Global Comparison of Albedo from CRS and MODIS BRDF/albedo products

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Methodology and Data

CERES data: CRS ed 2G data for 2008-09;

MODIS data: MCD43C1, 0.05° grid BRDF;

CERES FOV is modeled with 4×4 MODIS grid boxes surrounding the FOV's center;

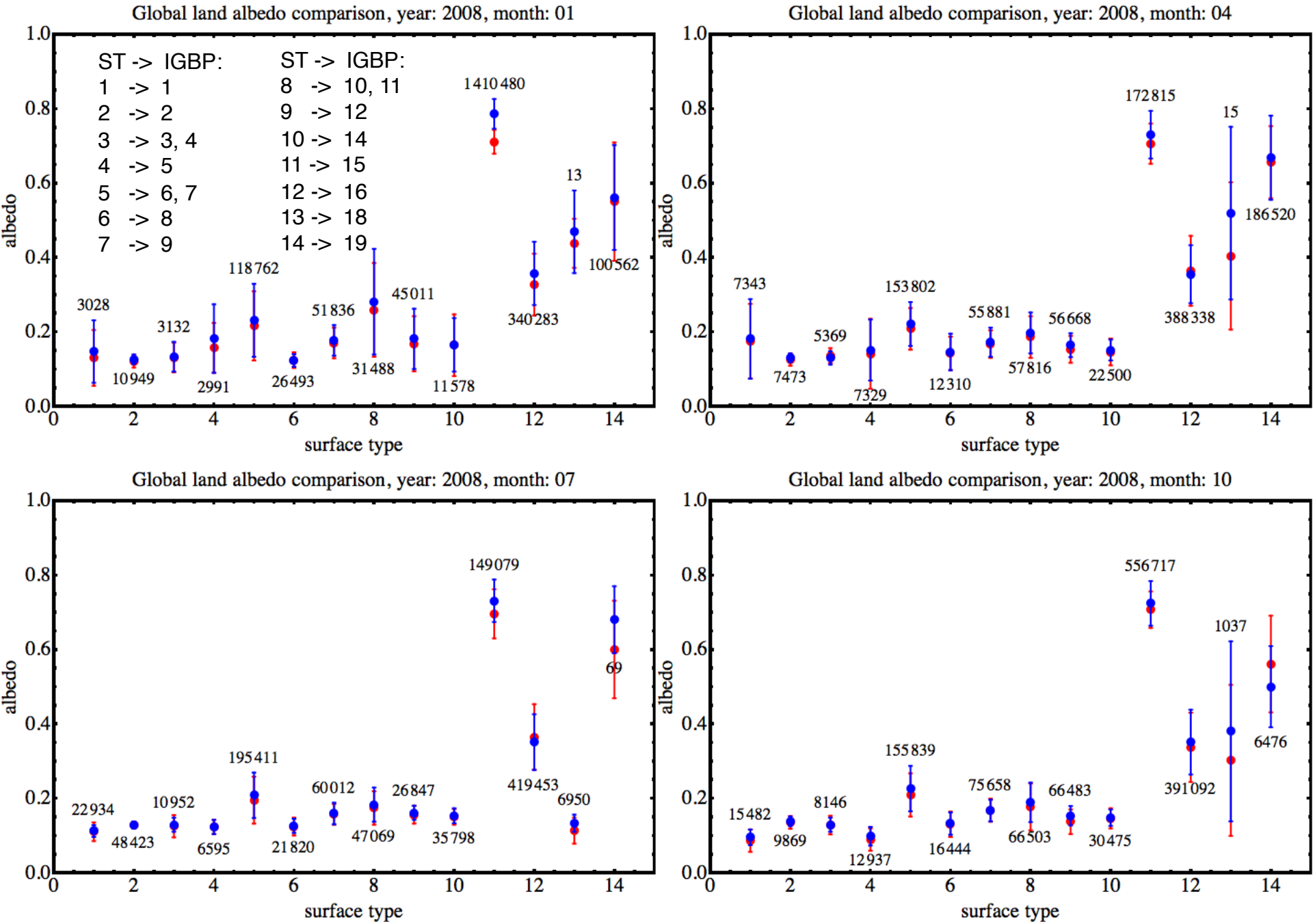
CERES albedo is the ratio of untuned SW upward and downward fluxes;

MODIS albedo is retrieved from BRDF parameters with CERES input (SZA, AOD, etc.)

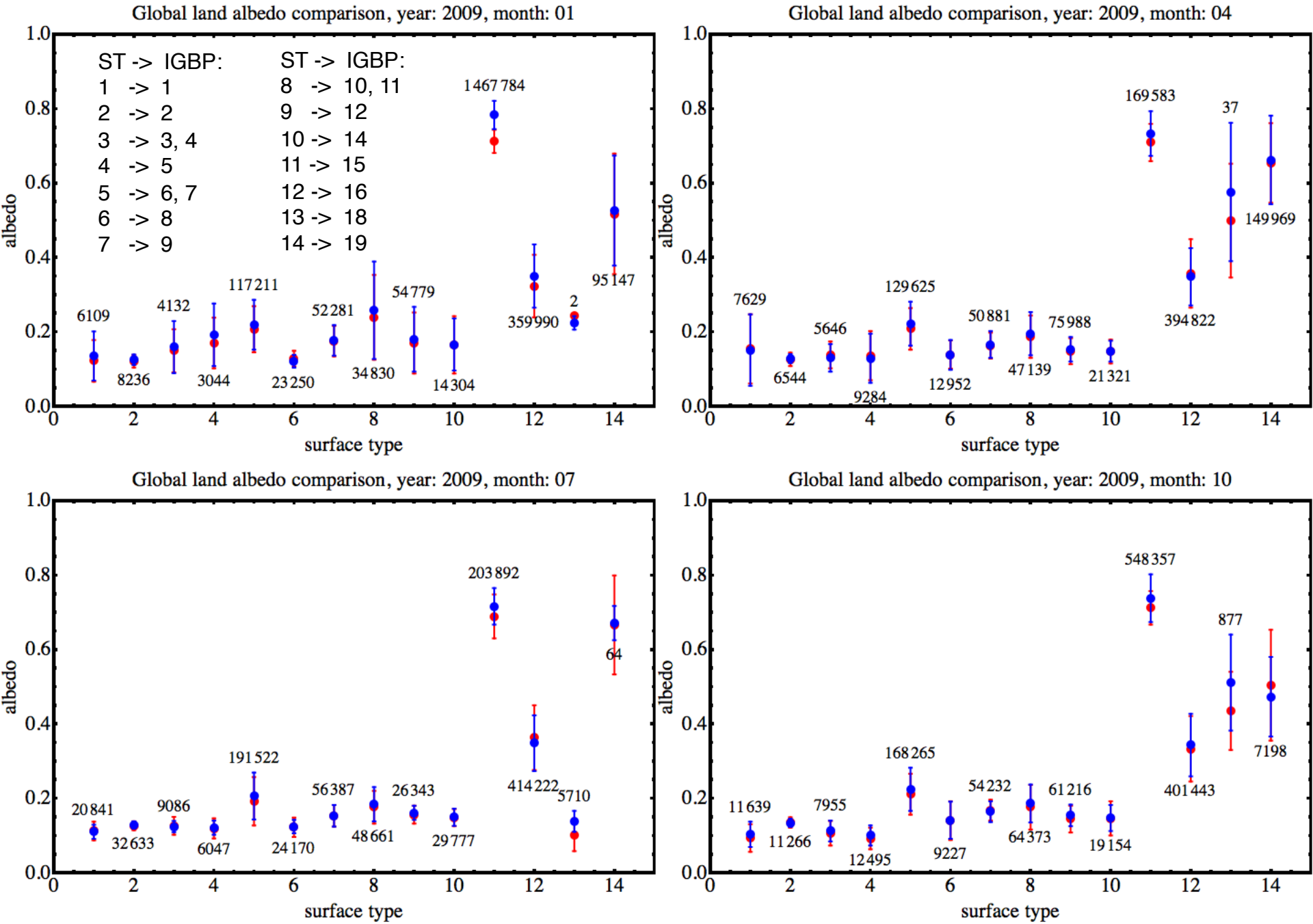
FOV selection criteria:

- clear sky,
- pure surface type (land only),
- must have valid MODIS albedo value,
- must pass additional clear snow/ice test over the cryosphere.

