

Comparison of Proxy and Multi-Model Ensemble Mean on Volcanic Aerosols' Hydrological Effects in Asian Monsoon and Westerlies-dominated Subregions

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Introduction

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Table S1*CMIP5 model ensembles used.*

Model	Ensemble	Resolution (°) (lat x lon)	Vertical levels	Volcanic forcing	References
CCSM4	rlilp1	0.94 x 1.25	26	GRA	Gent et al., 2011
BCC-CSM1-1	rlilp1	2.8 x 2.8	26	GRA	Wu et al., 2013
IPSL-CM5A-LR	rlilp1	1.9x3.75	39	GRA	<i>Dufresne et al.</i> , 2013
GISS-E2-R	rlilp121 rlilp125 rlilp128	2x2.5	40	GRA	<i>Schmidt et al.</i> , 2014
MPI-ESM-P	rlilp1	1.865x1.875	47	CEA	<i>Giorgetta et al.</i> , 2013
FGOALS-gl	rlilp1	5x4	26	CEA	Zhou et al., 2008
MIROC-ESM	rlilp1	2.8x2.8125	80	CEA	<i>Watanabe et al.</i> , 2011
GISS-E2-R	rlilp122 rlilp124 rlilp127	2x2.5	40	CEA	<i>Schmidt et al.</i> , 2014

Table S2

List of eruption year and northern hemisphere aerosol injection in two volcanic classifications.

Eruption Year (CE)	GNH	CNH
	Sulfate Aerosol Mass _a (Tg)	Sulfate Aerosol Flux _b (kg*km ⁻²)
1328	19.7	
1344		13.6
1441		11.8
1452	44.6	
1459	21.9	22.1
1553		13.6
1561		12.2
1585	24.2	22.0
1600	46.1	35.0
1620		12.4
1641	33.8	17.6
1668		23.3
1673		13.3
1694		15.1
1719	31.5	
1740		17.5
1783	93.0	17.9
1809	27.6	22.2
1815	58.7	32.5
1831	17.0	17.5
1835	26.4	14.3

Note. ^aAerosol mass is based on GRA volcanic forcing from Gao et al. (2008). ^bAerosol flux is based on CEA volcanic forcing from Crowley et al. (2013). Years in bold are the volcanic events included in both classifications.

Table s3

Tested classifications of volcanic events and their dated years for proxy reconstruction data.

Classification	Reference	Event Year (CE)	Num.
GCNH ^a	Gao et al., 2008; Crowley et al., 2008	1328, 1344, 1441, 1452, 1459, 1553, 1561, 1585, 1600, 1620, 1641, 1668, 1673, 1694, 1719, 1740, 1783, 1809, 1815, 1831, 1835	21
SNH ^b	Sigl et al., 2015	1345, 1458, 1601, 1641, 1695, 1783, 1809, 1815, 1836	9
A07	Ammann et al., 2007	1452, 1600, 1641, 1809, 1815	5
F07	Fischer et al., 2007	1586, 1596, 1600, 1641, 1673, 1809, 1815, 1823, 1831, 1835	10
AN03	Ammann and Naveau, 2003	1443, 1452, 1459, 1463, 1490, 1504, 1512, 1522, 1554, 1568, 1571, 1586, 1595, 1600, 1605, 1619, 1622, 1641, 1660, 1665, 1674, 1680, 1693, 1712, 1721, 1728, 1737, 1744, 1749, 1752, 1760, 1774, 1789, 1794, 1808, 1813, 1823, 1831, 1835	39

Note. ^aCombination of both volcanic events in the GNH and CNH classifications.

^bVolcanic events have larger global forcing and more sulfate in Greenland than that of Pinatubo eruption in 1991, selection is based on Sigl et al. (2015) reconstruction. The other three classifications are following that in Anchukaitis et al. (2010), which are classifications used by the reference papers. Here, we remove the latter year if two events happened in less than three years.