

WGCV36 Action Items	Assigned to:	Due Date	Status
WGCV-36-1: LPV to address the specification of the requirements for a worldwide network of land surface spectral directional measurements for validation of spaceborne retrievals.	LPV	WGCV 37	Open

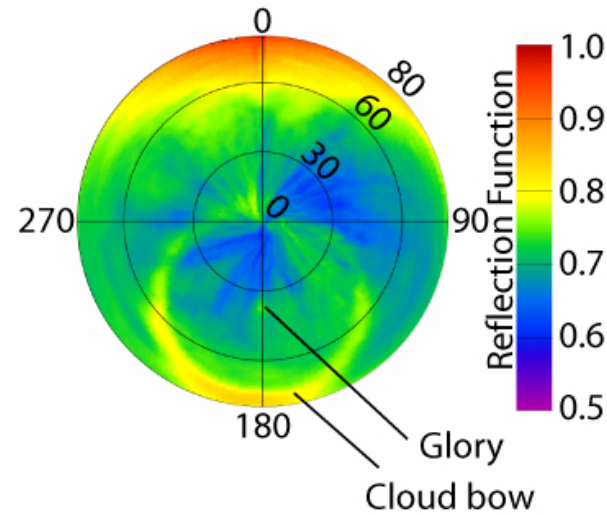
Miguel O. Román (NASA, LPV Vice Chair)

WGCV-36-1

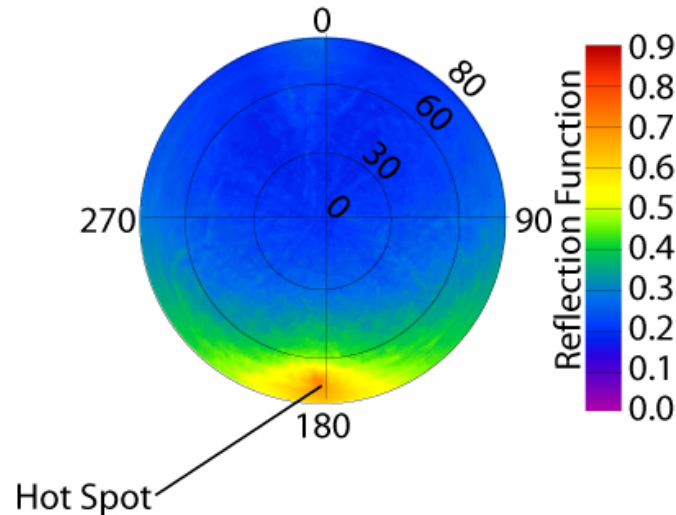
- LPV has identified various datasets suitable for the estimation of spectral bidirectional reflectance measurements over representative global biomes, which span several years, and are suitable for the evaluation of satellite-derived estimates of surface reflectance anisotropy.
- Both ground- and airborne- based measurement schemes were examined, with an emphasis on evaluation of routine land surface reflectance anisotropy models used by different CEOS member agencies (e.g., MODIS, MISR, VIIRS, and POLDER).

