Highlights of the past year

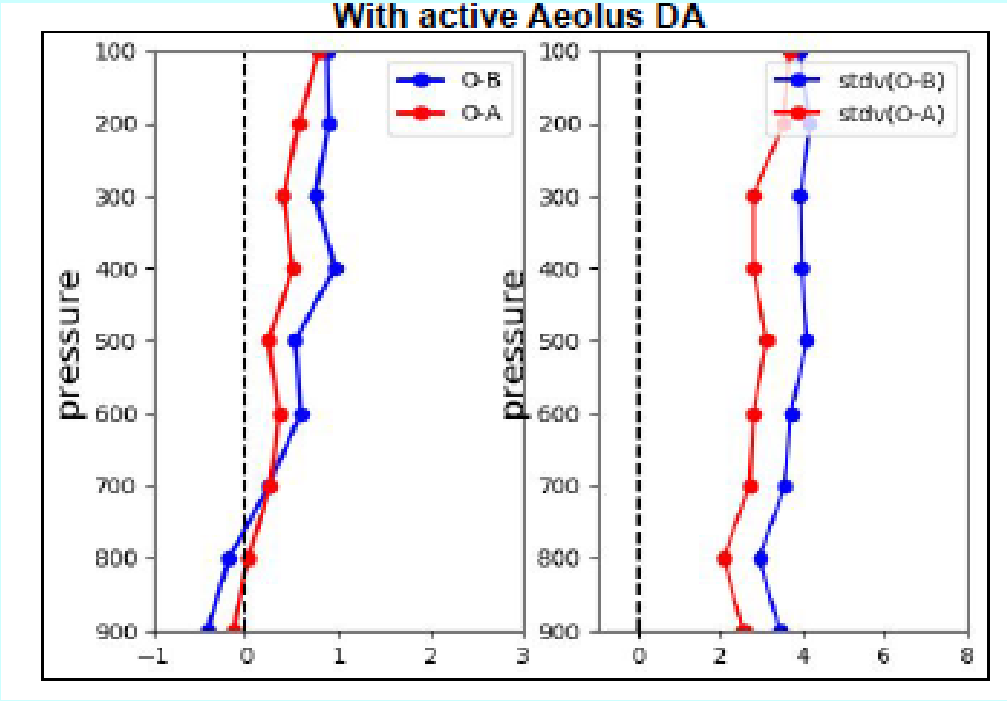
Jeanette Onvlee

Workshop/ASM 2020

30 March - 2 April, 2020

Towards optimal use of high-resolution observations and assimilation algorithms, also in nowcasting range

- Pre-operational testing of 4D-Var, cloud initialization
- Forward phasing of other algorithmic developments
- Good quality/impact of data from Aeolus, scatterometers
- Mode-S: more data sharing; improved preprocessing, quality of T data
- MF+CA: Preparations for LAM OOPS, DA unit testing



See presentations in DA/SY sessions

The hunt for causes of systematic errors and the introduction of aerosols

Identify and address systematic model weaknesses:

- focus on (low) clouds, fog and visibility, and convection (triggering)
  Challenge: search for understanding rather than immediate tackling through tuning, assess processes rather than schemes
- Improvements achieved for low clouds and convective triggering, shifting attention more to fog/microphysics

More sophisticated radiation-clouds-microphysics-aerosol interaction:

- Work on resolving inconsistencies between schemes
- Development of aerosol parametrizations for 5-6 most important aerosol types, initialization through CAMS. Tested in case studies.
- Tbd: implement aerosol code, test LIMA microphysics

MUSC development:

- installation, use made more user-friendly. Setup for virtual machine.

See presentations in PH session.

Surface analysis and modelling

- Assessment/impact testing of ECOCLIMAP-SG and other surface adaptations
- Assimilation of snow extent.
- SICE: Sea ice drift inclusion
- Windfarm parametrization
- Next: introduction/testing of Surfex v8.1 schemes (DIF, ES, …) in combination with SEKF assimilation in Cy46h.

See articles in NL14, presentations in Surface session.

