# Supporting Information for "Why moist dynamic processes matter for the sub-seasonal prediction of atmospheric blocking over Europe"

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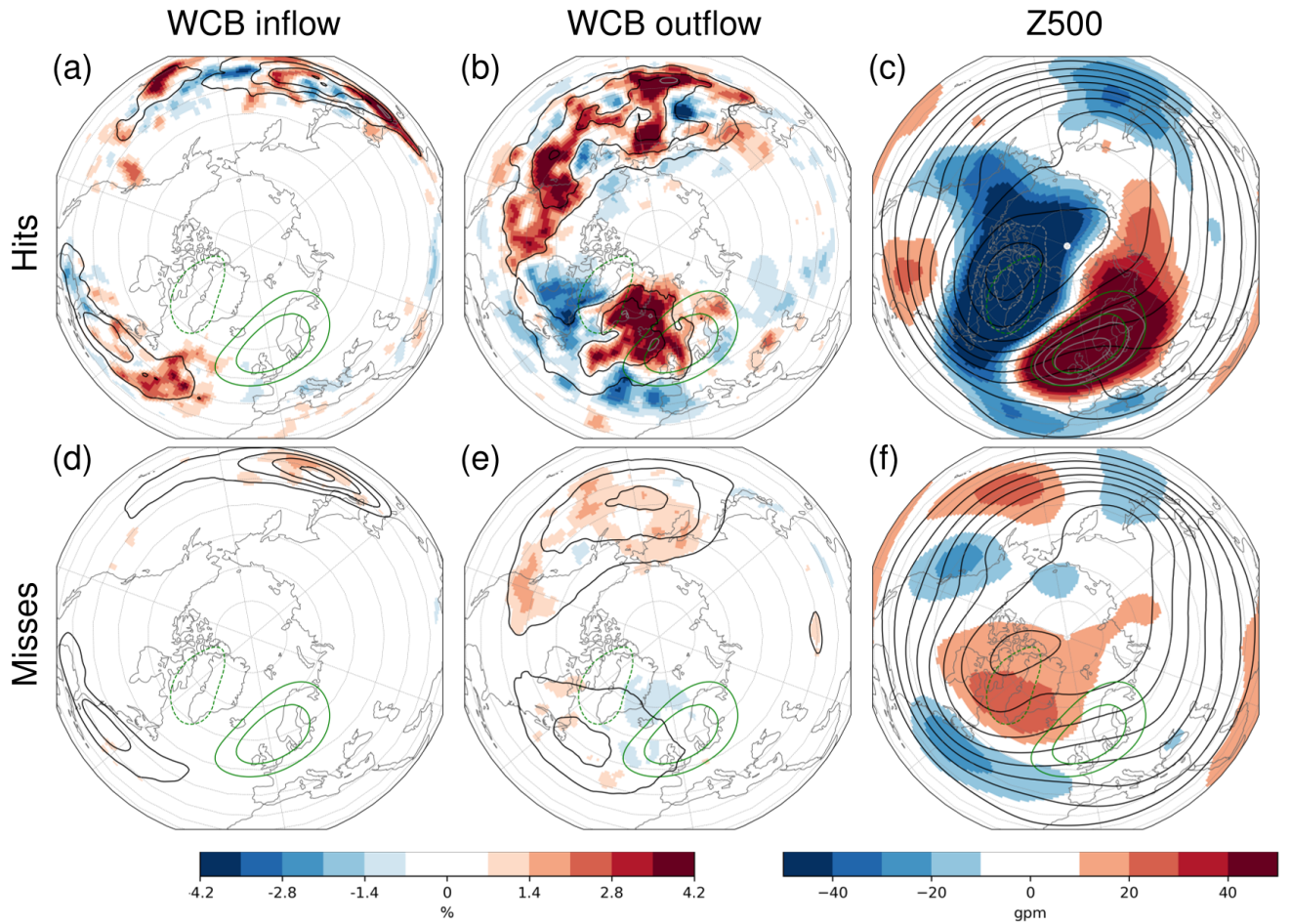
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**Figure S1.** (a-c) Ensemble members with a correct representation of ERA-Interim EuBL onset (Hits) and (d-f) ensemble members missing ERA-interim onsets (Misses) in pentad 4 (ECMWF's IFS reforecasts, NDJFM, 1997–2017). Plots show 5-day mean anomalies (shading) for (a,d) WCB inflow, (b,e) WCB outflow and (c,f) Z500, as well as 5-day mean WCB frequencies (black contours; 5,10,15,20 % in (a,b,d,e)) and Z500 fields (black contours; 5100–5800 gpm, every 100 gpm in (c,f)). Grey contours show strong WCB anomalies (6 %) and Z500 anomalies (-110,-90,-70,70,90,110 gpm). Green contours indicate geopotential height anomalies (-50,50,100 gpm) for all ERA-Interim EuBL cases from 1979–2015.
