



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA
Federal Office of Meteorology and Climatology MeteoSwiss

ICON with Data

Assimilation on GPU

Status & Performance Results



Setup

- ICON runs in «Kenda mode» for one hour and writes feedback files every 30 mins.
- DACE takes the output and compares them with some observations.
- Output files with corrections to the simulation are produced.

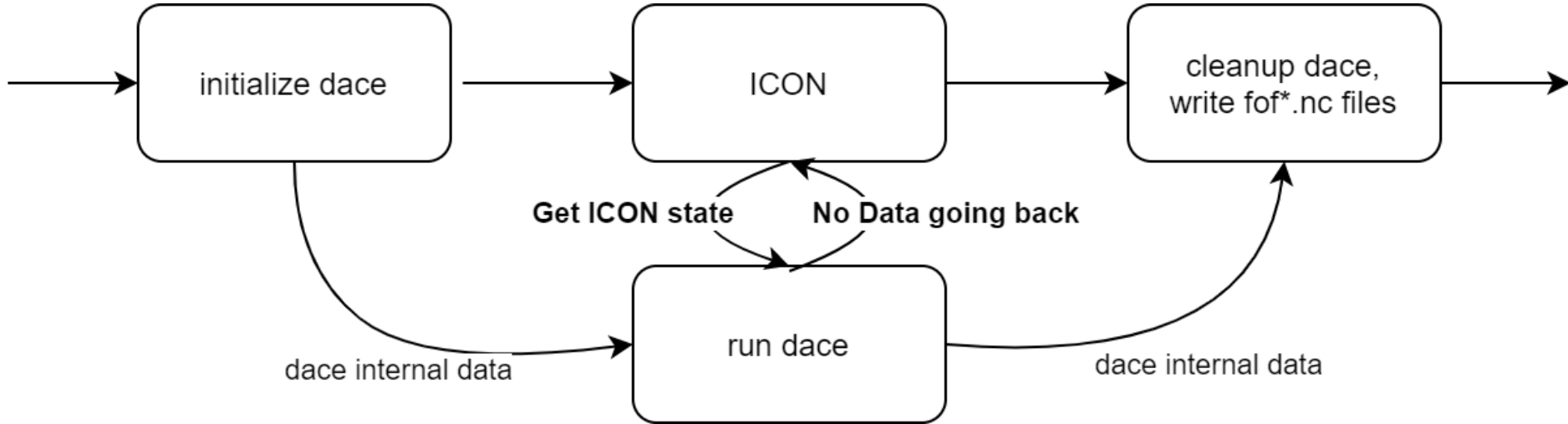


Observations

- Used observations:
 - Radiosonde
 - SYNOP (Ground Stations)
 - Windprofiler
 - Airplane measurements (AMDAR and MODE-S)
- Unused observations:
 - Radardata und Satellitedata
 - Different (Sub-)types of measurements that will not be used operationally until the launch of ICON



Data Flow





Porting Strategy

- DACE...
 - ...is initialized with a lot of data.
 - ...needs only a small part of the ICON data during the run
 - ...feeds nothing back
- DACE code is not ported to GPU. The DACE code is kept on the CPU. Data is copied from GPU to CPU when needed.
- Saves a lot of space on the GPU but is potentially a performance issue.



Performance Results I

- Test Setup as close as we can get right now to the operational setup:
 - Ca. 1.2M Grid columns (Area over Switzerland & Germany)
 - Simulation time of one hour
 - Run on Piz Daint (32 GPU nodes vs 8 CPU nodes)

	GPU run (DACE called every 1h)	CPU run (DACE called every 30min)
ICON total [s]	1214	20674
DACE total [s]	6.95	17
DACE total [%]	0.57	0.08



Performance Results II

- Considering these results, the current strategy (DACE on CPU with data transfer) is a viable option for the current setup
- These results are subject to some details:
 - Not all observation types were used.
 - Not all parts of ICON are currently ported to GPU.
 - Amount of observations has an impact on performance.
 - The GPU code of ICON is not fully optimized yet.



Discussion

- Merging and PGI/Nvidia bug issue



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA
Federal Office of Meteorology and Climatology **MeteoSwiss**

MeteoSwiss

Operation Center 1
CH-8058 Zurich-Airport
T +41 58 460 91 11
www.meteoswiss.ch

MeteoSvizzera

Via ai Monti 146
CH-6605 Locarno-Monti
T +41 58 460 92 22
www.meteosvizzera.ch

MétéoSuisse

7bis, av. de la Paix
CH-1211 Genève 2
T +41 58 460 98 88
www.meteosuisse.ch

MétéoSuisse

Chemin de l'Aérologie
CH-1530 Payerne
T +41 58 460 94 44
www.meteosuisse.ch

MeteoSwiss

© COSMO GM, 07.09.2021

Fabian
Gessler

9