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Recurrent Rossby wave packets in the Northern Hemisphere

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Recurrence of Rossby wave packets in a short time, termed as RRWPs, can lead to persistent and extreme weather events. Here, we study top RRWP events in the two basins: the North Atlantic and the East Pacific basins during 1979–2018 using ERA-5 reanalysis data. With the help of composite maps, we answer questions such as what are the characteristics of these events? Do they have a preferred phase? Is a particular flow configuration conducive to such events? What is the role of atmospheric blocks? And, whether these events are initiated by a common pathway such as tropical forcings or have several different pathways? We find that these events have a preferred phase configuration which varies with season. Both North Atlantic and East Pacific events are dominated by specific wavenumbers. In winter, dominant wavenumbers are 3, 4, and 5. In contrast, wavenumbers 5, 6, and 7 dominate in JJA. Furthermore, we address the role of low frequency zonal flow, blocks, and tropical convection during RRWP events using a causal network framework.