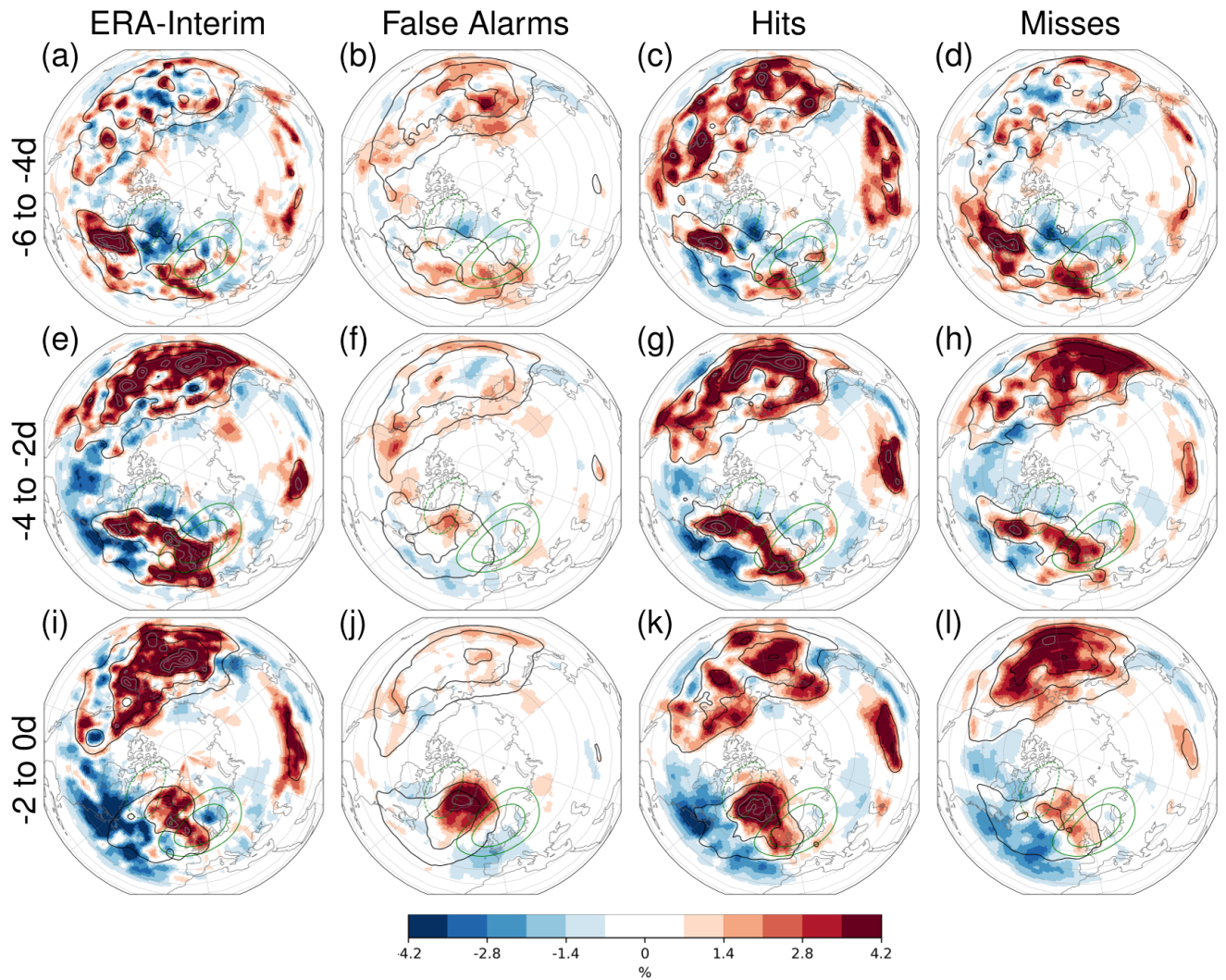
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**Figure S2.** WCB outflow frequency anomalies (shading) 6 to 4 days (a-d), 4 to 2 days (e–h), and 2 to 0 days (i–l) prior to EuBL onset in pentad 2 in a),e),i) ERA-Interim (NDJFM; 1997–2017), b),f),j) False Alarms, c),g),k) Hits, d),h),l) Misses (ECMWF's IFS reforecasts; NDJFM, 1997–2017). Grey contours show strong WCB outflow anomalies (6,8,10,12 %) and black contours indicate absolute WCB outflow (5,10,15,20 %). Green contours as in Fig. S1.
