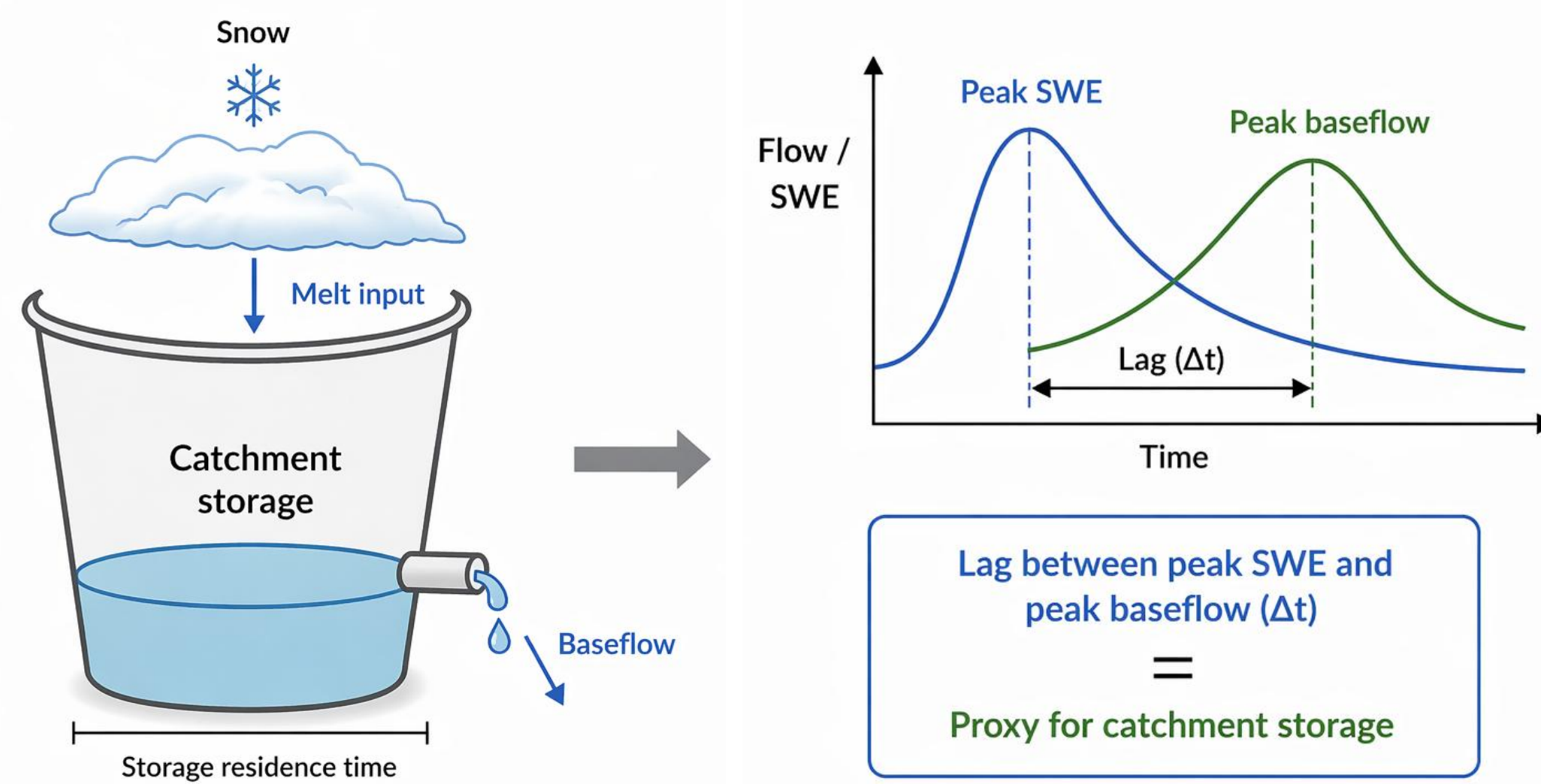


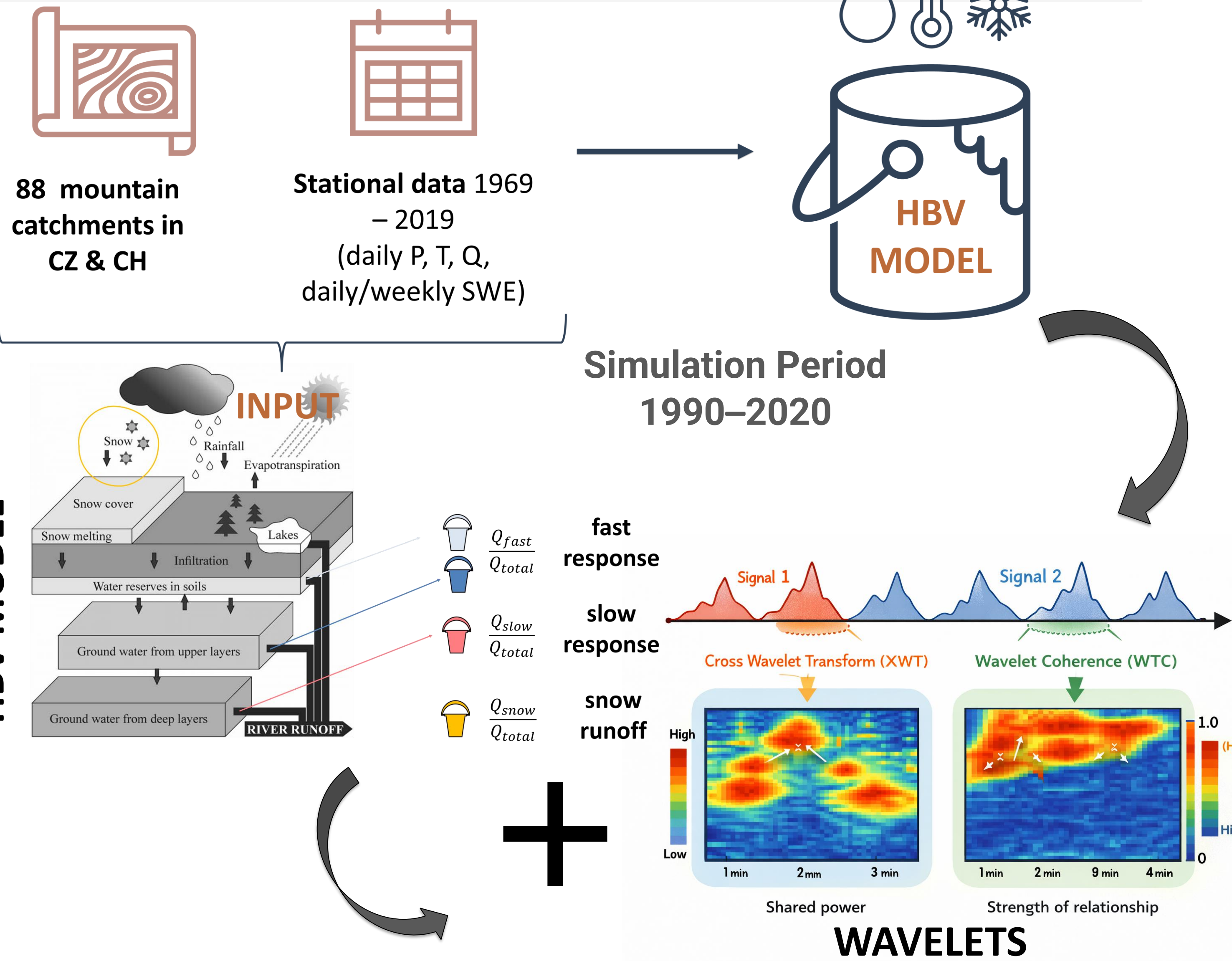
Motivation



Curiosity Question

Can phase lag between snow and baseflow act as a proxy for storage behaviour? and how does it vary with elevation?

Materials & Methods



Phase lag as a proxy for runoff response time

Fig. 1. Wavelet analysis of baseflow and snow water equivalent showing dominant annual (~365-day) periodicity and its significance across catchments.

