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## The Contribution of Waves in Mixing Processes of the Patos Lagoon Plume

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### ABSTRACT

The analysis of wave effects above salinity is important in order to define mixing processes and their potential to change density gradients, since action in the region of the Patos Lagoon plume is highly dynamic. This paper aims to evaluate the influence of waves on the mixing pattern of the adjacent continental shelf. Constantly marked by tides and circulation variations, changing from flood to ebb tide, salinity stands as a major parameter for analysis. The study is based on hydrodynamic numerical modeling experiments using the TELEMAC3D model and waves generated by the wind using the TOMAWAC coupled model. The comparison between the situations considering the waves generated by the wind and without waves was made through time series analysis, stratification series, transversal cross sections, longitudinal cross sections, salinity mean fields and diagrams by Richardson and Brünt-Väisäläs frequency parameters. With the cross sections analysis, the mixing effect generated by the waves was observed, demonstrating clearly that the waves were capable of raising the superficial salinity in regions far from the Patos Lagoon entrance, while at the entrance, the wave effects enhanced the mixing on the deepest layers, decreasing the saline intrusion and expanding the plume more radially on the surface. The space-temporal diagrams were effective to demonstrate the modulation effect of the waves over the salt mixing of saline waters, revealing that wave effects decrease the stratification as well as the Brünt-Väisäläs frequency and increase the period of buoyancy, due to the mixing increase.

### KEYWORDS

Vertical Mixing; Tridimensional Numerical Modeling; Stratification

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