

# Supplementary Materials

## 1 Information on proxy records used in this study

A total of 423 historical climate proxy records were initially collected from publicly available peer-reviewed papers and monographs. Following a rigorous quality control process, 119 proxy records were finally selected for this study. Detailed information regarding these selected proxy records, including their latitude, longitude, start year, end year, type, and data source, is provided in Tab. S1.

**Table S1: Information on proxy records used in this study**

No.	Latitude(°N)	Longitude(°E)	Start Year	End Year	Type	Data source
1	50.08	87.77	1495	1998	Tree ring	Panyushkina et al. (2005) <sup>1</sup>
2	50.12	87.92	1554	2000	Tree ring	Magda et al. (2012) <sup>2</sup>
3	33.75	107.80	1600	1992	Tree ring	Cook et al. (2013) <sup>3</sup>
4	27.45	90.15	1456	2005	Tree ring	Cook et al. (2010) <sup>4</sup>
5	27.95	89.75	1453	2006	Tree ring	Cook et al. (2010) <sup>4</sup>
6	29.28	100.08	1540	2006	Tree ring	Cook et al. (2010) <sup>4</sup>
7	30.23	100.27	1306	2007	Tree ring	Cook et al. (2010) <sup>4</sup>
8	28.98	99.93	1380	2007	Tree ring	Cook et al. (2010) <sup>4</sup>
9	27.62	99.80	1516	2007	Tree ring	Cook et al. (2010) <sup>4</sup>
10	29.30	91.97	1217	1998	Tree ring	Cook et al. (2013) <sup>3</sup>
11	31.12	97.03	1406	1994	Tree ring	Cook et al. (2013) <sup>3</sup>
12	34.47	110.08	1359	2005	Tree ring	Cook et al. (2013) <sup>3</sup>
13	28.38	85.72	1450	1996	Glacier Ice	Thompson et al. (2000) <sup>5</sup>
14	28.38	85.72	1450	1996	Glacier Ice	Thompson et al. (2000) <sup>5</sup>
15	34.75	100.82	1287	2004	Tree ring	Cook et al. (2013) <sup>4</sup>
16	30.98	78.93	1567	1999	Tree ring	Cook et al. (2013) <sup>4</sup>
17	34.73	100.80	1346	2004	Tree ring	Cook et al. (2013) <sup>4</sup>
18	34.78	100.82	1520	2002	Tree ring	Cook et al. (2013) <sup>4</sup>
19	34.73	100.78	1475	2004	Tree ring	Cook et al. (2013) <sup>4</sup>
20	43.18	87.18	1543	1993	Tree ring	Cook et al. (2013) <sup>4</sup>
21	31.37	78.17	1538	2004	Tree ring	Cook et al. (2013) <sup>4</sup>
22	44.35	142.18	1575	1999	Tree ring	Yasue et al. (1999) <sup>7</sup>
23	43.22	145.47	1511	1998	Tree ring	Cook et al. (2013) <sup>3</sup>
24	43.955	145.725	1585	2000	Tree ring	Demezhko&Solomina (2009) <sup>6</sup>
25	43.955	145.725	1585	2000	Tree ring	Demezhko&Solomina (2009) <sup>6</sup>
26	40.17	72.58	1378	1995	Tree ring	Cook et al. (2013) <sup>3</sup>
27	40.20	72.58	1420	1995	Tree ring	Cook et al. (2013) <sup>3</sup>
28	42.15	79.47	1301	2005	Tree ring	Cook et al. (2013) <sup>3</sup>

