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Ice-nucleating particle depletion in the wintertime boundary layer in the pre-Alpine region during stratus cloud conditions

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Figure S1 shows the temporal evolution of the INP concentration at chosen temperatures during the cold Bise period for Hohenpeißenberg in Fig. S1a) and Eriswil in Fig. S1b). Between 6 and 8 January the INP concentration does not change much at both stations. On 9 January the INP concentrations in Hohenpeißenberg for temperatures above -12°C in S1a) decrease, in parts below the detection limit, while INP concentrations at lower temperatures remain constant or even increase. On 10 January the transition of Hohenpeißenberg into the free troposphere happens and the INP concentration for temperatures above -14°C increases suddenly and significantly, to the highest values of the entire period. A similar strong increase in INP concentrations for lower temperatures is not observed. The measurements for Eriswil in Fig. S1b) do not show a similar increase in INP concentrations at freezing temperatures above -14°C after 10 January.

Figure S2 shows the temporal evolution of the INP concentration during the warm period. For both Hohenpeißenberg in Fig. S2a) and Eriswil in Fig. S2b) the INP concentration is higher than for the cold Bise situation. The temporal evolution, however, is quite constant for both places. There only seems to be a minor decrease throughout the period which is rather negligible.

Figure S3 shows a satellite image from NASA worldview on 8 January 2024. On that day an INP measurement was done in Melpitz that was closest in time to several INP measurements from Eriswil and Hohenpeißenberg discussed in the main text. It can be seen that Melpitz and regions to the north and east of it were free of clouds and free of snow. As discussed in the main text, this can be a reason for the high observed INP concentrations.

Figures S4, S5, S6, and S7 show the backward trajectories ending at Eriswil at 14 UTC on 8, 9, 10, and 11 January 2024, respectively, for the cold Bise situation. Figures S8, S9, and S10 show the backward trajectories ending at Eriswil at 14 UTC on 27, 28 and 29 January 2024, respectively, for the warm Bise situation. In all cases it can be seen, that the backward trajectories move very close to Hohenpeißenberg and especially on 8 January 2024 close to Melpitz. It can be assumed that the air mass is the same over all places (especially for the cold Bise period), first moving over Melpitz or at least coming roughly from the north-east, second moving over Hohenpeißenberg, and third arriving at Eriswil.