Reflectance Anisotropy: Different Surfaces

Water Clouds: 0.682 μm

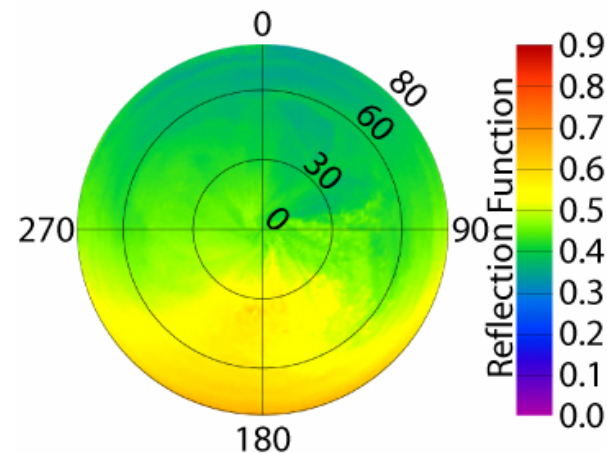


Savanna Vegetation: 0.870 μm

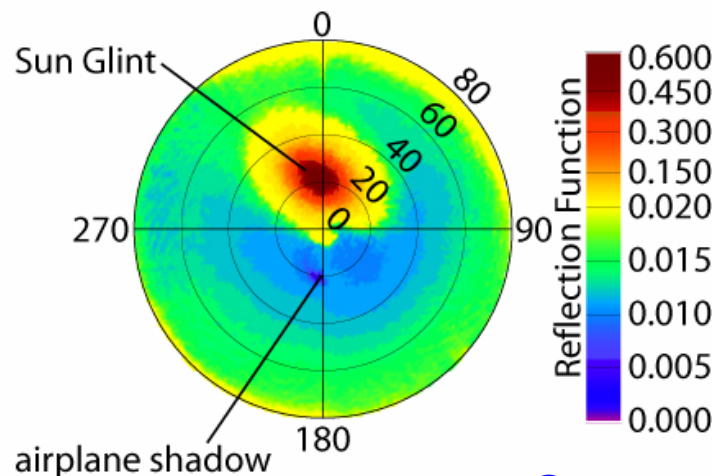


High angular and spatial resolution (1° IFOV) coupled with a high SNR and dynamic range is needed to achieve GCOS ECV requirements.

Salt Pan: 0.682 μm



Ocean: 0.472 μm



Source, C. Gatebe (NASA/USRA)

Objective: To directly map through measurement uncertainties from sensors to products.

Relating point measurements...



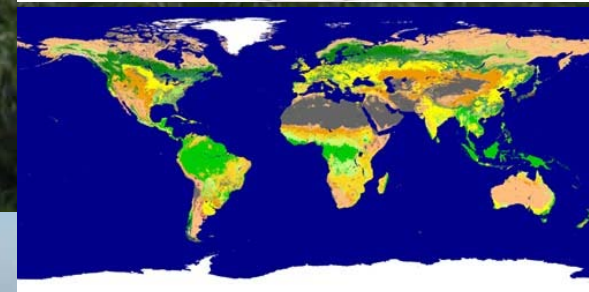
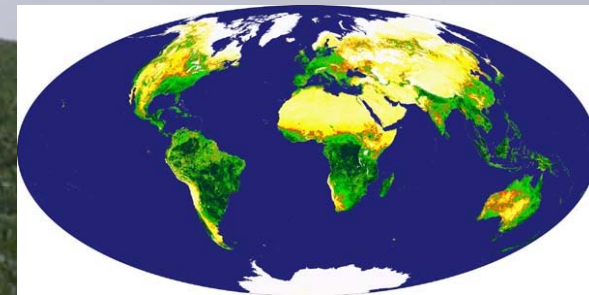
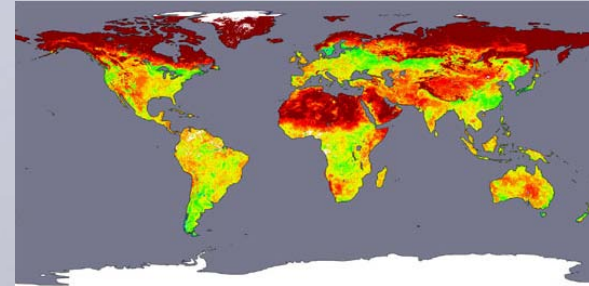
tower measurements...