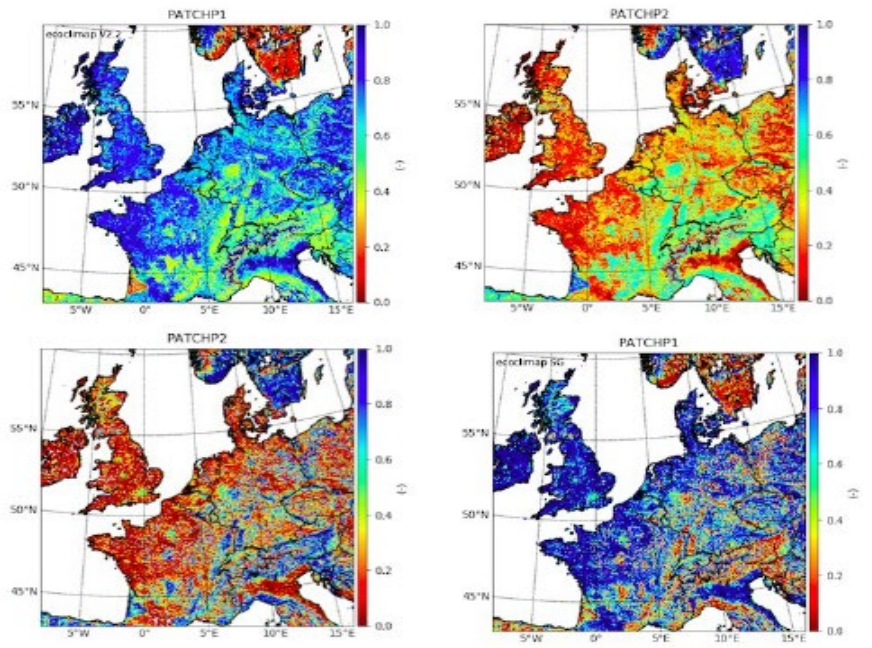


Figure 2.3.1: Spatial distribution of vegetation patches on The Netherlands domain.

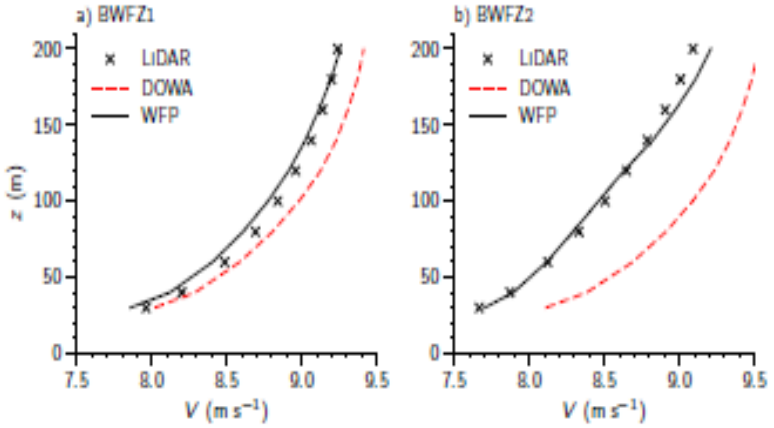


Figure 4.4: Vertical profiles of wind speed, from the normal DOWA reanalysis (DOWA) and experiment with wind farm parameterisation (WFP), compared to the Borssele LIDARS.

The creation of suitable configurations for use at higher resolution and in the nowcasting range

High resolution and nowcasting workshop, Dec 2019 Las Palmas

Nowcasting

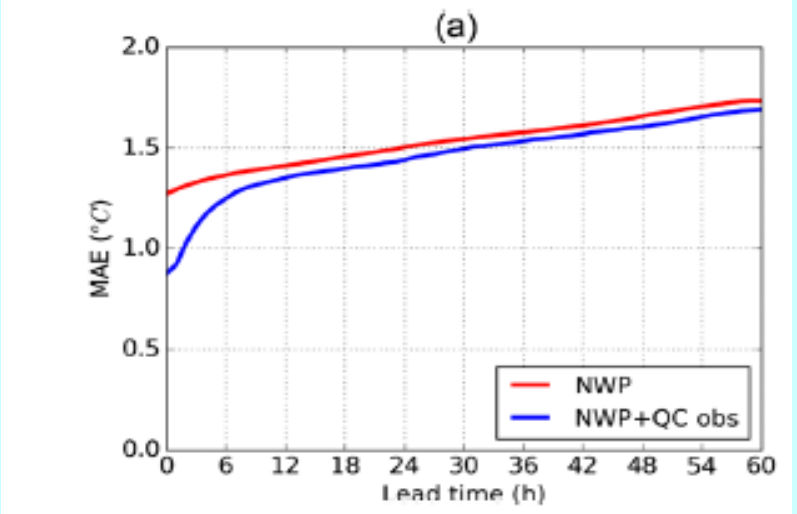
- Continuous assimilation enables timely yet large nowcasting ensembles
- Larger variety of high-frequency, high-resolution data is becoming available
- Cloud initialization implementation

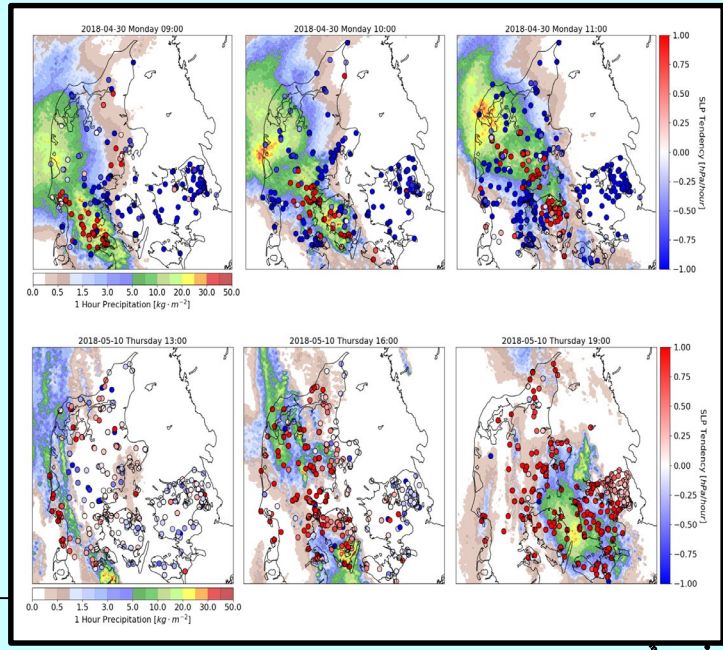
High resolution:

