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Deutscher Wetterdienst
Wetter und Klima aus einer Hand

Expansion of the ice deposition monitoring network in Germany

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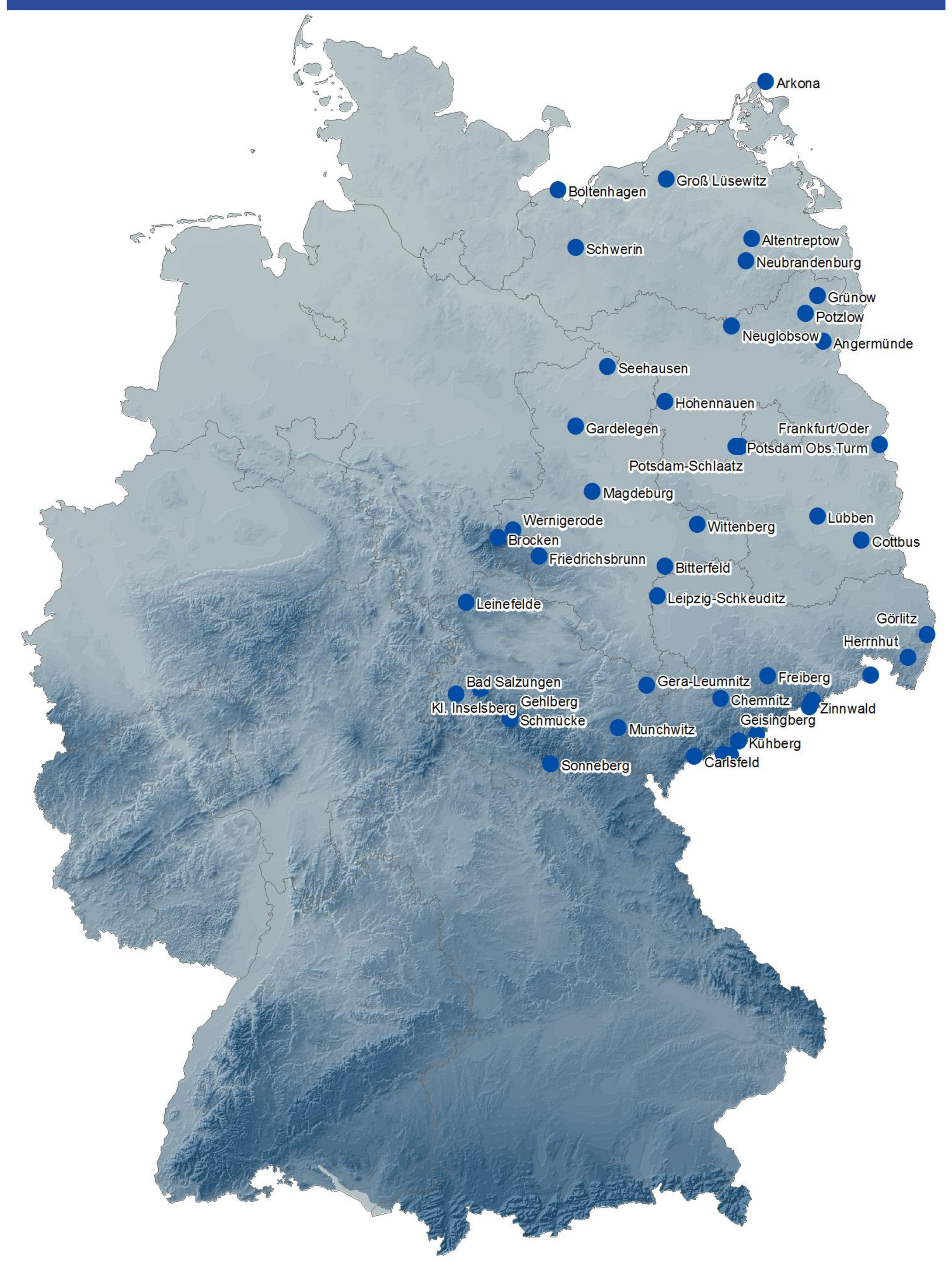
Long-term ice deposition measurements were carried out at up to 35 stations in the east part of Germany during 1965-1990. In 1991 the number of locations with ice deposition measurements was reduced to a total number of five. Since 2005 additional ice deposition measurements have been available from a meteorological mast (three heights 10 m, 50 m and 90 m above ground) at Falkenberg, near the Meteorological Observatory Lindenberg of German Meteorological Service (DWD).
The severe wet snow incident in November 2005 in the northwest part of Germany (Münsterland area) as well as the results of the European COST-Action 727 "Measuring and forecasting atmospheric icing on structures" gave convincing reasons for an expansion of the ice deposition monitoring network in Germany. Therefore, DWD started a project to implement the expansion of the network.

