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1. INTRODUCTION

Future Flows Hydrology comprises an 11-member ensemble of equally probable hydrological outcomes using a nationally consistent method based on the Medium Emission scenario (A1B), and the Hadley Centre HadAM3 and ECMWF (UK) climate projections (Pye et al. 2013). Daily mean simulation data is available for representative catchments in the UK, covering the period January 1951-December 2098, representing the best nationally consistent expression of potential flows over the medium to long-term (146 water years).

2. PURPOSE

- To assess potential for regional changes in future peak flows using flood indices based on daily mean simulated flow as a proxy.
- To consider implications for design flood estimate and engineering practice.

3. METHODOLOGY

- Future Flows data for 275 stations were obtained from the National River Flow Archive for the period 2025 to 2098.
- AMAX across all simulations (n=3025).
- To illustrate potential changes in flood magnitude/frequency:

3. METHODOLOGY

- Future Flows data for 275 stations were obtained from the National River Flow Archive (http://www.nrh.ac.uk/data/ita/ita).

4. RESULTS

4.1 Changes in the annual maximum of simulated daily flow

- Of the 120 simulations only a small proportion (1%) showed a decreasing trend in AMAX, although none were significant (at p<0.05).
- A majority of simulations (62%) showed a significant increasing trend (p<0.05), 40% of which were at a higher level of significance (p<0.01).

3. METHODOLOGY

- Future Flows data for 275 stations were obtained from the National River Flow Archive (http://www.nrh.ac.uk/data/ita/ita).

4. RESULTS

4.3 Implications for flood risk management

- Trends were more evident for some ensemble members (e.g. Q4 and Q9) than for others (e.g. Q1) (Fig. 4).
- For the Don at Parkhill, shaded dark blue in Fig. 3, 59% of simulations showed a significant increase in flood magnitude. The concept of flashiness is broadly and intuitively understood.

4. RESULTS

4.2 Changes in the Richards-Baker Flashiness Index

- Increasing trends for winter and decreasing trends for summer are relatively consistent across all ensemble members (Fig. 16). Patterns for autumn and spring are much more mixed.

4. RESULTS

4.3 Implications for flood risk management

- For the Don at Parkhill (11001), comparative frequency distributions for three of the ensembles (Q4 – highest proportion of trends, Q9 – lowest proportion of trends, Q0 – intermediate) for the two periods show an upward shift in the annual maximum of the simulated daily mean SDM flow (Fig. 4a).

- Flashiness increases in winter and decreases in summer (Fig. 4b). Apart from Scotland, the majority of ensemble members show no significant trends at most stations. In autumn positive trends dominate in the north but are less evident in the south.

REFERENCES

- Technical Flood Risk Guidance for Stakeholders Version 8 - Centre for Floods, Communities and Resilience
- SEPA. 2014. Technical Flood Risk Guidance for Stakeholders Version 8 - Centre for Floods, Communities and Resilience
- Climate change: Review of levels of protection offered by flood prevention schemes UKCIP02 update - Centre for Floods, Communities and Resilience

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