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The Influence of Anthropogenic Aerosols on the Aleutian Low

William Dow¹, Amanda Maycock¹, and Marcus Lofverstrom²

¹Institute for Climate and Atmospheric Sciences, University of Leeds, United Kingdom of Great Britain and Northern Ireland (eewjd@leeds.ac.uk)

²Department of Geosciences, University of Arizona, Tucson, United States of America

There is an incomplete understanding of the mechanisms that govern the Pacific Decadal Oscillation (PDO), a major mode of climate variability that plays a key role in the evolution of global climate on decadal time-scales. Recent research has suggested that regional anthropogenic aerosol (AA) emissions could modulate the behaviour of the PDO, including the transition to a negative PDO phase starting in the late 1990s (Smith et al., 2016). However, other studies have questioned whether this connection is robust (Oudar et al., 2018). East Asia is a region of particular focus, where AA emissions having increased in recent decades (Bartlett et al., 2017). Here we combine analysis of an ensemble of coupled climate models running idealised AA perturbation experiments and a steady-state primitive equation model (LUMA) forced by diabatic heating anomalies to examine whether AA emissions influence the behaviour of the Aleutian low - a climate feature closely associated with the PDO - and if so, test the posited teleconnection mechanisms proposed by Smith et al. (2016). We further compare the response of the Aleutian low to well mixed greenhouse gases to examine if AAs and GHGs influence the Aleutian low in a similar manner.