A-SRVN - AERONET-based Surface Reflectance Validation Network

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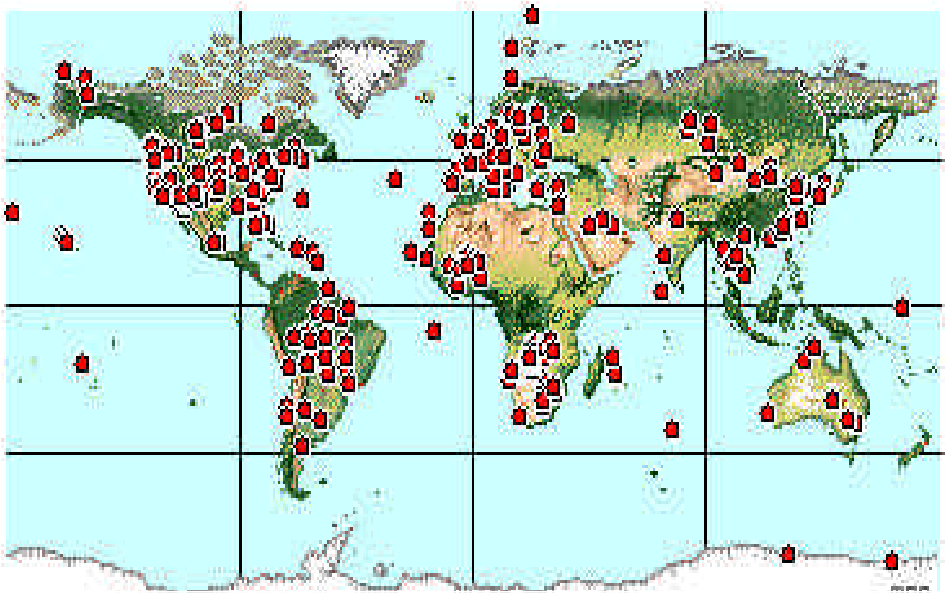
Main Functions

Daily Data Collection	Ancillary Data	Automatic AC
MODIS, MISR ... (area ~ 16x16 km2)	AERONET aerosol and WV, NCEP ozone	(single validated RT, unified algorithm)



PRODUCTS

BRDF
1. Point-wise in Observation Angles
2. Best-fit MRPV (MISR)
3. Best-fit Kernel (MODIS)

Albedo
1. Spectral
2. Shortwave Broadband (SB)
3. Spectral and SB Fluxes, PAR

Spectral Regression (for AOT retrieval)
1. 2.1 μm → blue & red

EXPECTED BENEFITS

1. Validation of surface albedo/BRDF at sensor's spatial & spectral resolution.
2. Development of global surface climatology for aerosol retrievals.
3. Way to MODIS – MISR data fusion.

Calibration Analysis

4. Vicarious calibration.
5. Cross-calibration of different sensors.
6. Detection of calibration trend based on a time series of surface reflectance.

A-SRVN: Theoretical Background

- 3D Radiative Transfer

(non-homogeneous surface with arbitrary BRDF)

Obtained exact solution with Green's Function method with parameterizations (Lyapustin & Knyazikhin, *Appl. Optics*, **40**, 3495-3501, 2001; …, **41**, 5600-5606, 2002):

- High (1-2%) accuracy (Lyapustin, *Appl. Optics*, **41**, 5607-5615, 2002);
- Analytical solution;
- Uniform accuracy in spatial resolution & angles.

