Journal of Advances in Modeling Earth Systems

Supporting Information for

Seasonal cycle of idealized polar clouds: large eddy simulations driven by a GCM

Xiyue Zhang[1], Tapio Schneider[2,3], Zhaoyi Shen[2], Kyle G. Pressel[4], and Ian Eisenman[5]

[1]Johns Hopkins University, Baltimore, Maryland, USA
[2]California Institute of Technology, Pasadena, California, USA
[3]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, USA
[4]Pacific Northwest National Laboratory, Richland, Washington, USA
[5]Scripps Institution of Oceanography, University of California, San Diego, California, USA

Contents of this file

Introduction

This supporting information provides figures showing the sensitivity of our results to a different liquid fraction function and resolution.

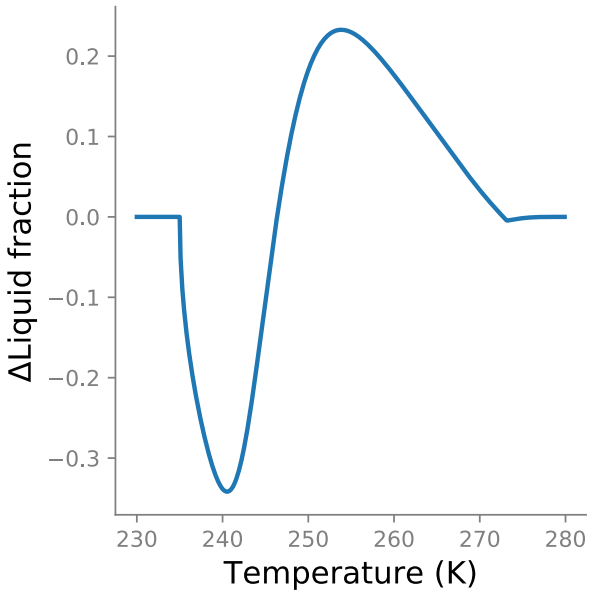

Figure S1. Liquid fraction difference between the observational-derived function in Hu et al. (2010) and Equation (1) with n=0.5.

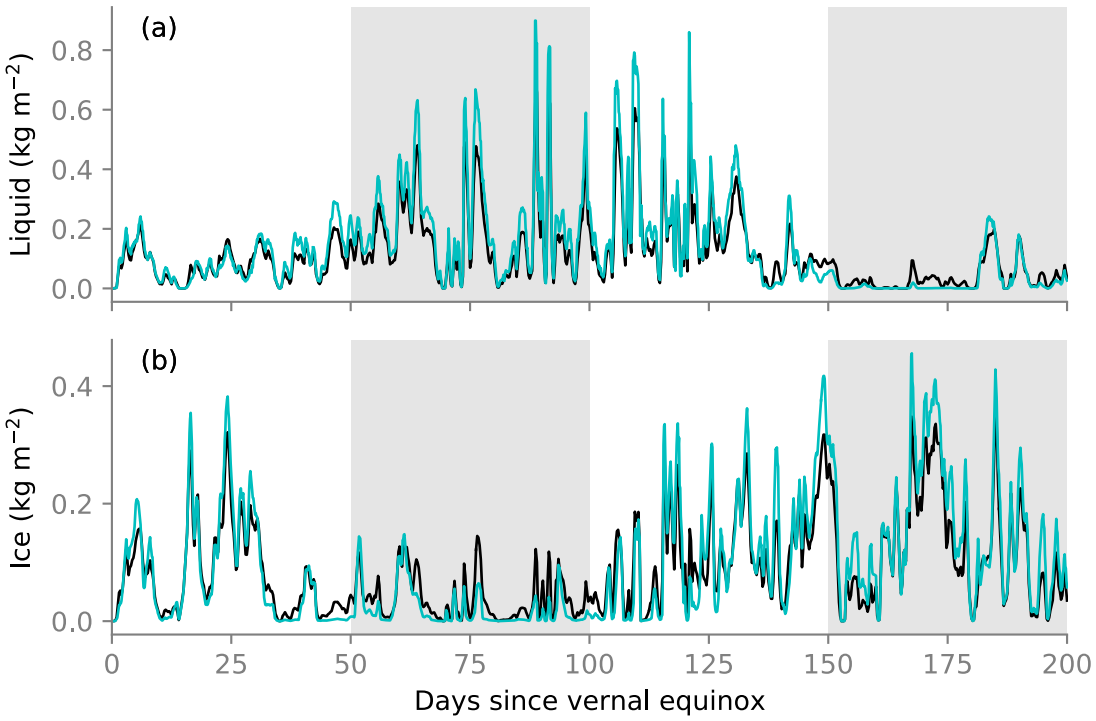

Figure S2. Timeseries of (a) cloud liquid water path and (b) cloud ice water path. Black lines show an ensemble member with default liquid fraction (Equation (1) with n=0.5). Cyan lines show the same ensemble member with Hu et al. (2010) liquid fraction.

