



# IV ROSS SEA CONFERENCE 2023

*Università degli Studi di Napoli "Parthenope"*

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**Topic:** Ocean-ice-atmosphere interactions

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**ABSTRACT Subject :**

Terra Nova Bay Polynya dynamics and its impact on surface heat fluxes and thermohaline variability

**Abstract** 01/03/2023 13:56:44

The Terra Nova Bay (TNB) polynya is important in the modification of the thermohaline structure of the whole Ross Sea. Brine release during sea ice formation increases the salinity of the subsurface water, resulting in the formation of High Salinity Shelf Water (HSSW), the densest water mass of the Southern Ocean. This study aims to investigate the processes that occur in the TNB polynya and the role of the air-sea interactions in the determination of its opening, activity and on the HSSW production that can ventilate the abyssal ocean circulation. First, we analyzed the role of the katabatic winds using meteorological data by the AWSs and ECMWF data, since 1994. In the second step the open water fractions from 2005 and 2021, detected by the Ice Surface Temperature (IST) imagery derived from the MODIS data, were used to estimate the opening and the activity of the polynya during the winter season. Then, we estimated the surface heat budget via empirical formulae in the investigated period. During the freezing season, heat flux from the ocean to the atmosphere can be assumed to result directly in ice production considering that ocean column is at its freezing point. Assuming that ice production rate depends on the net heat flux and on the polynya extension, it is possible to calculate the total production of salt released during sea ice formation and HSSW volume. Finally, a comparison between the estimated HSSW production and the salinity observed within the TNB water column is carried out.

