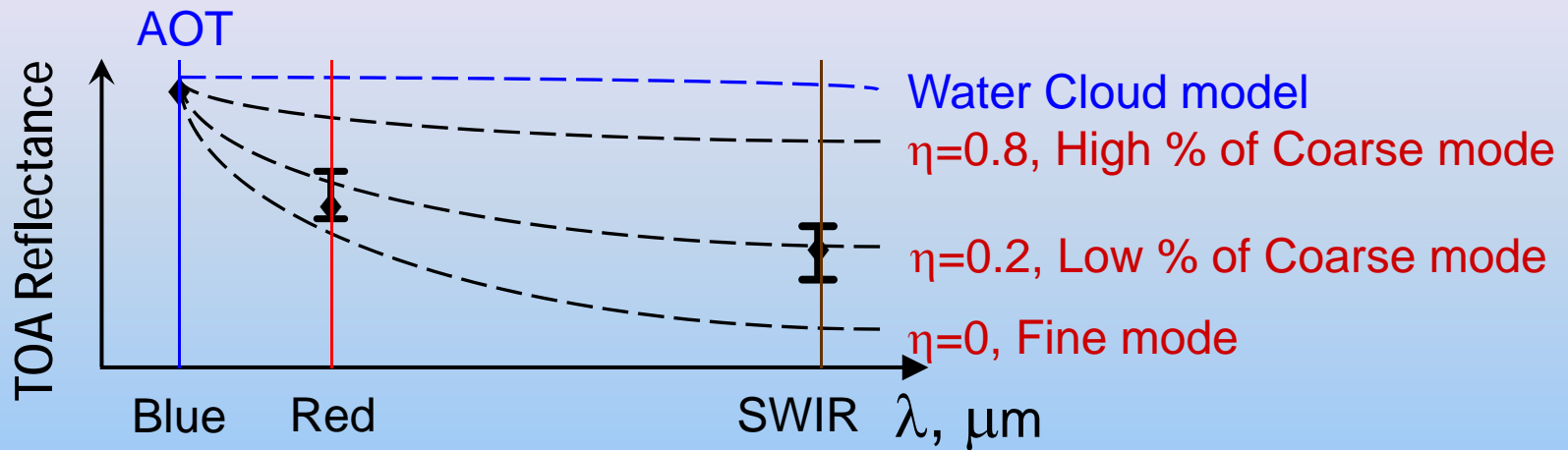
Standing Water
Mask (dynamic
LWS mask)

CM Legend

Blue – Clear
Yellow – Possibly Cloud
Red – Cloud
White – Snow
Dark Red – Cloud Shadow
Cyan – Water
Grey – Aerosol Filter

ASRVN: Quality Assurance – II

(CM enhancement from aerosol retrievals)



Resolving thin clouds using Cloud Model (yellow color)

