Avenues for crowd science in Hydrology.

Julian Koch (1,2) and Simon Stisen (1)

(1) Department of Hydrology, Geological Survey of Denmark and Greenland, DK (juko@geus.dk), (2) Department of Geosciences and Natural Resources Management, University of Copenhagen, DK

Crowd science describes research that is conducted with the participation of the general public (the crowd) and gives the opportunity to involve the crowd in research design, data collection and analysis. In various fields, scientists have already drawn on underused human resources to advance research at low cost, with high transparency and large acceptance of the public due to the bottom up structure and the participatory process. Within the hydrological sciences, crowd research has quite recently become more established in the form of crowd observatories to generate hydrological data on water quality, precipitation or river flow. These innovative observatories complement more traditional ways of monitoring hydrological data and strengthen a community-based environmental decision making. However, the full potential of crowd science lies in internet based participation of the crowd and it is not yet fully exploited in the field of Hydrology. New avenues that are not primarily based on the outsourcing of labor, but instead capitalize the full potential of human capabilities have to emerge. In multiple realms of solving complex problems, like image detection, optimization tasks, narrowing of possible solutions, humans still remain more effective than computer algorithms. The most successful online crowd science projects Foldit and Galaxy Zoo have proven that the collective of tens of thousands users could clearly outperform traditional computer based science approaches.

Our study takes advantage of the well trained human perception to conduct a spatial sensitivity analysis of land-surface variables of a distributed hydrological model to identify the most sensitive spatial inputs. True spatial performance metrics, that quantitatively compare patterns, are not trivial to choose and their applicability is often not universal. On the other hand humans can quickly integrate spatial information at various scales and are therefore a trusted competence. We selected zooniverse, the most popular crowd science platform where over a million registered users contribute to various research projects, to build a survey of the human perception. The survey will be shown during the interactive discussion, but moreover for building future avenues of crowd science in Hydrology the following questions should be discussed: (1) What hydrological problems are suitable for an internet based crowd science application? (2) How to abstract the complex problem to a medium that appeals to the crowd? (3) How to secure good science with reliable results? (4) Can the crowd replace existing and established computer based applications like parameter optimization or forecasting at all?