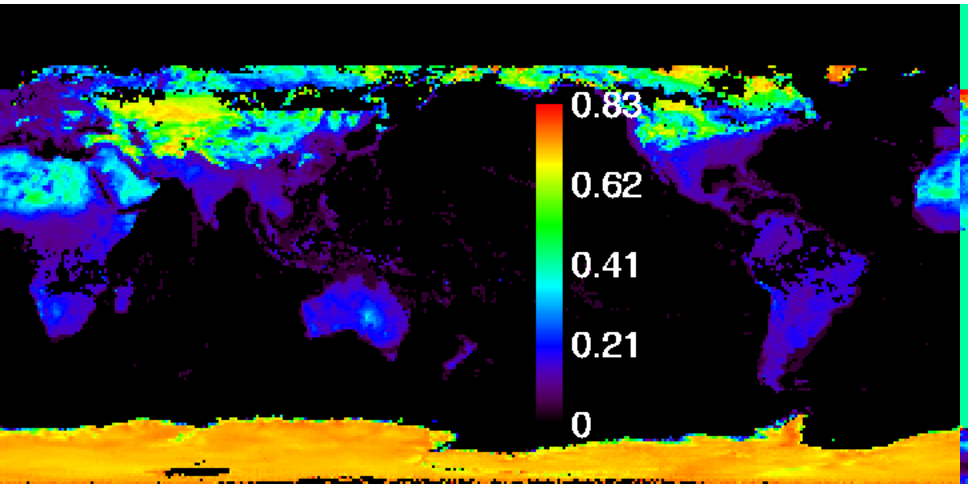
CERES vs MODIS albedo comparison



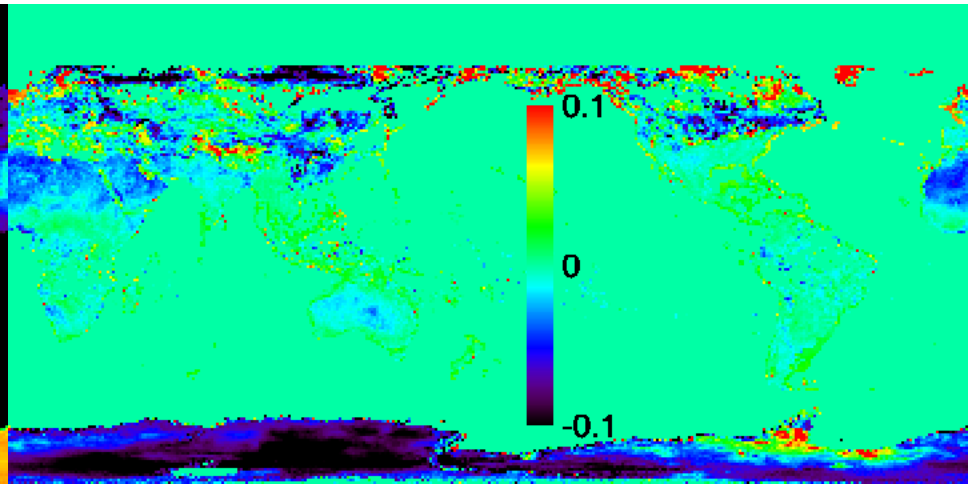
CERES vs MODIS albedo comparison



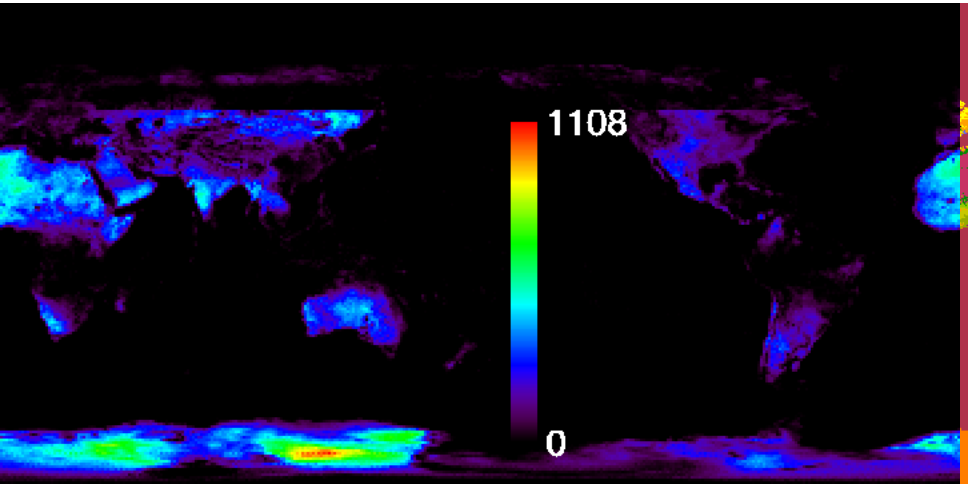
Global albedo 1° map, January 2008



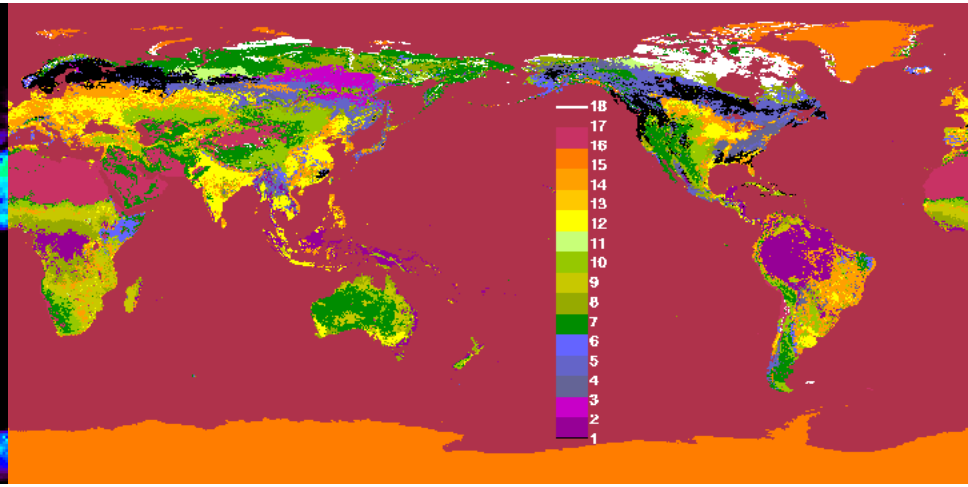
CERES surface albedo



CERES - MODIS

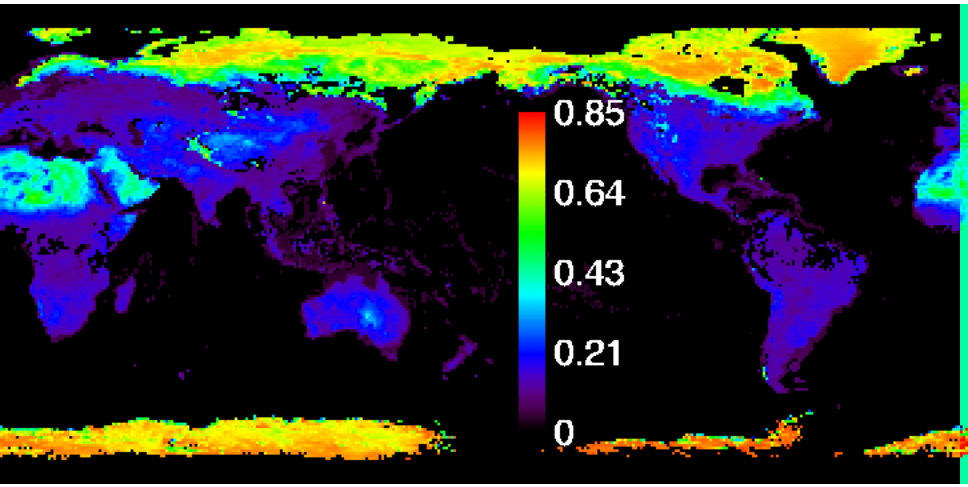


Distribution of FOVs

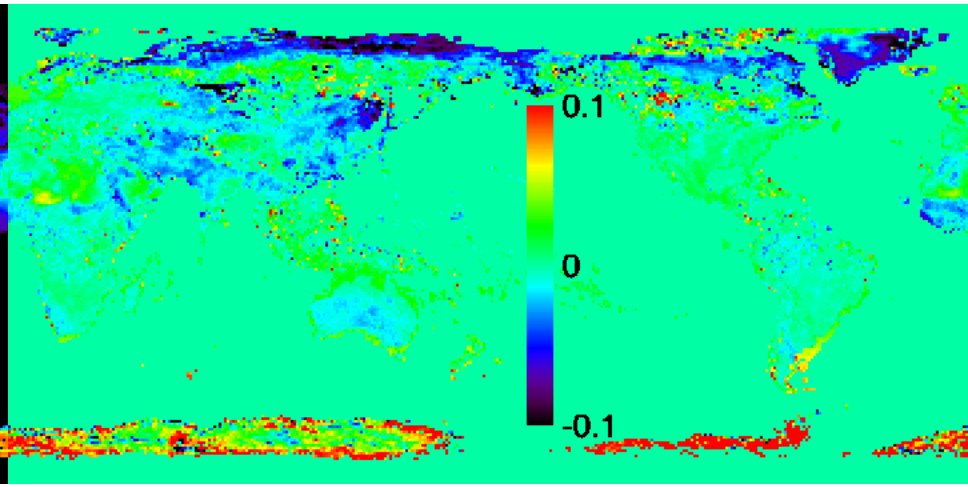


IGBP map

