

EGU2020-12232

<https://doi.org/10.5194/egusphere-egu2020-12232>

EGU General Assembly 2020

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Landfast ice in the Canadian Sub-Arctic: A Hudson-Bay wide study.

**Kaushik Gupta**, Anirban Mukhopadhyay, and Jens Ehn

CEOS, University of Manitoba, Winnipeg, Canada (guptak1@myumanitoba.ca)

Hudson Bay, along with James Bay, forms a significant section of the Canadian Sub-Arctic basin which experiences an annual event of Land-fast sea ice formation and melt. Here Landfast ice dynamics largely depends on the climatic and oceanographic conditions, along with coastal geomorphology. In this study, we attempt to investigate the annual cycle of land-fast sea ice formation and melt in the Hudson Bay and James Bay region by estimating the ice period, stages of development and extent. Through this study, we also emphasize the role of coastal morphology influencing ice stability. We have analysed over 2000 ice charts produced by the Canadian Ice Service (CIS) and satellite observations from Worldview and LANDSAT series. The Canadian Ice Service publishes charts of ice concentration and stages of development of Hudson Bay and James Bay on a monthly, weekly and daily scale. We observe the variation in land-fast ice dynamics by digitally extracting information from the daily and weekly ice charts produced by the CIS and satellite observation coupled with mean surface temperature throughout the period of study. Our results indicate landfast ice forming earlier and breaking later in the northern and north-western coastal margin of Hudson Bay as compared to the southern and eastern shore. James Bay experiences a relatively shorter ice season than Hudson Bay. Though time series analysis of break-up in the northern and north-western Hudson Bay shows a negative trend implying an earlier break-up in these regions. Southern and eastern Hudson Bay and James Bay have a positive trend implying a negligible change in the break-up period. The extent of landfast ice in the eastern coastal margins of Hudson Bay and James Bay was noted to be significantly more compared to the west, primarily due to the north to south and finally eastward movement of pack ice in the bay system. Complex coastal topography in the eastern coastal margin also contributes to the stability of these extended ice sheets. The study determines the description of the multiyear variability of land-fast sea ice under changing temperature regimes over the Canadian Sub-Arctic.