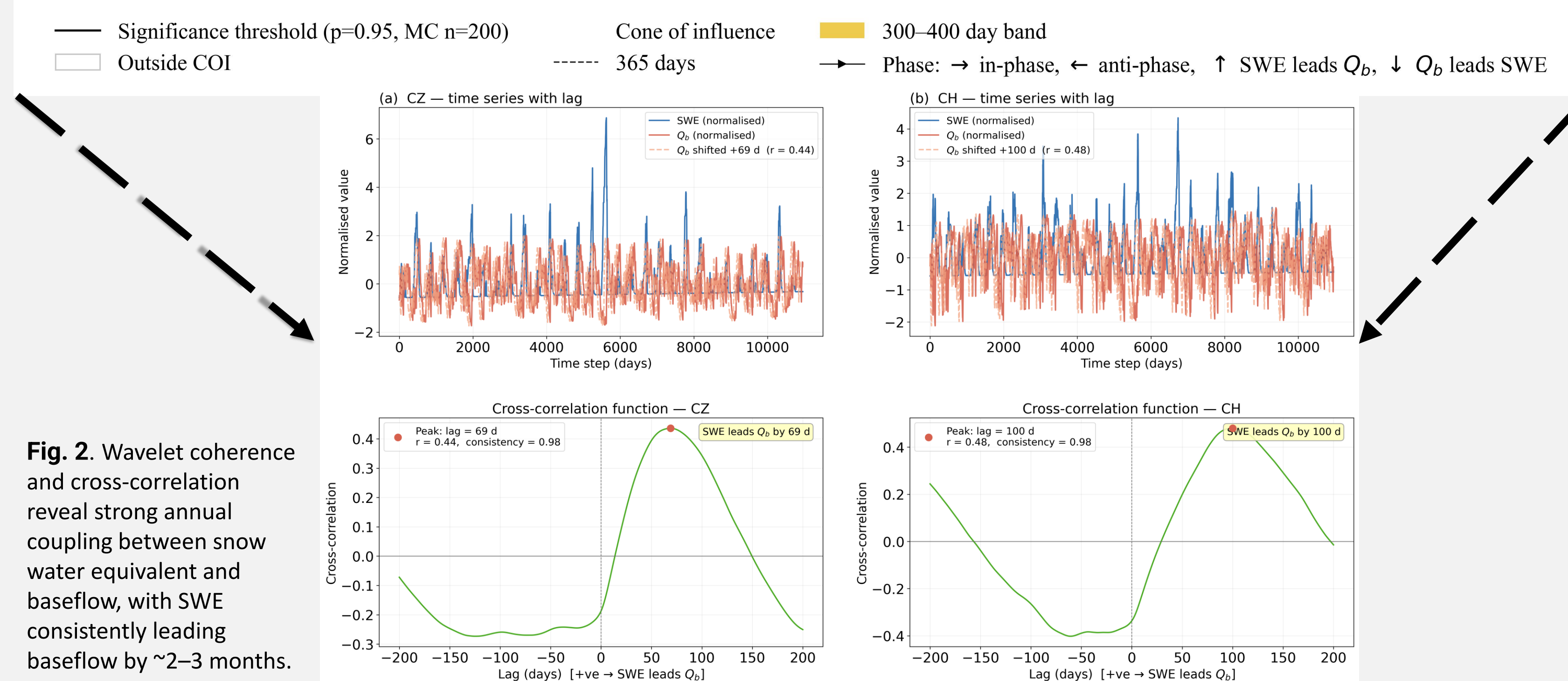
