

UNIVERSITY OF BOLOGNA
Subject: Advanced Hydrology

Exercise - Simulation of river flows by using an autoregressive stochastic process

In the cross section of the Po River at Piacenza flow data have been observed at daily time scale for a period of 86 years (1924-2009). The related observations can be downloaded at the web address:

<http://distart119.ing.unibo.it/albertonew/sites/default/files/didattica/po-piacenza.txt>

To the end of estimating the related flow duration curve, with uncertainty analysis, one is required to generate a synthetic series extended over an observation period of 1000 years.

In order to reach the above goal, one is required to:

- 1) draw a graph of the original time series;
- 2) make the series close to Gaussian
- 3) deseasonalise the time series by assuming that both mean and standard deviation are seasonal;
- 4) estimate an AR1 model to the data;
- 5) check that residuals are Gaussian and not correlated;
- 6) generate the required synthetic series;
- 7) estimate the required flow duration curve.

Explain in a brief report the above elaborations with the required graphs.