Eastward Eddy Shedding of the Asian Summer Monsoon Anticyclone

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Eastward eddy shedding of the Asian summer monsoon (ASM) anticyclone has a large impact on the chemical composition of the upper troposphere and lower stratosphere (UTLS) over the western Pacific. Here we investigate the dynamical mechanism of eastward eddy shedding in July and August using 41 years of the ERA5 6-hourly reanalysis data. We perform composite analyses of meteorological variables focusing on the eastward eddy shedding events with the presence of anticyclonic centers falling between 135\textdegree{}-140\textdegree{}E. The composited outgoing longwave radiation anomalies suggest enhanced convection near the Philippines Sea and the East China Sea one week beforehand. In the tropopause level, we see evident eastward propagating geopotential and meridional wind anomalies from the North Atlantic jet exit toward the western Pacific embedded along the extratropical westerly jet during day -10 to day 0. In the lower troposphere, we find that the geopotential anomalies aligned meridionally from the east Asian coast to the North Pacific to the northern North America during day -7 to day 0. The wave-activity flux is evaluated to identify the origin and propagation of the energy of the Rossby wave–like perturbation. In the UTLS we find a strong southeastward-pointing flux along 40\textdegree{}-50\textdegree{}N, resembling the Silk Road pattern. While in the lower troposphere, we also see a northeastward-pointing flux originating from tropical Philippine Sea across Japan to North America, resembling the Pacific-Japan pattern. Additional analysis is needed to study the relationship between the Silk Road pattern and the Pacific-Japan pattern.