



## **Energy-efficient Scalable Algorithms for Weather Prediction at Exascale**

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Energy-efficient and scalable algorithms are key for successfully running weather prediction models for exascale problems. Global kilometre-resolution Earth-system model ensembles clearly pose such exascale computing and data handling problems, and require  $O(100)$ - $O(1000)$  acceleration over today's capabilities if considered for operational production.

ESCAPE is the first project funded by the European Commission's Future and Emerging Technology High-Performance Computing programme to address the key elements for achieving such performance gains by synergistic developments between applied science and computational science and with a focus on new and emerging computing technologies.

The project is realizing this by defining and encapsulating the fundamental functional building blocks in models that are also associated with specific computational performance bottlenecks, and by combining traditional with novel programming models for optimizing code portability and exploiting novel hardware architectures.

ESCAPE joins European expertise from leading weather prediction centres, academia, computing centres and hardware vendors to achieve its ambitious goals. The paper will present ESCAPE and its achievements nearing the end of the project's lifetime, and will present recommendations for the weather and climate prediction community to move into the exascale era.