1965 - 1990



1990 - Present

Planning for the expansion

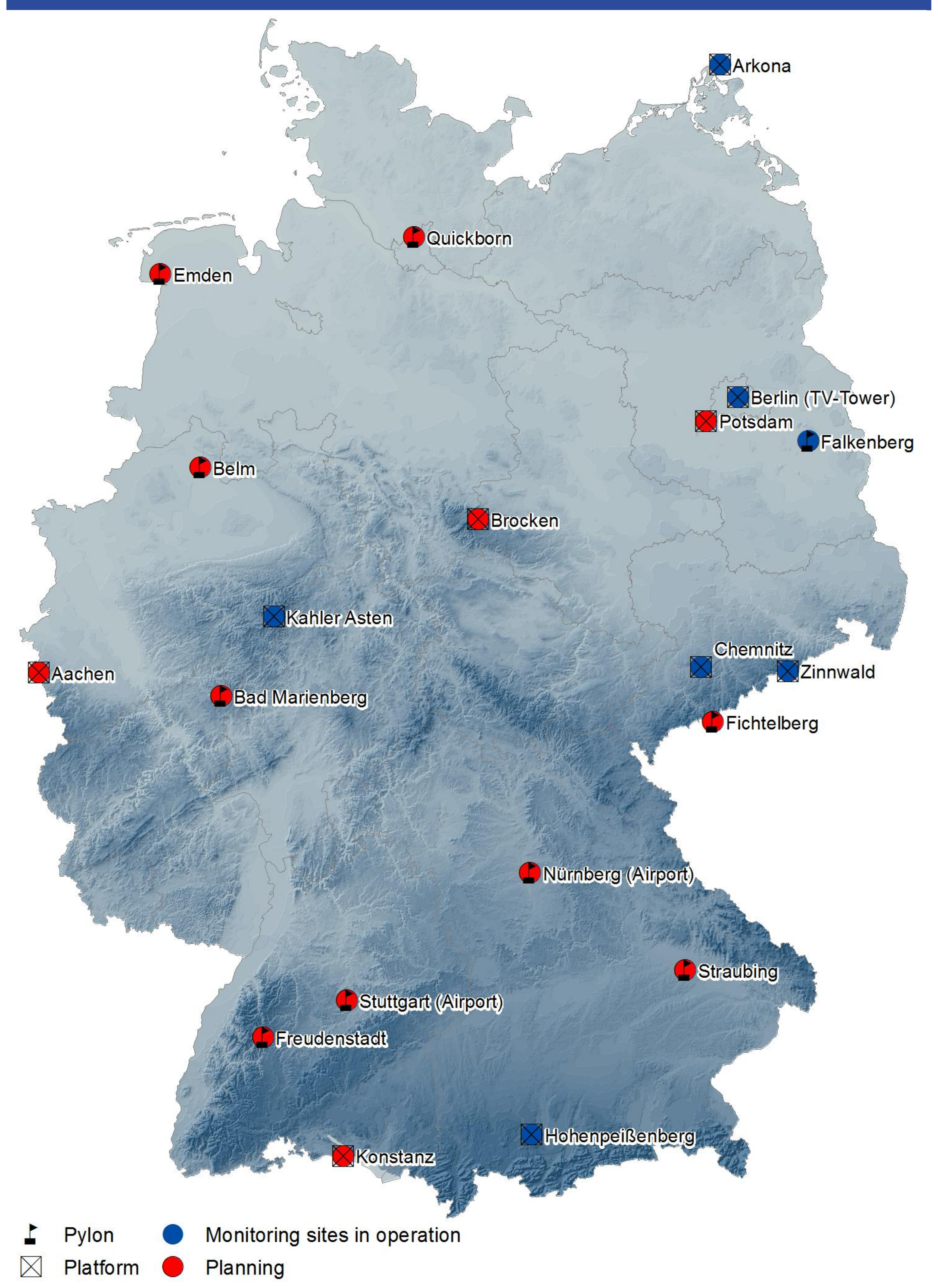


Fig. 1 – 3: Timeline of the ice deposition monitoring network in Germany. Background color varies with altitude. See [1] for more information regarding Fig. 1 and 2, respectively.

Trigger Event: Severe wet snow incident in November 2005 in the northwest part of Germany (Münsterland area).

- more than 80 power line towers were damaged as a result of wet snow accretion on power line cables (see Fig. 3, [2], [3]),
- due to the enormous economical impact of such damage the question arises as to how frequently similar climatic conditions may occur; such information forms the basis of structural design of power lines in areas prone to icing events,
- statistics on ice loads are scarce since they are seldom measured routinely.