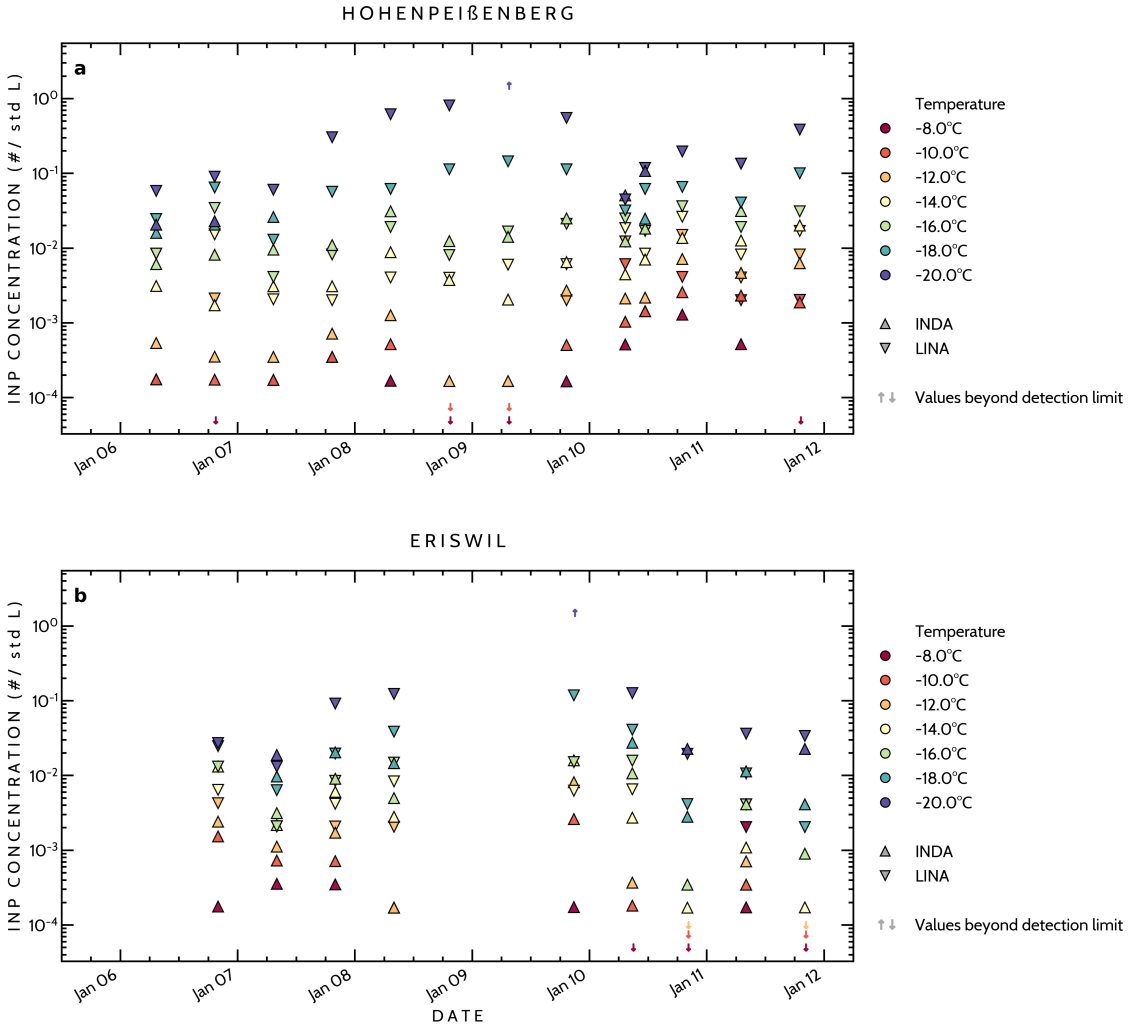

Figure S1. Time series of INP at selected temperatures (see legend) for a) Hohenpeißenberg and b) Eriswil for the cold Bise period 6–12 Jan 2024.