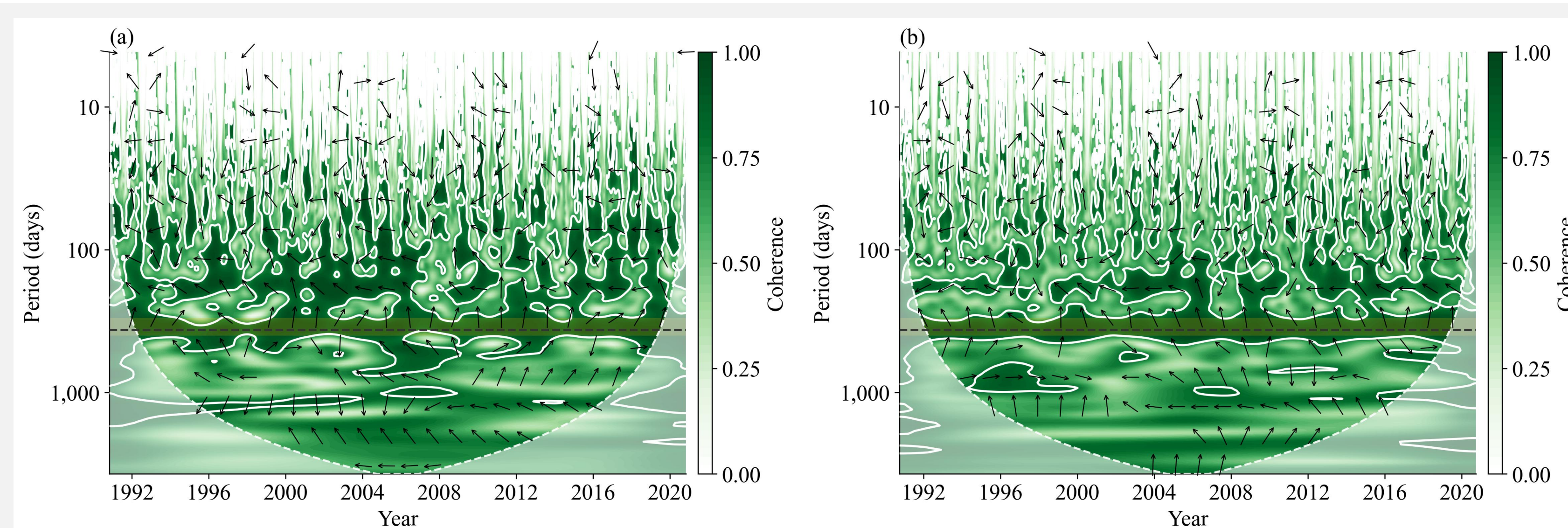
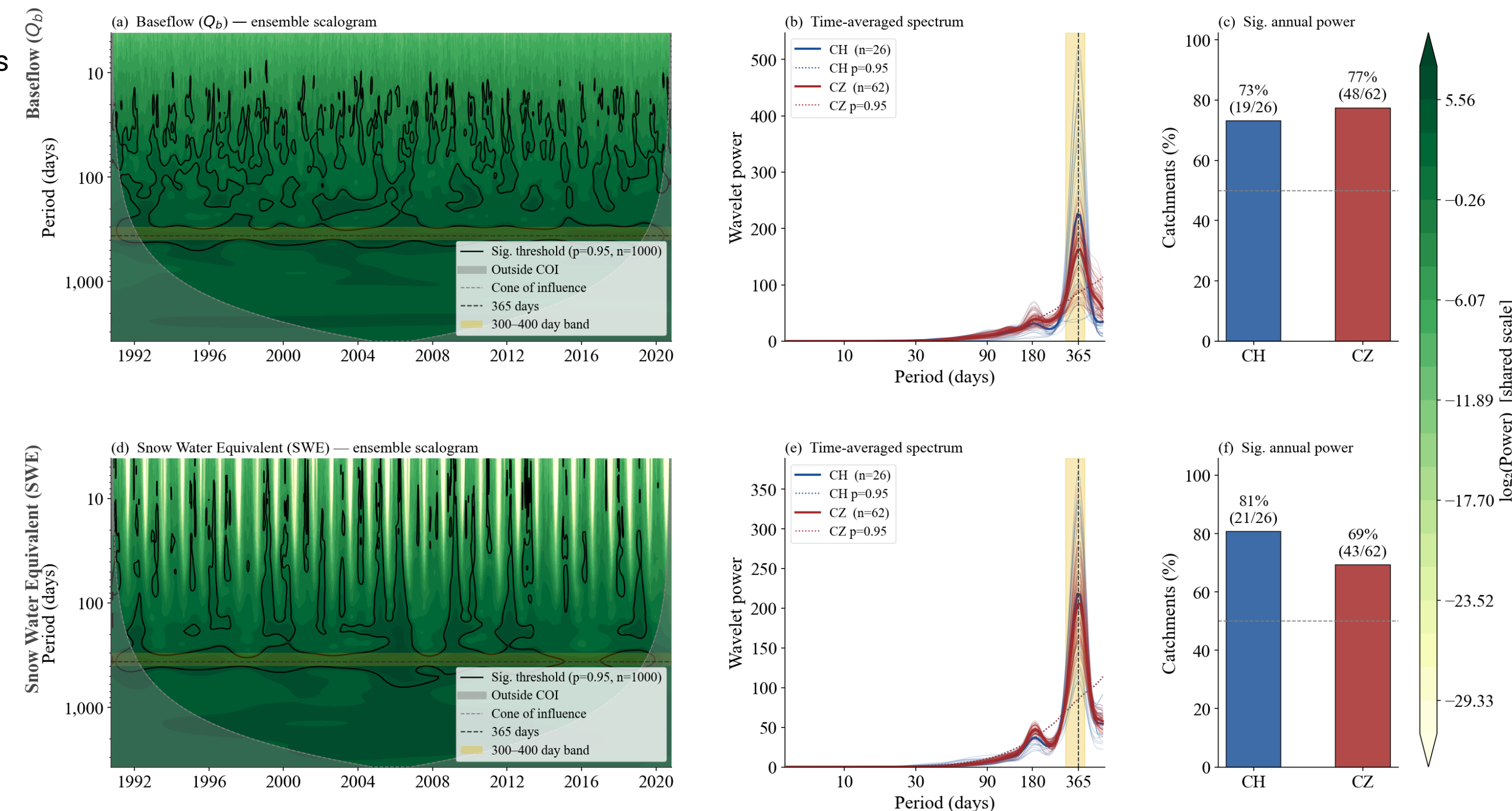