Trigger Event: Results of the European COST-Action 727 "Measuring and forecasting atmospheric icing on structures"

- a comparison of icing measurement devices was carried out at weather station Zinnwald during winter seasons 2007/2008 and 2008/2009 (see Fig. 4, for an example of results; [4], [5]),
- the comparison campaigns were part of the COST-Action 727,
- results of COST-Action 727 showed clearly the need of ice deposition measurements in order to monitor icing conditions for several applications [6].

Fig. 3: Damaged power line poles in Münsterland area on 26.11.2005 (Photo © DPA, 2005; see [2] and [3] for more information)

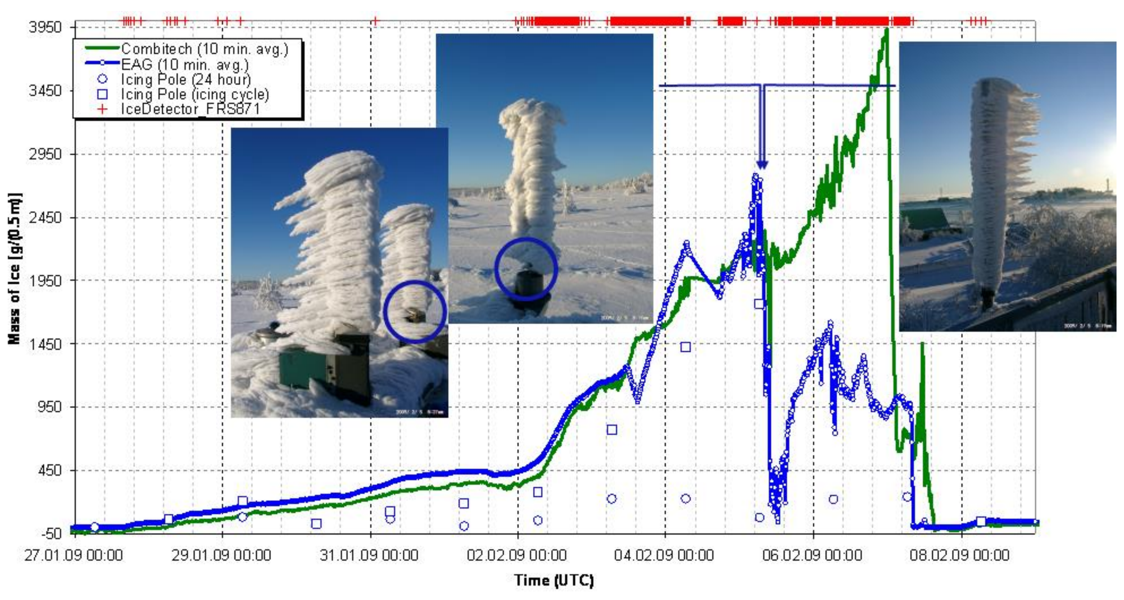


Fig. 4: Time series of icing variables as the result of test measurements with different instruments at weather station Zinnwald during the winter season 2008/2009 (see [4], [5] for more information). The photographs were taken in order to illustrate the result of icing measurements (blue arrows).

Instrumentation: Ice load sensor EAG 200 (as long as an adequate instrument will be available on the market)

- Pole diameter: 0,032 m, Pole length: 0,5 m
- Pole material: PVC
- Electro-mechanical scale
- Measuring range: 0-10 kg
- Resolution: 1 g, Accuracy: ± 50 g
- Standard measurement height: 6 m above terrain*
- On pylons or platforms (if on-site already)
- Measurement interval: 10 minute means
- Installation at weather stations, i.e. the full meteorological measurement program is available as supplementary information

* notwithstanding [7] in order to continue long term measurements at similar heights at many sites in Germany, see [1] for more information)

References:
[1] Wichura, B., 2007. A survey of icing measurements in Germany, 12th International Workshop on Atmospheric Icing of Structures (IWAIS2007), Yokohama, Japan, pp. 4.
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[3] Makkonen, L. and Wichura, B., 2010. Simulating wet snow loads on power line cables by a simple model. Cold Regions Science and Technology, 61(2-3): 73-81.
[4] Wichura, B., 2009a. Intercomparison of icing measurements at Zinnwald test site, 13th International Workshop on Atmospheric Icing of Structures (IWAIS 2009), Andermatt, Switzerland, pp. 4.
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[6] Fikke, S. et al., 2006. COST Action 727: Atmospheric Icing on Structures; Measurements and data collection on Icing : State of the Art. Publication of MeteoSwiss, 75, Zürich, pp. 110.
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