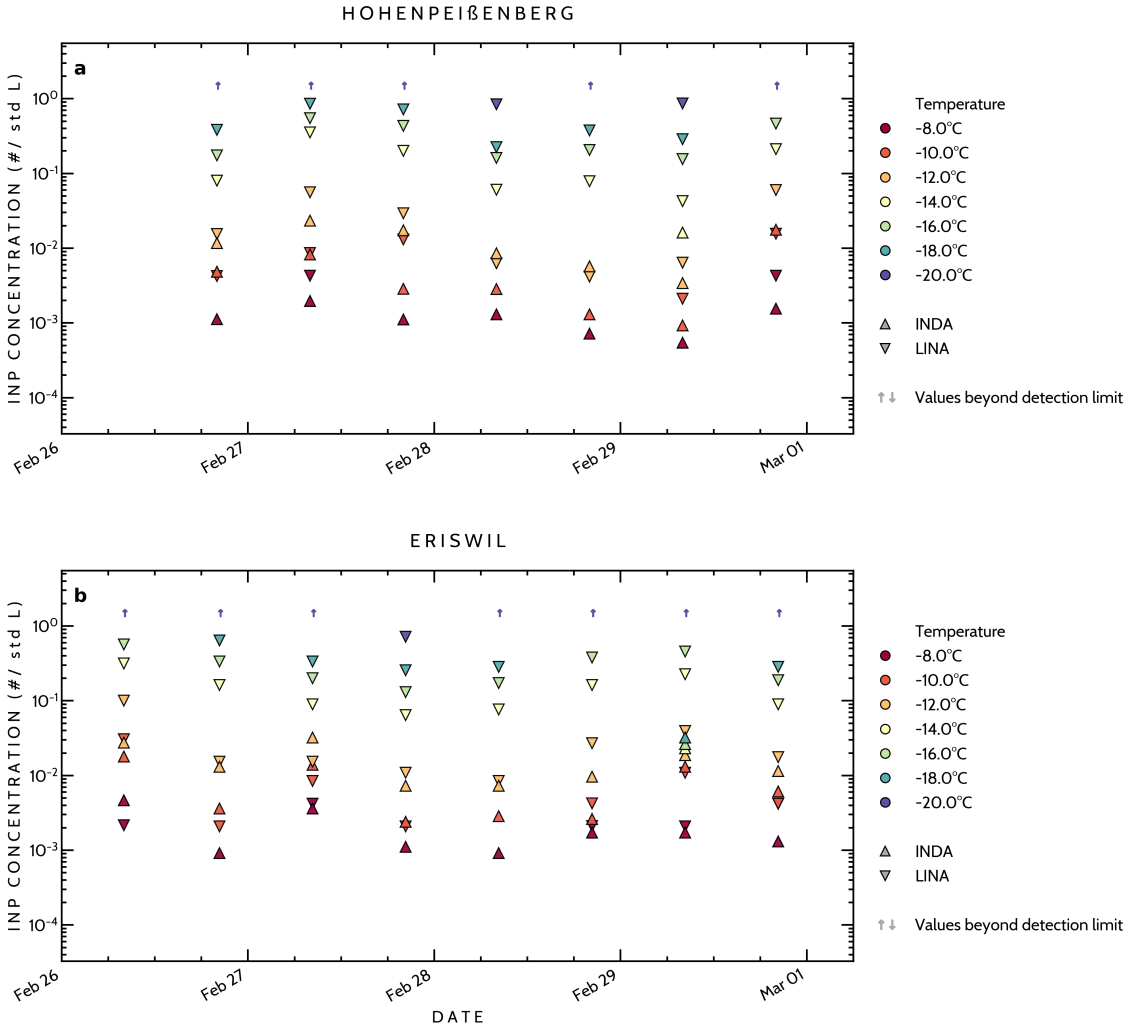

Figure S2. Time series of INP at selected temperatures (see legend) for a) Hohenpeißenberg and b) Eriswil for the warm Bise period 26–29 Feb 2024.

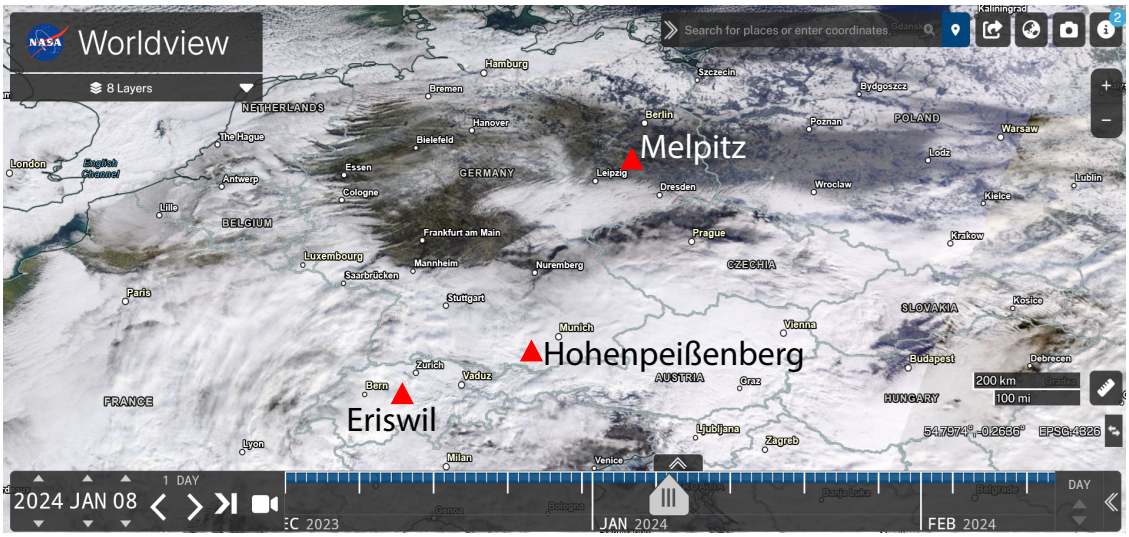

Figure S3. NASA worldview satellite image on 8 January 2024 (NASA, 2025).

