Distributed and Parallel environmental modelling paradigms

Models of fluid flow, whether weather / climate prediction, hydrological models or groundwater flows are at or near the pinnacle of computational complexity. Supercomputers were designed and built for, among other applications, simulations of fluid transport.

Many engineering environmental models were originally developed on more modest computing frameworks: typically they are now available for personal computers. As larger scale problems are presented for environmental analysis, however, models must be linked across media interfaces or over differing temporal and spatial dimensions and scales.

Complex models can be constructed from simpler components. A multiprocessor configuration (or grid or vector processor) may lead to simulation of events too complex for uniprocessor architecture, but in order to be successful, the development distributed and parallel versions of state equations for environmental problems must be structured to take advantage of available opportunities for parallelism.

Contributors to this stream at ISESS will elaborate on the unique problems faced in implementing environmental models on distributed and parallel architectures. Problems of particular interest are up- and downscaling models of time or spatial step, maximizing efficiency of extra processing speed of multiple CPUs, distribution of sensitivity analysis or uncertainty, and novel incorporation of legacy uniprocessor environmentasl models to attain speedups without loss of model integrity.

Session Chair: David Swayne
University of Guelph
dswayne@cis.uoguelph.ca