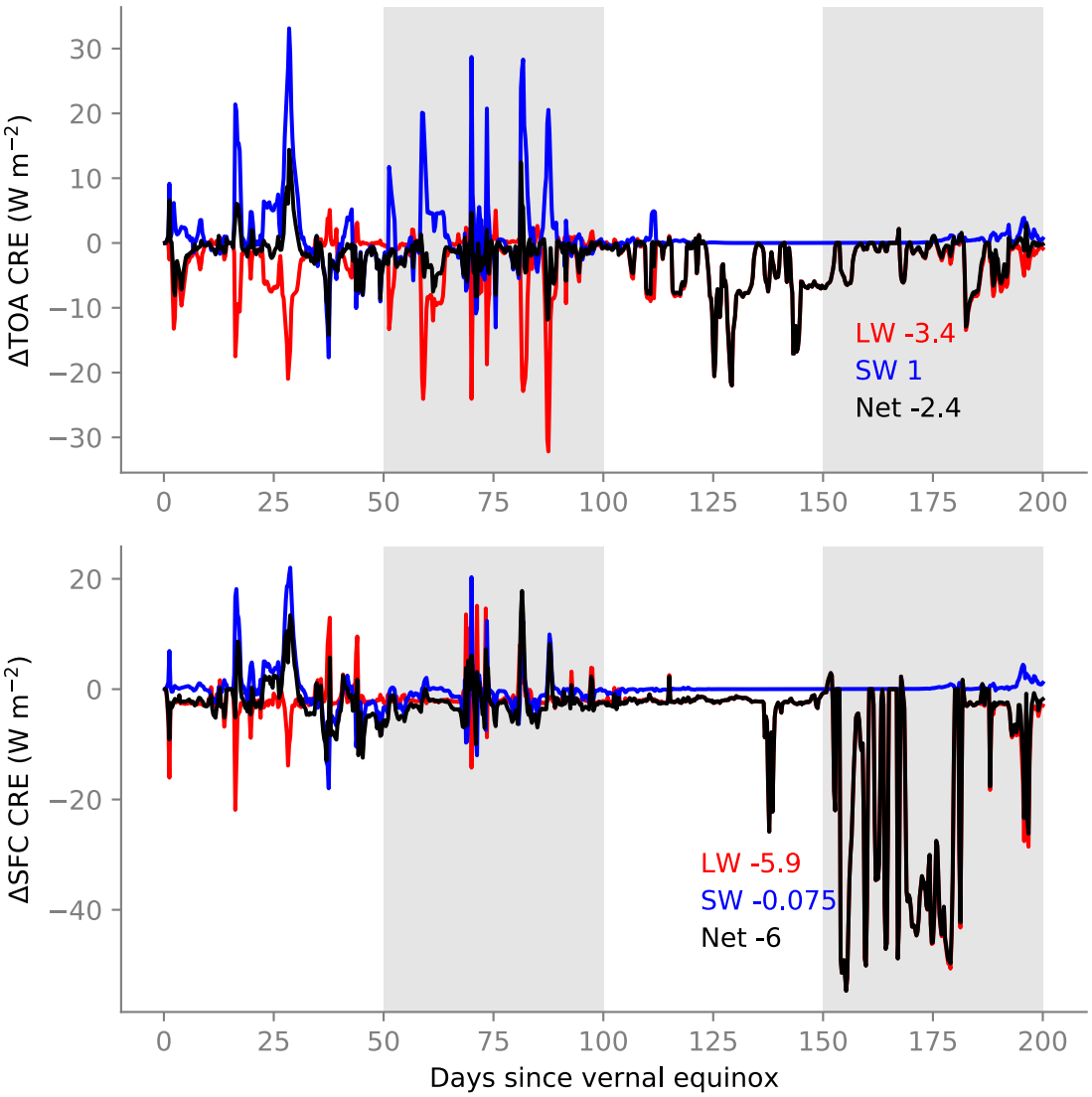

Figure S3. Difference in liquid CRE between two simulations with different liquid fraction functions (Hu et al. (2010) simulation minus default). The annual mean differences are indicated by the numbers.