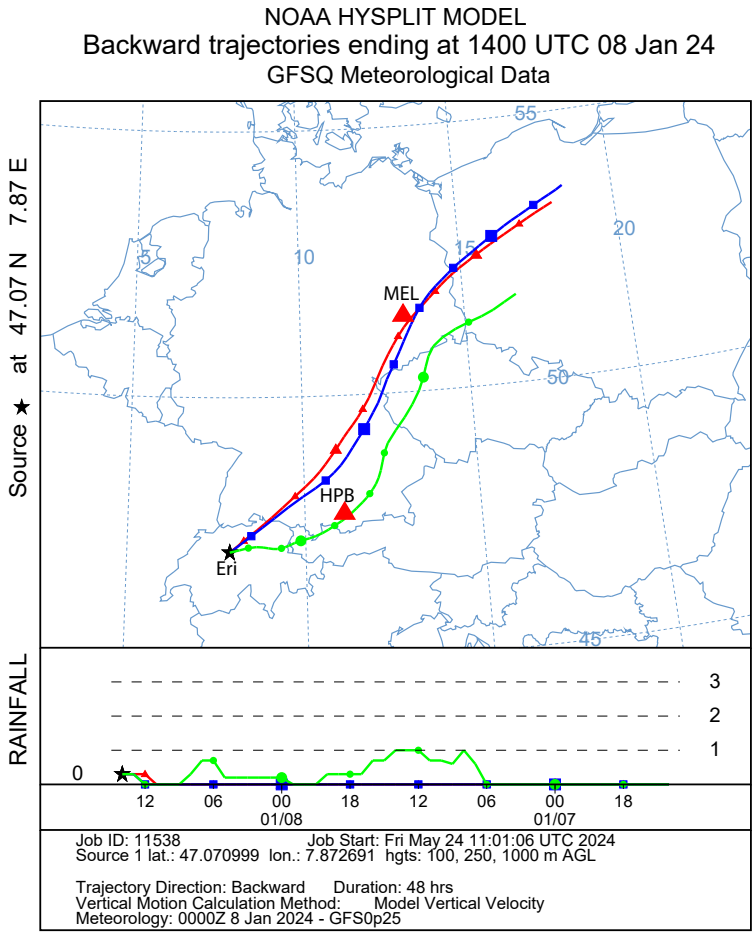

Figure S4. HYSPLIT backward trajectories ending at Eriswil on 8 Jan 2024, at 14 UTC at 100, 250, 1000 m a.g.l., shown in red, blue, green, respectively (HYSPLIT , 2025).

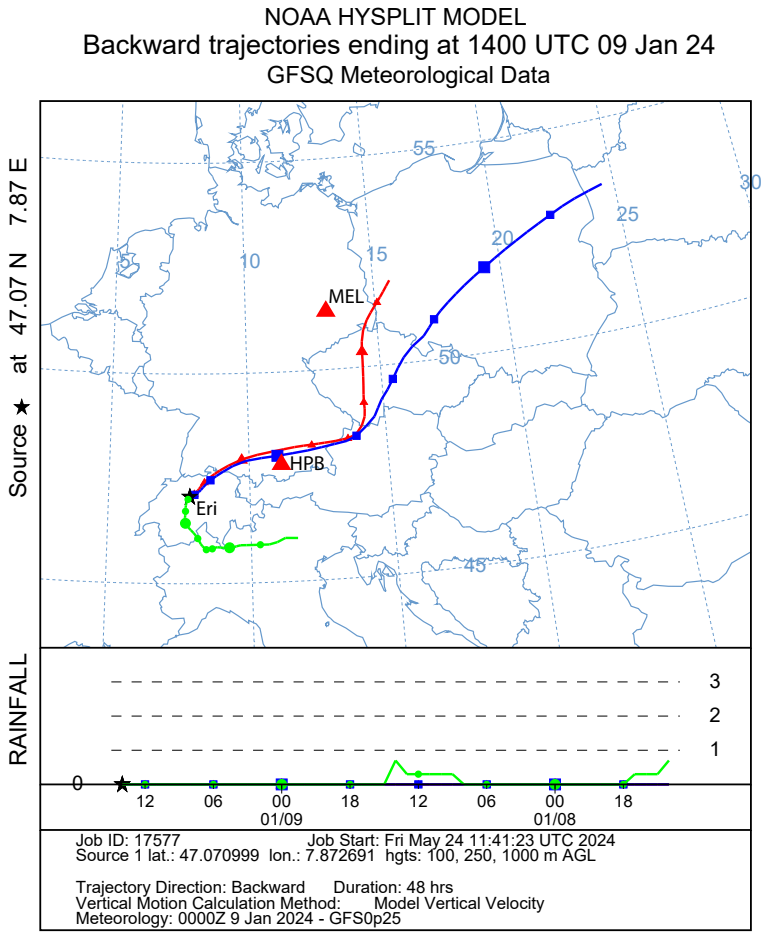

Figure S5. HYSPLIT backward trajectories ending at Eriswil on 9 Jan 2024, at 14 UTC at 100, 250, 1000 m a.g.l., shown in red, blue, green, respectively (HYSPLIT , 2025).