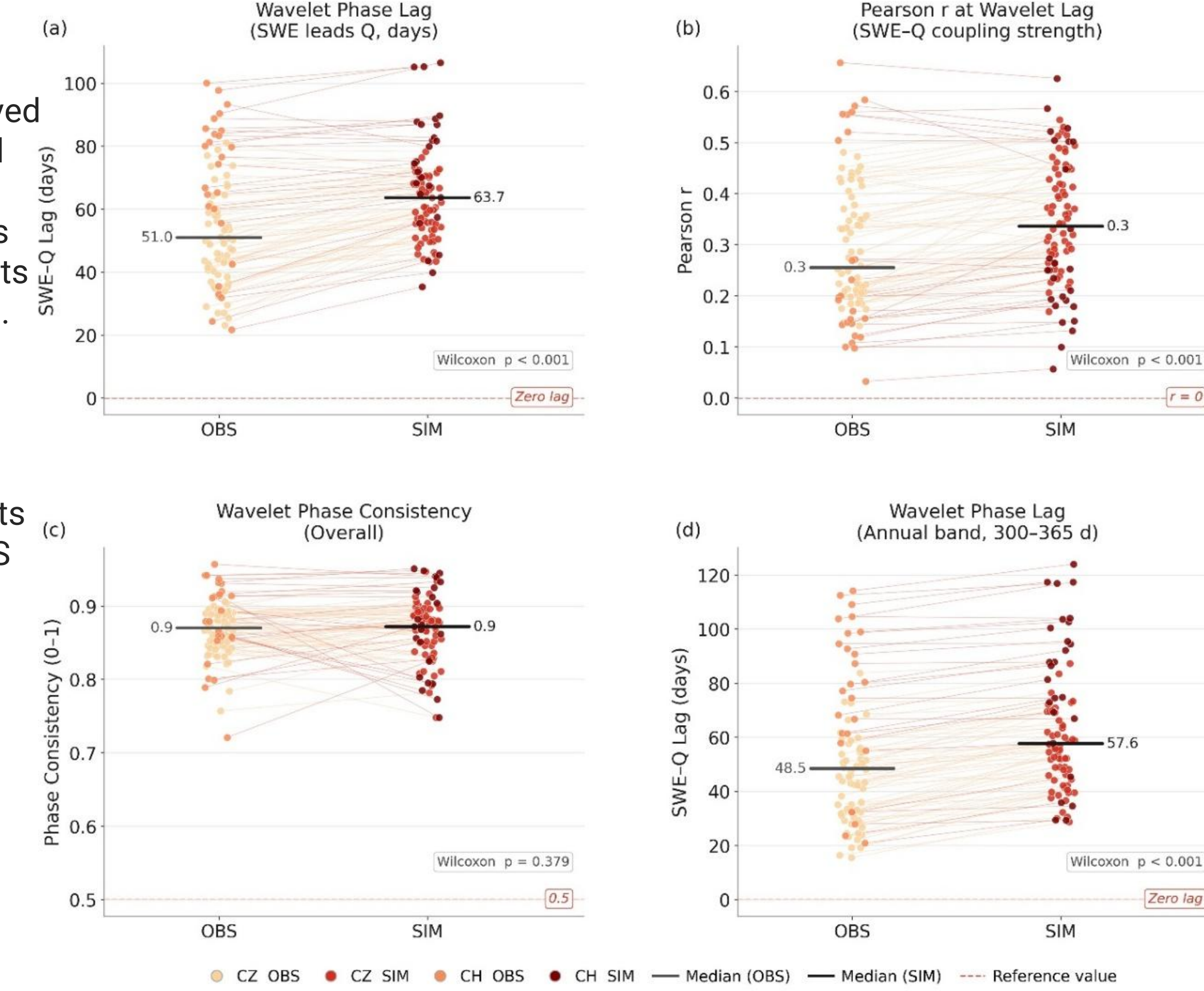


