

Alberto de la Fuente S.

aldelafu@ing.uchile.cl

Profesor Asistente Departamento de Ingeniería Civil,
FCFM

Ph.D. Ciencias de la Ingeniería, Mención Fluidodinámica,
Universidad de Chile.



Heat and dissolved oxygen exchanges between the sediment and water column in a shallow salty lagoon.

Resumen

Dissolved oxygen (DO) and heat exchanges across the water sediment interface (WSI) of a shallow lagoon are controlled by processes occurring on both sides of the WSI, particularly volumetric source and sink on the sediment side and turbulent transport on the water side. This article presents and analyzes measurements of DO (J_s) and heat (H_g) fluxes across the WSI in the extremely shallow lagoon of Salar del Huasco (20.274oS, 68.883oW, 3800 m above sea level), where volumetric source of DO and heat exists in the sediment layer, related to benthic primary production and absorption of solar radiation, respectively. Micro-profiles of temperature and DO were measured, and they were used for measuring J_s and H_g , and volumetric source/sink terms in the sediments. This information was used to propose and validate the simple theoretical framework to predict both the magnitude and direction of J_s and H_g . On the one hand, J_s can be predicted with a simple algebraic expression, where the diffusional mass transfer coefficient defines the magnitude of J_s while the direction is controlled by the balance between DO production and consumption in the sediments. On the other hand, solar radiation is absorbed in the upper sediments, and this heat diffuses toward the water column and the sediments. The heat flux toward the water column also induces unstable convection that promotes vertical transport across the WSI. The theoretical framework proposed here will help to understand DO and heat budgets of shallow aquatic systems in which solar radiation reaches the WSI.

Sala B-113, Edificio CEC, FCFM.
14:30 hrs. Martes 15 de Abril.
www.ingcivil.uchile.cl/rhma/



fcfm

Ingeniería Civil
FACULTAD DE CIENCIAS
FÍSICAS Y MATEMÁTICAS
UNIVERSIDAD DE CHILE