

Effects of hydropeaking on the hydrodynamics of a stratified reservoir: the Rapel Reservoir case study

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Resumen

The effects of hydropeaking of the Rapel Hydropower Plant on the hydrodynamics of the reservoir were investigated by combining field measurements and three-dimensional simulations performed with the Centre for Water Research, Estuary, Lake and Coastal Ocean Model. Two operational scenarios were analysed: the hydropeaking of the hydropower plant and a fictional scenario without hydropeaking. Two time periods were considered to allow different seasonal and operating conditions to be considered. The location of the thermocline was determined by the depth of the outlet and the withdrawal rate. Spectral analysis showed a strong correlation between the water withdrawals and the internal waves in the reservoir. Furthermore, vertical mixing with hydropeaking during the summer can be enhanced by one order of magnitude with respect to the case without hydropeaking. We conclude that hydropeaking has a major impact on the hydrodynamics of the reservoir, which indicates that diurnal variations in the outflows should be considered when studying these systems.

Palabras clave

Palabras clave de autor: [Computational methods](#); [environmental fluid mechanics](#); [hydropeaking](#); [lakes and reservoirs](#); [Rapel Reservoir](#)

KeyWords Plus: [INTERNAL WAVES](#); [SELECTIVE WITHDRAWAL](#); [SEASONAL EVOLUTION](#); [LAKES](#); [DYNAMICS](#); [DEGENERATION](#); [FIELD](#)

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