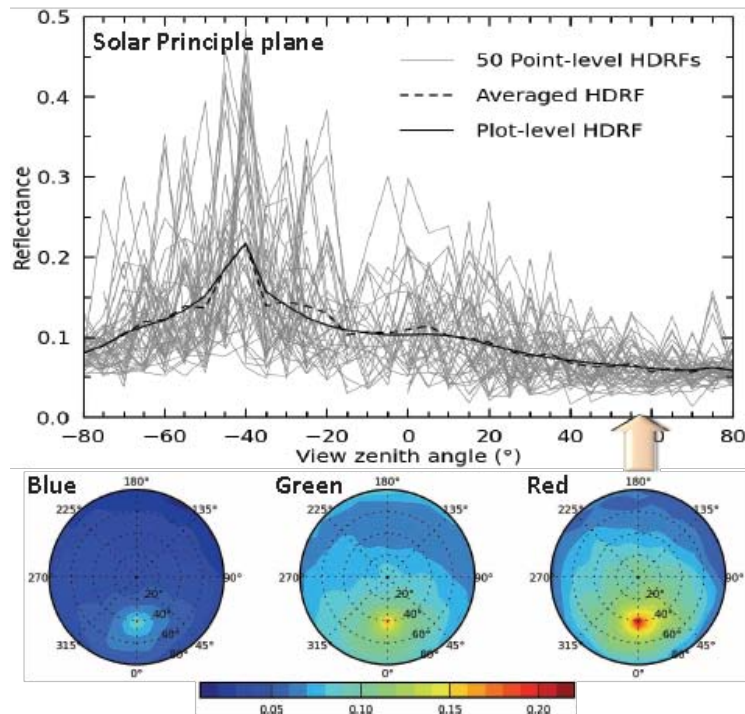
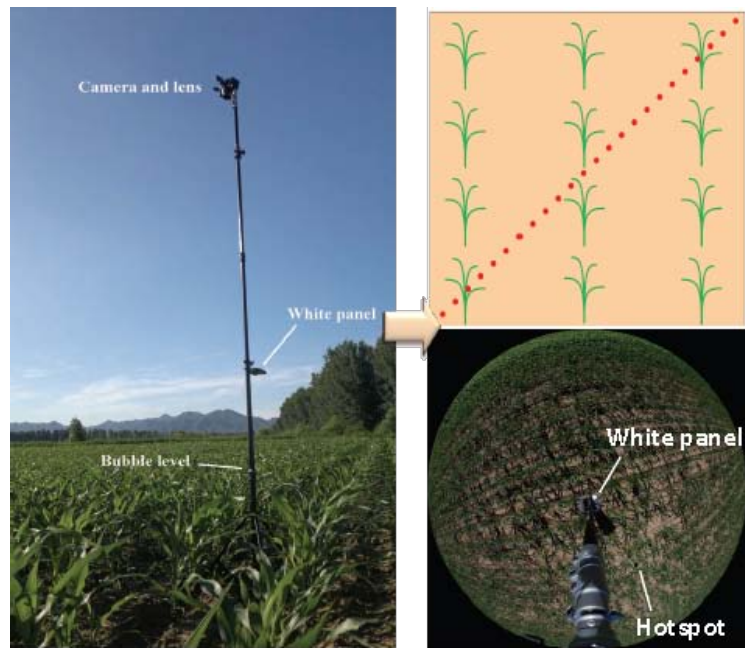
and/or airborne measurements...



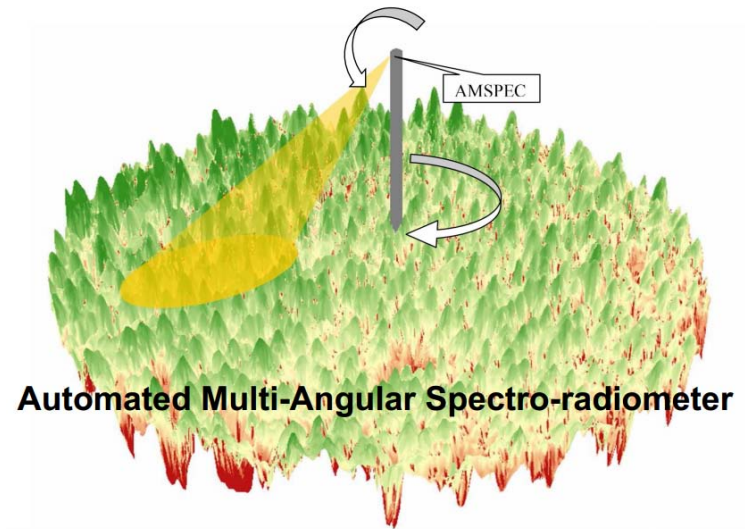
...to global land products.



