Supplement to: The importance of diabatic processes for the dynamics of synoptic-scale extratropical weather systems – a review

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The following pages contain figures for the four “catalyst cyclones” discussed in the paper. The figures are all produced with ERA5 reanalysis data and serve to illustrate the structure and evolution of the four cyclones with synoptic and PV maps, and vertical cross sections (at selected times). The four catalyst cyclones are:

- QE II storm 00 UTC on 09 September – 18 UTC on 12 September 1978
- President’s Day cyclone 00 UTC on 17 February – 18 UTC on 22 February 1979
- U.K. Great October storm 00 UTC on 13 October – 18 UTC on 18 October 1987
- Lothar 00 UTC on 23 December – 18 UTC on 28 December 1999

The following fields are shown for each cyclone at six-hourly intervals during the time periods indicated above:
- left panels: PV on 315 K (colours, in pvu) and MSLP (contours, every 4 hPa)
- middle panels: PV at 850 hPa (colours, in pvu) and MSLP (contours, every 4 hPa)
- right panels: potential temperature at 850 hPa (colours, in K), hourly accumulated precipitation (blue contours for 2 and 5 mm h⁻¹), and MSLP (contours, every 4 hPa)

In addition, meridional (left panels, from S to N) and zonal (right panels, from W to E) vertical cross-sections are shown through the centre of the cyclones at the time of minimum MSLP and at a few earlier times (as indicated specifically for each cyclone). Cross-sections show PV (colours, in PVU) and equivalent potential temperature (contours, every 3 K).

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QE II storm

Horizontal maps from 00 UTC on 09 September – 18 UTC on 12 September 1978

Vertical cross sections from 18 UTC on 09 September – 18 UTC on 10 September 1978
00 UTC on 10 September 1978

06 UTC on 10 September 1978

12 UTC on 10 September 1978

18 UTC on 10 September 1978
QE II Storm 18 UTC 09 Sep to 18 UTC 10 Sep 1978
President’s Day cyclone

Horizontal maps from 00 UTC on 17 February – 18 UTC on 22 February 1979

Vertical cross sections from 12 UTC on 19 February – 18 UTC on 20 February 1979
President’s Day Cyclone 12 UTC 19 Feb to 18 UTC 20 Feb 1979
U.K. Great October storm

Horizontal maps from 00 UTC on 13 October – 18 UTC on 18 October 1987

Vertical cross sections from 12 UTC on 15 October – 06 UTC on 16 October 1987
00 UTC on 16 October 1987

06 UTC on 16 October 1987

12 UTC on 16 October 1987

18 UTC on 16 October 1987
Lothar

Horizontal maps from 00 UTC on 23 December – 18 UTC on 28 December 1999

Vertical cross sections from 06 UTC on 25 December – 12 UTC on 26 December 1999
Lothar 06 UTC 25 Dec to 12 UTC 26 Dec 1999