

## **Hydrothermodynamics of a small alpine lake**

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The present research is aimed at investigating the hydrothermodynamic properties of alpine lakes with specific reference to the case of lake Tovel (Trentino, Italy). The lake was world famous for the spectacular reddening which has been occurring each year until 1964, when the phenomenon has suddenly ceased. Part of the present work has been developed within the framework of research project "SALTO" funded by "Provincia Autonoma di Trento" and oriented to the study of different ecological, biological and physical aspects of the lake, along with its historical development.

The present thesis is divided in three parts. In the first part we summarize the fundamental processes which characterize the hydrothermodynamics of lakes and those specific aspects that we have also investigated in the field. In the second part a detailed report is given about the field campaign performed in 2003 on lake Tovel. In particular the experimental techniques are illustrated along with the data post-processing procedures. The analysis of temperature data measured by thermistor chains and velocity data collected through current meter and profiler provide an understanding of the main circulations that may develop in the lake. The third part is devoted to numerical modelling and the results of a 1-D vertical model and a 3-D model are discussed. The former model (DYRESM), developed in Western Australia University, has been used to study the seasonal evolution of the lake; the latter 3-D model has been specifically developed in the framework of this project to investigate the hydrodynamics behaviour on short time scale. The results of simulation show a perfect agreement with the field data.