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THEORETICAL, EXPERIMENTAL AND NUMERICAL ANALYSIS OF SEA ICE IN THE ANTARCTIC MARGINAL ICE ZONE TRACK NUMBER 1600

J. SCHRÖDER*, C. NISTERS*, D.C. LUPASCU*, T. RICKEN†, M. VICHI‡ AND S. SKATULLA‡

* University of Duisburg-Essen, Germany
j.schroeder@uni-due.de, carina.nisters@uni-due.de, doru.lupascu@uni-due.de

† University of Stuttgart, Germany
tim.ricken@isd.uni-stuttgart.de

‡ University of Capetown, South Africa
marcello.vichi@uct.ac.za, sebastian.skatulla@uct.ac.za

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ABSTRACT

The complexity of interacting processes and drivers within the sea ice of the Marginal Ice Zone (MIZ) in the Southern Ocean is a significant challenge when trying to understand its impact on and its interaction with the world climate and the anthropogenic impact on the MIZ. The temporal and spatial distribution of the MIZ sea ice, its mechanical, biological, physical and geochemical properties are directly associated with the natural oceanic and atmospheric variability. The MIZ dynamics is a significant indicator of Antarctic sea ice variability, which participates to the Earth's climate functioning. The availability and reliability of computer models predicting the dynamics of the MIZ necessitate a multidisciplinary effort by natural and material scientists as well as engineers, based on satellite and in situ observations and measurements as well as experimental data obtained in the laboratory. In this context, advanced numerical simulation techniques mastering the complex problems on different scales in time and space are as important as advanced experimental investigation techniques tailored to the characteristics of the various sea ice types, the respective physical and biochemical processes and drivers as well as the annual variability. In the branch of computational mechanics, the arising challenges are the description of the mechanical, biological and physical mechanisms across space and time scales, as well as the treatment of the governing coupled differential equation systems. Moreover, capturing the highly nonlinear material behavior together with all its influencing variables is challenging for both experimentalists as well as the thermodynamics experts, demanding for their interdisciplinary collaboration. It is the organizers' opinion that a multitude of promising emerging schemes exists, which will advance progress in the design of efficient, reliable and robust solution methods for the simulation of sea ice dynamics, growing and melting processes and the biogeochemical activities within the ice. The design of new and improvement of existing experimental methods suitable to validate and verify numerical schemes are of crucial importance. This mini-symposium invites new ideas and schemes that aim to improve the description of physical and biogeochemical processes within the MIZ of the Southern Ocean.