

Press release

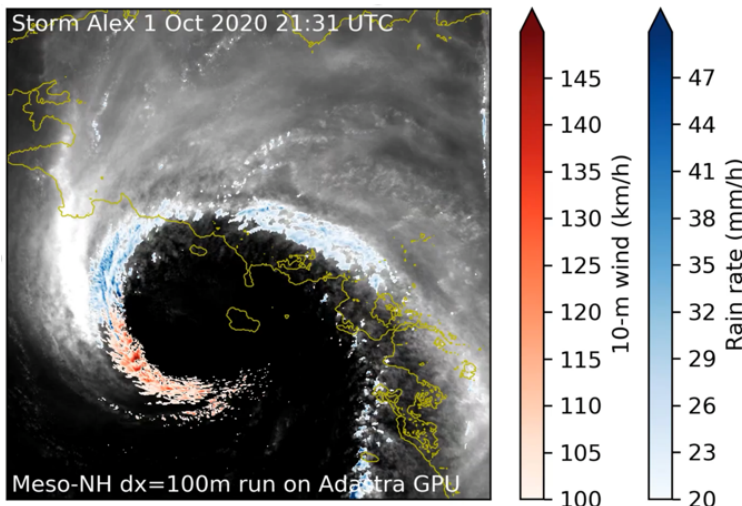
Adastra : near 30 Grand Challenges towards more sustainable science and already a first upgrade

Denver, 13th November

While Adastra, the latest GENCI’s supercomputer hosted and operated by CINES in Montpellier is now at full speed, aiming to accelerate the convergence between HPC and AI workloads in many domains (including climate research, astrophysics, material sciences and chemistry, new energies including fusion or biology and health applications), GENCI, CINES are announcing a first upgrade using the highly innovative AMD Instinct™ MI300A Accelerated Processing Unit (APU). Adastra is among the most powerful supercomputers in Europe and the most energy efficient system in production (ranked #3 on the November 2023 edition of the Green500).

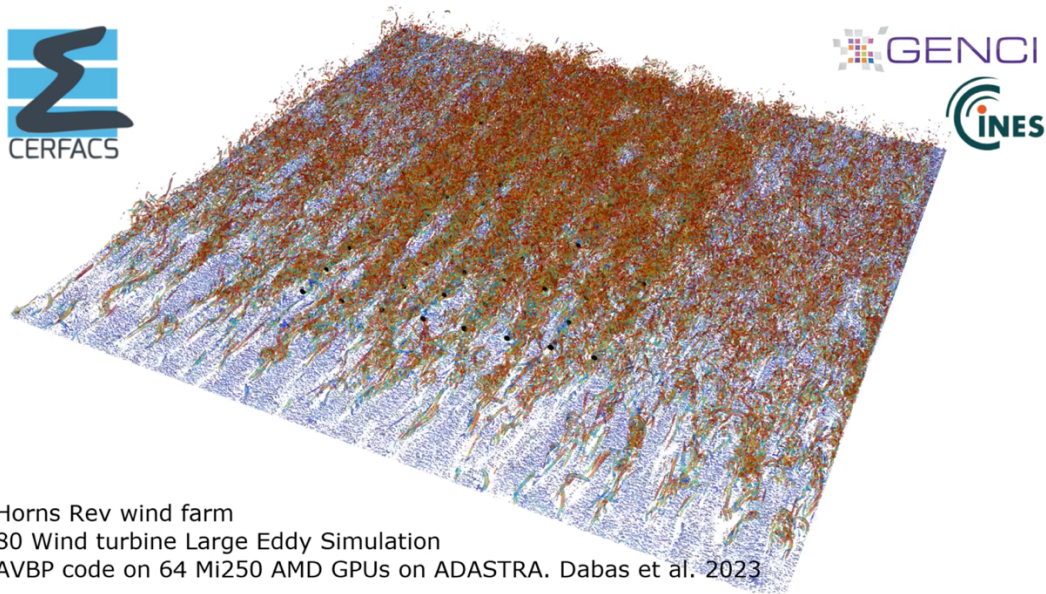
One year after the installation of its hybrid partition powered by 1,408 AMD Instinct™ MI250X accelerators and 6 months after the scalar one with close to 103,000 AMD 4th gen EPYC™ CPU cores, GENCI and CINES are proud to report some first outcomes carried out during the “Grand Challenges” phase:

- In the field of climate modeling** researchers from “LAERO Laboratoire d’Aerologie” located in Toulouse, benefited from a one year collaboration with CINES and HPE experts, for porting and scaling out on AMD Instinct accelerators Meso-NH, a leading atmospheric non-hydrostatic model, using the OpenACC support of the Cray compiler and ensuring bit reproducibility requirements. The result of this work will be presented during the SC’23 conference in Denver. They also performed a Grand Challenge on 128 hybrid nodes (512 AMD Instinct™ MI250X GPUs / 1,024 GCD - Graphic Compute Dies) in modeling past extreme weather at a grid resolution of 1.5 billion points with an unprecedented 100m resolution (Giga- LES). These simulations were instrumental in studying recent storms in the Atlantic (Storm Alex over Brittany in October 2020) and Mediterranean, including extreme wind gusts.



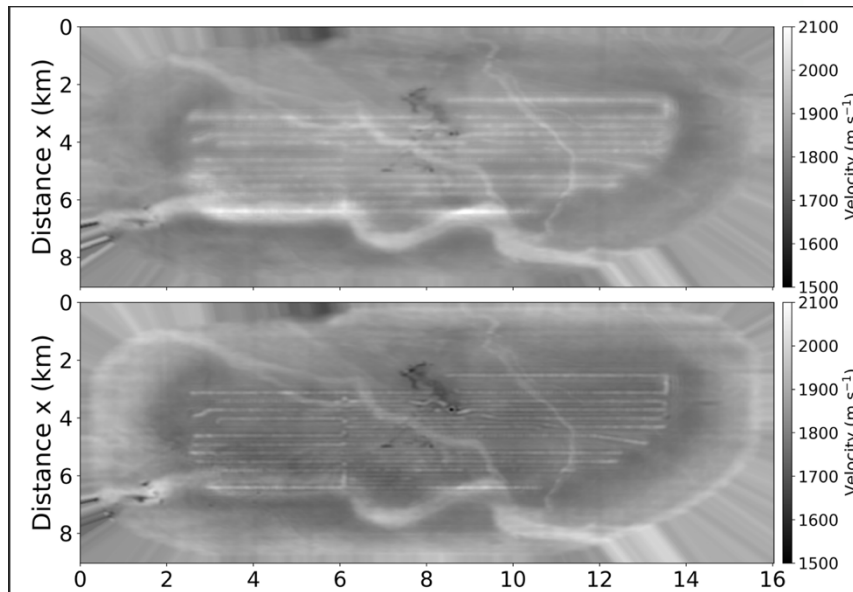
LES Simulation performed by “LAERO Laboratoire d’Aerologie” of extreme wind gusts over Brittany using AMD Instinct accelerators Meso-NH on AdastrA supercomputer

- **In the field of the development of new energies** a team from CERFACS ported the AVBP code and performed a hi-fidelity LES simulation of a windfarm of 80 wind turbines. The goal was to study the vortex wake effects potentially leading to a decrease in wind speed behind the turbine and an increase in fatigue loads within a Grand Challenges using 16 hybrid nodes of AdastrA (64 AMD Instinct™ MI250X GPUs / 128 GCD - Graphic Compute Dies).