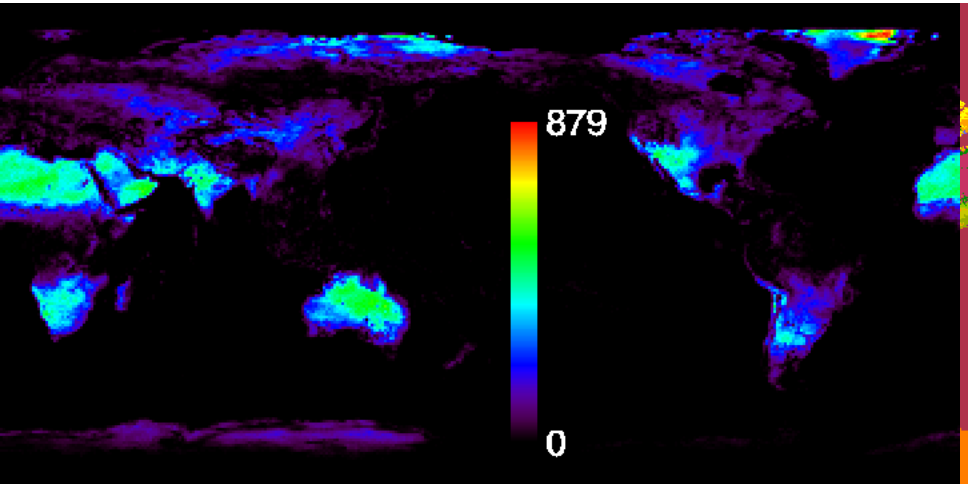
Global albedo 1° map, April 2008



CERES surface albedo



CERES - MODIS



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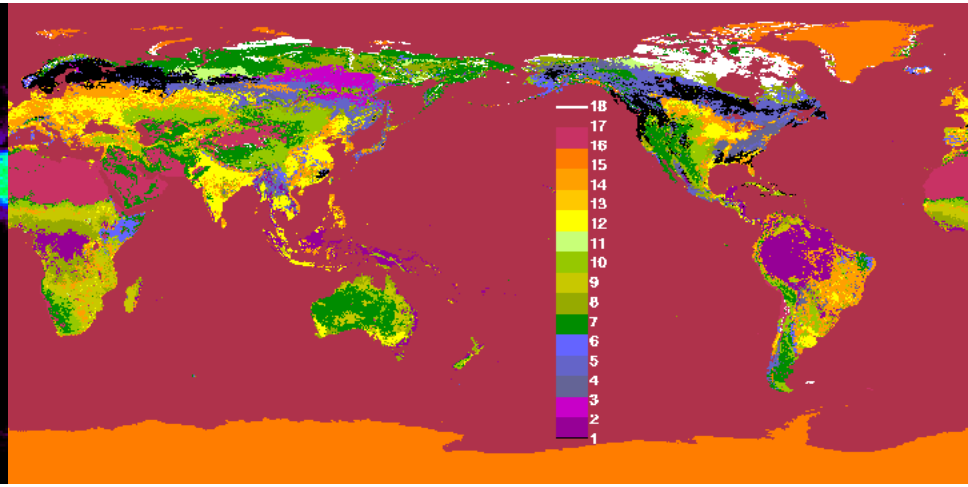
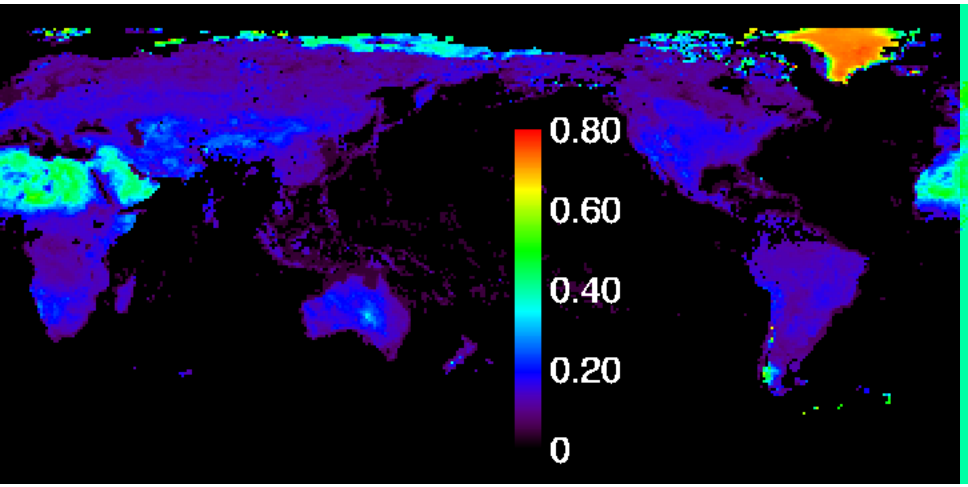
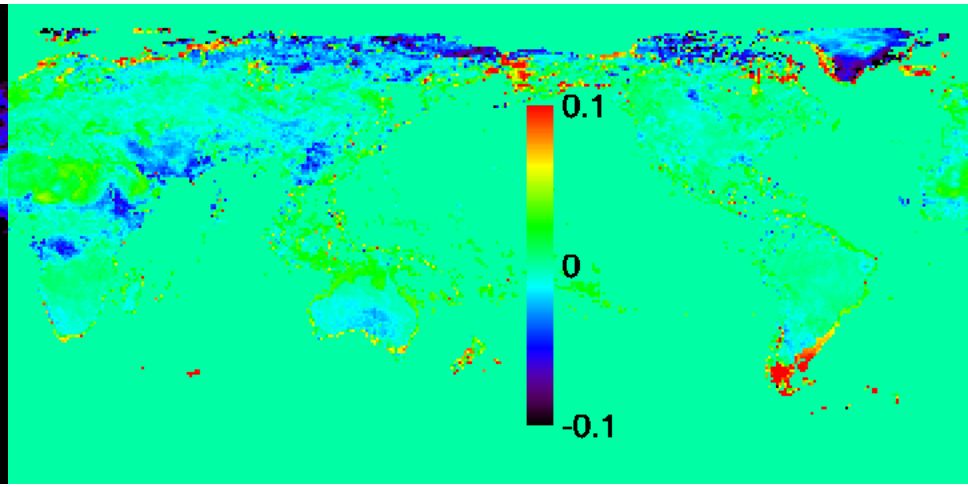


IGBP map

Global albedo 1° map, July 2008



CERES surface albedo



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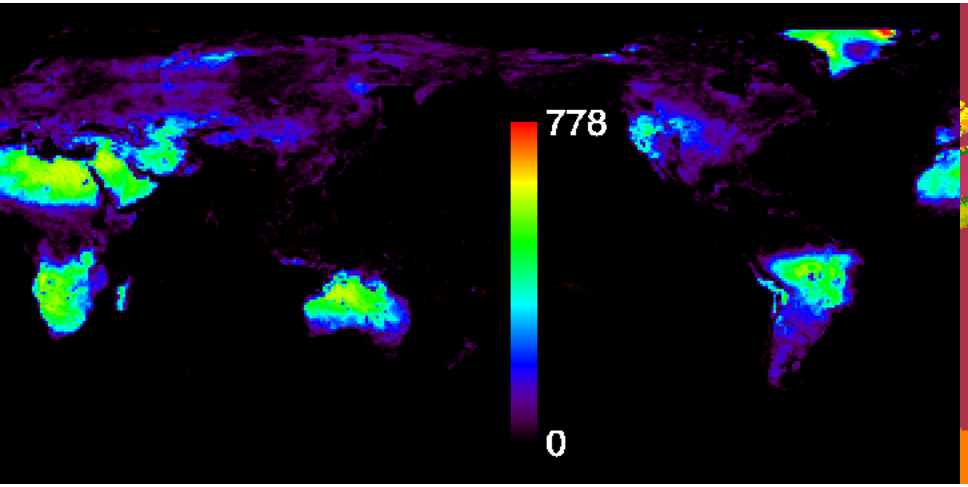

