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Impact of melt ponds on decrease of Arctic summer sea ice based on simulations from 1980 to 2012

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Melt ponds form on Arctic sea ice during the melting season and their presence affects the heat and mass balances of the ice cover, mainly by decreasing the value of the surface albedo by up to 20%. We have developed a melt pond model suitable for forecasting the presence of melt ponds based on sea ice conditions. This model has been incorporated into the Los Alamos CICE sea ice model, the sea ice component of several IPCC climate models. Simulations for the period 1980 to 2012 are in good agreement with observed ice concentration. The maximum pond area occurs in the beginning of July with an Arctic mean of 25% (fraction of sea ice). The inter-annual variability is strong with the lowest maximum fraction of 15% occurring in years with the largest September ice extent and the highest maximum fraction of nearly 40% in years with the lowest September ice extent. Can the pond fraction in July be used to predict the following September ice extent? Based on our 33 year long time series the connection and correlation of pond fraction and minimum sea ice extent will be quantified.