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ASSESSMENT OF TIME COMPOSITING VS NEAR INSTANTANEOUS FOR SPECTRAL & BROADBAND BRF/BRDF/ALBEDO RETRIEVAL FOR ARCTIC SEA-ICE

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ABSTRACT:

In the ESA GlobAlbedo project (http://www.GlobAlbedo.org), a method was developed to retrieve a time composite of surface Broadband Bi-directional Reflectance (BBDR) and consequent BRDF/albedo in 3 broadbands (0.4-0.7, 0.7-3, 0.4-3µm) from co-registered and Rayleigh corrected Top of Atmosphere spectral reflectances from the ESA MERIS and AATSR instruments. The MERIS+AATSR method does not take into account sea-ice motion, which can be ≈10km/day so the 8-day time compositing does not refer to the same piece of sea-ice but rather whatever sea-ice is in the same pixel over the time period. This is comparable to the approach adopted for the CLARA-SAL product derived from AVHRR.

On the other hand, NASA MISR has the unique capability to provide near instantaneous spectral BRFs at 9 angles up to ±70º. However, currently there is no reliable method for the discrimination of clouds overlaying sea-ice using MISR data alone. Therefore, the MODIS sea-ice mask product, MOD29, is employed instead to mask out all non sea-ice pixels as MODIS data is acquired simultaneously with MISR on the same Terra platform.

There are no FLUXNET, SURFRAD or BSRN tall towers with albedometer measurements available over sea-ice. Therefore, we cannot apply the same method of validation as employed for the land surface broadband albedo validation of Blue Sky Albedo as developed for GlobAlbedo (http://www.globalbedo.org/docs/GlobAlbedo_FVR_V1_2_web.pdf). Instead, we can compare the values derived using the different EO sensors and compare this with underflight spectral BRF measurements. Fortunately, the NASA CAR instrument conducted the ARCTAS campaign with near-simultaneous underflights of the NASA Terra MISR sensor in April 2008. A comparison will be shown of MISR BRFs with the at-aircraft BRFs from CAR. Examples will also be shown of the inter-comparison of EO-derived time-composites with near instantaneous albedo products. The long-term implications of these results for mapping sea-ice albedo will be discussed.