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Variation of Arctic's Sea-ice Albedo between 2000 and 2016 by fusion of MISR and MODIS data

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Many research studies have demonstrated that sea-ice plays a key role in climate change and global warming. Most of these studies are based either on ground in-situ data or on remotely sensed data. The latter data are provided mainly by active (SAR and LiDAR) sensors such as Cryosat2, ERS1/2, ENVISAT, Radarsat1/2, ICESat as well as passive sensors such as SSM/I. Nevertheless, the contribution of such active optical sensors data is limited to parameters such as thickness and sea-ice concentration from which albedo may be inferred.

The creation of high quality albedo for sea-ice using optical satellites is confronted with two main obstacles: 1) the Arctic is a very cloudy region and, high quality albedo requires multi-angle observations over a relatively short period; 2) cloud masking over sea-ice is a very difficult task, especially for sensor with low spectral resolution.

To overcome the above two obstacles, we discuss in a separate report the generation of this fused daily, weekly, fortnightly and monthly product at 1km and 5km resolution on a polar stereographic grid [1]. The limited swath (380km) of MISR means that not all of the Arctic is covered on a daily basis so composites on different time-steps were produced. The results show that sea-ice albedo has been in continuous decline since 2000 with thinner sea-ice and greater leads and open water as well as more ponding at earlier times in the year. The implications of these results are discussed in terms of the sea-ice climate feedback.

Animated visualisations of the albedo patterns each year, the decline in average and the increase in standard deviation in albedo for every single day for all 17 years will be shown to demonstrate the effects of climate change over sea-ice albedo.

References

[1] Kharbouche & Muller, Production of Arctic sea-ice albedo by fusion of MISR and MODIS data. This conference.

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