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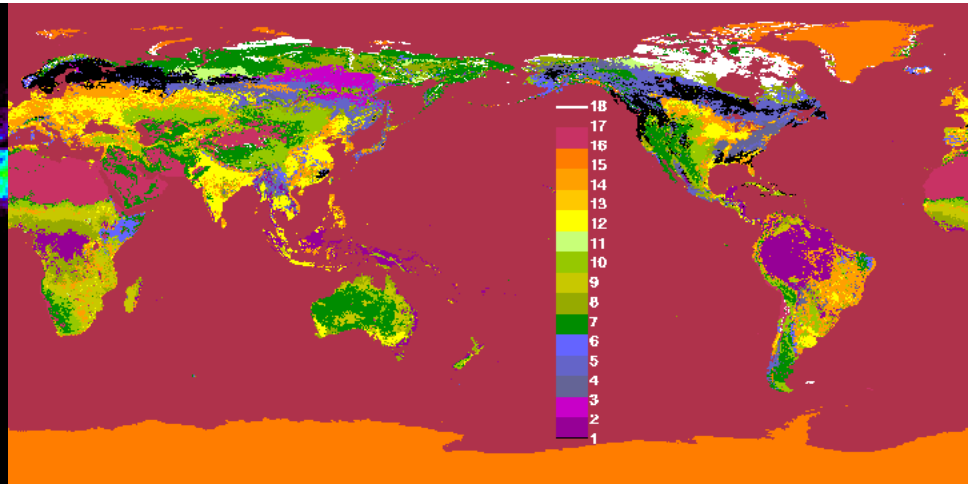
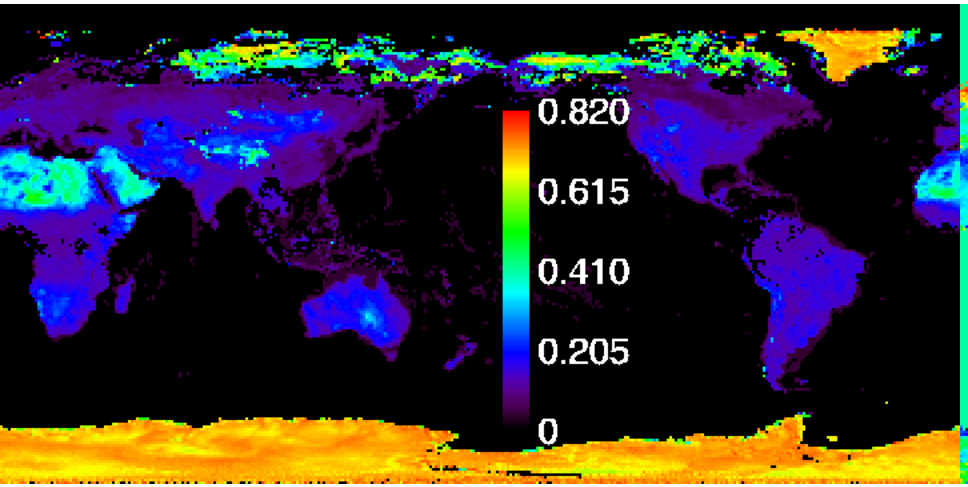


IGBP map

Global albedo 1° map, October 2008



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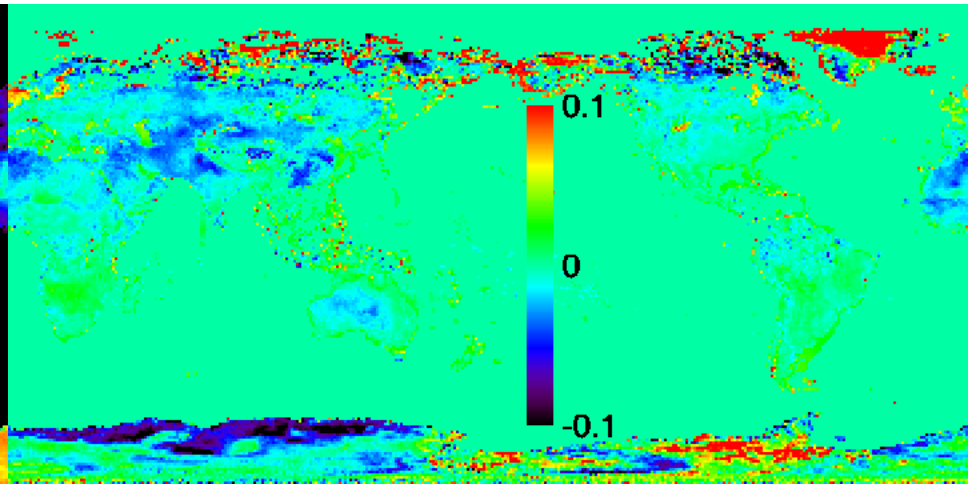

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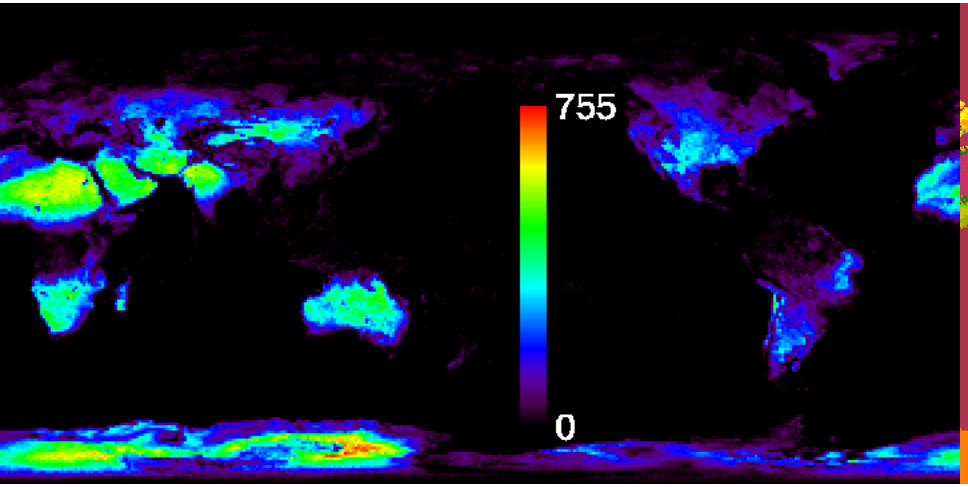

