Data Intelligence and Innovation in Environmental Monitoring – Delivering More For Less

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Abstract

The environmental landscape is changing rapidly, much of the change being driven by innovation in how we monitor, and also the growth in AI models. The richness of the resulting and varied data streams highlights the complexity of earth systems, and how the science of systems is being applied.

Water is a critical national (and planetary) infrastructure, yet water quantity and quality continue to be modelled separately. Water is used for many purposes- from generating electricity, to irrigating crops, to providing recreational benefits, to goods production, and as part of cultural heritage, so interacts with many parts of the social, engineered and natural earth systems. Data on water quantity and quality are becoming increasingly rich with new real time sensors and satellite missions (a data deluge) but water data are disparate, held in many places under different governance structures, and sometimes behind barriers, so one challenge is data discovery followed by linkage of the different data streams. A second challenge is that we do not yet have a fully holistic view of hydrological cycles and their interactions whether this be between social systems, natural systems (eg rainfall, or groundwater), and engineered systems (eg treatment plants). The temporal and spatial scales at which the processes operate are all different, but integrated water models (global, regional and local) are essential tools to understand the impacts of climate change. Uncertainty remains the third challenge, given the different natures of unknowns- whether this be data variability or scientific gaps in knowledge.

Two examples of current projects will be used to exemplify the changes and challenges.