PDRMIP: A Precipitation Driver and Response Model Intercomparison Project

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As the global temperature increases with changing climate, precipitation rates and patterns are affected through a wide range of physical mechanisms. The globally averaged intensity of extreme precipitation also changes more rapidly than the globally averaged precipitation rate. While some aspects of the regional variation in precipitation predicted by climate models appear robust, there is still a large degree of inter-model differences unaccounted for. Individual drivers of climate change initially alter the energy budget of the atmosphere leading to distinct rapid adjustments involving changes in precipitation. Differences in how these rapid adjustment processes manifest themselves within models are likely to explain a large fraction of the present model spread and needs better quantifications to improve precipitation predictions. Here, we introduce the Precipitation Driver and Response Model Intercomparison Project (PDRMIP), where a set of idealized experiments designed to understand the role of different climate forcing mechanisms were performed by a large set of climate models. PDRMIP focuses on understanding how precipitation changes relating to rapid adjustments and slower responses to climate forcings are represented across models. Initial results show that rapid adjustments account for large regional differences in hydrological sensitivity across multiple drivers. The PDRMIP results are expected to dramatically improve our understanding of the causes of the present diversity in future climate projections.