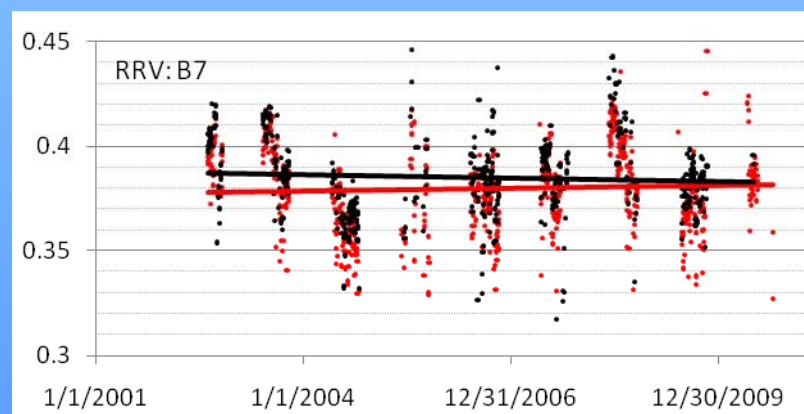
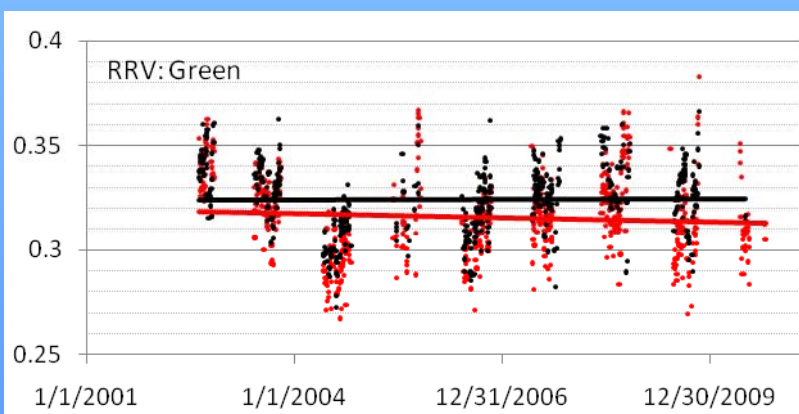
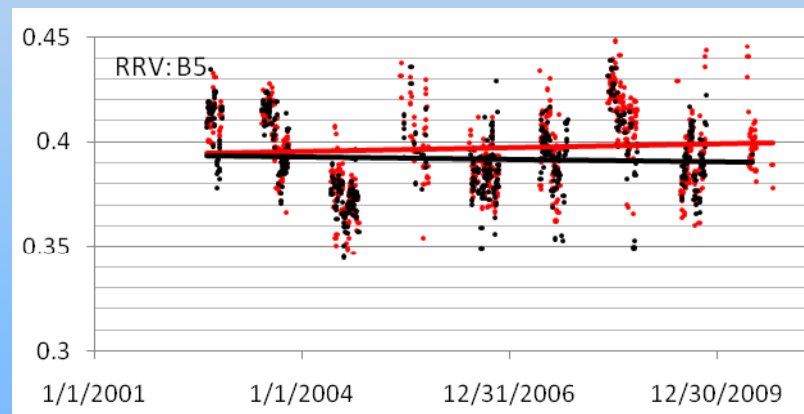
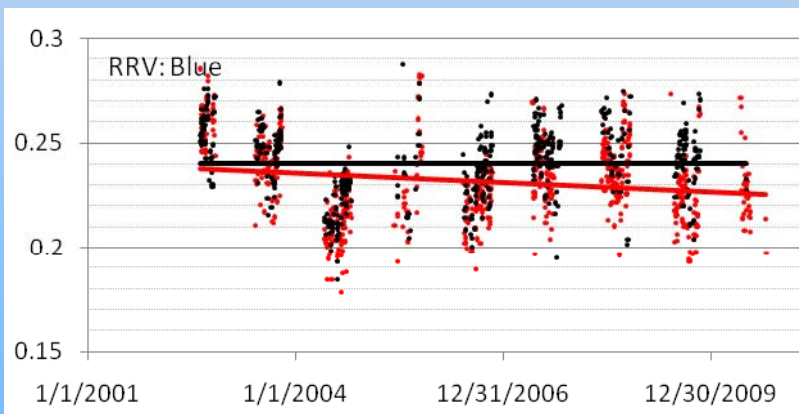
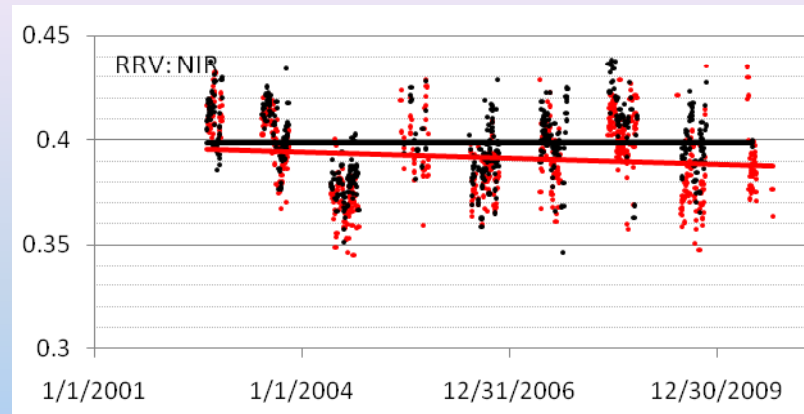
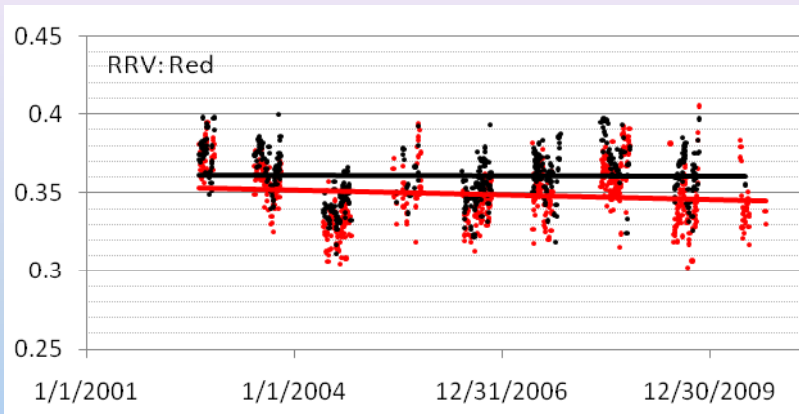
Method of Analysis

