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Characterising simulated changes of jet streams since the Last Glacial Maximum

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Jet streams control hydroclimate variability in the mid-latitudes with important impacts on water availability and human societies. According to future projections, global warming will change jet stream characteristics, including its mean position. Variability of these characteristics on hourly-to-daily timescales is key to understanding the mid-latitudes circulation. Therefore, most analysis methods of present-day jet streams are designed for 6-hourly data. By modelling the climate since the Last Glacial Maximum, we can investigate the long-term drivers of jet stream characteristics. However, for transient simulations of the last deglaciation, 3d wind fields are only archived with a monthly resolution due to storage limitations. Hence, jet variability at shorter timescales cannot be identified, and established methods can't be used.

Here, we study to what extent changes of jet stream characteristics can be inferred from monthly wind fields. Therefore, we compare latitudinal jet stream positions, strength, tilt and their variability from daily and monthly wind fields in reanalysis data and for LGM and PI simulations. We test three different methods to construct jet stream typologies and metrics. This comparison identifies to which extend these jet stream characteristics can be robustly studied from monthly wind fields. In addition, our analysis assesses the added value of archived daily data for future research. Once the limitations of monthly wind output are known, jet stream characteristics in transient simulations of the last deglaciation can be analysed. This analysis provides new insights on jet stream changes on decadal-to-orbital timescales and identifies the factors controlling these changes.