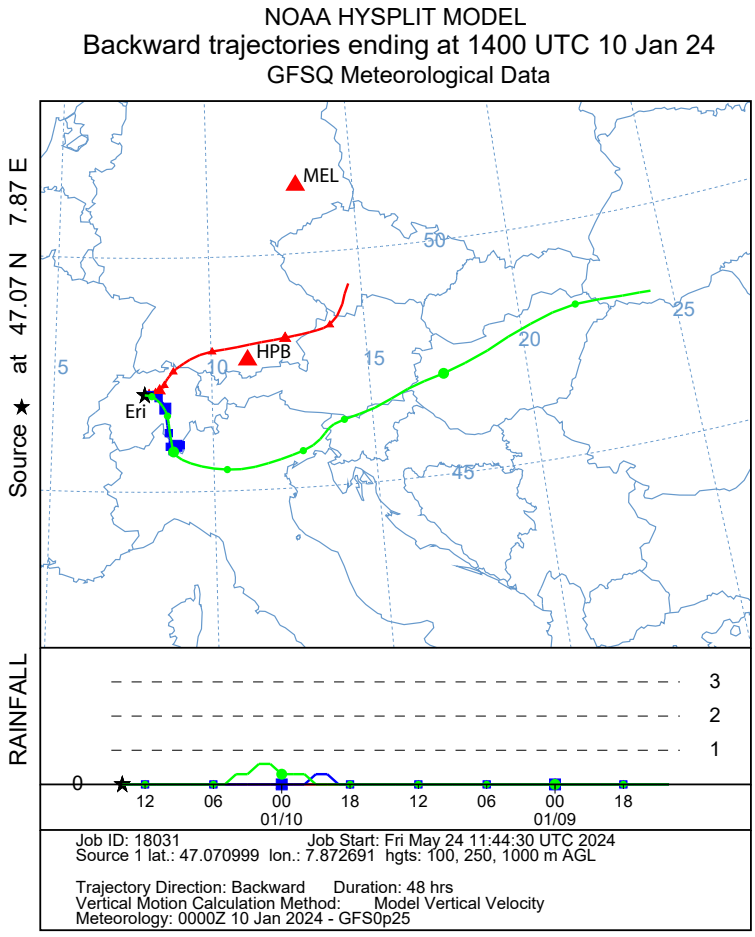

Figure S6. HYSPLIT backward trajectories ending at Eriswil on 10 Jan 2024, at 14 UTC at 100, 250, 1000 m a.g.l., shown in red, blue, green, respectively (HYSPLIT , 2025).

