

PAMIP Webinar Series

How do tropical Pacific sea-surface-temperatures impact moisture transport into the Arctic ?

Etienne Dunn-Sigouin

University of Bergen

Date: October 27th, 2021

Time: 9 am (GMT)

Registration: shorturl.at/ltzH0

Or contact Lantao Sun:
lantao.sun@colostate.edu

Abstract

Northward transport of moisture strongly influences Arctic climate and is projected to increase in the future. Warming tropical Pacific Sea-Surface Temperatures (SSTs) have been suggested to play a key role. However, the pattern of SST change that matters most and the mechanisms through which they can influence the Arctic are unclear. Here, I present results from slab ocean model experiments, with and without continents, to clarify the link between tropical Pacific SSTs and Arctic moisture transport. Ocean heating experiments that warm tropical Pacific SSTs uniformly, rather than modify its spatial pattern, are shown to be most effective at increasing moisture transport into the Arctic. To first order, the transport changes are consistent with increases in atmospheric moisture while dynamical changes, linked to background tropical SSTs and midlatitude eddies, play an important secondary role, both regionally and over the entire Arctic. The heating experiments compare favourably with increased carbon dioxide experiments in the same model but show that the dynamical changes in Arctic moisture transport can depend sensitively on the type of forcing.



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