- Time period May – October to reduce effect of clouds and surface change due to rain and snow (at RRV);
- Use 10×10 km² average for SV and 5×5 km² average for RRV shifted off-center;
- Use geometry normalized BRF_n based on known Ross-Thick Li-Sparse (RTLS) (reduces angular variation by a factor of 3-6):

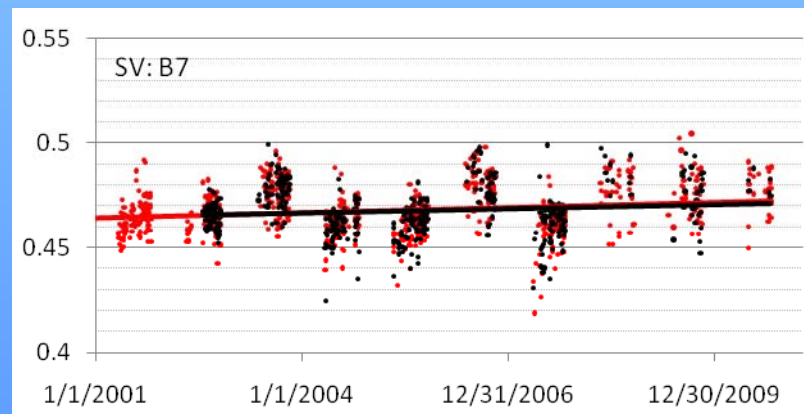
