Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09806, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09806
EGU General Assembly 2008

A model to simulate hydraulic inflows for France

J. Collet, (1), P. Coudray (1), X. Epiard (1)

(1) EDF R&D division; 1, avenue du Gal de Gaulle; 92141 Clamart CEDEX; FRANCE (Jerome.Collet@edf.fr)

EDF has energy stocks whose management is defined annually. To evaluate these management strategies one needs stochastic models to simulate the hazards that affect these strategies. We investigate here the water inflows in EDF plants, or more precisely their sum throughout France.

We have daily data since 1948. Their analysis, as well as the expertise of hydrologists, show 3 important features. If we start the year on September 1st, we can assume the years independent of each other, since September 1st, most water stocks are at their lowest. In winter, part of the inflows is snow, which melts during the summer; so inflows in winter and summer are linked. There is a link between temperature and inflows, and this link is seasonal.

To summarize the correlations of the inflows within the year, we perform a PCA. The 2 first components summarize the already seen interactions between winter and summer. The inertia of the 2 components is about half of the total inertia. Remaining inertia is modeled using an ARMAX model, where the exogenous variable is the temperature.

The last step is to validate the model obtained, which involves checking at the same time that the model correctly fits the data, but also that it is capable of generalization. For this, we conduct tests distinguishing estimation period from validation period.

A difficult point is that we need to verify the goodness-of-fit between the data and the distribution simulated by the model, while these distributions are conditional (eg. conditional to the temperature). That is why we use systematically Probability Integral Transform, which puts back all data to the U[0;1] distribution.