29	49.92	91.57	1326	1998	Tree ring	Cook et al. (2013) <sup>3</sup>
30	47.10	90.97	1375	2004	Tree ring	Cook et al. (2010) <sup>4</sup>
31	48.70	88.80	1565	2004	Tree ring	Cook et al. (2010) <sup>4</sup>
32	46.32	101.32	1599	2001	Tree ring	Cook et al. (2010) <sup>4</sup>
33	48.83	111.68	1576	2001	Tree ring	Cook et al. (2010) <sup>4</sup>
34	48.25	97.40	1516	1998	Tree ring	Cook et al. (2010) <sup>4</sup>
35	46.52	100.95	1340	2002	Tree ring	Cook et al. (2010) <sup>4</sup>
36	49.37	94.88	1550	1997	Tree ring	Cook et al. (2010) <sup>4</sup>
37	43.77	142.55	1557	1997	Tree ring	Cook et al. (2013) <sup>3</sup>
38	43.77	142.55	1532	1997	Tree ring	Cook et al. (2013) <sup>3</sup>
39	27.70	86.45	1417	1998	Tree ring	Cook et al. (2013) <sup>3</sup>
40	27.73	86.33	1445	1998	Tree ring	Cook et al. (2013) <sup>3</sup>
41	27.5	88.02	1525	1999	Tree ring	Cook et al. (2013) <sup>3</sup>
42	27.73	87.20	1509	1996	Tree ring	Cook et al. (2013) <sup>3</sup>
43	36.03	74.58	1240	1993	Tree ring	Esper et al. (2007) <sup>8</sup>
44	35.33	74.80	1505	2005	Tree ring	Cook et al. (2013) <sup>3</sup>
45	35.90	71.73	1537	2006	Tree ring	Cook et al. (2013) <sup>3</sup>
46	35.90	71.73	1260	2006	Tree ring	Cook et al. (2013) <sup>3</sup>
47	36.15	74.18	1497	2009	Tree ring	Cook et al. (2013) <sup>3</sup>
48	36.15	74.18	1387	2005	Tree ring	Cook et al. (2013) <sup>3</sup>
49	35.35	71.80	1472	2005	Tree ring	Ahmed et al. (2011) <sup>9</sup>
50	27.37	99.37	1498	2007	Tree ring	Cook et al. (2013) <sup>3</sup>
51	43.88	145.6	1585	2000	Tree ring	Cook et al. (2010) <sup>4</sup>
52	48.30	98.93	46	1999	Tree ring	Cook et al. (2013) <sup>3</sup>
53	34.78	100.80	1340	2002	Tree ring	Cook et al. (2013) <sup>3</sup>
54	34.78	100.82	1400	2002	Tree ring	Cook et al. (2013) <sup>3</sup>
55	30.33	119.43	1590	2007	Tree ring	Cook et al. (2013) <sup>3</sup>
56	50.15	85.37	1581	1994	Tree ring	Briffa et al. (2002) <sup>10</sup>
57	50.15	85.37	1581	1994	Tree ring	Briffa et al. (2002) <sup>10</sup>
58	50.15	85.37	1581	1994	Tree ring	Briffa et al. (2002) <sup>10</sup>
59	50.15	85.37	1581	1994	Tree ring	Briffa et al. (2002) <sup>10</sup>
60	50.15	85.37	1581	1994	Tree ring	Briffa et al. (2002) <sup>10</sup>
61	50.48	87.65	1581	1994	Tree ring	Briffa et al. (2002) <sup>10</sup>
62	30.37	130.53	1080	2005	Tree ring	Cook et al. (2013) <sup>3</sup>
63	34.63	104.47	1568	2006	Tree ring	Cook et al. (2010) <sup>4</sup>
64	48.00	99.00	262	1999	Tree ring	D'Arrigo et al. (2001) <sup>11</sup>
65	51.03	143.59	1600	2004	Tree ring	Wiles et al. (2015) <sup>12</sup>
66	34.00	103.5	1500	1995	Tree ring	Yang et al. (2013) <sup>13</sup>
67	32.5	95.00	1000	2005	Tree ring	Wang et al. (2015) <sup>14</sup>
68	43.77	142.55	1557	1997	Tree ring	Davi et al. (2002) <sup>15</sup>
69	51.15	99.083	931	2005	Tree ring	Davi et al. (2015) <sup>16</sup>
70	38.70	99.69	670	2012	Tree ring	Zhang et al. (2014) <sup>17</sup>
71	37.00	111.50	1470	2002	Documents	Yi et al. (2012) <sup>18</sup>