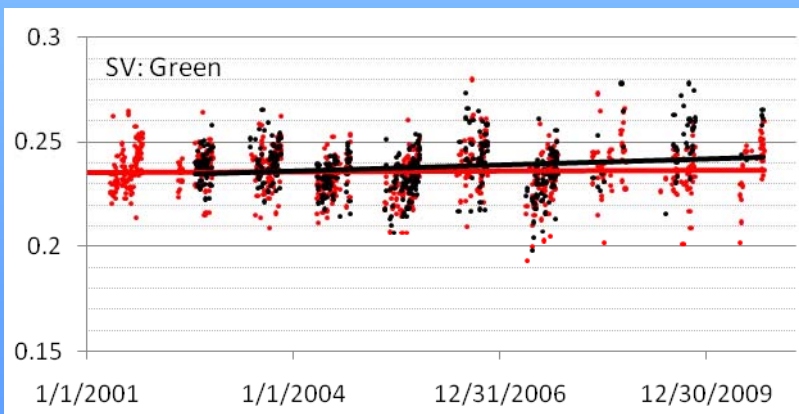
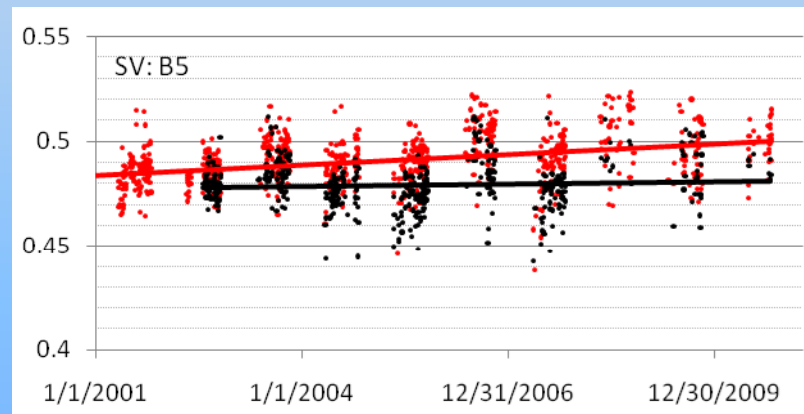
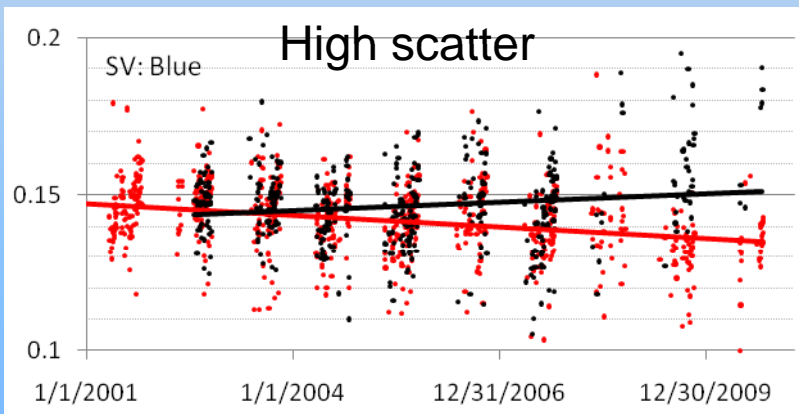
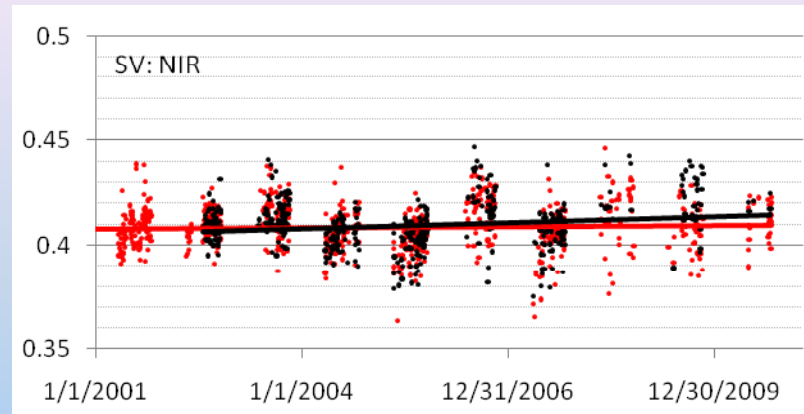
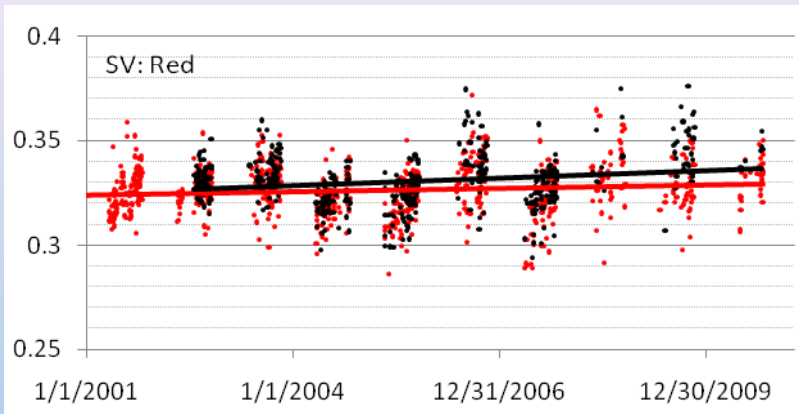
$$\rho_n = \rho(\theta_0, \theta, \varphi) \frac{RTLS(45^\circ, 0^\circ)}{RTLS(\theta_0, \theta, \varphi)}$$

