First reports of associations between spectral properties, chlorophyll, bacterial and zooplankton in two Chilean north Patagonian lakes (Villarrica and Caburgua, 38° S, Araucania region, Chile)

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Abstract
The Chilean Patagonian lakes are characterized by their marked oligotrophic or oligomesotrophic status and low zooplankton species abundances, many of these lakes with oligomesotrophic status is associated to human intervention due towns in their shores. The aim of the present study was determine the relations between spectral properties (LANDSAT/OLI), chlorophyll and plankton abundances in two north Patagonian lakes, Villarica, that has two towns in its shore, and Caburgua, that has native forest in its shores as basis of environmental pollution monitoring tools. The results revealed that Villarica lake has high reflectances in near infrared, red and green bands, high chlorophyll (a, b and c) concentrations, and high bacterial and plankton abundances, whereas Caburgua lakes has low reflectance in the same bands, and low chlorophyll concentrations, low bacterial and plankton abundances, with exception to high mixotrophic ciliates. The obtained results agree with limnological observations about both lakes, and the comparison with spectral properties agree with similar observations for glacial north Patagonian lakes about spectral properties and zooplankton community.

Author keywords
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