Horns Rev wind farm
80 Wind turbine Large Eddy Simulation
AVBP code on 64 Mi250 AMD GPUs on ADASTR A. Dabas et al. 2023

- In the field of high resolution of the first kilometers of Earth’ crust, crucial toward the energy transition (massification of gas storage, extraction of resources used for solar/windfarm energy or next generation of batteries) a team from the [SEISCOPE consortium](#) performed on 49,152 4th AMD EPYC™ “Zen4” cores of AdastrA using an allocation of 28 million core hours an unprecedented modeling of 3D maps of wave propagation velocity, density and a quality factor characterizing subsurface attenuation comprising over 123 million pixels, with a resolution of several tens of meters. The following picture highlights a comparison at 10 Hz and 22.5 Hz of the velocity model (Figure 1), and an image cube derived from velocity and density (Figure 2). The gain in detail is striking!



Cross-section at $z=200$ m of the acoustic wave propagation velocity model obtained at 10 Hz (top) and 22.5 Hz (bottom). In the first case, the model contains around 15 million pixels for a resolution of around 100 m. In the second case, the model contains over 123 million pixels, for a resolution of around 50 m.

These scientific results have been achieved prior to entering a full production mode on Adastra, and after the completion of the contract of progress funded by GENCI. Those last allowed joint teams of application owners and experts from HPE, AMD and CINES to port and offload on GPUs the existing scalar applications and compare apple-to-apple TTS / ETS (Time To Solution / Energy To Solution) between one (1) scalar node (Based on 4th gen AMD™ CPUs) and one (1) accelerated node (based on AMD Instinct MI250X accelerators).



Credits GENCI

In October 2023, in order to amplify this dynamic, GENCI and CINES have decided to engage a first extension of Adastra based on 112 AMD Instinct™ MI300A APUs integrated in a new HPE Cray EX4000 cabinet equipped with 14 HPE Cray EX255a Accelerator Blades, 28 nodes, each with 4 AMD Instinct™ MI300A APUs, each APU being connected to one HPE Slingshot interconnect 11 NIC@200 Gbps.

Thanks to its innovative APU architecture, this future AMD Instinct™ MI300A partition is designed to offer to French researchers an increased support in the convergence of HPC and AI applications by providing a unique memory coherent computing system federating on the same socket both general-purpose (scalar) and accelerated resources.

About GENCI

Created by the public authorities in 2007, GENCI is a major research infrastructure. This public operator aims to democratize the use of digital simulation through high performance computing associated with the use of artificial intelligence, and now quantum computing, to support French scientific and industrial competitiveness.

GENCI is in charge of three missions:

- To implement the national strategy for the provision of high-performance computing resources, storage and processing of massive data associated with AI technologies for the benefit of French open scientific research in conjunction with the three national computing centers.
- Support the creation of an integrated HPC ecosystem at the national and European levels.
- Promote digital simulation through HPC to academic research and industry scale.

GENCI is a civil company, 49% of which is owned by the French government, represented by the Ministry of Higher Education and Research, 20% by the CEA, 20% by the CNRS, 10% by Universities represented by France Universités and 1% by Inria.

For more information, visit www.genci.fr

About CINES

Created in 1999, the CINES (National Computing Center for Higher Education) is a national HPC center located in Montpellier, affiliated with French universities and higher education and research institutions (ESR). It hosts and operates, with dedicated HPC teams, the Adastra supercomputer from GENCI on behalf of France's Universities. In addition to HPC, CINES is also the national center for the long-term archiving of ESR (higher education and research) and also hosts the computing resources of around fifteen institutions through its national data center label. In addition to high-performance computing, CINES has two other missions: long-term archiving and National hosting entity (servers/platforms).

About HPE

Hewlett Packard Enterprise (NYSE: HPE) is the global edge-to-cloud company that helps organizations accelerate outcomes by unlocking value from all of their data, everywhere. Built on decades of reimagining the future and innovating to advance the way people live and work, HPE delivers unique, open and intelligent technology solutions as a service. With offerings

spanning Cloud Services, Compute, High Performance Computing & AI, Intelligent Edge, Software, and Storage, HPE provides a consistent experience across all clouds and edges, helping customers develop new business models, engage in new ways, and increase operational performance. For more information, visit: www.hpe.com.



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