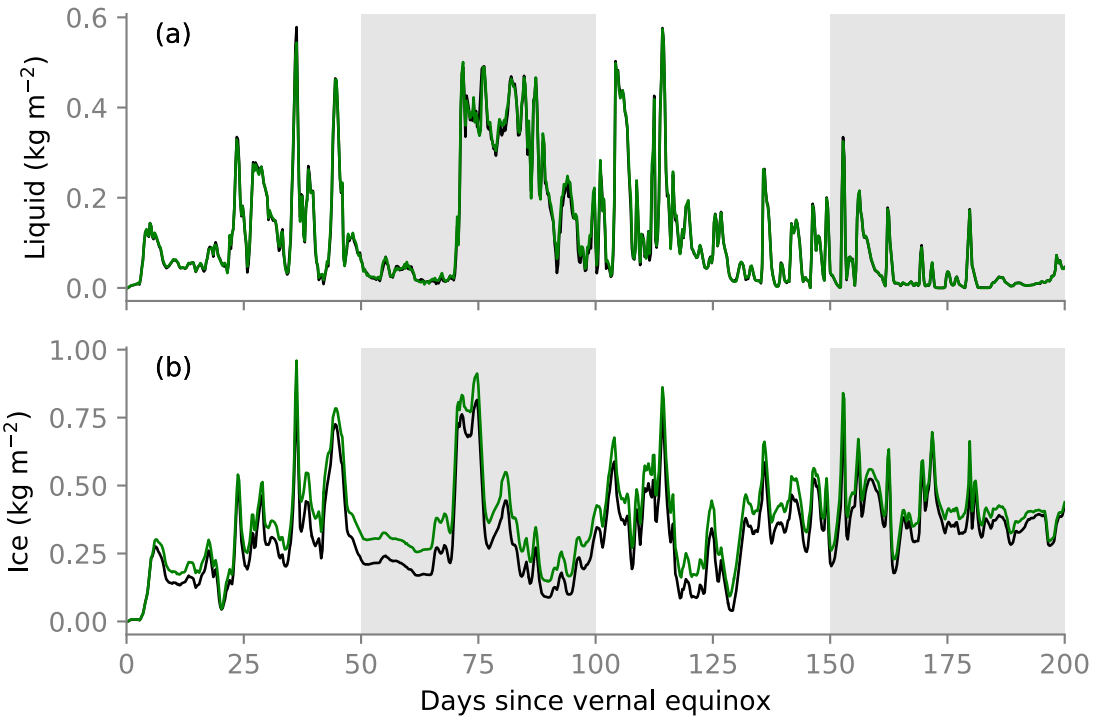

Figure S4. Timeseries of (a) liquid water path and (b) ice water path of baseline simulation in black, doubled vertical resolution simulation in green.