Point and Tower-based Methods

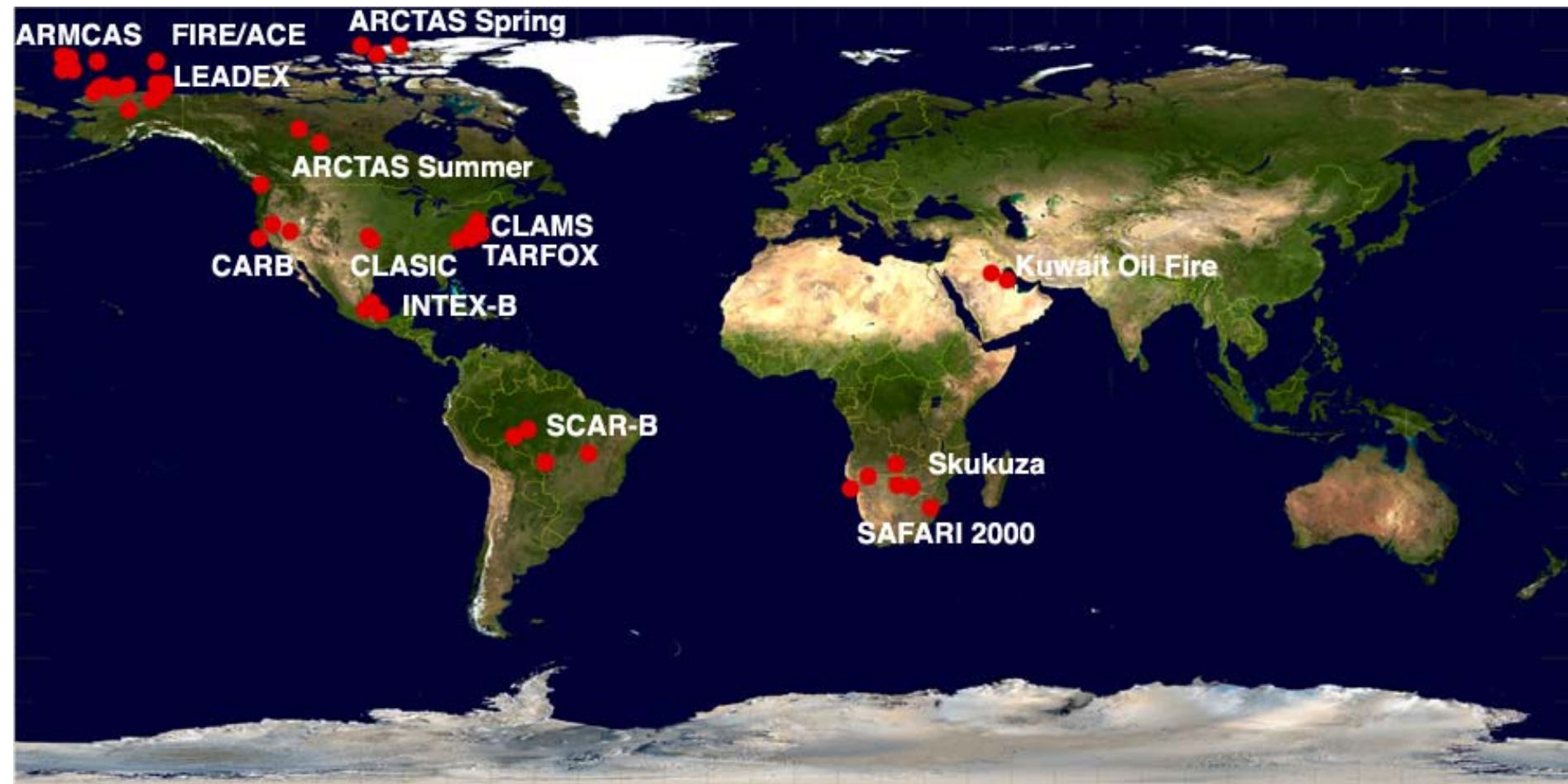


Credit: C. Jiang, H. Fang (CAS)



Credit: T. Hilker (Oregon State)

