



Fluid Earth - A Platform for Integrated Modelling Using the OpenMI Standard

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It is being increasingly understood that a 'joined up science' approach is required to address modern environmental issues such as extreme hydro-meteorological events. For example, it is not sufficient to understand the meteorology, hydrology or hydraulics in isolation - the full hydro-meteorological chain must be considered. We need model not just individual parameters, but how these parameters interact to affect the whole system. Environmental systems couple many natural processes and simulating them accurately demands modelling them in a similar fashion.

Modelling such systems more accurately can be done in two ways: either simulate everything in one large model or link smaller models together. Fluid Earth focuses on the second approach, linking existing computer models together to form integrated compositions. This demands greater interoperability between model suites and the data supporting them together with the ability to easily link these models.

OpenMI provides a standard interface which allows models to exchange data with each other and other modelling tools on a time-step by time-step basis as they run. This enables the modelling of process interactions. The models may come from different suppliers, represent processes from different domains, be based on different concepts or have different spatial and temporal resolutions. Model components that comply with this standard can, without any programming, be configured to exchange data during computation (at run-time). This means that combined systems can be created, based on OpenMI-compliant models from different providers, enabling the modeller to use the models that are best suited to a particular project. The standard supports two-way links where the involved models mutually depend on calculation results from each other. Linked models may run asynchronously with respect to timesteps and data represented on different geometries can be exchanged seamlessly.

Fluid Earth is an HR Wallingford initiative bringing together a community of specialists with the aim of researching and implementing integrated computer modelling approaches to environmental systems. Using the OpenMI standard, it includes a functional and technical platform and is supported by an e-Infrastructure (<http://fluidearth.net>).

The Fluid Earth Software Development Kit allows model developers to adapt their models for linking to other models and data services. It takes most of the complexity out of this process allowing easy creation of a new generation of environmental models which can be combined into compositions.

Pipistrelle is a tool giving modellers the ability to easily create and run compositions of linked models. Everything is controlled through a simple user interface showing models as OpenMI components with data exchange along links.

The presentation illustrates how it is possible for you to download these free tools and develop and run your first OpenMI Integrated Modelling composition in just two hours.