Fig. 2. Wavelet coherence and cross-correlation reveal strong annual coupling between snow water equivalent and baseflow, with SWE consistently leading baseflow by ~2–3 months.

Observation Consistency

Fig. 3. Observed vs. simulated snow–runoff timing across 88 catchments in CZ and CH. Points show catchments; bars show medians; Wilcoxon tests compare OBS and SIM



Physiographic Controls: Elevation & T_{winter}

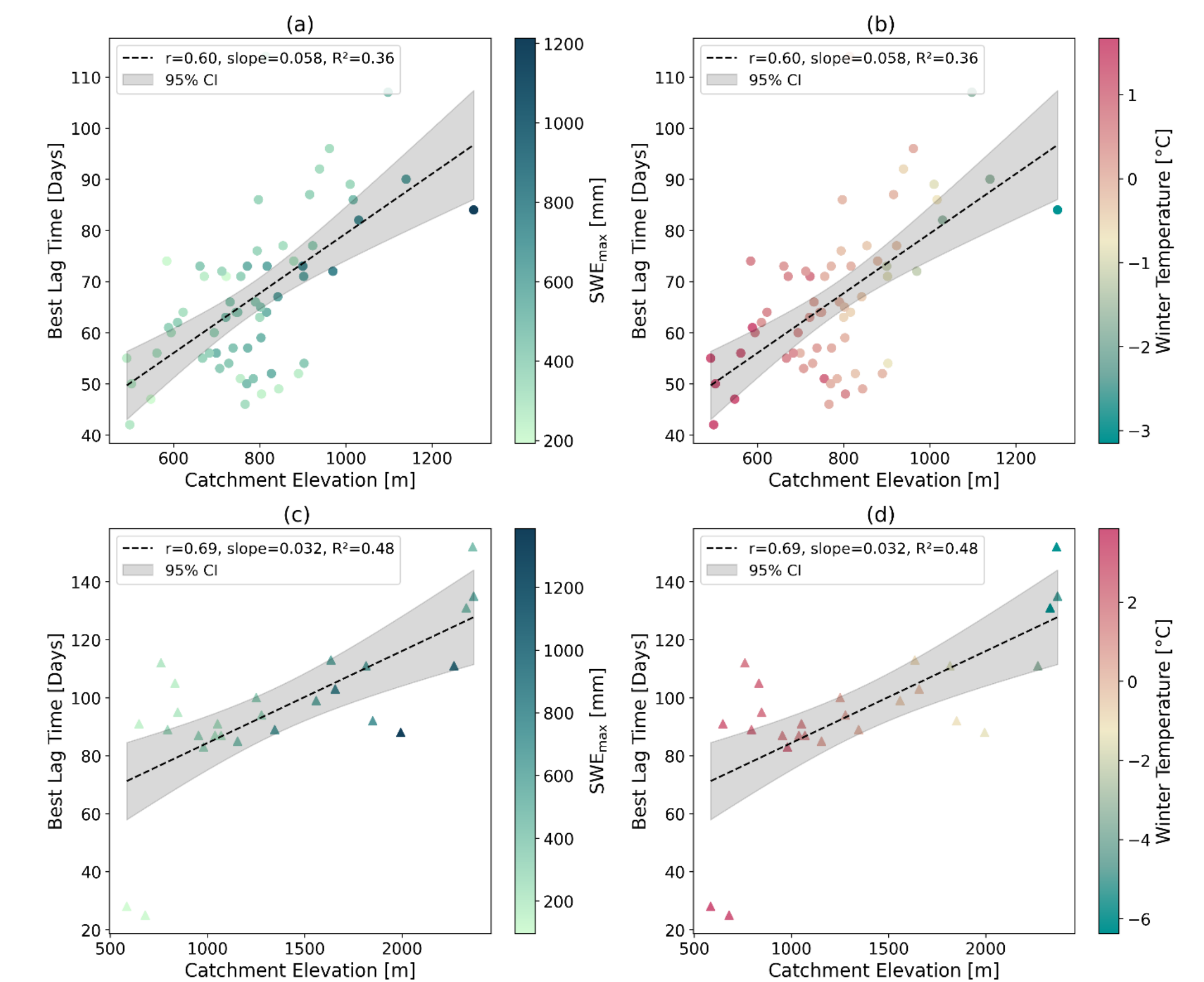


Fig. 4. Best lag time versus catchment elevation. Panels (a,c) are coloured by SWE_{max}, and panels (b,d) by winter temperature. Dashed lines indicate linear fits, and gray shading denotes the 95% confidence interval.

Take-Home

Mountain catchments remember snow: SWE leads baseflow by ~2–3 months, and that lag varies with elevation and snow magnitudes.

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