



Sociological factors in geoscientific model construction

Lucie Babel and Derek Karssenbergh

Utrecht University, Department of Physical Geography, Netherlands (l.v.babel@uu.nl)

How do we actually build new models? The scientific articles accompanying the release of new models typically address this question by sequential, interlinked steps, starting with the definition of a clear research question and leading at the end of the process to the validation of the model. Everything in our communication could make one believe that the process of model construction is a relatively linear one, in which each action is justified by either theory, data, or technological constraints. Everything - except our actual practice.

Model construction, i.e. the identification of time transition functions, requires an abundance of micro-decisions, of which little evidence is kept on paper. These decisions will lead the researcher to disregard one equation and retain another; to take over a well-known approach or search for a new one. Next to theoretical and observational considerations, the reasons for these choices might be for example of technical or cost-related nature. We believe there is more. We decided to focus our research on one of the least studied factors possibly influencing model construction: the sociological one. How does the scientific environment in which the researcher operates now and did operate in the past (the research institute, her or his colleagues, directors, former supervisors, etc.) act on the modeler's choices?

Following an ethnographic approach within the framework of social sciences, we conducted extensive interviews with model builders in the fields of hydrology, geomorphology, ecology, biogeosciences and climate sciences in the Netherlands, Switzerland and France. The results of the study shed light on the weight of habit in decisions relative to model construction. Habits appear to be predominantly two-fold: extrinsic (the researcher taking over a model component that has been institutionalized as a modeling habit by predecessors) and intrinsic (the researcher re-using a model component she has experience with). Extrinsic habits seem to be closely linked to the concept of credibility. The use of the model component by other members of the community, which the researcher considers as of reference, renders it more trustworthy.

Extrinsic and intrinsic habits are a guarantee of our efficiency. Not having to re-consider each of our single modeling actions indubitably enables us to gain expertise. But up to which point? Is there a boundary line beyond which habits, rather than rendering us more efficient, lock us up in inertia? Our research explores the influence of our modeling habits on model construction, on the basis of the conducted interviews and theoretical contributions from the field of science and technology studies.