

## **Multivariate Shifting Mean Plus Persistence Model for Simulating the Great Lakes Net Basin Supplies**

Óli Grétar Blöndal Sveinsson<sup>1</sup>

The National Power Company (Landsvirkjun), Reykjavík Iceland

Jose D. Salas

Civil Engineering Department, Colorado State University, Fort Collins

**Abstract.** The focus of this paper is to develop a multivariate model to model the net basin supplies (NBS) of the Great Lakes. Not all NBS series show similar behavior. For example, a feature that is apparent in some but not all NBS series is a sudden shifting pattern. In this paper previous studies of univariate shifting mean models are expanded to develop multivariate contemporaneous shifting mean models. These multivariate models are further mixed with CARMA models in such a way, that the lag zero correlation in space is conserved between the underlying processes of the different models. The full contemporaneous shifting mean CARMA models are successfully applied for modeling jointly the whole Great Lakes system, preserving the spatial correlation at lag zero between different lakes, and preserving other important statistical characteristics of the individual lakes.

---

<sup>1</sup> The National Power Company  
Research and Surveying Division  
Háaleitisbraut 68  
103 Reykjavík  
Iceland  
Tel: (+354) 552-2533  
e-mail: [olis@lv.is](mailto:olis@lv.is)