Master Classes - Tuesday, 23 May 2023

Time	**Session 1: Preparation and optimization of HPC codes to Exascale** **Instructor:** Ludovic Raess (ETH Zurich) **Room:** VX S213	**Session 2: Edge-to-end data workflows** **Instructor:** Rosa M. Badia (BSC) **Room:** VX S214	**Session 3: State-of-the-art in computational geosciences** **Instructors:** Jorge Macias (UMA) and Rui Ferreira (ULisboa) **Room:** VX S216
8:30-9:00	Course registration		
9:00-11:00	Master Class 1	Master Class 2	Master Class 3
11:00-11:30	Coffee break (provided) - Room VXS201		
11:30-13:30	Master Class 1	Master Class 2	Master Class 3
13:30-14:30	Lunch (not provided)		
14:30-16:30	Master Class 1	Master Class 2	Master Class 3
16:30-17:00	Coffee break (provided) - Room VXS201		
17:00-19:00	Master Class 1	Master Class 2	Master Class 3
19:00-20:30	Icebreaker event with light dinner - Vertex Garden		

Solid Earth and Geohazards in the Exascale Era Day 1 - Wednesday, 24 May 2023

Time	Room	Session
8:30-8:45	Sala d'Actes	Registration
8:45-9:00		Welcome, conference organization and short introduction of participants
<u>Session 1: Preparation and optimization of HPC codes to Exascale</u> *Conveners: Boris Kaus and Marisol Monterrubio-Velasco*		

9:00-10:00	Sala d'Actes	Keynote: Richard Mills **Enabling End-to-End Accelerated Multiphysics Simulations in the Exascale Era Using PETSc**
10:00-10:15		Short talk: Marc de la Asuncion **Towards exascale-prepared codes for tsunami simulation**
10:15-10:30		Short talk: Ivan Utkin **Massively parallel inverse modelling on GPUs using the adjoint method**
10:30-11:30	VX S217	*Coffee break (provided) and Poster session for Session 1* ● Albert de Montserrat Navarro **Using Julia for the next generation of HPC-ready software for geodynamic modelling** ● Daniel Conde **A distributed-heterogeneous framework for of explicit hyperbolic solvers of shallow-water equations** ● Daniel Caviedes-Voullième **Towards exascale shallow-water modelling with SERGHEI model and Kokkos** ● Pascal Aellig **Modelling the accumulation of magma prior to the caldera collapse** ● Kim Olsen **AWP-ODC: A Highly Scalable HPC Tool for Dynamic Rupture and Wave Propagation Simulations**
11:30-12:30	Sala d'Actes and VX S208	Breakout sessions
12:30-13:00	Sala d'Actes	Panel discussion
13:00-14:30	Around UPC campus	Lunch (not provided)
<u>Session 2: Edge-to-end data workflows</u> *Conveners: : Josep de la Puente, Rui Ferreira and Tiziana Rossetto*		
14:30-15:30	Sala d'Actes	Keynote: Scott Callaghan **Preparing Seismic Applications for Exascale Using Scientific Workflows**

15:30-15:45		Short talk: Natalia Poiata **BackTrackBB workflow for seismic source detection and location with PyCOMPSs parallel computational framework**
15:45-16:00		Short talk: Steven Gibbons **ML Emulation of High Resolution Inundation Maps for Probabilistic Tsunami Hazard Analysis**
16:00-16:15		Short talk: Silvia Massaro **Improving Probabilistic Gas Hazard Assessment through HPC: Unveiling VIGIL-2.0, an automatic Python workflow for probabilistic gas dispersion modelling**
16:15-16:30		Short talk: Farnaz Bayat **A first look at the calibration of near-fault motion models to synthetic big data from CyberShake's application to the Southwest Iceland transform zone**
16:30-17:30	Sala d'Actes and VX S208	Breakout sessions
17:30-18:00	Sala d'Actes	Panel discussion
18:00-19:00	VX S217	*Coffee break (provided) and Poster session for Session 2* ● Frank Bell **Alerting technologies to save lives in Forest Fires are effective with technology redundancies and multilingual CAP Event Terms basis. Design for worldwide consumer electronics adoption is preferable to reduce costs** ● Sebastian Noe **The Collaborative Seismic Earth Model: Generation 2** ● Alejandra Guerrero **Volcanic ash dispersal and deposition workflow on HPC** ● Marisol Monterrubio-Velasco **Machine Learning based Estimator for ground Shaking maps** ● Farnaz Bayat **A new Near-Fault Earthquake Ground Motion Model for Iceland from Bayesian Hierarchical Modeling** ● Milad Kowsari **Characterization of Earthquake Near-fault Ground Motion Parameters Using an Artificial Neural Network on Synthetic Big Data**

		• Benedikt Halldorsson **Towards physics-based finite-fault Monte Carlo PSHA for Southwest Iceland based on a new fault system model** • Manuel Titos Luzon **Feasibility of Multiple Advanced Machine Learning Techniques for Synthetic Finite-fault Earthquake Ground Motion Data** • Luciano Garone **Monitoring the sediment dynamics of Maltese beaches. The SIPOBED project and its future challenges**
20:00-22:00	Restaurante Pomarada	Social dinner

