

UNIVERSITY OF BOLOGNA
Subject: Advanced Hydrology and Water Resources Management

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

In a cross river section river flow data have been observed at daily time scale for a period of 5 years. The related observations can be downloaded at the web address:

<http://distart119.ing.unibo.it/alberto/site/files/data/river-flows.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 50 years.

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

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

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