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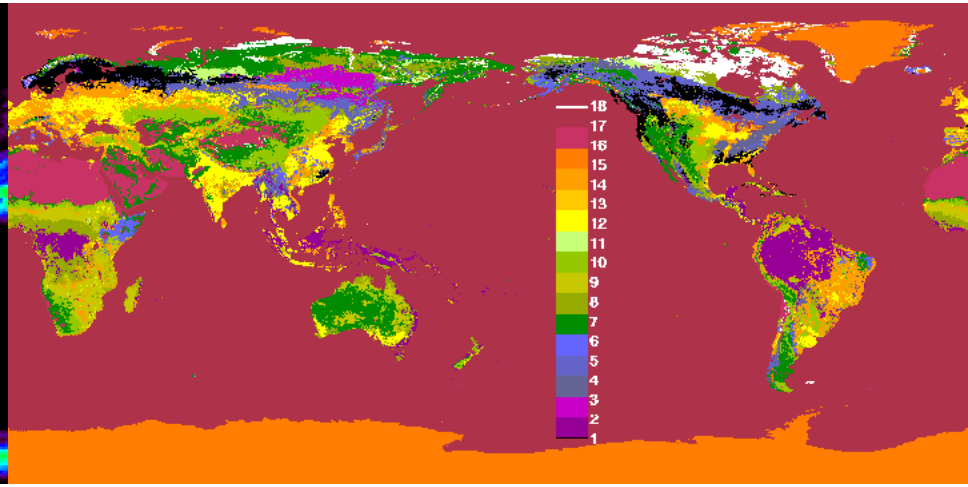
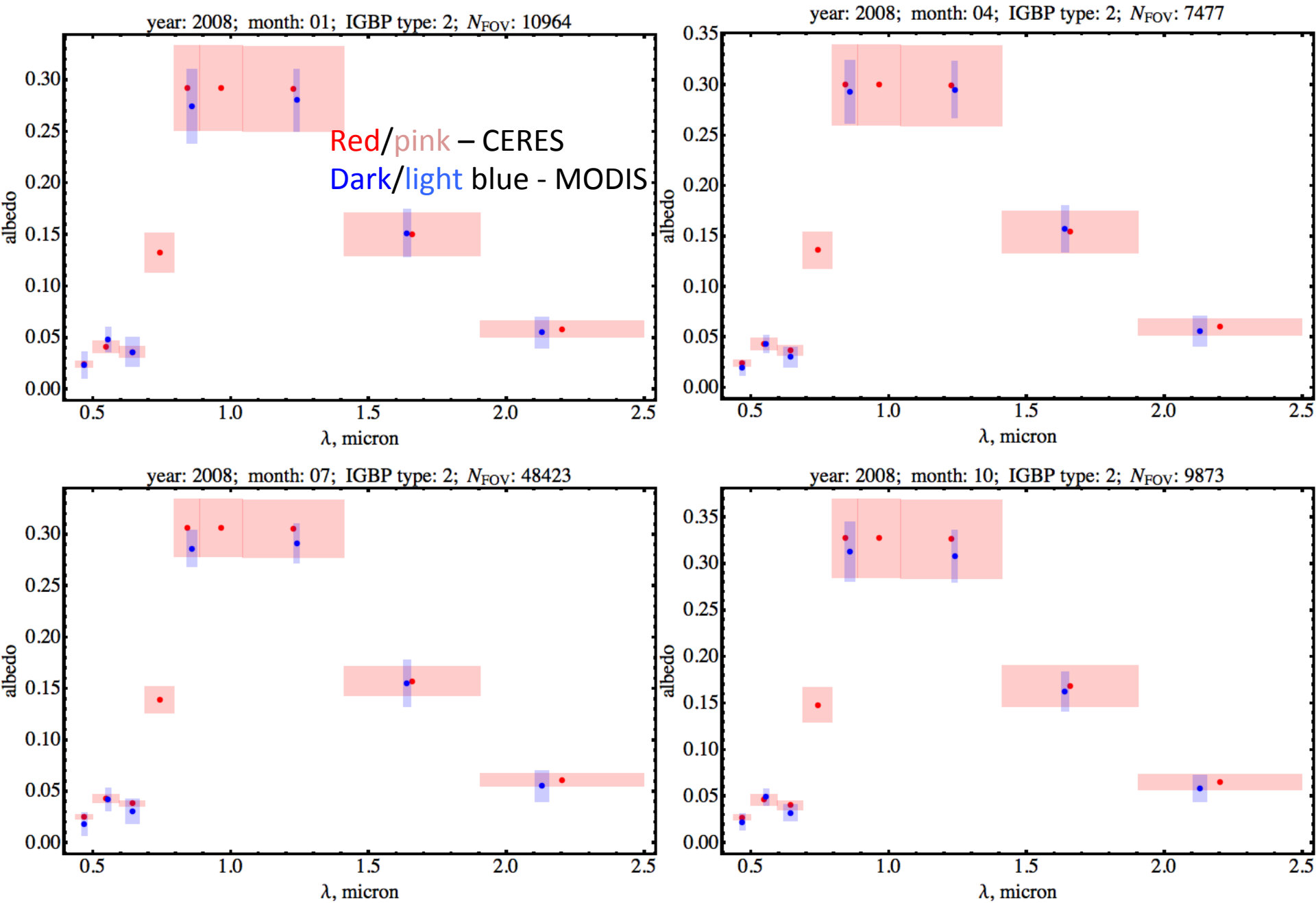
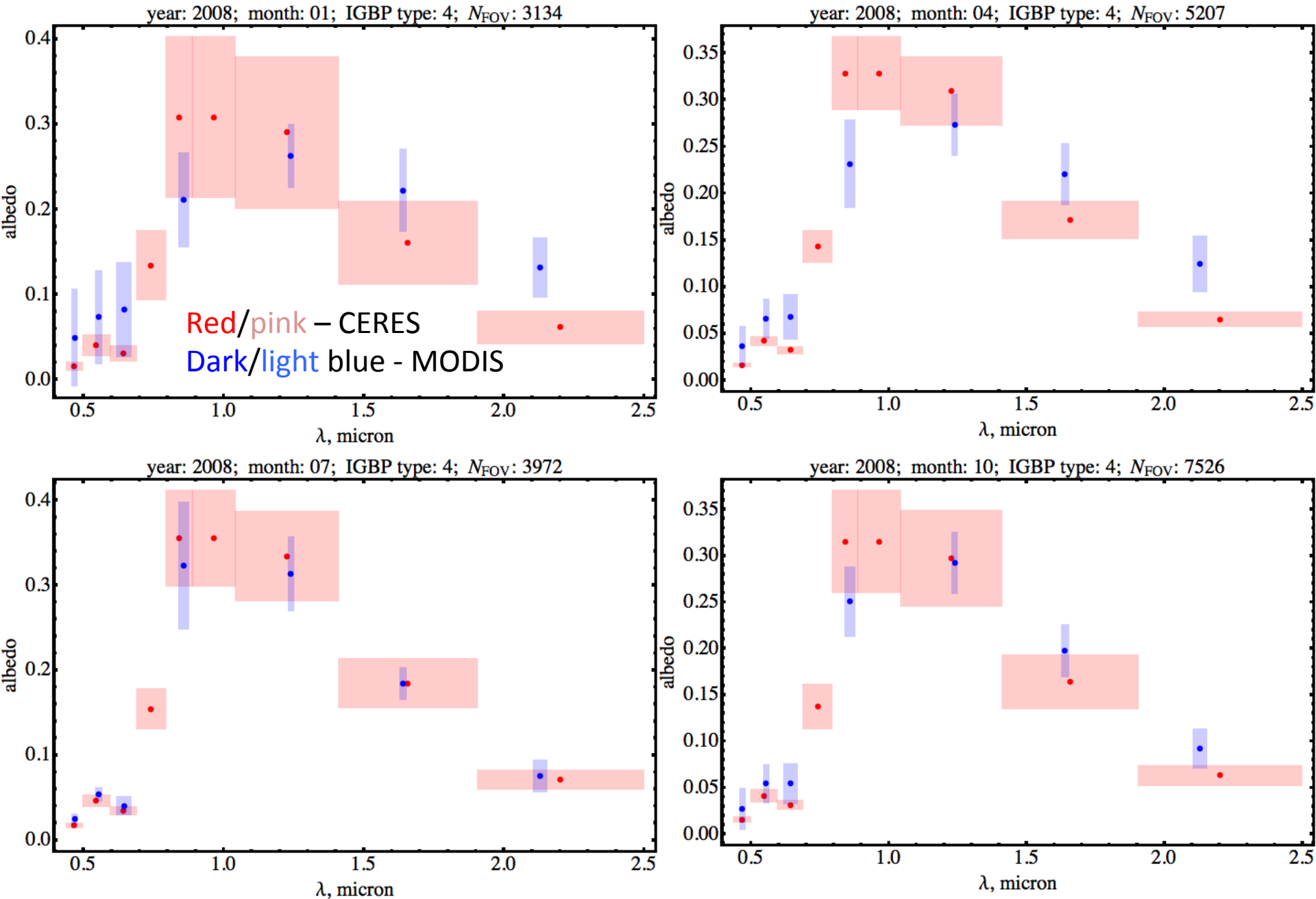


