The Future of Surface Dynamics Modeling: A View Through Rose Tinted Glasses.

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Providing a visionary talk on the future of environmental surface dynamics modeling, with a view perhaps 10 years out, is a daunting task. As such, the presentation will lightly alternate between wishful thinking and operational needs. Models will play increasingly important roles in operational **workflows**. The U.S., for example, is addressing the challenge of 21st century environmental infrastructure using a triad approach: 1) real-time sensing the environment, sometimes in remote locations; 2) **big data systems**, such as EarthCube, designed to integrate data and deliver advanced geoscience knowledge; 3) **model-model** and **model-data coupling** through CSDMS-like cyberinfrastructure. Ten years out we will surely have viable **Source-to-Sink (Ensemble) Modeling Systems** that employ CSDMS-like plug and play component approaches that supplies necessary services (grids, time orchestration, unit conversion) and able to track data and model **uncertainty**. Real-time **data ingestion schemes** will become common. Two-way **model nesting** for the purposes of downscaling will move out from beyond the present institutes that presently offer this capability. This will include the coupling of Earth System Models with more generic Domain models for support of sustainable development and future earth science. In ten years, many more models will have evolved from science-driven questions to more anthropogenic solution-driven questions aimed at addressing such esoteric concepts as thresholds, tipping points, and early warning signals. Ten years out, most new models will be exercised first through community **benchmark tests** and **Model Intercomparison Experiments**. Surely in ten years out we will have solved how to move purposely along the **Computationally Fluid Dynamic line**, from Direct Numerical Simulation that is presently limited by computational power and fluid Reynolds Numbers, through to Large Eddy Simulators, Reynolds-averaged Navier Stokes models and Shallow Water simulators. And finally, wouldn't it be nice if code development became respected, vetted and valued at the same level as most other scholarly journal publications or books.