72	42.00	80.00	1615	2005	Tree ring	Chen et al. (2019) <sup>19</sup>
73	47.10	88.20	1710	1983	Tree ring	Li (1989) <sup>20</sup>
74	41.00	83.30	1807	1983	Tree ring	Li (1989) <sup>20</sup>
75	41.00	83.30	1829	1983	Tree ring	Li (1989) <sup>20</sup>
76	40.40	83.30	1854	1983	Tree ring	Li (1989) <sup>20</sup>
77	47.20	89.30	1464	1981	Tree ring	Li (1989) <sup>20</sup>
78	43.40	90.20	1550	1977	Tree ring	Li (1989) <sup>20</sup>
79	43.20	93.20	1678	1979	Tree ring	Li (1989) <sup>20</sup>
80	43.20	93.20	1653	1979	Tree ring	Li (1989) <sup>20</sup>
81	43.50	93.20	1463	1979	Tree ring	Li (1989) <sup>20</sup>
82	43.20	87.10	1752	1993	Tree ring	Li (1989) <sup>20</sup>
83	43.20	87.10	1667	1993	Tree ring	Li (1989) <sup>20</sup>
84	43.10	87.10	1736	1993	Tree ring	Li (1989) <sup>20</sup>
85	42.50	81.10	1676	1982	Tree ring	Li (1989) <sup>20</sup>
86	43.40	83.40	1687	1982	Tree ring	Li (1989) <sup>20</sup>
87	35.33	135.73	1847	1983	Tree ring	Kojo (2002) <sup>21</sup>
88	43.77	142.55	1532	1997	Tree ring	Davi et al. (2006) <sup>22</sup>
89	38.13	128.47	1657	1998	Tree ring	Park et al. (2007) <sup>23</sup>
90	48.30	98.93	900	1999	Tree ring	Jacoby et al. (2011) <sup>24</sup>
91	49.92	91.57	1326	1998	Tree ring	Jacoby et al. (2003) <sup>25</sup>
92	47.27	100.03	1363	1999	Tree ring	Jacoby et al. (2003) <sup>26</sup>
93	24.5	121.4	1190	2007	Tree ring	Liu et al. (2017) <sup>27</sup>
94	29.64	94.71	1820	2008	Reconstruction	Li et al. (2018) <sup>28</sup>
95	34.45	106.15	1666	2008	Reconstruction	Chen & Yuan (2014) <sup>29</sup>
96	27.78	98.48	1678	2019	Reconstruction	Deng & Li (2022) <sup>30</sup>
97	31.15	99.81	1383	2005	Reconstruction	Li et al. (2022) <sup>31</sup>
98	34.65	75.47	1682	1981	Tree ring	Hughes (2002) <sup>32</sup>
99	51.03	143.59	1536	2004	Tree ring	Wiles et al. (2014) <sup>33</sup>
100	35.00	135.77	891	1995	Reconstruction	Aono et al. (2019) <sup>34</sup>
101	35.23	81.46	1840	2014	Glacier Ice	Thompson et al. (2021) <sup>35</sup>
102	43.96	145.73	1585	2000	Reconstruction	Demezhko & Solomina (2017) <sup>36</sup>
103	27.42	90.97	1376	2013	Reconstruction	Davi et al. (2003) <sup>37</sup>
104	29.63	79.85	1621	2008	Tree ring	Xu et al. (2018) <sup>38</sup>
105	32.75	76.62	1146	2006	Tree ring	Managave et al. (2020) <sup>39</sup>
106	32.22	77.22	1767	2008	Tree ring	Sano et al. (2018) <sup>40</sup>
107	28.18	85.18	1801	2000	Tree ring	Xu et al. (2018) <sup>41</sup>
108	29.85	81.93	1778	2000	Tree ring	Sano et al. (2017) <sup>42</sup>
109	52.23	104.18	1682	1998	Tree ring	Schleser et al. (2017) <sup>43</sup>
110	30.83	77.43	1801	1988	Tree ring	Borgaonkar et al. (2004) <sup>44</sup>
111	31.12	77.17	1775	1988	Tree ring	Borgaonkar et al. (2004) <sup>45</sup>
112	32.27	77.17	1676	1988	Tree ring	Borgaonkar et al. (2004) <sup>46</sup>
113	31.2	77.23	1685	1989	Tree ring	Borgaonkar et al. (2004) <sup>47</sup>
114	31.18	77.27	1673	1989	Tree ring	Borgaonkar et al. (2004) <sup>48</sup>