- $AOT_{Blue} < 0.4$

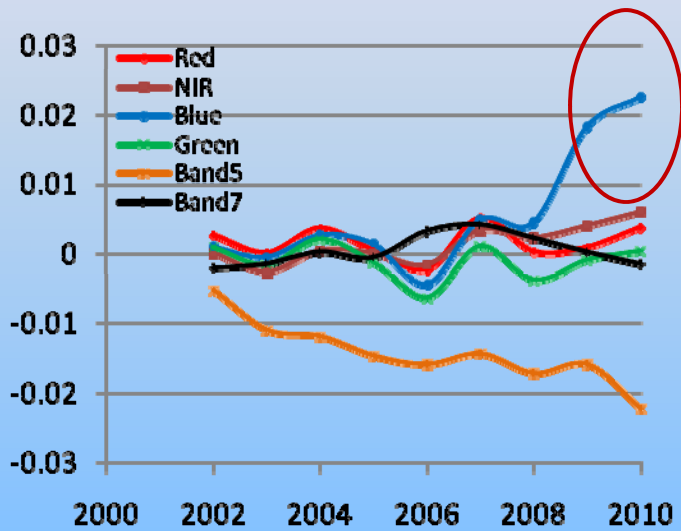
Results: Railroad Valley TMS



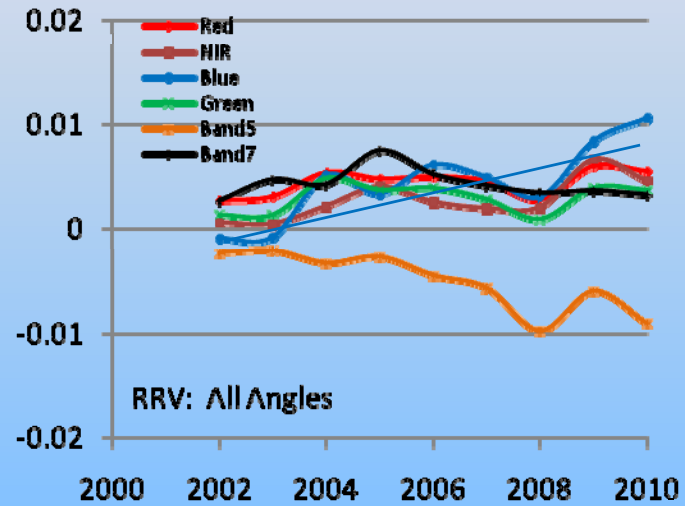
Results: Solar Village TMS



Results: Annual Mean Aqua-Terra



Solar Village



Railroad Valley

RRV: All Angles

Conclusions

- The used SV and RRV sites have seasonal and interannual variability and are used for a relative Terra/Aqua characterization;
- On average, B1, B2, B4, B7 show lower relative change over time between Terra and Aqua;
- Bands B3, B5 of MODIS Terra show a clear trend with respect to Aqua: Terra B3 decreases with time (SV – high scatter, 0.011/0.24~6% RRV), while B5 increases with time (0.016/0.48~3.3% SV, 0.008/0.39~2.1% RRV).
- Need proper separation of view angles for RVS analysis.
- Need updated subsets with frame number; RRV subset shifted by ~14km east; 12 CEOS Desert Cal. Sites.