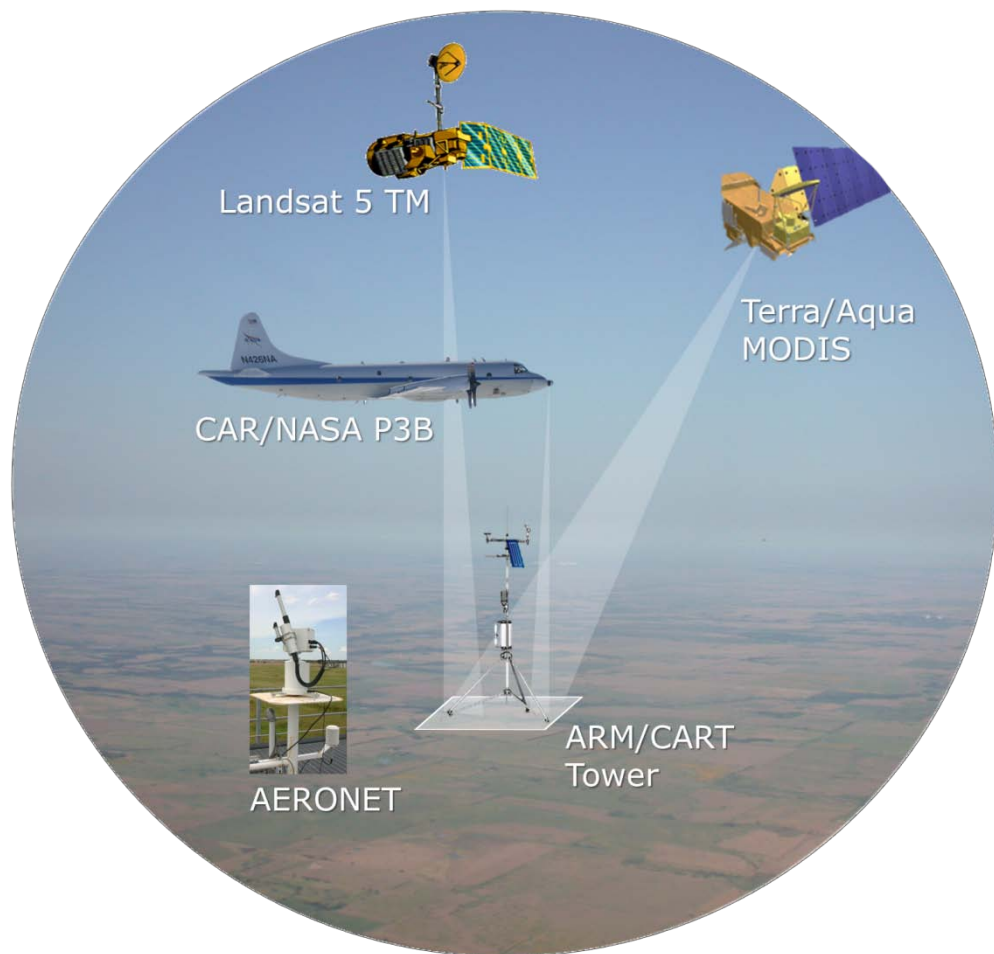
NASA CAR Airborne Data Sets 1991-2008



Multi-spectral Surface Bidirectional Reflectance (BRF) for: snow & sea ice, ocean, clouds, smoke plumes, salt pan (i.e., calibration sites), vegetation (grass, savanna, forests, etc), urban.



Use of in situ and airborne multiangle data to assess MODIS- and Landsat-based estimates of directional reflectance and albedo (Román et a., 2013)



Measurement configuration for multiscale assessment of MODIS- and Landsat-based estimates of directional reflectance and albedo.

