YOGA-2012 description

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The YOGA-2012 dataset is the result of LES simulations driven by the Regional Atmospheric Climate Model (RACMO, see van Meijgaard et al., 2008), that span a full year of weather conditions over Cabauw, the Netherlands. The set-up, characterization and validation of the simulation runs are described in Schalkwijk et al. (2014). This report serves as a quickstart guide to the dataset itself.

The dataset is available of two runs: YOGA-2012 and YOGA-HR-2012, which differ in resolution and domain size. There are a number of other differences between these two runs:

- YOGA is performed using GALES version 5.0.8 and YOGA-HR using v5.3.6. Most of the differences between these two versions are extra options which were not used. The code was generally optimized and speed up, and the option to run on a grid spanning a number other than 2^N cells in the horizontal direction was added. This option was necessary to run at the higher resolution of YOGA-HR, since the decreased time-steps made a year-long run of 256^3 cells at this resolution unfeasible (we ended up running YOGA-HR at $192^2 \times 180$). There are also some minor bugfixes in the statistics routines, which fix the writing of fielddumps, for instance, such that those are available for YOGA-HR but not for YOGA.

- Another major difference between YOGA and YOGA-HR, is the timing. After analyzing YOGA, we noticed that the timing was offset: at any time t, YOGA was forced by hourly data from RACMO that is averaged between $t-1$ hr and t. We realized that this made YOGA representative of time $t' = t - 1/2$ hr. For instance, if the sun came up (Q_{net} suddenly increases), at time t_0 in RACMO, then this was

effectively applied at $t = t_0 + 1/2$ hr in YOGA. Therefore, we have remedied this in YOGA-HR by shifting the applied forcings by half an hour. Effectively, therefore, the time variable in the NetCDF datasets should be regarded as follows:

- In YOGA, time is given as the number of seconds that have passed since December 31st, 2011, 11:30:00 UTC
- In YOGA-HR time is given as the number of seconds that have passed since December 31st, 2011, 12:00:00 UTC

For each run, two NetCDF files are made available. The first of these two covers the 'standard' statistics, i.e. horizontal averages and spectra. This file is called YOGA-stats.nc and YOGA-HR-stats.nc for YOGA and YOGA-HR, respectively. The files should be mostly self-explanatory: it covers a wide range of horizontally averaged first and second order moments (in rare cases third), as well as sampled fields (cloud-sampled $q_l > 0$, var. names starting with cld; cloudcore sampled $q_l > 0$ and $\theta_v > \langle\theta_v\rangle$ starting with cldco; updraft sampled $w > 0$ starting with up).

The second NetCDF file contains the 'tower' emulated data. In the simulations, four columns were marked as 'tower'. For these columns, at several heights were the (almost) full time-series written (dt $\approx$ 5 sec), as well as the cloud base, cloud top and vertically integrated liquid water path. These files are YOGA-tower.nc and YOGA-HR-tower.nc.

More extensive data was also produced during the simulation. In particular, field dumps were written in YOGA-HR every day at 12:00 UTC. Moreover, the full cloud field q_l and in-cloud vertical velocity w was written every 900 s. Also horizontal cross sections were written for θ_l, q_t and w in YOGA-HR every 900 s at a 200 m height. Such datasets are, however, far larger in terms of required disk space and are therefore only available through personal communication.

Note also that an observational supersite is located in Cabauw (Cabauw Experimental Site for Atmospheric Research, CESAR), of which many observations are freely available, and can thus be compared to the LES. Information on the observational supersite can be found at
`http://www.cesar-observatory.nl`
and the observational database itself is found at
`http://www.cesar-database.nl`

References

Schalkwijk, J., H.J.J. Jonker, A.P. Siebesma, and F.C. Bosveld, 2014. A Year-Long Large-Eddy Simulation of the Weather over Cabauw: an Overview. *Submitt. to MWR.*

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