115	30.75	78.42	1720	1990	Tree ring	Borgaonkar et al. (2004) <sup>49</sup>
116	30.62	78.75	1796	1989	Tree ring	Borgaonkar et al. (2004) <sup>50</sup>
117	29.77	79.17	1657	1990	Tree ring	Borgaonkar et al. (2004) <sup>51</sup>
118	52.80	106.43	1877	2004	Tree ring	Oskolkov & Voronin (2014) <sup>52</sup>
119	28.42	83.75	1740	1978	Tree ring	Schweingruber (2002) <sup>53</sup>

## References

- 10 1 Panyushkina I P, Ovtchinnikov D V, Adamenko M F. Mixed response of decadal variability in larch tree-ring chronologies from upper tree-lines of the Russian Altai[J]. *Tree-ring research*, 2005, 61, 1: 33-42.
- 2 Magda V, Block J, Oidupaa, O C, et al. Extraction of the climatic signal for moisture from tree-ring chronologies of altai-sayan mountain forest-steppes[J]. *Contemporary Problems of Ecology*, 2012, 4, 7: 716-724.
- 15 3 Cook E R, Krusic P J, Anchukaitis K J, et al. Tree-ring reconstructed summer temperature anomalies for temperate East Asia since 800 CE. *Climate Dynamics*, 2013, 41: 2957-2972.
- 4 Cook E R, Anchukaitis K J, Buckley, B. M, et al. Asian Monsoon Failure and Megadrought during the Last Millennium[J]. *Science*, 2010: 328, 5977, 486-489.
- 20 5 Thompson L G, Yao, T, Mosley-Thompson, E, et al. A high-resolution millennial record of the South Asian Monsoon from Himalayan ice cores[J]. *Science*, 2000, 289, 5486, 916-1919.
- 6 Demezhko, D.Y., & Solomina, R. O. N. (2009). Ground surface temperature variations on Kunashir Island in the last 400 years inferred from borehole temperature data and tree-ring records. *Doklady Earth Sciences*, 426, 1, 628-631.
- 25 7 Yasue K, Funada R, Fukazawa K, et al. Tree-ring width and maximum density of *Picea glehnii* as indicators of climatic changes in northern Hokkaido, Japan[J]. *Canadian Journal of Forest Research*, 1997, 27, 12: 1962-1970.
- 8 Esper J, Frank D C, Wilson R J S, et al. Uniform growth trends among central Asian low and high elevation juniper tree sites[J]. *Trees-structure and Function*, 2007, 21, 2: 141-150.
- 30 9 Ahmed M, Palmer J, Khan N, et al. The dendroclimatic potential of conifers from northern Pakistan[J]. *Dendrochronologia*, 2011, 29, 2: 77-88.
- 10 Briffa K R, Osborn T J, Schweingruber F H, et al. Tree-ring width and density data around the Northern Hemisphere: Part 1, local and regional climate signals[J]. *Holocene*, 2002, 12, 6: 737-757.
- 35 11 D'Arrigo R, Jacoby G, Frank D, et al. 1738 years of mongolian temperature variability inferred from a tree-ring width chronology of siberian pine[J]. *Geophysical Research Letters*, 2001, 28, 3: 543-546.
- 12 Wiles G C, Solomina O, D'Arrigo R, et al. Reconstructed summer temperatures over the last 400 years based on larch ring widths: sakhalin island, russian far east[J]. *Climate dynamic*, 40 2015, 45: 397-405.
- 13 Yang F M, Wang N, Shi F, et al. Multi-Proxy Temperature Reconstruction from the West Qinling Mountains, China, for the Past 500 Years. *Plos One*, 2013, 8, 2: e57638.
- 14 Wang, J. L, Yang, B, Ljungqvist, F. C. A Millennial Summer Temperature Reconstruction for the Eastern Tibetan Plateau from Tree-Ring Width[J]. *Journal of Climate*, 2015, 28, 13: 45 5289-5304.

