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Analysis of the Genesis Potential Index in Subtropical Cyclones off the Coast of Brazil

João Gabriel Martins Ribeiro[1], Gabriel Teodoro da Paz[1], **Michelle Simões Reboita**[1], Luiz Felippe Gozzo[2], Glauber Willian de Souza Ferreira[1], and Rosmeri Porfírio da Rocha[3]

[1]Federal University of Itajubá, Natural Resources Institute, Itajubá, Brazil (gabrielmr472@unifei.edu.br)
[2]Paulista Julio de Mesquita Filho State University, Department of Physics, Bauru, SP, Brazil
[3]University of São Paulo (USP), Department of Atmospheric Sciences, São Paulo, SP, Brazil

The coastal region of southern and southeastern Brazil, which is part of the South Atlantic Ocean basin, is a genesis region for subtropical cyclones and, therefore, is susceptible to weather changes caused by these systems. The first named subtropical cyclone in the South Atlantic basin was Anita in 2010. Since then, some studies on subtropical cyclones have been carried out, but there are still several questions to be investigated. Thus, this study aims to: (a) describe the main physical mechanisms of genesis of the subtropical cyclones that were named in the South Atlantic Ocean between 2010 and 2021 and (b) identify the value of the Genesis Potential Index (GPI) between the pre-cyclogenesis and the phase in which these systems acquire subtropical characteristics. The rationale for analyzing the CPI is that we want to identify a possible pattern that helps in operational weather forecasting. The main database used in the study is the ERA5 reanalysis. Of the 14 cyclones studied, only two systems did not have cyclogenesis with subtropical characteristics, but acquired it 24 hours after cyclogenesis. The results indicate that 5 cyclones have a genesis associated with mid-level troughs in the atmosphere, and 9 with blocking patterns (cutoff low type). As most of the cyclones studied occur in an environment with blocking structure, this indicates that the condition of weak vertical wind shear is an important factor for subtropical cyclones. As the GPI does not show a standard value in the 14 cyclones studied, between pre-cyclogenesis and the moment when these systems become subtropical, as it varies from 0.35 in the Deni genesis to 22.71 in the Anita genesis, perhaps it is not possible to use it with a threshold in operational practices. The authors thank Programa de P&D regulado pela ANEEL e empresa Engie Brasil Energia e a Companhia Energética Estreito for the financial support.