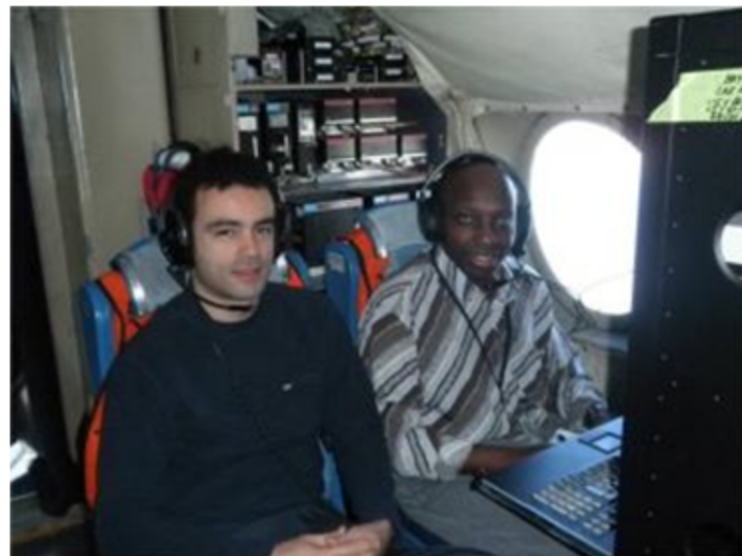
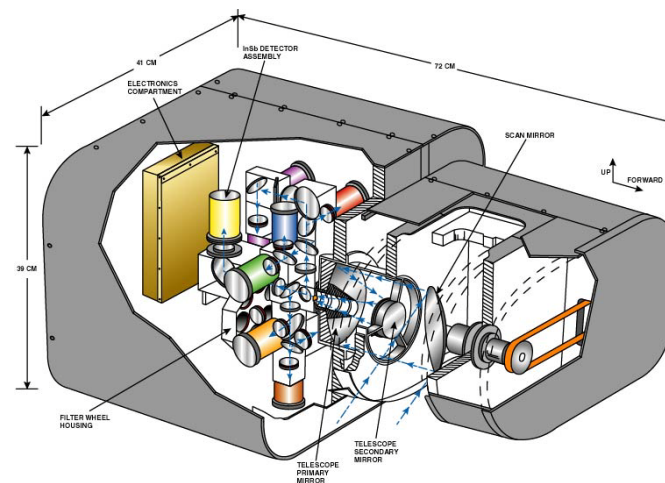


Fig. 1: Román and Gatebe on P3B during Eco/3D campaign Flight #2035.



CAR Instrument

WGCV-36-1: LPV Recommendations and Follow-on Actions

- Emphasis should be given on assembling core spectral directional reflectance datasets to provide continuity with existing multiangular sensors. **[Links to specific in-situ datasets will be posted on the LPV website]**.
- Generation of requirements for land spectral directional reflectance sites is both impractical and premature for the following reasons:
 1. The development of good practice protocols for surface reflectance anisotropy and albedo (both which are core Land ECV) is still underway **[v1 to be released by end of 2014]**;
 2. In-situ multi-angular sensor capabilities that are both cost effective and scalable are still being developed by the Land science community (i.e., a 'state-of-the-art' package has yet to arise).
- Future WGCV plenary actions pertaining to the validation of land surface anisotropy products (or any other Land ECVs) should be done in close consultation with LPV and its core team of subject matter experts.

References

- Gatebe, C.K., King, M.D., Platnick, S., Arnold, G.T., Vermote, E.F., & Schmid, B. (2003). Airborne spectral measurements of surface-atmosphere anisotropy for several surfaces and ecosystems over southern Africa. *Journal of Geophysical Research*, 108(D13), doi:10.1029/2002JD002397.
- Hilker, T., Hall, F.G., Coops, N.C., Lyapustin, A., Wang, Y., Nesic, Z., Grant, N., Black, T.A., Wulder, M.A., Klijun, N., Hopkinson, C., & Chasmer, L. (2010). Remote sensing of photosynthetic light-use efficiency across two forested biomes: Spatial scaling. *Remote Sensing of Environment*, 114, 2863-2874, doi:10.1016/j.rse.2010.07.004.
- Román, M.O., Gatebe, C.K., Shuai, Y., Wang, Z., Gao, F., Masek, J.G., He, T., Liang, S., & Schaaf, C.B. (2013). Use of in situ and airborne multiangle data to assess MODIS- and Landsat-based estimates of directional reflectance and surface albedo. *IEEE Transactions on Geoscience and Remote Sensing: Special Issue on Inter-Calibration of Satellite Instruments*, doi:10.1109/TGRS.2013.2243457.
- Jiang, C. and Fang H., Plot-level HDRF and Albedo Measurement Using Digital Hemispherical Photography (DHP). *Global Vegetation Monitoring and Modeling Conference (GV2M)*, 3rd - 7th February 2014, Avignon, France.