- 15 Davi N, D'Arrigo R, Jacoby G, et al. Warm-season annual to decadal temperature variability for Hokkaido, Japan, inferred from maximum latewood density (AD 1557-1990) and ring width data (AD 1532-1990)[J]. *Climatic Change*, 2002, 52: 201-217.
- 16 Davi N K, D'Arrigo R, Jacoby G, et al. A long-term context (931-2005 CE) for rapid warming over Central Asia[J]. *Quaternary Science Reviews*, 2015, 121: 89-97.
- 50 17 Zhang Y, Shao, X. M, Yin, Z. Y, et al. Millennial minimum temperature variations in the Qilian Mountains, China: evidence from tree rings[J]. *Climate of the past*, 2014, 10, 5, 1763-1778.
- 18 Yi L, Yu H J, Ge J Y, et al. Reconstructions of annual summer precipitation and temperature in north-central China since 1470 AD based on drought/flood index and tree-ring records[J]. *Climatic Change*, 2012, 110: 469-498.
- 55 19 Chen Y F, Yuan Y J, Yu S L, et al. A 391-Year Summer Temperature Reconstruction of the Tien Shan, Reveals Far-Reaching Summer Temperature Signals Over the Midlatitude Eurasian Continent. *Journal of Geophysical Research: Atmospheres*, 2019, 124, 22: 11850-11862.
- 20 Li J F. Research on dendroclimatology and dendrohydrology in Xinjiang[M], Meteorology Press, Beijing, 1989.
- 60 21 Kojo Y. (2002-04-26): NOAA/WDS Paleoclimatology-Kojo-Ashiu Locality 1-CMJA-ITR DB JAPA004. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/f69c-sc66>.
- 22 Davi N K, D'Arrigo R D, Jacoby G C, et al. (2006-04-26): NOAA/WDS Paleoclimatology-Davi -Mount Asahidake, Hokkaido-PCGN-ITRDB JAPA008. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/mp0w-sf19>.
- 65 23 Park W K; Seo J W; Kim Y, et al. (2007-02-07): NOAA/WDS Paleoclimatology-Park-Whachae Peak-Sorak Mountain-PIKO-ITRDB KORE001. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/ensg-dr55>.
- 70 24 Jacoby G C, D'Arrigo R D, Buckley B M, et al. (2011-11-14): NOAA/WDS Paleoclimatology-Jacoby-Solongotyn Davaa (Tarvagatay Pass)-PISI-ITRDB MONG003. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/v658-we82>.
- 25 Jacoby G C, D'Arrigo R D, Pederson N. (2003-11-06): NOAA/WDS Paleoclimatology-Jacoby-Khalzan Khamar-LASI-ITRDB MONG009. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/fls9-jb47>.
- 75 26 Jacoby G C, D'Arrigo, R D, Pederson N. (2003-11-06): NOAA/WDS Paleoclimatology-Jacoby-Suuleen Bagtraa-LASI-ITRDB MONG010. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/5384-5930>.
- 27 Liu Y, Cobb K, Song H. et al. Recent enhancement of central Pacific El Niño variability relative to last eight centuries[J]. *Nature Communication*, 2017, 8: 15386.
- 80 28 Li M Y, Duan J P, Wang L, et al. Late summer temperature reconstruction based on tree-ring density for Sygera Mountain, southeastern Tibetan Plateau[J]. *Global and Planetary Change*, 2018, 163: 10-17.
- 29 Chen F, and Yuan Y J. May-June maximum temperature reconstruction from mean earlywood density in north central China and its linkages to the summer monsoon activities[J]. *PLoS ONE*, 2014, 9(9):e107501.
- 85 30 Deng G F, Li M Q. Establishment of a Yearly September-October Mean Temperature Dataset during 1678-2019 in Northwest Yunnan Province, China[J]. *Journal of Global Change Data & Discovery*, 2022, 6(3): 330-338.

