The Optimal Observation Problem applied to a rating curve estimation including the "cost-to-wait"

Luciano Raso (1), Micha Werner (2), and Steven Weijs (3)

(1) TU Delft, Water Resources Management, Netherlands (l.raso@tudelft.nl), (2) Unesco IHE, Delft, The Netherlands, (3) EPFL Lausanne, Switzerland

In order to manage a system, a decision maker (DM) tries to make the best decision under uncertainty, having partial knowledge on the effects of his/her decision. Observations reduce uncertainty, but are costly. Deciding what to observe and when to stop observing is a complementary problem that the DM has to face.

The Optimal Observation Problem (OOP) offers a solution to the questions: (1) which observation is more effective? And (2) Is the next observation worth its cost?

We show an application of the OOP to a rating curve estimation in the White Carter River (Scotland). The cost of extra gauging is compensated by the value of better decisions, that reduce the costs due to floods. The observational decision is then whether to gauge, and when.

In the application, we include the "cost-to-wait" in the cost structure. The Algorithm find thus an optimal trade-off between getting less informative data now or wait for more informative, but later. The OOP can be used to plan a measurement campaign, also taking into account that the rating curve can change.