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eFlows4HPC

Enabling dynamic and Intelligent workflows in the future EuroHPC ecosystem

Convergence of HPC, Big Data and Machine Learning for Earth System workflows

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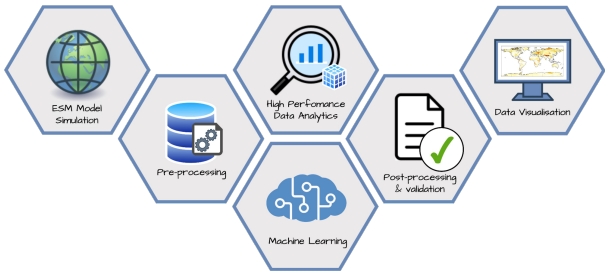
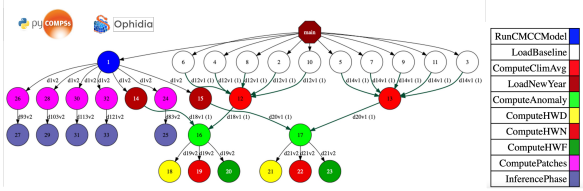
PILLAR II USE CASE

Earth System Models (ESM) simulations represent one of the most challenging HPC use cases due to the very high computational cost, intensive Input/Output patterns, very large data volumes produced, and the necessity of post-processing them to distill knowledge and extract relevant information.



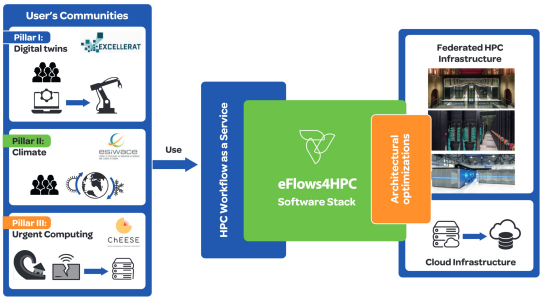
FEATURE EXTRACTION WORKFLOW

Our work targets ESM workflows, integrating multiple components from the CMCC-CM3 model execution to the extraction of knowledge concerning extreme events analysis with **HPDA** and **ML** techniques. **PyCOMPSs** is exploited for the management of parallel pipelines, **PyOphidia** for climate data analytics, and ML frameworks (i.e., TensorFlow) for data-driven models. Through this, users can run complex end-to-end workflows in a seamless way on both Cloud and HPC.



EFLOWS4HPC PROJECT

eFlows4HPC aims to design and implement a **European platform** that supports **workflows** integrating **HPC** processes, **data analytics** and **artificial intelligence**. It will deliver the **eFlows4HPC software stack** to enable the integration of components with different deployment requirements, spanning from HPC to Cloud computing, and large volumes of data from different sources and locations in the workflows realization.

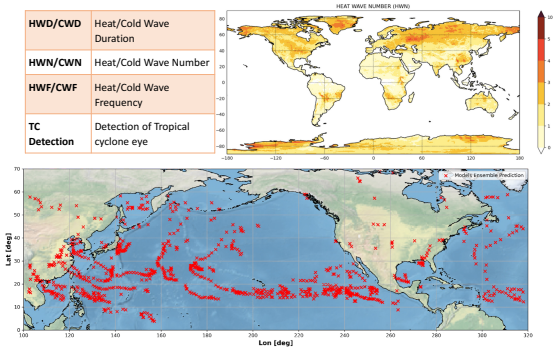


EXTREME EVENTS COMPUTATION

Key results of this integration:

- automating the creation of added-value products from the output of the ESMs simulation
- allowing scientists to increase their knowledge of the climate system through novel techniques
- democratizing access to the complex end-to-end ESM workflows.

HWD/CWD	Heat/Cold Wave Duration
HWN/CWN	Heat/Cold Wave Number
HWF/CWF	Heat/Cold Wave Frequency
TC Detection	Detection of Tropical cyclone eye



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