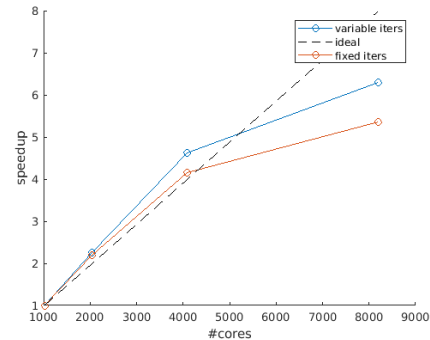
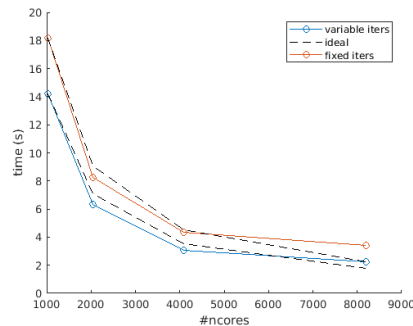


Codes updates OpenPDAC

- **Updated results**

- **New performance portability campaigns:** not planned
- **Improvements with new solution algorithm:**
 - reduced computational time
 - improved parallel scalability



- **Porting activities** (full code): the code is being ported to ARM
- **Use (integration with code/workflow) of TALP in performance monitoring activities**
 - TALP more recent version now works with OpenFOAM (used for 2nd audit)



Performance data acquisition

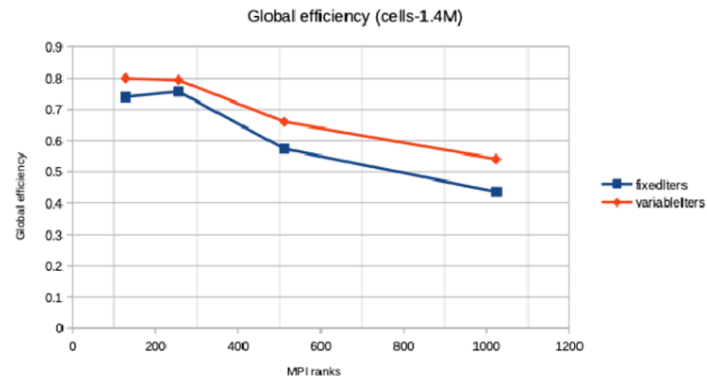
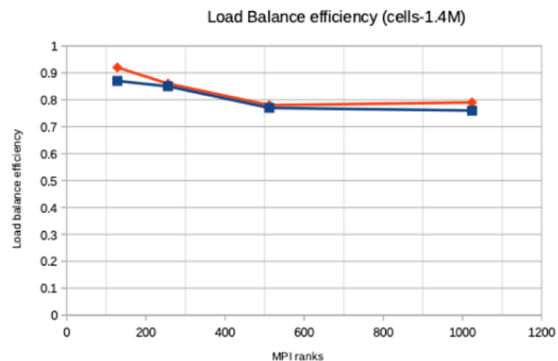
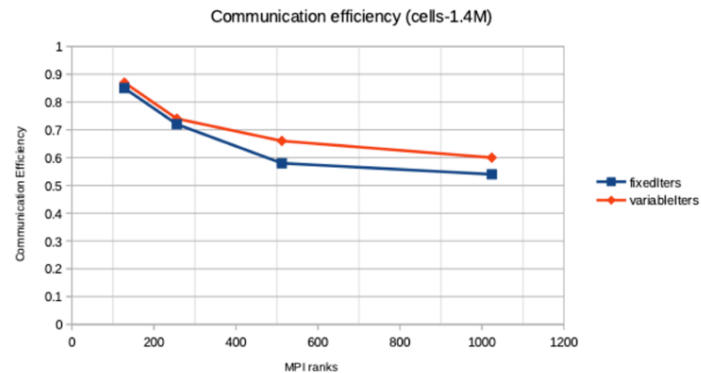
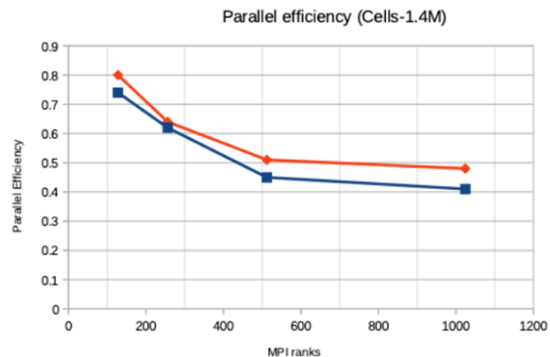
We used TALP to collect performance metrics of the OpenPDAC MPI application. Traces have been produced for all strong-scaling analysis.

Cells	Nodes	MPI ranks	Cells / rank	Elapsed time (ns)	Useful Time (ns)	Avg. use. time (ns)	MPI time (ns)	PE	CE	LB	CS	GE
1.4M	1	128	11000	8.10E+11	8.27E+13	6.46E+11	2.09E+13	0.8	0.87	0.92	1.00	0.80
1.4M	2	256	5500	4.08E+11	6.66E+13	2.60E+11	3.76E+13	0.64	0.74	0.86	1.24	0.79
1.4M	4	512	2700	2.45E+11	6.39E+13	1.25E+11	6.12E+13	0.51	0.66	0.78	1.29	0.66
1.4M	8	1024	1400	1.51E+11	7.33E+13	7.16E+10	8.05E+13	0.48	0.6	0.79	1.13	0.54
15M	8	1024	15000	1.44E+12	1.03E+15	1.00E+12	4.47E+14	0.7	0.84	0.83	1.00	0.70
15M	16	2048	7500	6.40E+11	8.16E+14	3.99E+11	4.92E+14	0.62	0.77	0.81	1.26	0.78
15M	32	4096	3800	3.49E+11	7.33E+14	1.79E+11	6.91E+14	0.51	0.61	0.85	1.40	0.71
15M	64	8192	1900	3.35E+11	9.34E+14	1.14E+11	1.81E+15	0.34	0.52	0.66	1.10	0.37

Table 8-1 POP metrics extracted from the TALP traces, for the "small" (1.4M) and "large" (15M) simulation cases. ns: nanoseconds; PE: Parallel Efficiency; CE: Communication Efficiency; LB: Load Balance Efficiency; CS: Computational Scalability (strong scaling); GE: Global Efficiency.



POP performance efficiency metrics



POP efficiency metrics comparison: new OpenPDAC convergence algorithm (variableIters) VS. 1st Audit algorithm (fixedIters), for the "small" simulation case

Codes updates to come (code owners)

The code has been recently updated to:

- further accelerate/optimize the iterative algorithms (Aitken acceleration applied to energy equation loop);
- change dynamically the maximum number of iteration within internal loops;
- exit from outer loops when convergence does not improve.

The efficiency of these changes should be assessed.