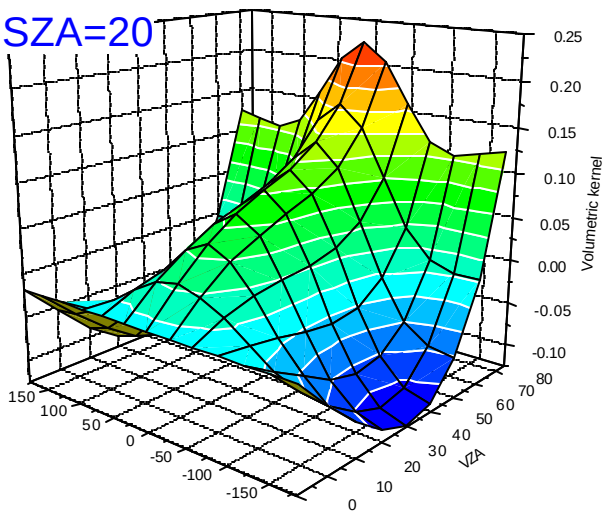
- RT with Gaseous Absorption

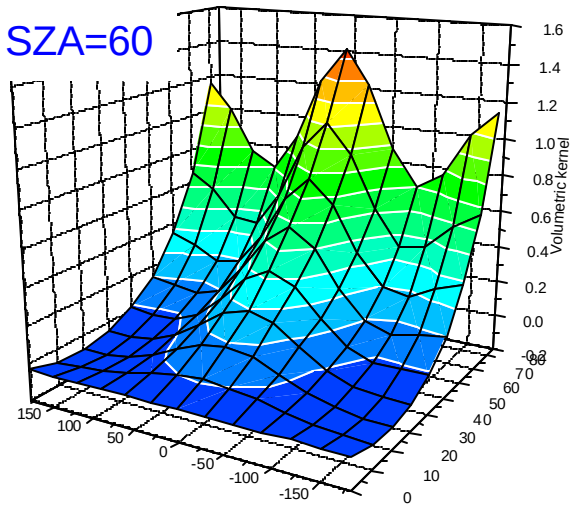
- LBL absorption based on HITRAN-2000 and continuum absorption of McClough, Mlawer etc.
- Fast Interpolation & Profile Correction (IPC) method for RT with LBL spectral resolution.

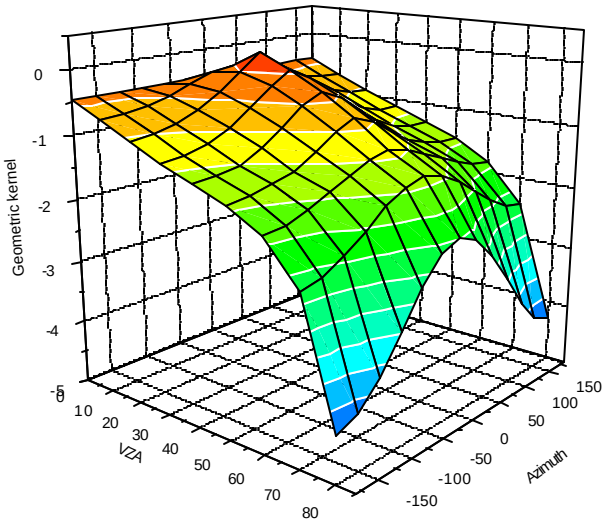
- Testing 1D MISR AC Alg.

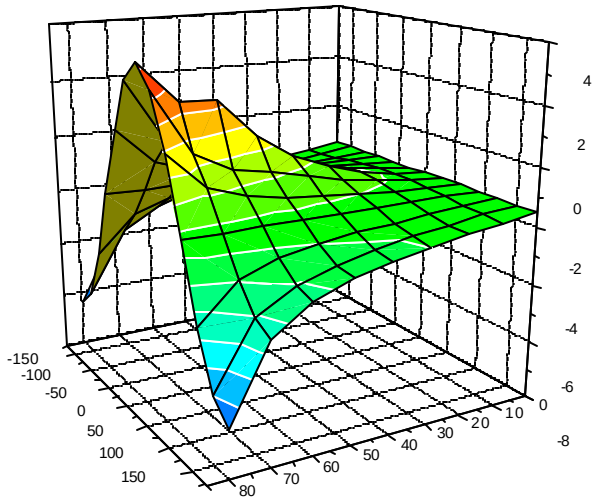
with linear BRDF model of Li and Strahler:

