

## The Pros and Cons of 1D vs. 3D Modeling

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Advances in computing capability have led to tremendous improvements in 3D modeling. Entire active regions are being simulated in what might be described as a first principles way, in which plasma heating is treated self consistently rather than through the specification of heating functions. There are limitations to this approach, however, as actual heating mechanisms on the Sun involve spatial scales orders of magnitude smaller than what these simulations can resolve. Other simulations begin to resolve these scales, but they only treat a tiny volume and do not include the all important coupling with larger scales or with other parts of the atmosphere, and so cannot be readily compared with observations. Finally, 1D hydrodynamic models capture the field-aligned evolution of the plasma extremely well and are ideally suited for data comparison, but they treat the heating in a totally ad hoc manner. All of these approaches have important contributions to make, but we must be aware of their limitations. I will highlight some of the strengths and weaknesses of each.