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Doing open science in practical hydrological modeling

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There is an increasing movement to support the concept of open science, and replicable research. The authors embraced the philosophy and applied some rules to obtain this achievement. Because most of their work focuses on modelling, this contribution discusses which are the requirements for doing open science in the field of hydrological modelling. In practice, we present how we started and continue to develop the modelling system GEOframe. We review the choices to make our model open source and discuss the fact that "open sourceness" is not enough to permit third part inspection. The latter characteristic implies some rigour in software design and implementation: these aspects are common in other research fields but are rarely being taken advantage of by researcher in hydrology. We discuss the concept of componentization of software as a way to achieve an optimal authorship attribution and to open codes for inspection. Furthermore, we discuss the deployment options for these ideas examining those adopted inside GEOframe. Finally, we present some possibilities for exposition of data, simulations, and analysis that accompanies publications.
Open science is not necessarily good science. Bad science remains bad even if it is open. However, we claim that bad science and practices can be more easily hidden when modelling tools are not openly available.