

Operational NWP System: ICON-EU/ICON-D2

Update of Mixing Height computation

On 27.10.2026, the following changes will become effective with the 09-UTC forecast

Update of the Mixing Height (MH) computation

The height of the mixing layer (or planetary boundary layer) is computed in a postprocess for ICON-EU and -D2 and saved as variable 'MH'. The mixing layer height describes the depth of the atmospheric layer in contact with the surface and is typically characterized by turbulent mixing. In this layer different atmospheric processes cause mixing more strongly than in the rest of the atmosphere. The parameter is used by some dispersion models or for air-quality related studies.

The update consists of three main changes:

(1) Removal of default values

- Old: a constant low value was assumed during nighttime and certain daytime conditions.
- New: a MH value is always computed.

(2) Lower values allowed

- Old: computed values were capped between 200m and 3000m
- New: computed values are capped between 100m and 3000m

(3) New algorithm

- Old: the Gradient Richardson Number was used to determine the height. In addition some bug caused unrealistic outliers
- New: the Bulk Richardson Number is used and a rewrite of the code also removed the unrealistic outliers

In the future we plan to move from this postprocessing to an online computation in ICON with a more sophisticated algorithm. In case you have any stakes in this or the related data (planetary boundary layer height / mixing layer height) please reach out to us (ausbreitungsrechnung@dwd.de) and let us know what would be beneficial for you or what exactly you are interested in.



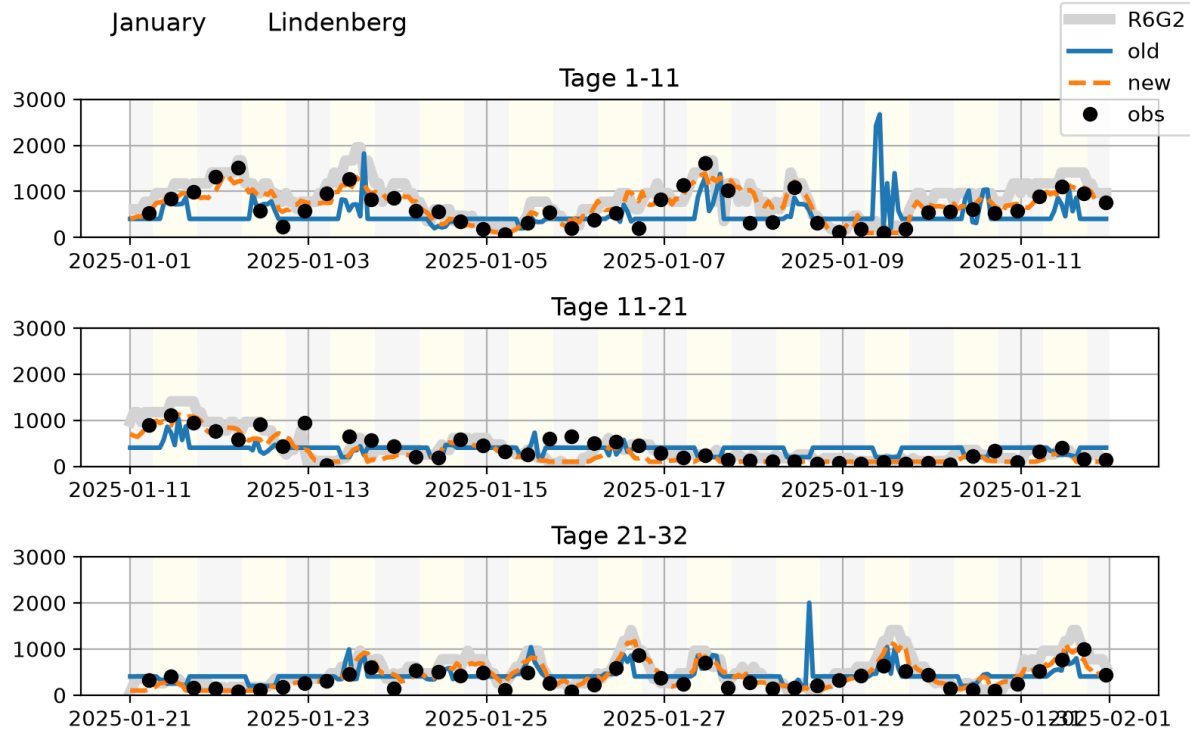


Fig.1: Mixing Height for Lindenberg January 2025. Observation from radio sounding as black dots. COSMO Reanalysis R6G2 as gray line. Old mixing height computation as solid blue line. New mixing height computation as dashed orange line.

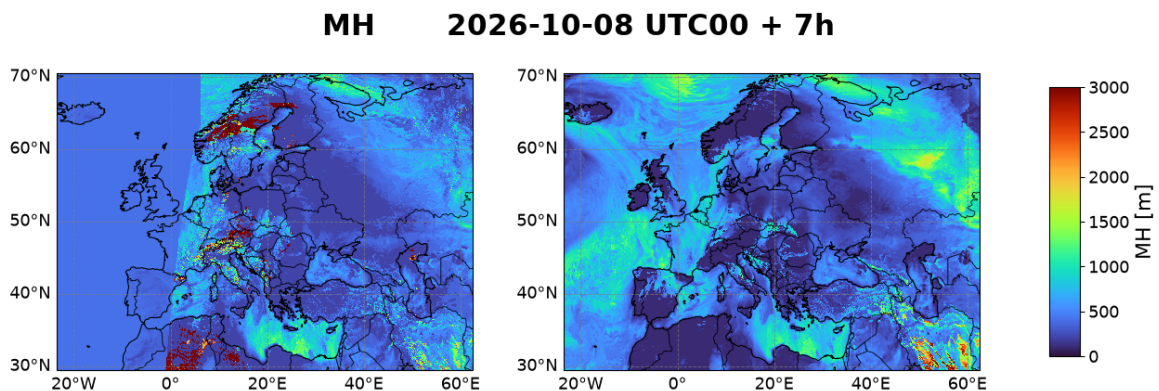


Fig.2: Mixing Height for ICON-EU: old(left), new(right). Notice for the old version: the day/night-break with constant values in the West can be seen around 0° longitude and the unrealistic high values between 0° and 20°E.

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