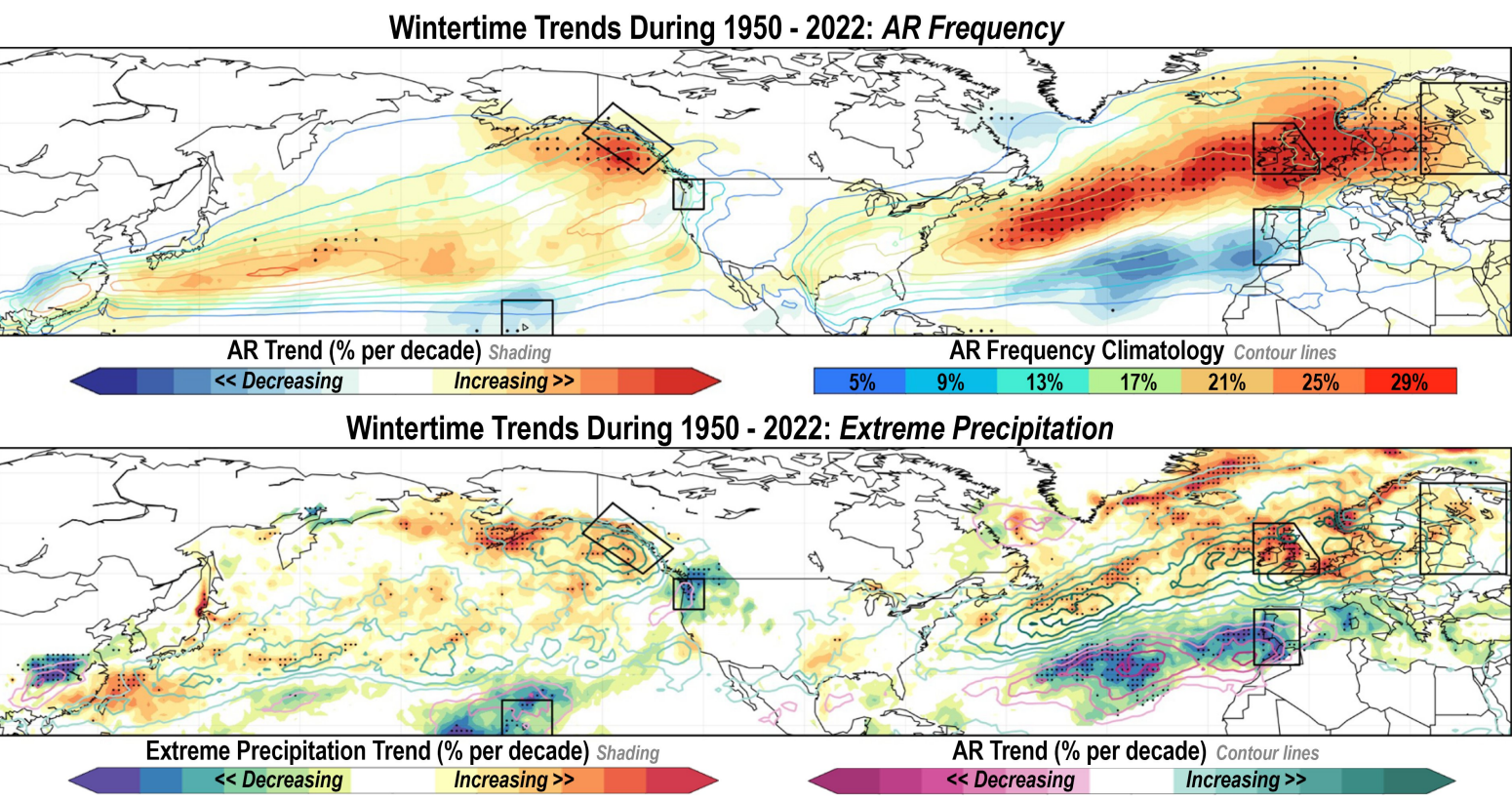


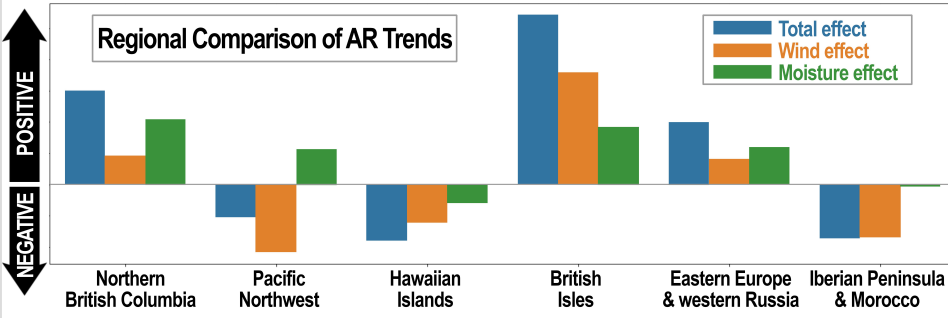


*Our analysis of atmospheric river (AR) trends aims to understand changes in weather extremes from a climate perspective.*

Our systematic investigation into atmospheric reanalysis and station-based observations reveal robust, long-term trends of **enhanced and poleward-shifted winter atmospheric river and extreme precipitation since 1950 in the northern hemisphere**. Both **historical anthropogenic warming** and **internal climate variability** have contributed to these trends.



- Physical mechanisms of AR trends are further investigated:
- **Moisture increase** - due mainly to historical warming - tends to enhance the AR activity overall;
  - **Poleward shift of westerly wind jets** - due partly to historical warming - acts to shift the AR active band poleward.



**Outlook:** Changes in AR & related extreme precipitation events need to be closely monitored with satellite observations and studied with climate models and theory.

**New data:** A recently developed, satellite-derived AR database has great potential to serve that purpose ([Liu and Hu, 2025](#)).

**What are atmospheric rivers?** Long, narrow transient corridors of intense horizontal moisture transport in the atmosphere often leading to strong, landfalling heavy precipitation.

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