



## **A study on the influencing factors of Terra Nova Bay Polynya using satellite imagery, AWS, and reanalysis data**

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Terra Nova Bay Polynya (TNBP) is one of the representative coastal polynya in East Antarctica. TNBP plays a major role of sea ice producers in the Antarctica, and it influences the regional current circulation and the surrounding marine environment. Therefore, it is important to investigate the influencing factors of TNBP. In this study, time series of TNBP area was estimated from Landsat-8 OLI/TIRS (2013-2016) and Sentinel-1 SAR (2017-2021) images by visually analyzing the boundary of polynya. To analyze the environmental factors influencing the area of TNBP, wind speed, temperature, air pressure, and humidity measured at an automatic weather station installed near the polynya, and sea surface temperature, salinity and heat fluxes predicted by a reanalysis data were compared to the time series TNBP area. The area of TNBP showed a moderate correlation with the wind speed, but it was statistically low correlated with all other environmental factors. Meanwhile, a multiple linear regression between the time series area and all environmental factors showed a much higher correlation coefficient than between the polynya area and wind speed. However, the polynya areas predicted by the multiple linear regression model were largely deviated from those estimated from the satellite images. In future work, we intend to develop a model that retrieve more accurate TNBP area by selecting environmental factors suitable for polynya area estimation and applying them to machine learning techniques.