- 90 31 Li J J, Zhang Y, Shao X M, et al. Reconstruction Dataset of Yearly Mean Temperature in  
June-July at Western Sichuan Plateau of China using Tree-ring Width (1383-2005)[J/DB/OL].  
Digital Journal of Global Change Data Repository, 2022.
- 32 Hughes M K. (2002-04-26): NOAA/WDS Paleoclimatology-Hughes-Thijwas A-ABPI-IT  
RDB INDI007. NOAA National Centers for Environmental Information. [https://doi.org/  
95 10.25921/rtnv-7d91](https://doi.org/10.25921/rtnv-7d91).
- 33 Wiles G, Solomina O, D'Arrigo, R D, et al. (2014-12-16): NOAA/WDS Paleoclimatology  
-Wiles-Chamga-Skahalin Island-LAGM-ITRDB RUSS243. NOAA National Centers for  
Environmental Information. <https://doi.org/10.25921/5b03-sj94>.
- 34 Aono Y, Saito S, Kazui K. (2019-03-23): NOAA/WDS Paleoclimatology-Kyoto, Japan 1,200  
100 Year Cherry Tree Flowering Dates and March Temperature Reconstructions. NOAA National  
Centers for Environmental Information. <https://doi.org/10.25921/1xy4-ht08>.
- 35 Thompson L G, Yao T, Davis M E, et al. (2021-12-08): NOAA/WDS Paleoclimatology-Guliya  
Ice Cap, Tibetan Plateau 174 Year Stable Isotope, Major Ion and Dust Data. NOAA National  
Centers for Environmental Information. <https://doi.org/10.25921/6e2p-x626>.
- 105 36 Demezhko D Y, Solomina O. (2017-05-19): NOAA/WDS Paleoclimatology-Kunashir Island  
400 Year Temperature Reconstruction. NOAA National Centers for Environmental  
Information. <https://doi.org/10.25921/d66b-q088>.
- 37 Davi N K, D'Arrigo R D, Jacoby G C, et al. (2003-07-01): NOAA/WDS  
Paleoclimatology-Davi et al. 2001 Hokkaido, Japan Warm Season Temperature  
110 Reconstruction. NOAA National Centers for Environmental Information.  
<https://doi.org/10.25921/nq84-1274>.
- 38 Xu C, Sano M, Dimri A P, et al. (2018-04-09): NOAA/WDS Paleoclimatology-Jageshwar,  
Northern India 388 Year Tree Ring Oxygen Isotope Data. NOAA National Centers for  
Environmental Information. <https://doi.org/10.25921/jdmh-bm92>.
- 115 39 Managave S, Shimla P, Yadav R R, et al. (2020-10-03): NOAA/WDS  
Paleoclimatology-Keylong, India 860 Year Tree-Ring Oxygen Isotope Data. NOAA National  
Centers for Environmental Information. <https://doi.org/10.25921/de2r-b132>.
- 40 Sano M, Dimri A P, Ramesh R, et al. (2018-01-18): NOAA/WDS Paleoclimatology-Manali,  
NW India 242 Year Tree Ring Oxygen Isotope Data. NOAA National Centers for  
120 Environmental Information. <https://doi.org/10.25921/xxcd-4236>
- 41 Xu C, Sano M, Dimri A P, et al. (2018-04-09): NOAA/WDS Paleoclimatology-Ganesh, Nepal  
200 Year Tree Ring Oxygen Isotope Data. NOAA National Centers for Environmental  
Information. <https://doi.org/10.25921/heyh-ky04>.
- 42 Sano M, Ramesh, R, Sheshshayee, M.S, Sukumar, R. (2017-08-23): NOAA/WDS Paleo  
125 climatology-Humla, Western Nepal 223 Year Tree Ring Oxygen Isotope Data. NOAA  
National Centers for Environmental Information. <https://doi.org/10.25921/9w68-zf20>.
- 43 Schleser G H, Helle G. (2017-08-08): NOAA/WDS Paleoclimatology-Lake Baikal Regio  
n, Russia 600 Year Tree Ring Stable Isotope Data. NOAA National Centers for Envir  
onmental Information. <https://doi.org/10.25921/3mjn-9827>.
- 130 44 Borgaonkar H P, Pant G B, Rupa Kumar K. (2004-08-31): NOAA/WDS Paleoclimatolo  
gy-Borgaonkar-Tuni-PIRO-ITRDB INDI011. NOAA National Centers for Environmental  
Information. <https://doi.org/10.25921/q5bs-xp48>.
- 45 Borgaonkar H P, Pant G B, Rupa Kumar K. (2004-08-31): NOAA/WDS Paleoclimatolo

