



## **LFRic: Building a new Unified Model**

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The LFRic project, named for Lewis Fry Richardson, aims to develop a replacement for the Met Office Unified Model in order to meet the challenges which will be presented by the next generation of exascale supercomputers. This project, a collaboration between the Met Office, STFC Daresbury and the University of Manchester, builds on the earlier GungHo project to redesign the dynamical core, in partnership with NERC. The new atmospheric model aims to retain the performance of the current ENDGame dynamical core and associated subgrid physics, while also enabling a far greater scalability and flexibility to accommodate future supercomputer architectures. Design of the model revolves around a principle of a 'separation of concerns', whereby the natural science aspects of the code can be developed without worrying about the underlying architecture, while machine dependent optimisations can be carried out at a high level. These principles are put into practice through the development of an autogenerated Parallel Systems software layer (known as the PSy layer) using a domain-specific compiler called PSyclone.

The prototype model includes a re-write of the dynamical core using a mixed finite element method, in which different function spaces are used to represent the various fields. It is able to run in parallel with MPI and OpenMP and has been tested on over 200,000 cores. In this talk an overview of the both the natural science and computational science implementations of the model will be presented.