



CLIMATE CHANGE PROJECTIONS FOR LAKES SURFACE WATER TEMPERATURE IN THE LAURENTIAN GREAT LAKES REGION: UNCERTAINTY ASSESSMENT

Submitted by : Piccioni Francesco

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Author Speaker : Piccioni Francesco

Information about other authors (name,surname,institute,country) :

Francesco, Piccioni, LEESU, Ecole des Pont ParisTech, AgroParisTech, UPEC, UPE, Paris, France

& Department of Civil, Environmental and Mechanical Engineering, University of Trento, Italy

Sebastiano, Piccolroaz, Institute for Marine and Atmospheric research Utrecht, Department of Physics, Utrecht University, Netherlands

Marco, Toffolon, Department of Civil, Environmental and Mechanical Engineering, University of Trento, Italy

Bruno, Majone, Department of Civil, Environmental and Mechanical Engineering, University of Trento, Italy

Abstract :

Water temperature is one of the key variables governing limnological systems. Recent studies confirmed that water-bodies are showing warming trends worldwide, indicating that climate change will influence lakes thermal dynamics in the near future;.

Focusing on the Laurentian Great Lakes, we performed a climate change impact study with two main objectives: (i) estimating future projections of surface water temperature and (ii) assessing the contributions to the overall uncertainty introduced from the different steps of the modelling chain. We utilized 10 climate change scenarios (CCS) developed by NARCCAP and a family of 3 lake models (air2water) to estimate water temperature in a control (1970-2000) and a future (2040-2070) period. ANOVA is used to estimate the rate of uncertainty introduced in the ensemble of simulations by three independent factors: (i) the 10 CCS, (ii) the air2water family of models, and (iii) different calibration periods for the lake models.

Mean annual water temperature projections for the five lakes show consistent warming (around 2°C) with peaks of up to 4°C in summer. Uncertainty due to the CCS is generally predominant when compared to that of the lake model. The calibration on different periods introduces considerable rates of variability, sometimes comparable to that of CCS.

Keywords : Climate change scenarios, water temperature, uncertainty

Documents :