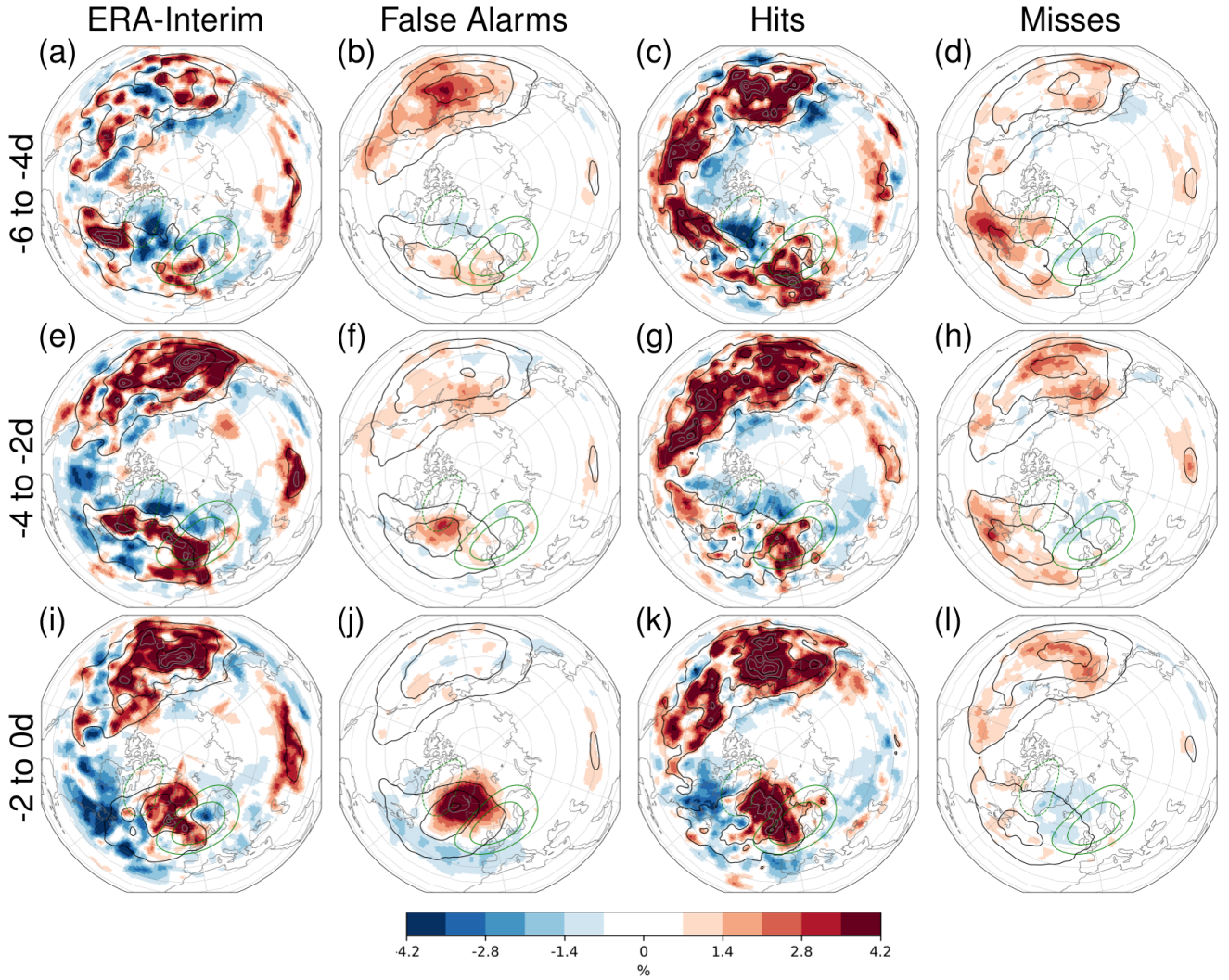
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**Figure S3.** WCB outflow frequency anomalies (shading) 6 to 4 days (a-d), 4 to 2 days (e–h), and 2 to 0 days (i–l) prior to EuBL onset in pentad 4 in a),e),i) ERA-Interim (NDJFM; 1997–2017), b),f),j) False Alarms, c),g),k) Hits, d),h),l) Misses (ECMWF's IFS reforecasts; NDJFM, 1997–2017). Grey contours show strong WCB outflow anomalies (6,8,10,12 %) and black contours indicate absolute WCB outflow (5,10,15,20 %). Green contours as in Fig. S1.
