The WegenerNet 3D weather and climate research facility: A unique open-air laboratory for high-resolution precipitation studies

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The WegenerNet Feldbach Region is a unique weather and climate observation facility comprising 155 meteorological stations measuring temperature, humidity, precipitation, and other parameters, in a tightly spaced grid within a core area of 22 km × 16 km centered near the city of Feldbach (46.93°N, 15.90°E). With its stations every about two square-km (area of about 300 square-km in total), and each station with 5-min time sampling, the network provides regular measurements since January 2007. In 2020, the station network will be expanded by three major new components, converting it from a 2D ground station network into a 3D open-air laboratory for weather and climate research at very high resolution.

The following new observing components will start operations by spring 2020:

- A polarimetric X-band Doppler weather radar for studying precipitation parameters in the troposphere above the ground network, such as rain rate, hydrometeor classification, Doppler velocity, and approximate drop size and number. It can provide 3D volume data (at about 1 km × 1 km horizontal and 500 m vertical resolution, and 5-min time sampling) for moderate to strong precipitation. Together with the dense ground network this allows detailed studies of heavy precipitation events at high accuracy.

- An azimuth-steerable microwave/IR radiometer for vertical profiling of temperature, humidity, and cloud liquid water in the troposphere (with 200 m to 1 km vertical resolution, and 5-min time sampling), also capable of measuring integrated water vapor (IWV) along line-of-sight paths towards Global Navigation Satellite System (GNSS) satellites.

- A water vapor mapping high-resolution GNSS station network, named GNSS StarNet, comprising six ground stations, spatially forming two star-shaped subnets (one with ∼10 km interstation distance, and one embedded with ∼5 km distance), for providing slant IWV, vertical IWV, and precipitable water, among other parameters, at 5-min time sampling.

We will present a detailed overview of the new components, their location, specifica-
tion, and output data products.