Solid Earth and Geohazards in the Exascale Era Day 2 - Thursday, 25 May 2023

Time	Room	Session
8:30-9:00	Sala d'Actes	Registration
<u>Session 3: State-of-the-art in computational geosciences</u> *Conveners: Victor Vilarrasa and Jorge Macias*		
9:00-10:00	Sala d'Actes	Keynote: Nicola Castelletto **Simulation of Geological CO2 Storage with the GEOS Open-Source Multiphysics Simulator**
10:00-10:15		Short talk: Arnau Folch **HPC projects in the Solid Earth ecosystem**
10:15-10:30		Short talk: Louise Cordrie **Complete workflow for tsunami simulation and hazard calculation in urgent computing using HPC services**
10:30-11:00	VX S217	Coffee break (provided)
11:00-11:15	Sala d'Actes	Short talk Carlos Paredes **Can we model lava flows faster than real-time to assist on a first volcanic emergency response?**
11:15-11:30		Iva Tojcic **Modelling of extreme sea-level hazards: state-of-the-art and future challenges**

11:30-12:30	Sala d'Actes and VX S208	Breakout sessions
12:30-13:00	Sala d'Actes	Panel discussion
13:00-14:30	Around UPC campus	Lunch (not provided)
<u>Session 4: Horizon Europe and EuroHPC Policies</u> *Conveners: Arnau Folch and Laetitia Le Pourhiet*		
14:30-15:00	Sala d'Actes	Keynote: Linda Gesenhues **The European High Performance Computing Joint Undertaking (EuroHPC JU) – Leading the way in European Supercomputing**
15:00-15:15		Invited talk: Oriol Pineda **Access to MareNostrum5 and other European HPC infrastructures**
15:15-15:30		Invited talk: Thomas Zwinger **LUMI supercomputer for European researchers**
15:30-15:45		Invited talk: Piero Lanucara **Leonardo: A Simulator4Earth**
15:45-16:00		Invited Talk: Ignacio Sarasua **Accelerating Time-To-Science in Geophysical Simulations**
16:00-16:30	Sala d'Actes and VX S208	Breakout session
16:30-17:00	Sala d'Actes	Panel discussion
17:00-18:00	VX S217	*Coffee break (provided) and Poster session for Session 3* ● Thomas Y Chen **Climate Adaptation and Disaster Assessment using Deep Learning and Earth Observation** ● Thomas Y Chen **Operationalizing deployable hazard detection technology based on machine learning** ● Ayyoub Sbihi **Contribution of geomatic tools for the study of geological control of ground movements in the province of Al Hoceima - Northern Morocco** ● Tomaso Esposti Ongaro **Three-dimensional, multiphase flow numerical models of phreatic volcanic eruptions**

		• Auregan Boyet **Hydro-mechanical modeling of injection-induced seismicity at the Deep Heat Mining Project of Basel, Switzerland** • Iman R. Kivi **A computationally efficient numerical model to understand potential CO2 leakage risk within gigatonne scale geologic storage** • Cláudia Reis **Tsunami risk management in the Exascale Era:Global advances and the European standpoint** • Juan Francisco Rodríguez Gálvez **Combining High-Performance Computing and Neural Networks for Tsunami Maximum Height and Arrival Time Forecasts** • Manuel Stocchi **Ash fallout long term probabilistic volcanic hazard assessment for Neapolitan volcanoes: an example of what Earth Scientists can do with HPC resources** • Deepak Garg **GALES: a general-purpose multi-physics FEM code** • Carlos Sánchez-Linares **HPC in Rapid Disaster Response: Numerical simulations for hazard assessment of a potential dam breach of the Kyiv cistern reservoir, Ukraine** • Linus Walter **Physics-informed Neural Networks to Simulate Subsurface Fluid Flow in Fractured Media** • Thomas Zwinger **Coupled permafrost-groundwater simulation applied to a spent fuel nuclear waste repository** • Haiqing Wu **Risk assessment and mitigation of induced seismicity for geo-energy related applications at the basin scale** • Alice Abbate **Optimal source selection for local probabilistic tsunami hazard analysis**

		• Natalia Zamora **Tsunami evacuation using an agent-based model in Chile** • Alejandro Gonzalez del Pino **Exhaustive High-Performance Computing utilization in the estimation of the economic impact of tsunamis on Spanish coastlines** • Victor Vilarrasa **Numerical simulation of injection-induced seismicity** • Leonardo Mingari **A digital twin component for volcanic dispersal and fallout** • Andrea C. Riaño **Integrating 3D physics-based earthquake simulations to seismic risk assessment: The case of Bogotá, Colombia** • Ebissa Kedir **Modeling Depth averaged velocity and Boundary Shear Stress distribution with complex flows**
18:00-19:00	BSC building and Torre Girona Chapel	Visit to MareNostrum 4 and 5 supercomputers

Solid Earth and Geohazards in the Exascale Era Day 3 - Friday, 26 May 2023

Time	Room	Session
8:30-9:00	Sala d'Actes	Registration
9:00-10:30		Discussion on the the consensual documents
10:30-11:00	VX S217	Coffee break (provided)
11:00-12:00	Sala d'Actes	Further discussion on the the consensual documents
12:00-12:30		Wrap up

End of conference