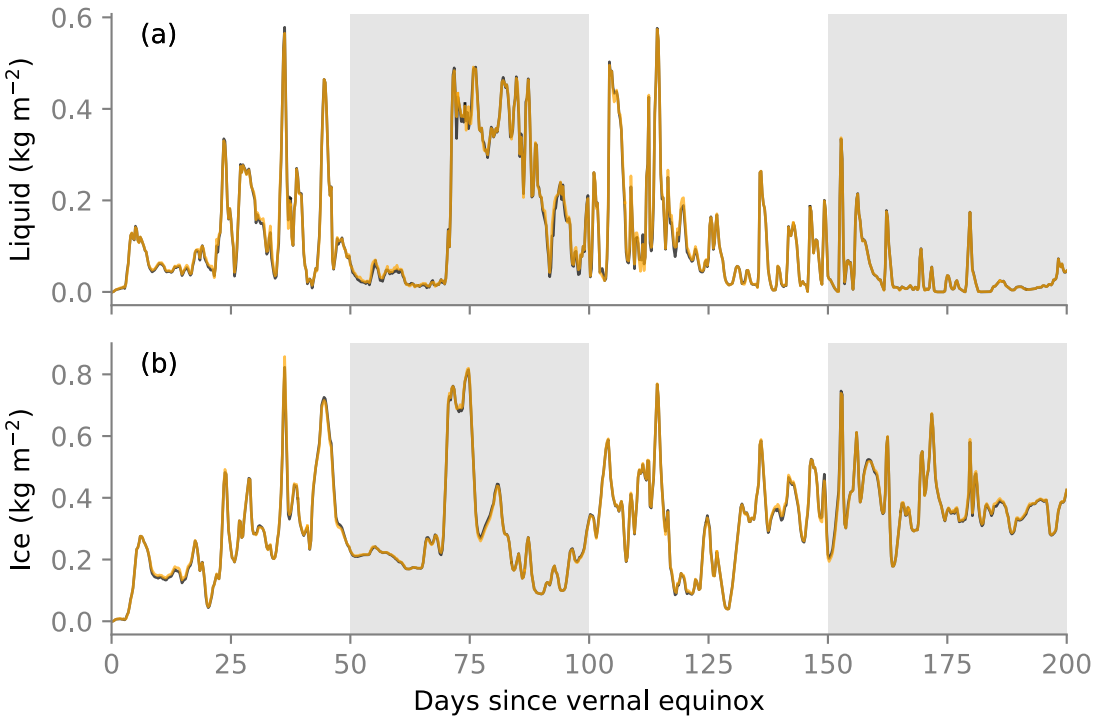

Figure S5. Timeseries of (a) liquid water path and (b) ice water path of baseline simulation in black, doubled horizontal resolution simulation in yellow.

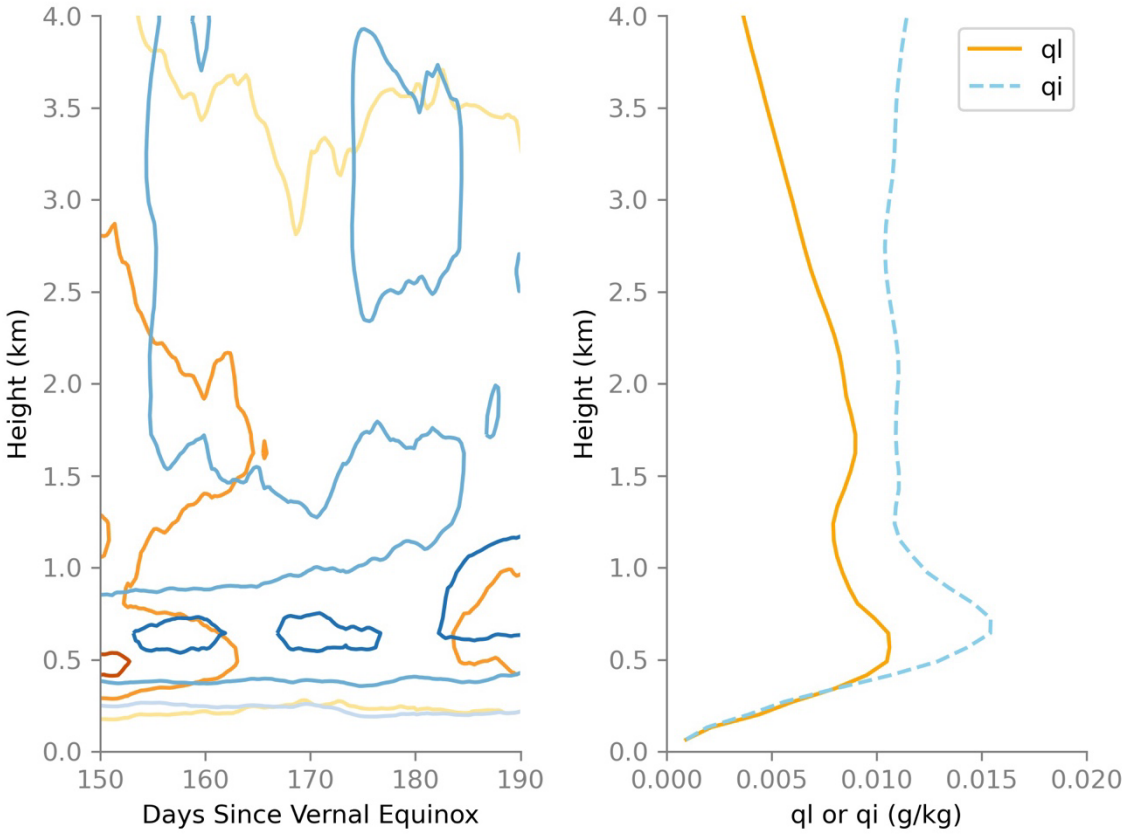

Figure S6. Winter vertical q_l and q_i in the lowest 4 km of the domain. Left: vertical profile timeseries of q_l (orange) and qi (blue), smoothed by a 20-day running mean. Contours increase from the lighest to darkest colors with intervals of 0.005 g/kg. Right: winter mean q_l (solid) and q_i (dashed) in g/kg.