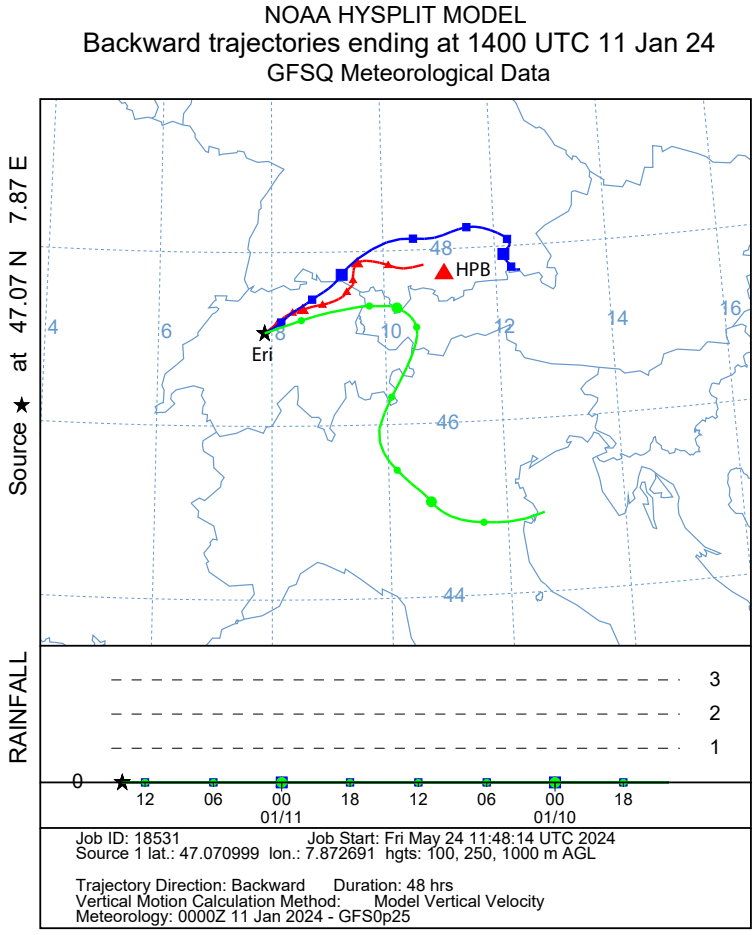

Figure S7. HYSPLIT backward trajectories ending at Eriswil on 11 Jan 2024, at 14 UTC at 100, 250, 1000 m a.g.l., shown in red, blue, green, respectively (HYSPLIT , 2025).

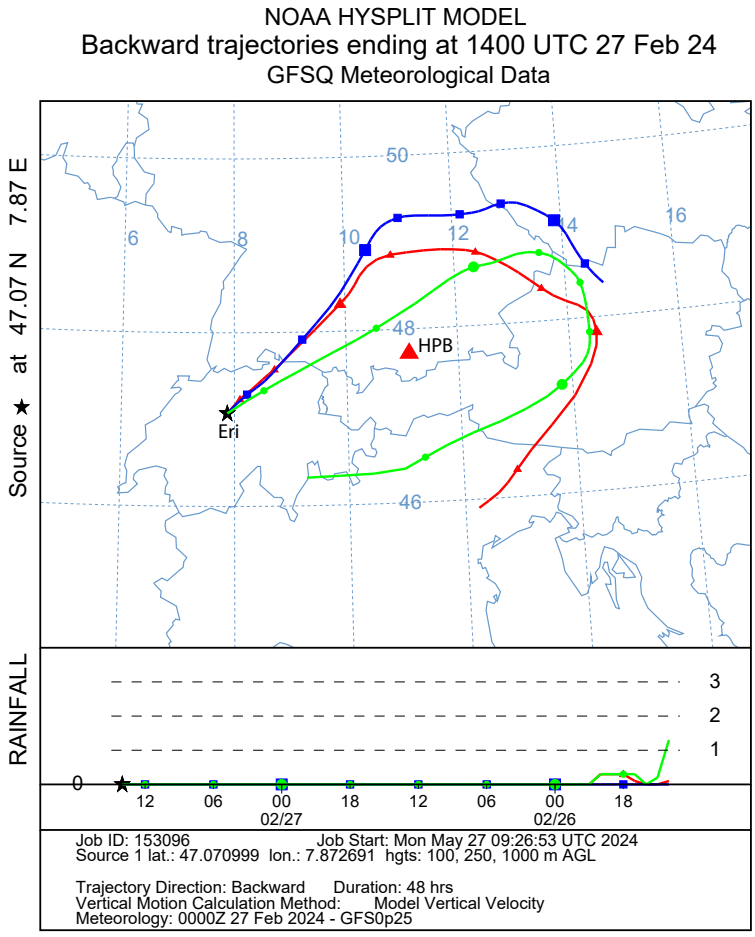

Figure S8. HYSPLIT backward trajectories ending at Eriswil on 27 Feb 2024, at 14 UTC at 100, 250, 1000 m a.g.l., shown in red, blue, green, respectively (HYSPLIT , 2025).

