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The Hydrologic Modeler's Evolving Role in the Age of AI

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Our community has defined its expertise by the ability to construct, calibrate, and refine complex modeling processes. Now, agentic coding tools and off-the-shelf time series foundation models are dramatically reducing the time and effort required to produce a streamflow model or prediction. As we enter the age of AI, where should human hydrologists focus, and what is our role in the modeling process?

We are moving away from the increasingly commodified nuts and bolts of model building and toward a role defined by scientific judgment. While this shift implies the loss of an aspect of our jobs many of us love, the roles that remain are increasingly impactful and important, and perhaps even more fun. I argue that two roles are becoming central and share examples of how they are already being practiced effectively. First, precise problem definition and success criteria: what should we create, and how do we know if it worked? Second, bridging users and science: assessing model fitness for use, mapping societal water problems to available solutions, and helping decision makers synthesize a proliferation of data.

As other aspects of our work become faster, this talk will highlight skills like modeling intuition, clear specification writing, data curation, and technical communication, and discuss how hydrologic scientists can build strength in areas that will maximize impact in the dynamic years ahead.