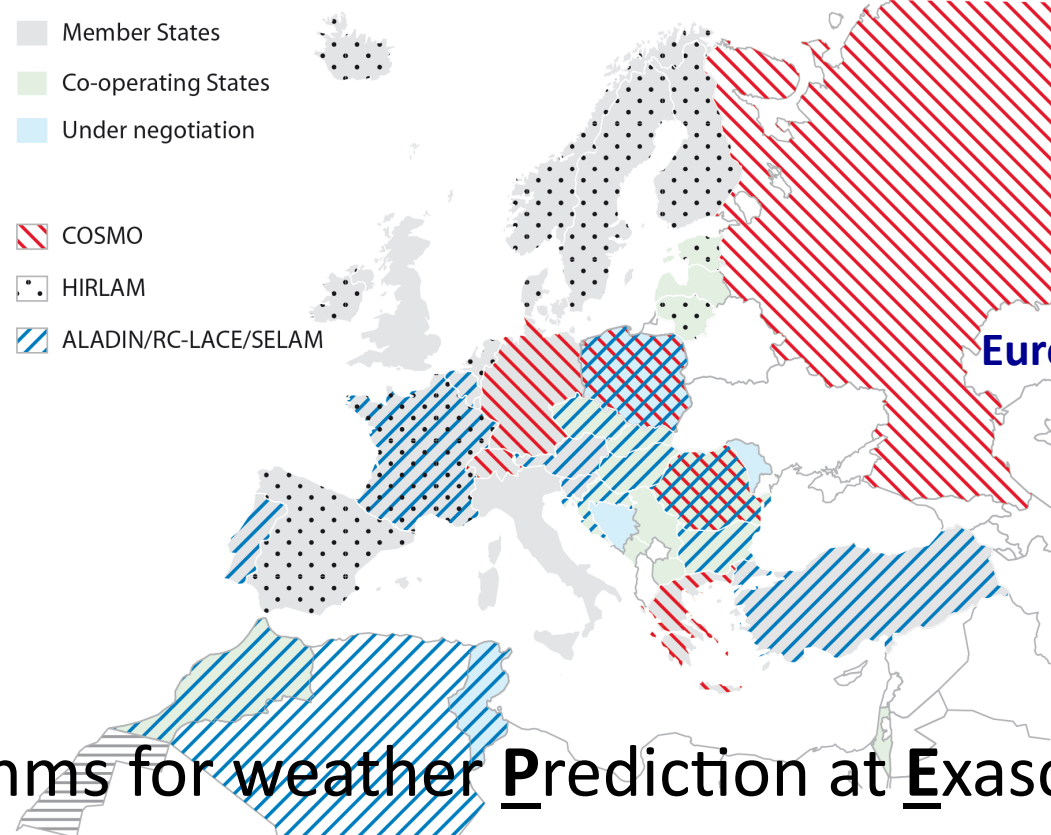




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- Member States
- Co-operating States
- Under negotiation
- COSMO
- HIRLAM
- ALADIN/RC-LACE/SELAM



Funded by the European Union



European-wide impact on operational weather prediction consortia

Energy efficient Scalable Algorithms for weather Prediction at Exascale:

- Define fundamental **algorithm building blocks** (*“Weather & Climate Dwarfs”*) to co-design, advance, benchmark and efficiently run the next generation of NWP and climate models on energy-efficient, heterogeneous HPC architectures
- Combine frontier research on **algorithm development** and extreme-scale, high-performance computing applications with **novel hardware technology**, to create a flexible and sustainable weather and climate prediction system



Weather and climate prediction codes are large and heterogeneous, 24/7 production codes with strict time-to-solution / energy-to-solution requirements

EsD must provide:

- **Substantial advances in energy-aware acceleration and computational speed**, to allow ESCAPE dwarfs to have a particular focus on compact stencil, global communication avoiding, resilient, massively-parallel algorithms and multi-level time-stepping strategies
- ‘Mainstream’ developments such as **GPU and CPU** technologies (and a novel optical processor), and the use of **new programming models and DSLs**
- Enhanced **compiler development** to facilitate code porting



Objective: ESCAPE output will be integrated in production-type weather & climate applications for EsD

Support is needed for:

- advancing **ESCAPE dwarfs** to full-scale benchmark solutions:
 - widening scope to more advanced processor types
 - widening the use of DSL to support variety of models and application domains
 - widening the choice of algorithmic implementations to exploit hardware options
 - adding handling of big data volumes
- Advanced **programming model / compiler development** to facilitate code porting
- **Applications should drive EsD component / system design with emphasis of usability**
- **Performance metric should be related to achieving key application challenges**