- 135 gy-Borgaonkar-Kufri-CDDE-ITRDB INDI012. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/15ch-sh16>.
- 46 Borgaonkar H P, Pant G B, Rupa Kumar K. (2004-08-31): (2004-08-31): NOAA/WDS Paleoclimatology-Borgaonkar-Manali-CDDE-ITRDB INDI013. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/js6k-vj79>.
- 140 47 Borgaonkar H P, Pant G B, Rupa Kumar K. (2004-08-31): NOAA/WDS Paleoclimatology-Borgaonkar-Narkhanda-CDDE-ITRDB INDI014. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/y1g4-z507>.
- 48 Borgaonkar H P, Pant G B, Rupa Kumar K. (2004-08-31): NOAA/WDS Paleoclimatology-Borgaonkar-Gahan-PCSM-ITRDB INDI017. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/d7gg-fe41>.
- 145 49 Borgaonkar H P, Pant G B, Rupa Kumar K. (2004-08-31): NOAA/WDS Paleoclimatology-Borgaonkar-Dhanolti-PCSM-ITRDB INDI019. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/dftg-p971>.
- 50 Borgaonkar H P, Pant G B, Rupa Kumar K. (2004-08-31): NOAA/WDS Paleoclimatology-Borgaonkar-Ghansali-PIRO-ITRDB INDI020. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/3gix-r006>.
- 150 51 Borgaonkar H P, Pant G B, Rupa Kumar K. (2004-08-31): NOAA/WDS Paleoclimatology-Borgaonkar-Jageswar-CDDE-ITRDB INDI021. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/w7hd-8n61>.
- 52 Oskolkov V A, Voronin V I. (2021-01-28): NOAA/WDS Paleoclimatology-Oskolkov-Olkhon HAR-LASI-ITRDB RUSS289. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/gtfn-bj98>.
- 155 53 Schweingruber F H. (2002-07-30): NOAA/WDS Paleoclimatology - Schweingruber - Ghorepanipass Annapurne - ABSB - ITRDB NEPA001. NOAA National Centers for Environmental Information. <https://doi.org/10.25921/3xch-zb08>.

## 2 North test results for the EOF modes

The North test was applied to assess the sampling uncertainty of the EOF eigenvalues and to determine whether the first ten EOF modes are statistically distinguishable. Tab. S2 lists the eigenvalues, explained variance, cumulative variance, associated error ranges, and the North test results for the first ten modes.

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**Table S2: EOF decomposition and North Test results for reconstructed EA temperature during 1400-2000.**

<b>Modes</b>	<b>Eigenvalue</b>	<b>Explained Variance (%)</b>	<b>Cumulative Variance (%)</b>	<b>Error Range</b>	<b>Passes North Test?</b>
1	614.47	26.3%	26.3%	35.45	Yes
2	260.93	11.2%	37.5%	15.05	Yes
3	178.46	7.5%	45.0%	10.12	Yes
4	159.07	6.8%	51.8%	9.18	No
5	115.82	5.0%	56.8%	6.68	No
6	92.06	3.9%	60.7%	5.31	No
7	85.96	3.7%	64.4%	4.96	No
8	64.59	2.8%	67.2%	3.73	No
9	59.11	2.5%	69.7%	3.41	No
10	44.37	1.9%	71.6%	2.56	No