$$r(s',s) = k_L + k_{go} f_{go}(s',s) + k_v f_v(s',s)$$



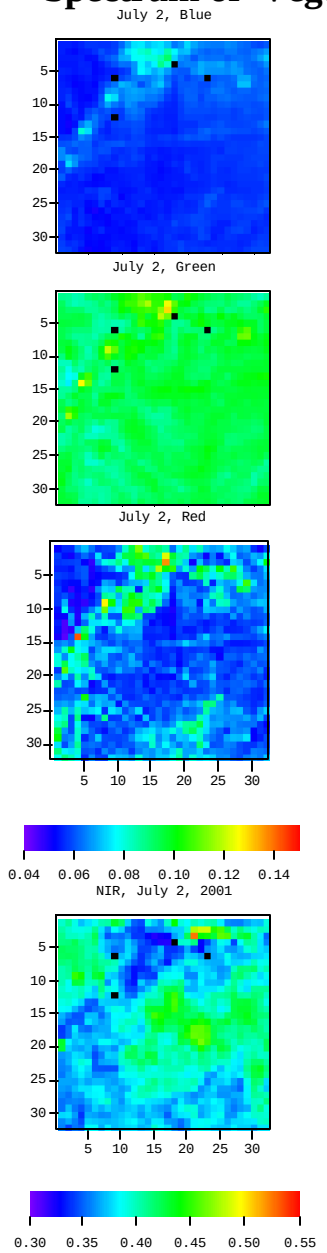




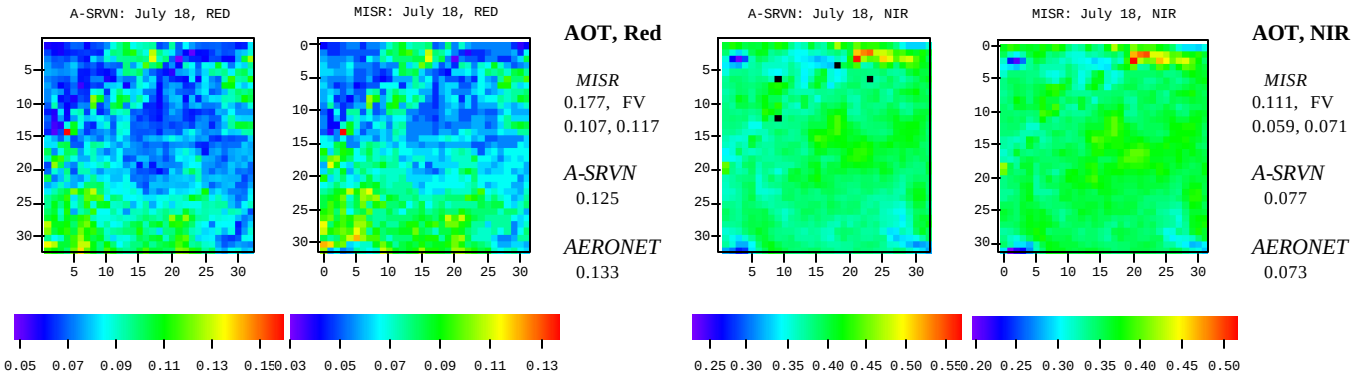


First Results: Konza Prairie 2003 - Albedo

• Spectrum of Vegetation



• MISR vs A-SRVN Albedo Comparison



AOT, Red

MISR
0.177, FV
0.107, 0.117

A-SRVN
0.125

AERONET
0.133

AOT, NIR

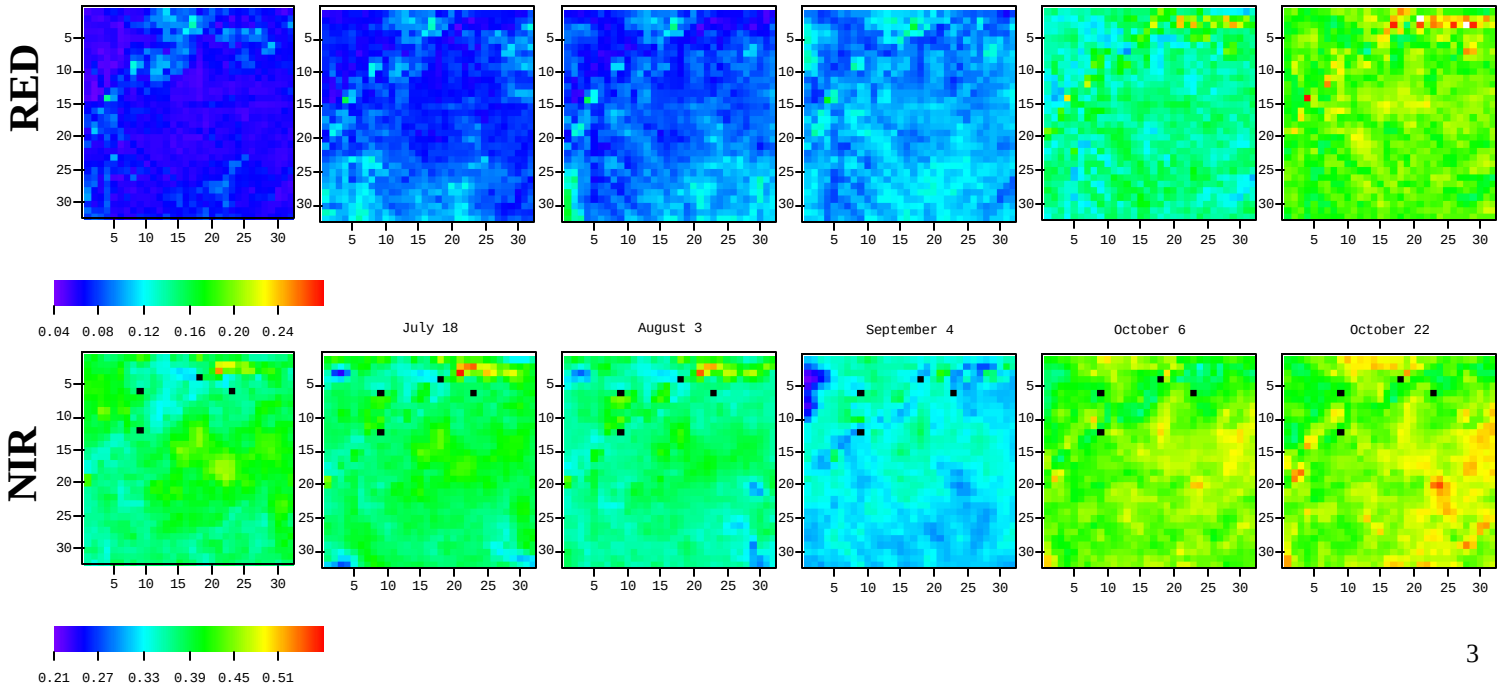