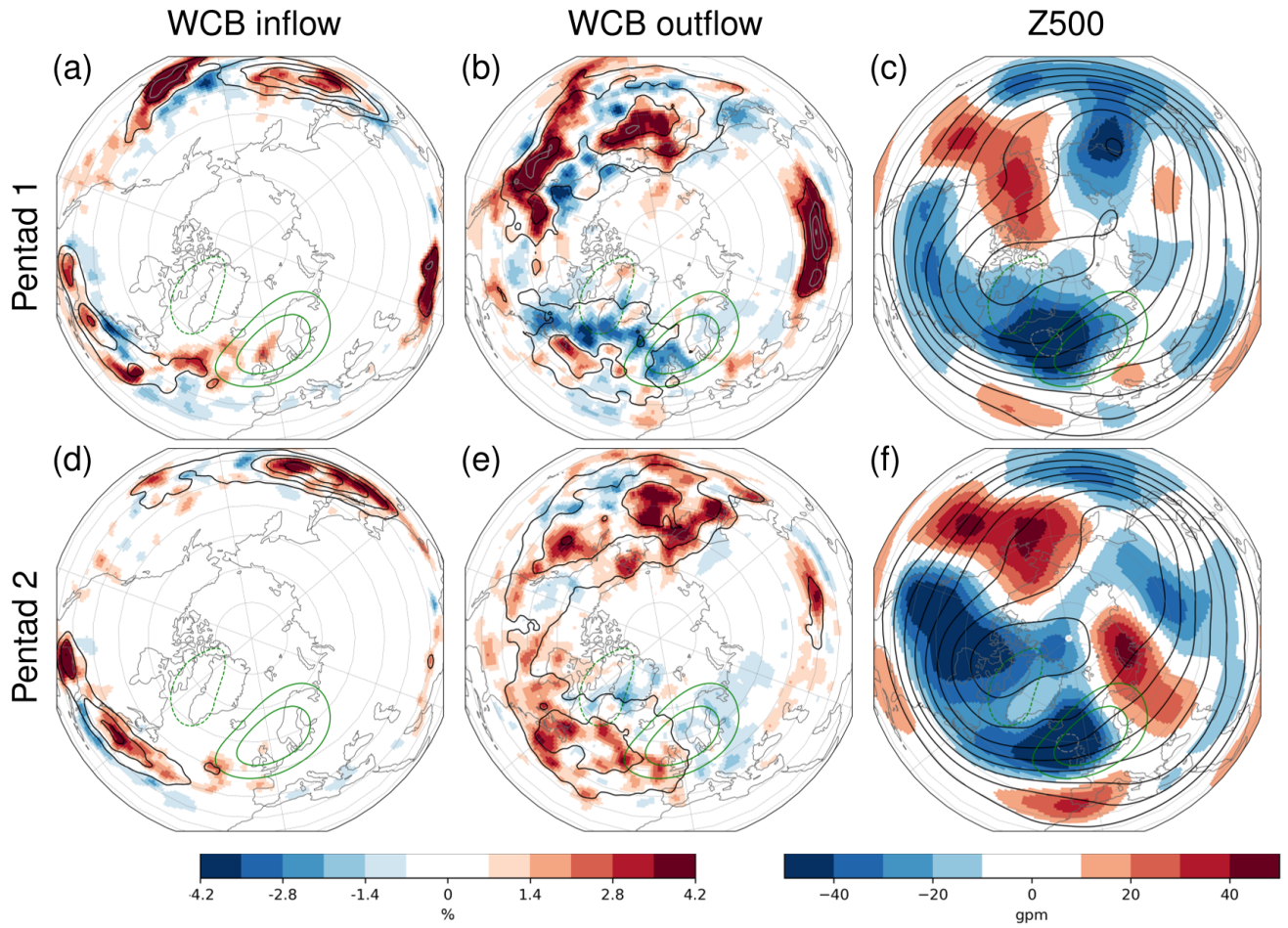
**Figure S4.** Evolution of 5-day mean (a,d) WCB inflow, (b,e) WCB outflow and (c,f) Z500 for the Ensemble members with a correct representation of ERA-Interim EuBL onset (Hits) in (a-c) pentad 1 and (d-f) pentad 2 before observed EuBL onsets in pentad 3. WCB and Z500 anomalies (shading), absolute fields (contours) and green contours as in Fig. S1.

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