\<OpenPDAC SC6.1\>

Description: Workflow for Urgent, high resolution 3D multiphase flow simulation of phreatic eruptions

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This workflow consists of a limited number of uncorrelated high-resolution (order of 1m at the ground), 3D numerical simulations of phreatic eruptions.
Each simulation will require between 10^7 and 10^8 elements and $>10^9$ degrees of freedom solved on $O(10^4)$ cores

Preprocessing 1 (serial)

Manual action
- Set parallel decomposition parameters

decomposeParDict
- 1-2k
- ASCII file

decomposePar
- C++ (OpenFOAM)
- serial
- workstation/LUMI/leo-boost

polyMesh
- 513 M
- folder with ASCII files

blockMesh
- C++ (OpenFOAM)
- serial
- workstation/LUMI/leo-boost

blockMeshDict
- 1-2k
- ASCII file

Manual action
- Set crater geometry and mesh parameters.

Mesh Preprocessing (left-serial/right-parallel)

Manual action
- Set mesh deformation parameters

topoGridDict
- 1-2k
- ASCII file

dem.asc
- 1-10Mb
- ESRI ascii file

processors#cores folder
- 1 folder 351M
- 30-40 binary or ascii files

topoSet
- C++ (OpenFOAM)
- MPI
- workstation/LUMI/leo-boost

topoSetDict
- 1k
- ASCII file

topoGrid
- C++ (OpenFOAM)
- MPI
- workstation/LUMI/leo-boost

processors#cores/constant/polyMesh
- 611M
- folder with ASCII files

sets
- 44k
- folder with ASCII file

Field Preprocessing (parallel)

Manual action
- Set simulation conditions and numerical schemes/parameters

system
- 1-10k
- folder with ASCII file (OpenFOAM dictionaries)

OpenPDAC
- C++ (OpenFOAM)
- MPI
- workstation/LUMI/leo-boost

setFields
- C++ (OpenFOAM)
- MPI
- workstation/LUMI/leo-boost

setFieldsDict
- 1k
- ASCII file

Preprocessing 2 (parallel)

Manual action
- Set phases/lagrangian properties dictionaries

constant
- 1-10k
- folder with ASCII file (OpenFOAM dictionaries)

processors#cores folder
- ?Gb
- folder with ASCII or binary file (OpenFOAM dictionaries)

processors#cores
- 351M
- folder with ASCII or binary file (OpenFOAM dictionaries)

Manual action
- Set initial conditions

Simulation (parallel)

Manual action
- Set simulation conditions
- Set run-time processing files

processors#cores and postProcessing folder
- processors#cores: 1.6G (x nout)
- postProcessing: 31G
- folders with binary file (OpenFOAM outputs and csv and VTK files)

OpenPDAC
- C++ (OpenFOAM)
- MPI
- workstation/LUMI/leo-boost

system + constant
- 1-10k
- folder with ASCII file (OpenFOAM dictionaries)

Postprocessing (parallel/serial)

Postprocessing 2

plotIso.py
- Python
- parallel
- workstation/LUMI/leo-boost

MP4 video files
- 6x1.6M

PNG files
- Nx1Mb
- jpegl ascii files for ballistic impact maps

Postprocessing 1

plotBallistics.py
- Python
- serial
- workstation/LUMI/leo-boost

createMaps.py
- Python
- parallel
- workstation/LUMI/leo-boost

asc files
- Nx10Mb each
- ESRI files for flow invasion map

asc files
- Nx10Mb each
- ESRI files for flow invasion map

PNG files
- Nx1Mb
- jpegl ascii files for ballistic impact maps

The size of files reported here is for a 120s simulation on a 4.5M gird,
For a finer grid we expect larger files.