MISR
0.111, FV
0.059, 0.071

A-SRVN
0.077

AERONET
0.073

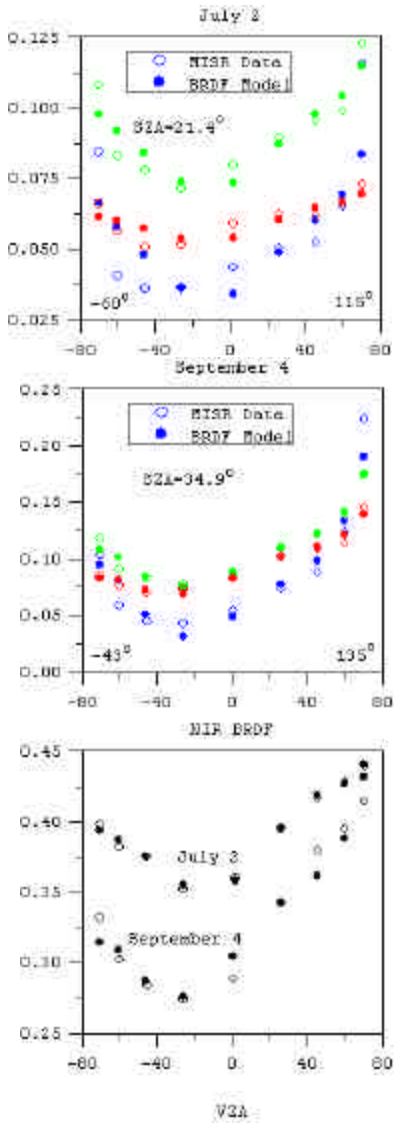
• Vegetation Dynamics

SZA:	21.4	23.5	26.4	34.9	45.8	51.4
AOT (0.5μm):	0.229	0.231	0.237	0.149	0.068	0.048
	July 2	July 18	August 3	September 4	October 6	October 22



First Results: Konza Prairie 2003 - BRDF

Retrieved BRDF



Spectral Dependence of BRDF Components