EGU22-1930
https://doi.org/10.5194/egusphere-egu22-1930
EGU General Assembly 2022

The 2021 Pacific Northwest heat wave and associated blocking: meteorology and the role of an upstream cyclone as a diabatic source of wave activity

Noboru Nakamura
Department of the Geophysical Sciences, University of Chicago, USA (nnn@uchicago.edu)

The heat wave that enveloped the Pacific Northwest from late June through early July 2021 delivered unprecedented temperatures to the normally cool region --- 108°F (42°C) in Seattle, 116°F (47°C) in Portland --- and claimed over 1000 lives mostly in British Columbia. We investigate the meteorological and dynamical conditions that led to this extreme heat event. The extreme surface temperatures (29-30 June) were preceded by the formation of an upper-level atmospheric blocking that snatched a warm pool of air from lower latitudes (25-27 June). A heat-trapping stable stratification ensued within the block, raising the surface temperatures significantly. The block itself was initiated by an upper-tropospheric wave breaking and the concomitant surface cyclogenesis off the coast of Alaska a few days prior (22-24 June). The regional local wave activity budget reveals that a localized diabatic source associated with this storm critically contributed to the zonal wave activity flux downstream, whose convergence over Canada drove the blocking. A simple wave activity-based reconstruction predicts a 41 percent reduction in strength and a 10-degree eastward displacement of the block when the upstream diabatic source is reduced by just 30 percent. Our work complements previous trajectory-based studies to gain insight on the role of diabatic heating in blocking episodes.