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## Melt pond retrieval based on LinearPolar algorithm using Landsat data

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The formation and distribution of melt ponds also have an important influence on the Arctic climate. It is necessary to obtain more accurate information of melt ponds on Arctic sea ice by remote sensing. Present large-scale melt pond products, especially melt pond fraction (MPF), still need a lot of verification, and it is a good way to use the very high resolution optical satellite remote sensing data to verify the retrieval MPF of low-resolution melt pond results.

Most MPF algorithm such as Markus (Markus, et al., 2003) and PCA (Rosel et al., 2011) relying on fixed melt pond albedo, LinearPolar algorithm (Wang et. al., 2020) considers that the albedo of melt ponds albedo is variable, it has been proved the retrieval results of this algorithm has a high accuracy of the MPF than that of the previous algorithm based on Sentinel-2 data in Wang et al.'s work. In this paper, we applied this algorithm to Landsat 8 data. Meanwhile, Sentinel-2 data as well as SVM and ISODATA method are used as the comparison and verification data. The results show that the MPF obtained from Landsat 8 using LinearPolar algorithm is the much more closer to Sentinel-2 than Markus and PCA algorithms, and the correlation coefficients of the two MPF is as high as 0.95. The overall relative error of LinearPolar algorithm is 53.5% and 46.4% lower than Markus and PCA algorithms, respectively. And in the cases without obvious melt ponds, the relative error is reduced more than that with obvious melt ponds. This is because LinearPolar algorithm can identify 100% dark melt ponds and relatively small-scale melt ponds, and the latter contributes more to MPF retrieval.

The application of LinearPolar algorithm on Landsat can cover a wider range than Sentinel and enhance the verification efficiency. Moreover, because of the longer time series of Landsat data than Sentinel data, the long-term variation trend of sea ice in fixed areas can be monitored.