

Accepted Manuscript

Short-term Optimal Operation of Water Systems using Ensemble Forecasts

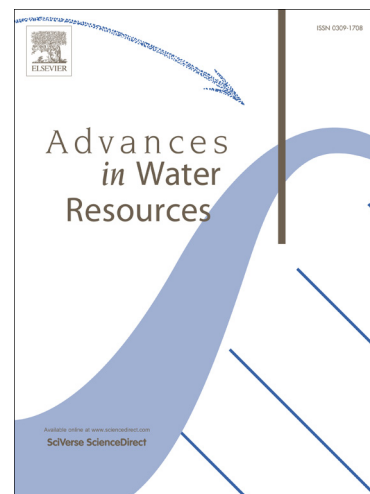
L. Raso, D. Schwanenberg, N.C. van de Giesen, P.J. van Overloop

PII: S0309-1708(14)00126-2

DOI: <http://dx.doi.org/10.1016/j.advwatres.2014.06.009>

Reference: ADWR 2226

To appear in: *Advances in Water Resources*



Please cite this article as: Raso, L., Schwanenberg, D., van de Giesen, N.C., van Overloop, P.J., Short-term Optimal Operation of Water Systems using Ensemble Forecasts, *Advances in Water Resources* (2014), doi: <http://dx.doi.org/10.1016/j.advwatres.2014.06.009>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Short-term Optimal Operation of Water Systems using Ensemble Forecasts

L. Raso^{a,b}, D. Schwanenberg^{c,d}, N.C. van de Giesen^a, P.J. van Overloop^a

^a*Delft University of Technology, Delft, The Netherlands*

^b*IRSTEA, Montpellier, France*

^c*Deltares Foundation, Delft, The Netherlands*

^d*University of Duisburg-Essen, Duisburg, Germany*

Abstract

Short-term water system operation can be realised using Model Predictive Control (MPC). MPC is a method for operational management of complex dynamic systems. Applied to open water systems, MPC provides integrated, optimal, and proactive management, when forecasts are available. Notwithstanding these properties, if forecast uncertainty is not properly taken into account, the system performance can critically deteriorate.

Ensemble forecast is a way to represent short-term forecast uncertainty. An ensemble forecast is a set of possible future trajectories of a meteorological or hydrological system. The growing ensemble forecasts' availability and accuracy raises the question on how to use them for operational management.

The theoretical innovation presented here is the use of ensemble forecasts for optimal operation. Specifically, we introduce a tree based approach. We called the new method Tree-Based Model Predictive Control (TB-MPC). In TB-MPC, a tree is used to set up a Multistage Stochastic Programming, which finds a different optimal strategy for each branch and enhances the adaptivity to forecast uncertainty. Adaptivity reduces the sensitivity to wrong forecasts and improves the operational performance.

TB-MPC is applied to the operational management of Salto Grande reservoir, located at the border between Argentina and Uruguay, and compared to

Email address: luciano.raso@irstea.fr (L. Raso)

Download English Version:

<https://daneshyari.com/en/article/6381020>

Download Persian Version:

<https://daneshyari.com/article/6381020>

[Daneshyari.com](https://daneshyari.com)