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Future projections in the climatology of five low-level jets across different CORDEX domains

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Five of the most prominent low-level jets (LLJs) around the world – the Monsoon Low-Level Jet, Caribbean Low-Level Jet, West African Westerly Jet, Great Plains Low-Level Jet and South American Low-Level Jet – are examined for future climate conditions relative to the present using an ensemble of Regional Climate Model (RCM) simulations under the Coordinated Regional Downscaling Experiment (CORDEX) initiative. The simulations were conducted on a 25 km horizontal grid spacing using lateral and lower boundary forcing from three Coupled Model Inter-comparison Project 5 (CMIP5) global climate models (GCMs) for a near-present historical period (1995–2014) and two future periods (2041–2060 and 2080–2099) under the Representative Concentration Pathway 8.5 (RCP8.5). The RCM is capable of capturing most of the observed climatological features of the LLJs and exhibits a much greater capacity to represent their positioning and core strength compared to the driving GCMs. Analysis of the influence of global warming on the LLJs shows a consistent strengthening of the jets and a shift in their location under both future scenarios. The Monsoon and West African LLJs exhibit a northward shift, while the Caribbean and South American LLJs undergo a westward expansion. The use of an ensemble of high-resolution simulations provides a key element in a robust assessment of changes in LLJs associated with future global-warming scenarios.