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“Open science? Activism!” Working together to share modelling resources

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Global Water Futures Core Computer Science

Illustration by Fred Reibin

“Open science? Activism!”

Working together to share modelling resources

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In early 2023 I attended a scientific conference to discuss my recent work on open science. ‘Open science’ is an umbrella term for scientific practice in which all data, tools used for analysis, and results are freely available for everyone to look at. I used this approach to make the computer-based hydrologic modeling our group does more open and transparent. In this way, other scientists or practitioners can re-use the computer code, and anyone with an interest can investigate the methods and decisions involved in the research. To me, these concepts are essential to the way we do science, but not everyone in my audience of fellow scientists agreed. “Sharing all your work and computer code openly? Some would call that revolutionary, or activism”, was one careful, unexpected, reply.

My work over the past year has focused less on generating new scientific insights and more on how we do science. To me, being clear about what you did, and why, are cornerstones of scientific practice, but in some of the earth sciences this is not always done well. Reproducing someone else’s results is often impossible and this has multiple consequences: work is slower when methods are poorly described and tools are insufficiently shared; results are more uncertain when it is impossible to check them as a third party; and trust in the process is reduced, when transparency of the science is low.

Many of my colleagues will readily acknowledge these concerns if I bring them up in conversation, but progress in addressing them has been somewhat scattered and scarce. One of the main reasons for this is that the traditional academic environment provides very few incentives to spend time on this kind of work. Only in the last few years has the community of water resources scientists started to shift towards a culture of more open collaboration.

Recently, for example, I have collaborated with computer modelers at different institutes who built upon my openly available computer code to create specific applications of their own models. The mutual benefits are clear: being able to re-use my work saved them multiple months of duplicated effort. For myself, I got a new set of contacts and co-authorship on another publication. However, as my conversation with some more senior members of the community have shown, old habits die hard.

Fortunately, these cynical voices are few. Most of my fellow scientists are more concerned about the practical implementation of open science practices (“how do I even begin to do this?”) and less about any fundamental differences in whether this is a good idea or not. What this conference made very clear to me, though, is that different people have very different views on how science is and should be conducted. I firmly believe that a community that openly shares its data, code, and methods is the only way to tackle society’s water challenges. The problems we work on are too big to solve alone: providing society with accurate predictions of how the environment will evolve and respond to changes goes well beyond the capabilities of any single person. By collaborating as a community of scientific peers, rather than competing as individuals, we can go beyond our personal limits and solve the big water problems we currently face. Some are not on board with this yet, so I will continue to have this discussion for as long as necessary.

Find out more about the potential of collaboration in hydrology:

Knoben, W. J. M., Clark, M. P., Bales, J., Bennett, A., Gharari, S., Marsh, C. B., et al. (2022). Community Workflows to Advance Reproducibility in Hydrologic Modeling: Separating model-agnostic and model-specific configuration steps in applications of large-domain hydrologic models. Water Resources Research, 58, e2021WR031753. G Blöschl, MFP Bierkens, A Chambel, C Cudennec et al. 2019. Twenty-three unsolved problems in hydrology (UPH)–a community perspective Hydrological sciences journal, 64 (10): https://doi.org/10.1080/02626667.2019.1620507

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