IGBP map

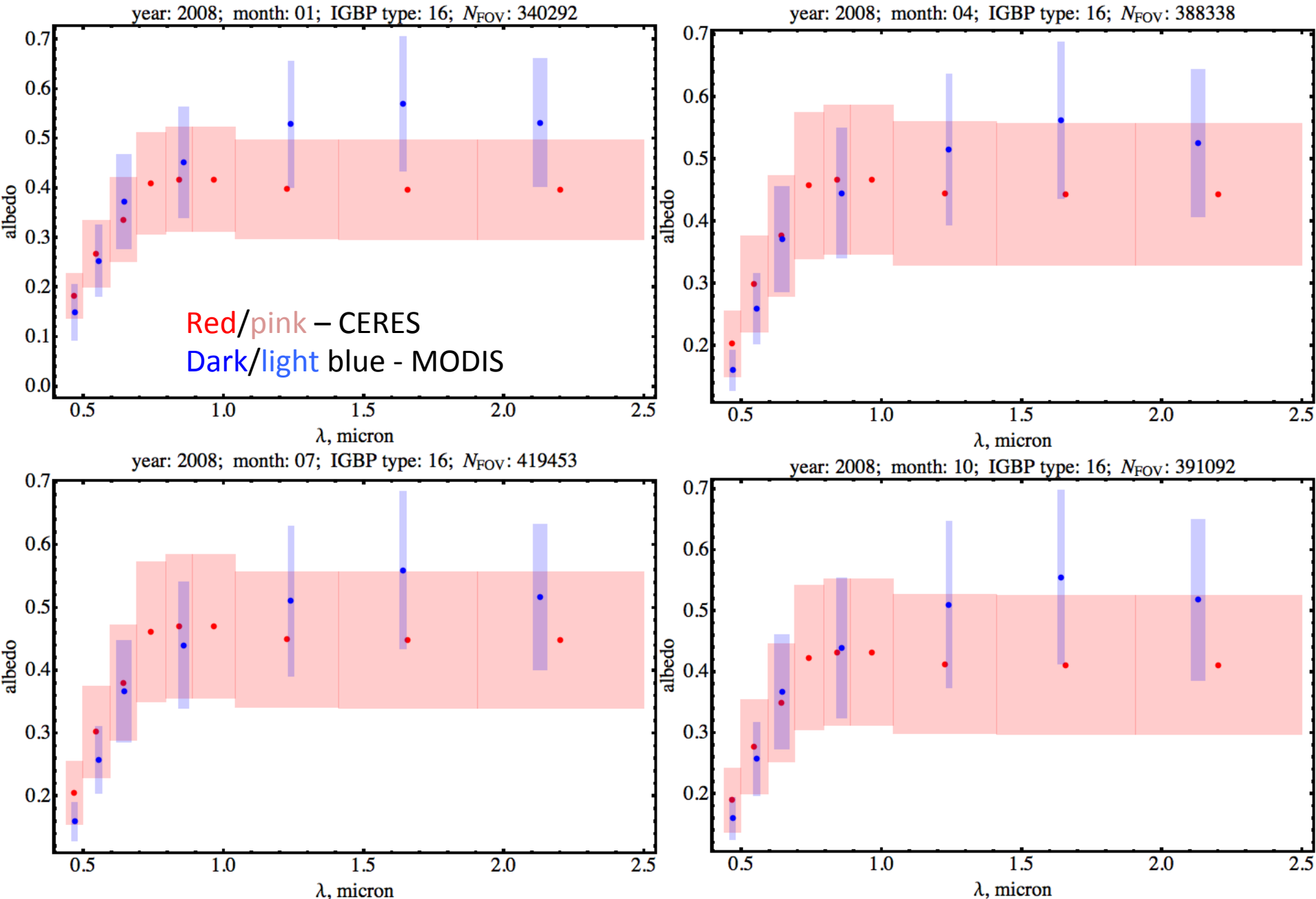
Spectral albedo, evergreen broadleaf forest



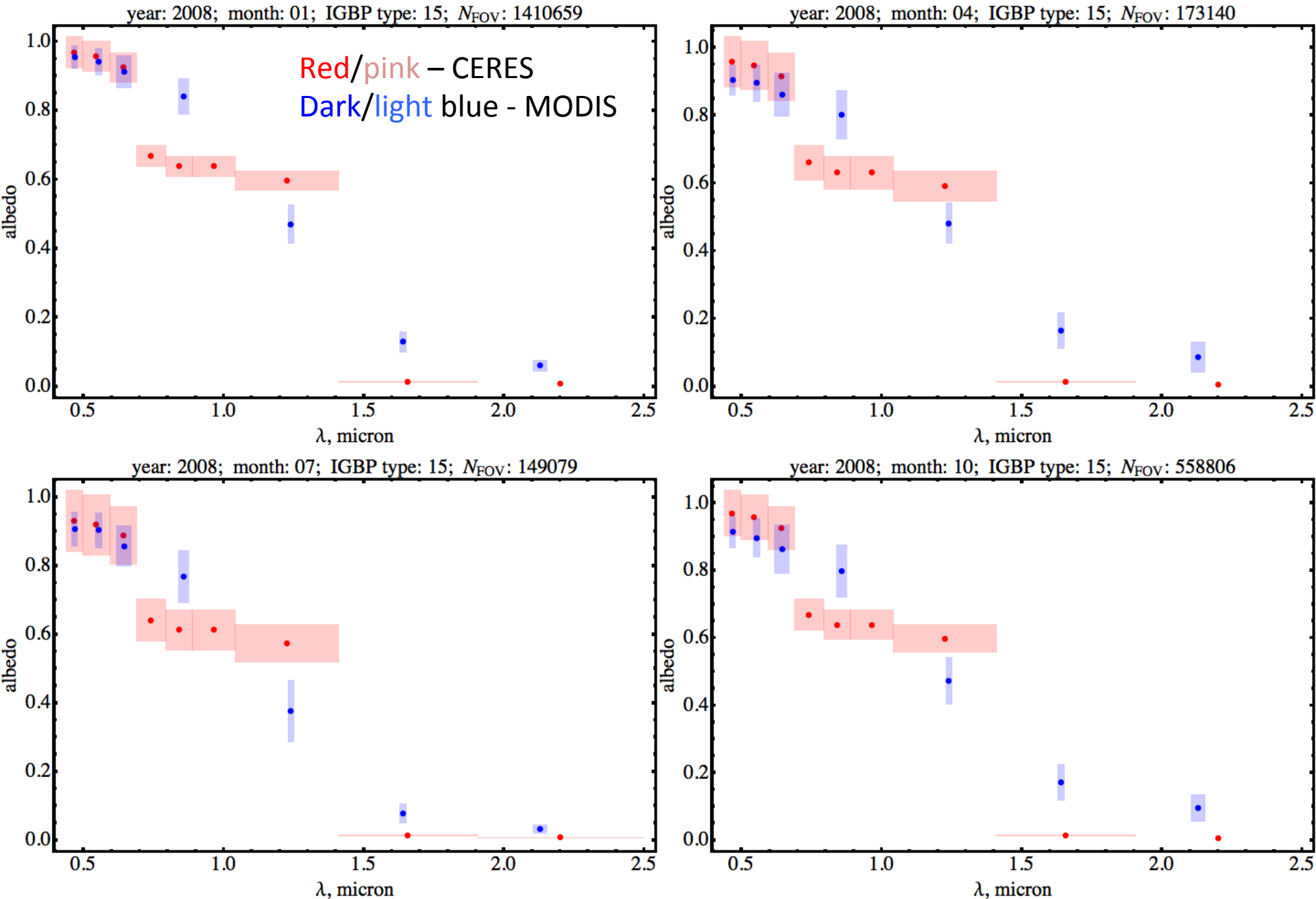
Spectral albedo, deciduous broadleaf forest