- Crowd-sourced data proving value for verification at sub-km/urban scales

Challenges:

- Performance in first few hours of forecast
- Verification at high resolution (time/space)
- Acquisition, QC, sharing of third-party data





Quality assessment

- Good progress on HARP-v3 verification system

- HARP training, Copenhagen

- Harmonie User meeting in Dublin, November 2019

System aspects

- Preparations for new releases:
  - Cy43h2.1 (physics changes; ECOCLIMAP-SG and smaller surface changes; release early summer 2020)
  - Cy43h2.2 (4D-Var; release candidate end 2020)
  - Forward phasing to Cy46T1
  - Preparing Cy46h-alpha.

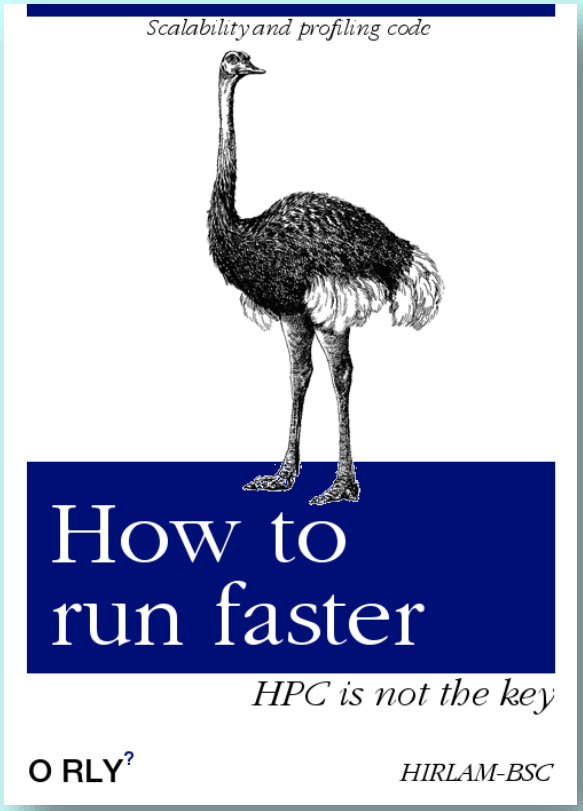
- CA work on prototyping scripting system and working environment revisions, LAM OOPS.

- Code optimization investigation by BSC

See presentations in System session

The hunt for increased computational efficiency in a post-Moore's law age

Example ambition: ~double hor. res, increase vert. res (->90 levs), double ensemble size. Challenge: this will require ~2x2x2x1.5x2 = ~24x present resources, and from new hardware it is unrealistic to expect > ~3! With what set of steps can we achieve this? Alternative approaches if we can't?



- **Continuous (overlapping windows) assimilation (2 – 3)**
- **Use quadratic or cubic spectral grids (1.3, 1.5; BUT…)**
- **Single versus double precision (~1.4-1.5; BUT…)**
- **Optimization of existing code (e.g. coop. BSC) ongoing**
- **Test Harmonie-Arome on other architectures (e.g. ARM energy-to-solution) ongoing**
- **Need to prepare/test code for increasingly heterogeneous architectures: enable use with GPU's, ATLAS, domain-specific languages, … invest!!**

Towards a single consortium…

The road towards convergence so far:

- 2016: Agreement on data policy, CMC's. Definition of Harmonie-Arome CMC

- 2017, 2018: New setup of RWP and monitoring of R&D efforts

- 2018: Agreement on mission and scope of joint consortium

- 2019: Start drafting MoU, consider working organization and financing.

- 2020: Formulate strategy and working organization. Finalize MoU.

… and another convergence to joint operational production…

MetCoOp: start with incorporation of Baltic weather services: ESTEA joined in Jan 2020.

UWC-West:

- Legal/financial agreement on shared HPC infrastructure on Iceland
- Assessments of working organization, operational procedures, NWP configuration and data architecture, post-processing.
- Start made with tender and benchmark preparation
- Joint meeting June 2020 (Corona permitting…)

After vulcanic eruptions, now there is Corona…

Unfortunately we cannot meet as planned in lovely Ljubljana… so a web conference for now…

…but I hope to see you there next year!