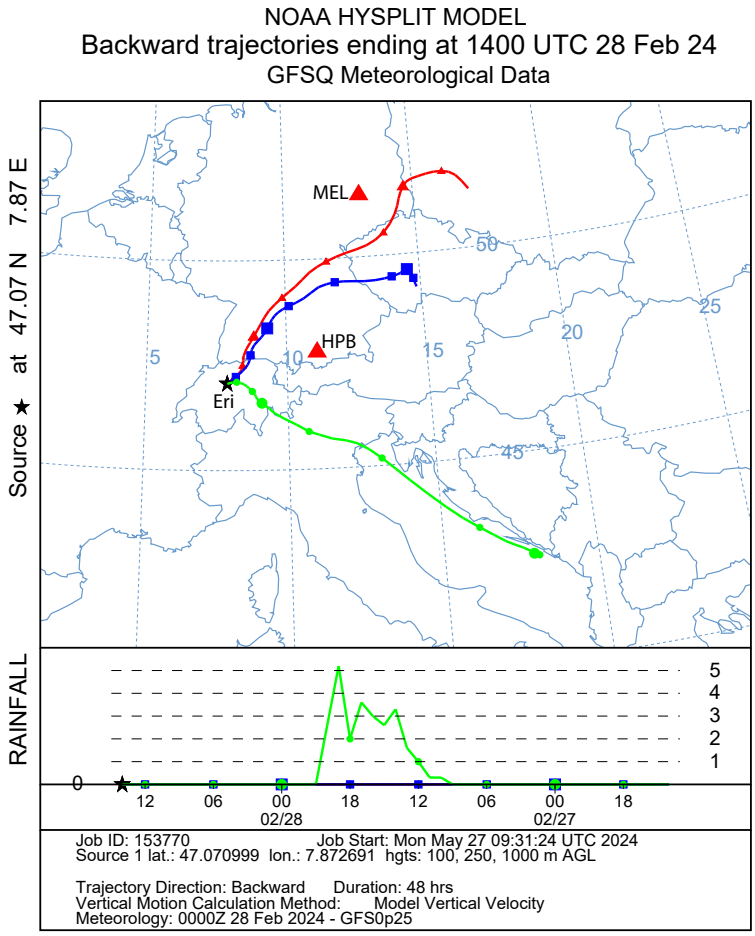

Figure S9. HYSPLIT backward trajectories ending at Eriswil on 28 Feb 2024, at 14 UTC at 100, 250, 1000 m a.g.l., shown in red, blue, green, respectively (HYSPLIT , 2025).

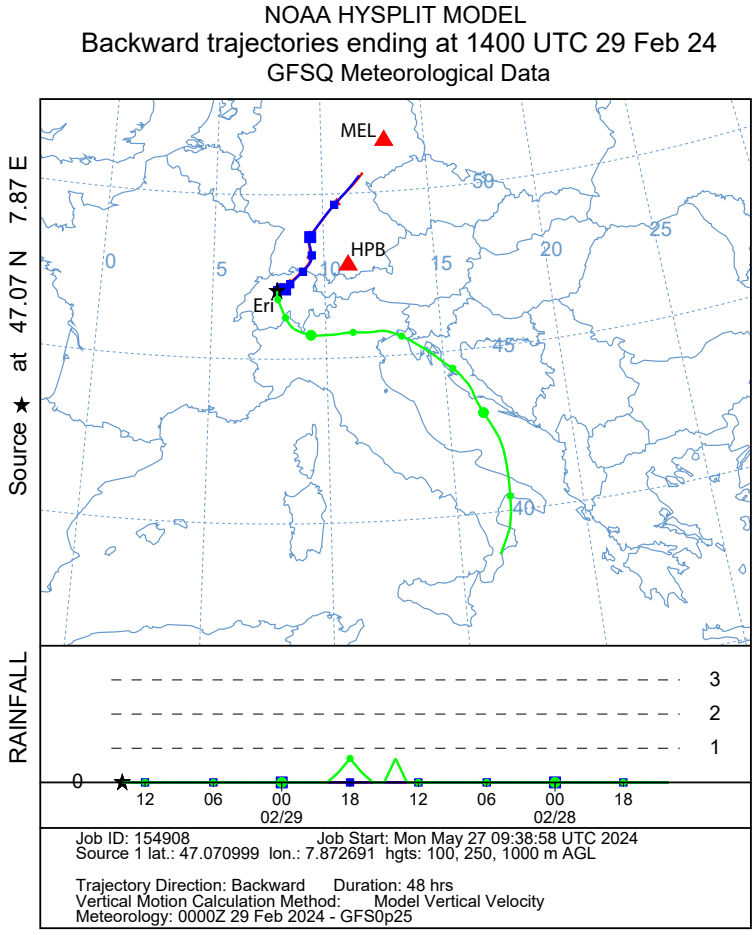

Figure S10. HYSPLIT backward trajectories ending at Eriswil on 29 Feb 2024, at 14 UTC at 100, 250, 1000 m a.g.l., shown in red, blue, green, respectively (HYSPLIT , 2025).

References

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