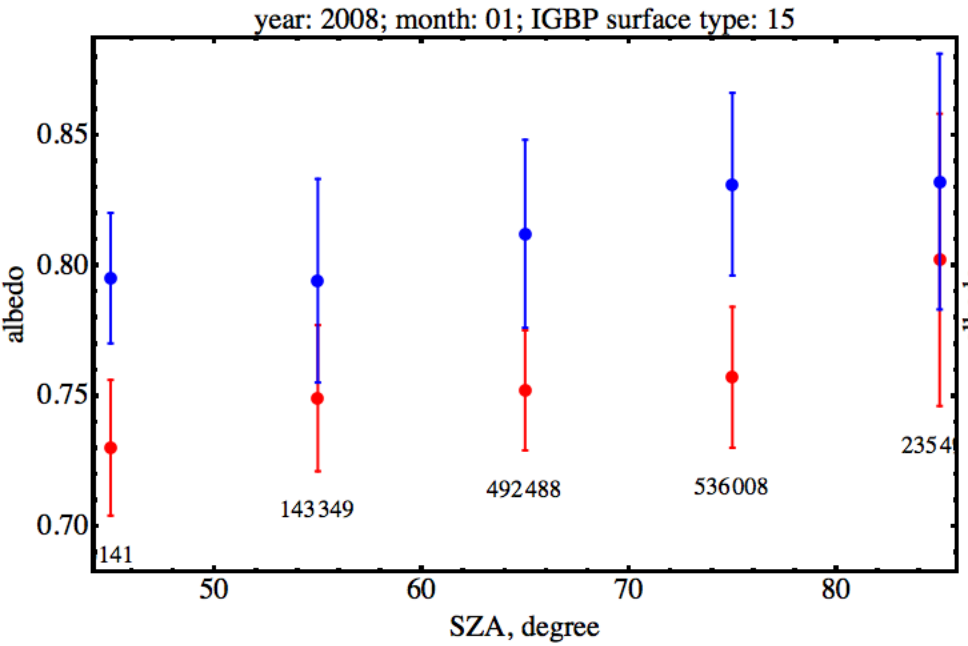
Spectral albedo, desert

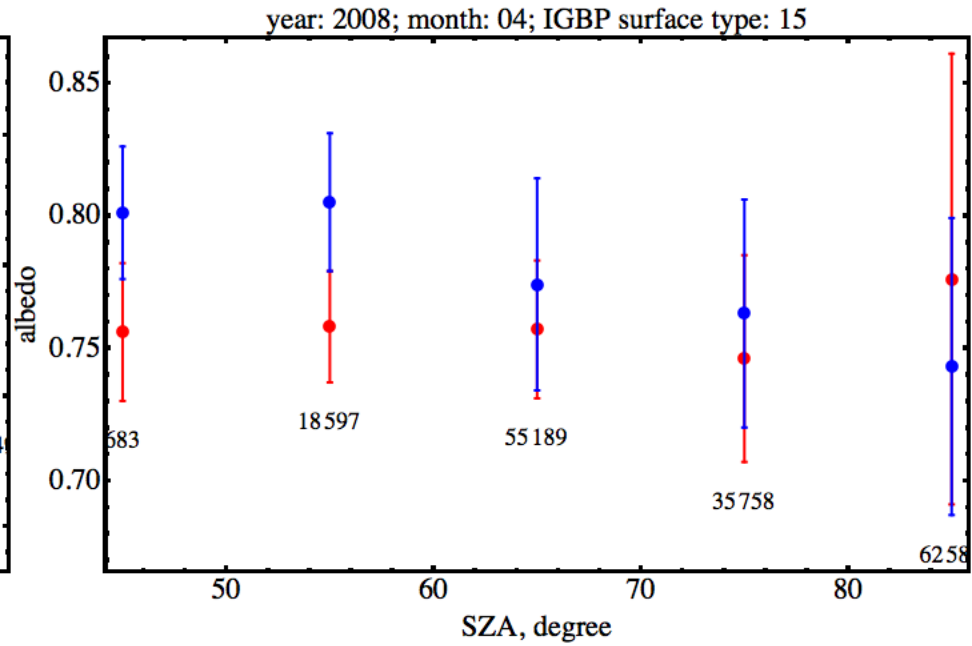


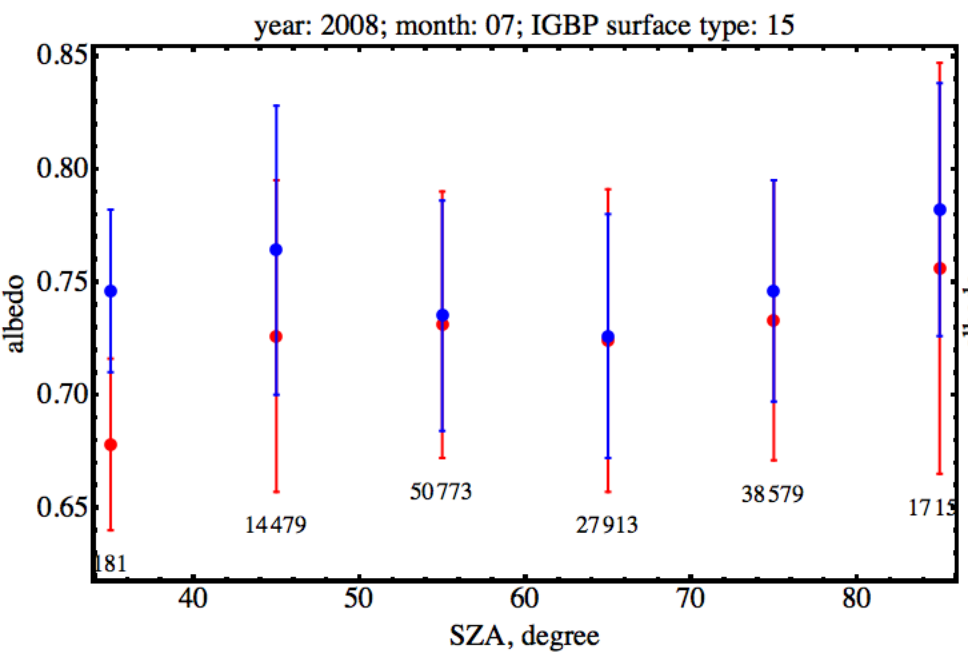
Spectral albedo, permanent snow/ice

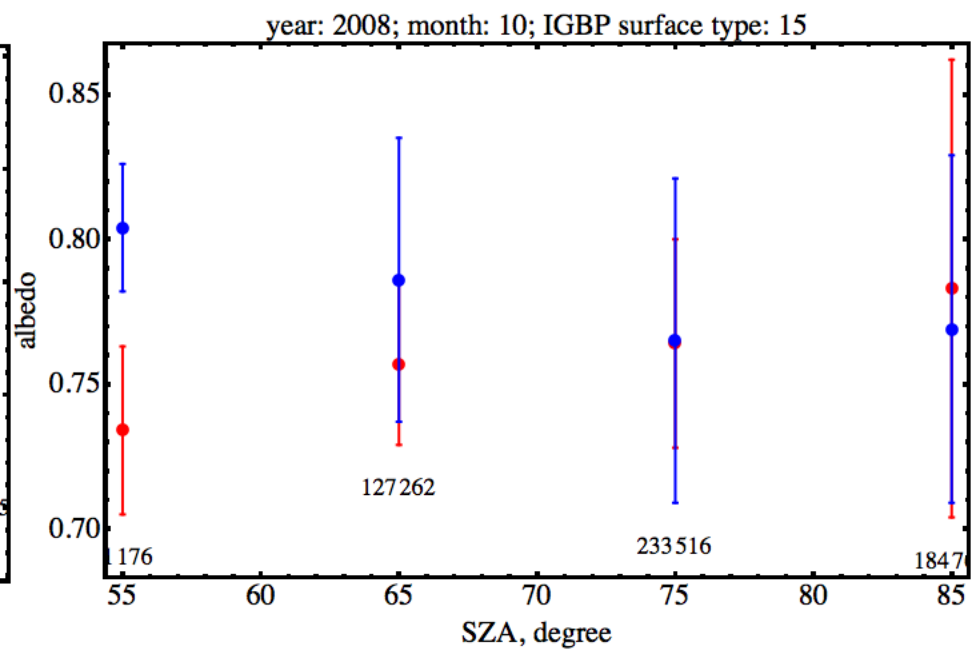


Dependence of albedo on solar zenith angle, permanent snow/ice

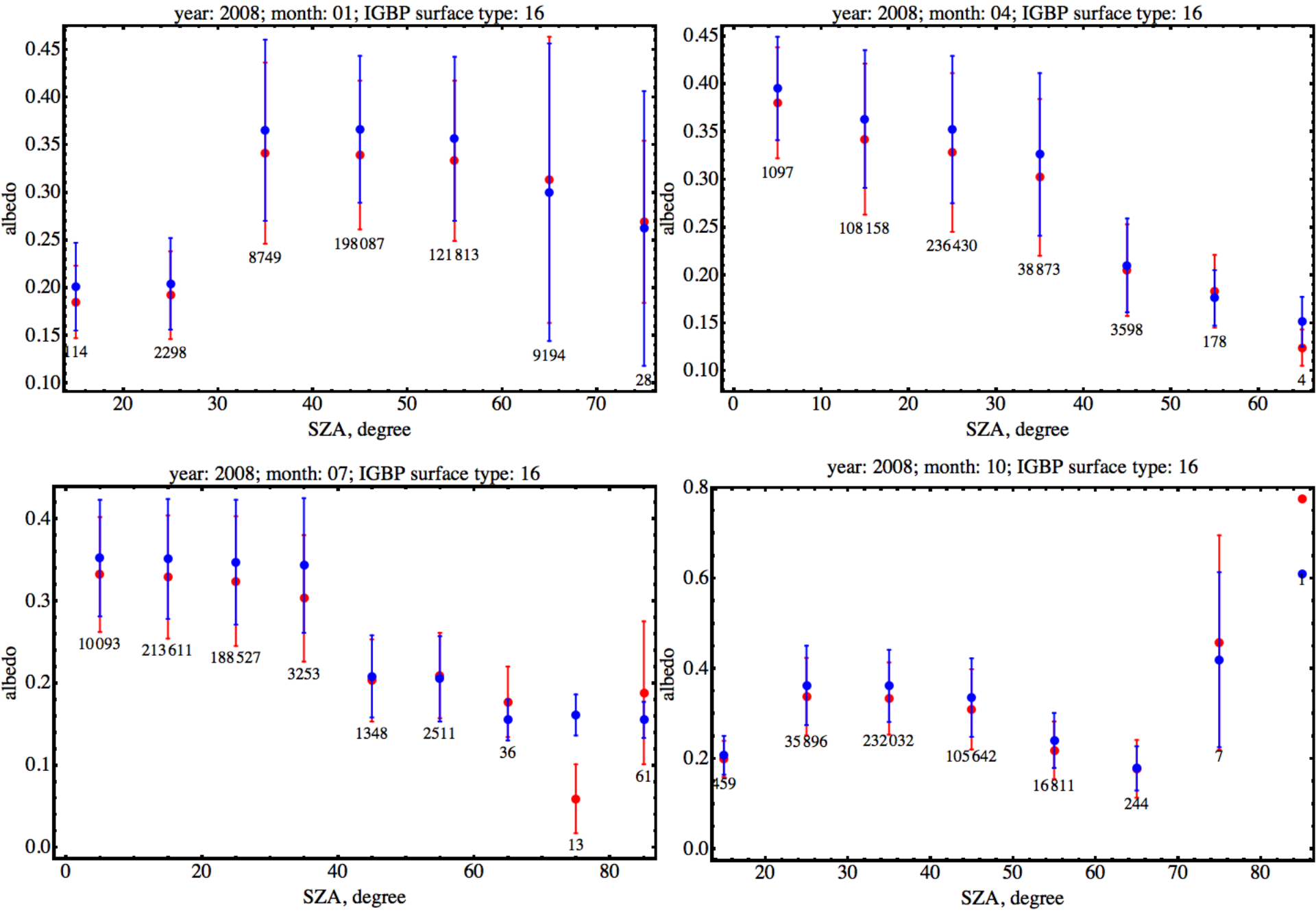








Dependence of albedo on solar zenith angle, desert



Region of interest: the Antarctic

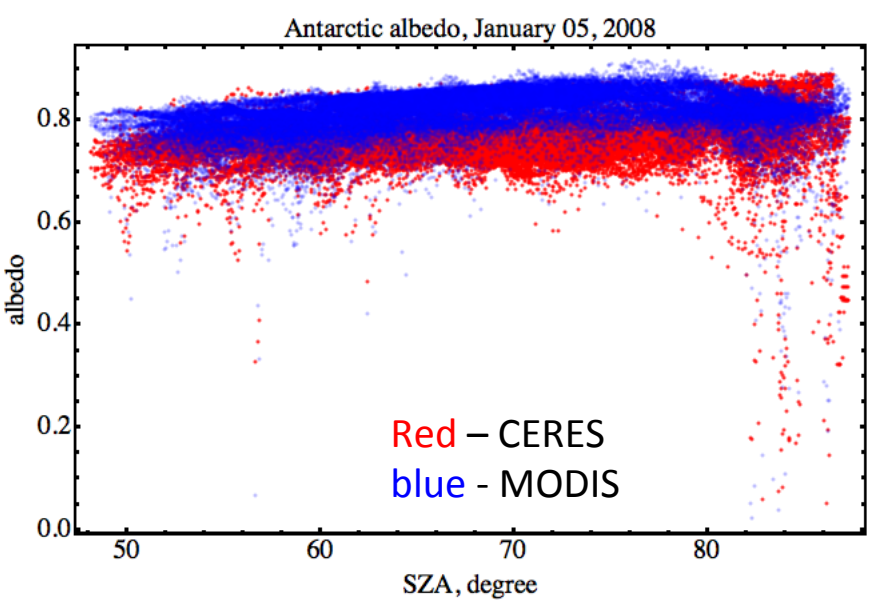
CRS ed 2:

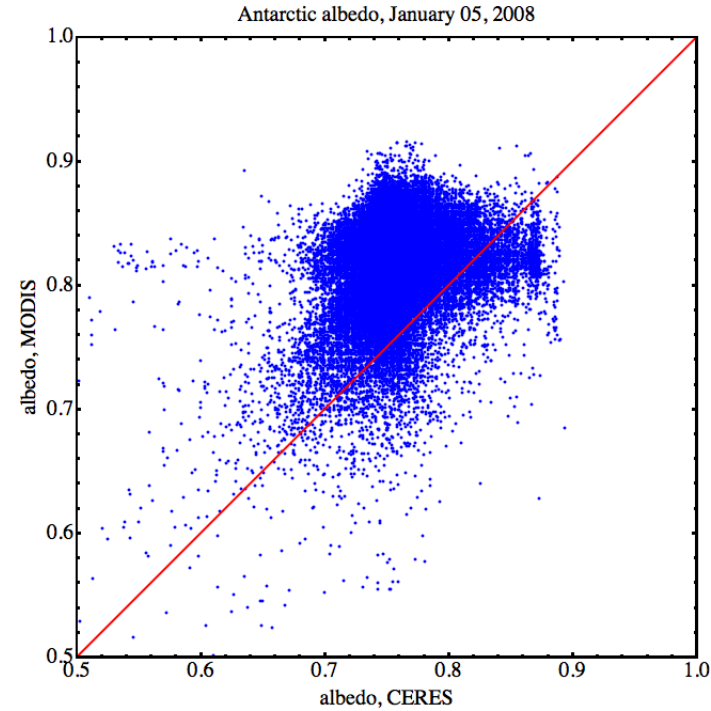
All SZAs: $N_{FOV} = 45496$,
albedo: 0.758 ± 0.039 (CRS), 0.814 ± 0.042 (MODIS),
linear fit: $a_{\mathrm{MODIS}} = 1.0727 * a_{\mathrm{CERES}}$;

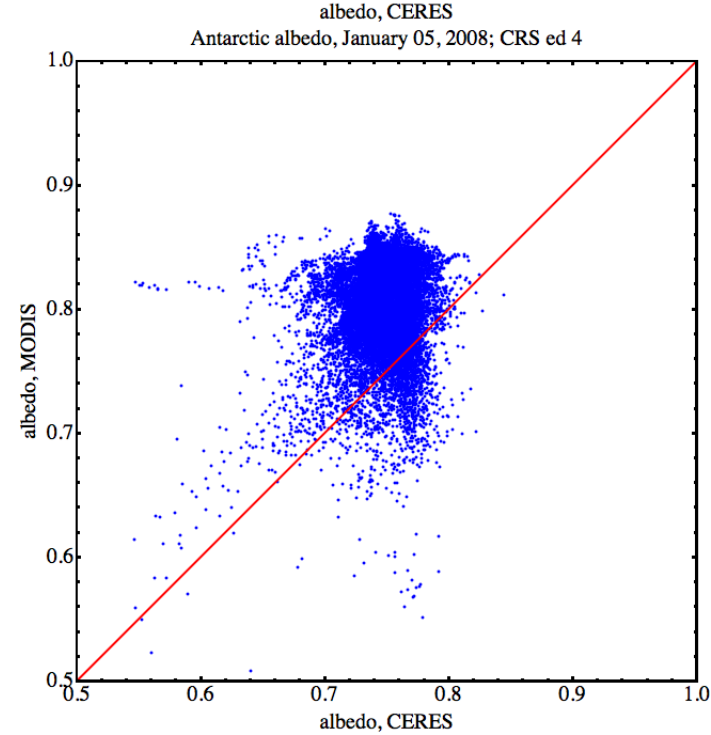
SZA < 70: $N_{FOV} = 26879$,
albedo: 0.751 ± 0.025 (CRS), 0.806 ± 0.039 (MODIS),
linear fit: $a_{\mathrm{MODIS}} = 1.0724 * a_{\mathrm{CERES}}$.

CRS ed 4:

All SZAs: $N_{FOV} = 18036$,
albedo: 0.745 ± 0.026 (CRS), 0.800 ± 0.038 (MODIS),
linear fit: $a_{\mathrm{MODIS}} = 1.0719 * a_{\mathrm{CERES}}$;







CONCLUSION

1. CERES surface albedo retrievals are in good agreement with MODIS retrievals over most of surface types;
2. CERES algorithm slightly underestimates albedo in comparison with MODIS;
3. The greatest discrepancies between two products are observed over permanent snow/ice and deserts;
4. These discrepancies can be addressed to the difference in spectral albedo shapes;
5. CERES spectral albedo shape is not season dependent; the analysis shows that this assumption is not correct over some targets; inclusion of the season dependency based on MODIS in edition 4 will fix this problem;
6. Great difference between CERES and MODIS albedo retrievals over the Antarctic may be addressed to unrealistic spectral shape in edition 2 algorithm. This will be fixed in edition 4 algorithm.