

## European Seasonal Temperature Reconstructions

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 World Data Center for Paleoclimatology, Boulder  
 and  
 NOAA Paleoclimatology Program  
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NOTE: PLEASE CITE CONTRIBUTORS WHEN USING THIS DATA!!!!

NAME OF DATA SET: European Seasonal Temperature Reconstructions  
 LAST UPDATE: 6/2006 (Original receipt by WDC Paleo)  
 CONTRIBUTOR: Juerg Luterbacher, University of Bern  
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SUGGESTED DATA CITATION: Luterbacher, J., et al. 2006.  
 European Seasonal Temperature Reconstructions.  
 IGBP PAGES/World Data Center for Paleoclimatology  
 Data Contribution Series # 2006-060.  
 NOAA/NCDC Paleoclimatology Program, Boulder CO, USA.

## ORIGINAL REFERENCES:

Xoplaki, E., J. Luterbacher, H. Paeth, D. Dietrich, N. Steiner,  
 M. Grosjean, and H. Wanner. 2005.  
 European spring and autumn temperature variability and change of extremes  
 over the last half millennium.  
 Geophys. Res. Lett., 32, L15713.

Luterbacher, J., D. Dietrich, E. Xoplaki, M. Grosjean, and H. Wanner. 2004.  
 European seasonal and annual temperature variability, trends and extremes  
 since 1500. Science, 303, 1499-1503.

## ABSTRACT (Xoplaki et al. 2005):

We evaluate variability, trends, uncertainties, and change of extremes  
 of reconstructed and observed European spring and autumn temperature  
 back to 1500. Spring and autumn temperature experienced systematic  
 century-scale cooling compared to present conditions. The coldest  
 springs appeared during the Maunder Minimum (DT = -1 K wrt 1901-2000).  
 The amplitude of spring temperature variations at decadal and multidecadal  
 scales doubles that of autumn and is most expressed in northeastern Europe.  
 The decade 1995-2004 was very likely the warmest of the last half millennium.  
 Anomalously warm springs and autumns have generally become more extreme  
 in recent decades. However, the recent changes are statistically not  
 significant with respect to the pre-industrial period.

## ABSTRACT (Luterbacher et al. 2004):

Multiproxy reconstructions of monthly and seasonal surface temperature  
 fields for Europe back to 1500 show that the late 20th- and early  
 21st-century European climate is very likely (>95% confidence level)  
 warmer than that of any time during the past 500 years. This agrees with  
 findings for the entire Northern Hemisphere. European winter average  
 temperatures during the period 1500 to 1900 were reduced by ~0.5°C  
 (0.25°C for annual mean temperatures) compared to the 20th century.  
 Summer temperatures did not experience systematic century-scale cooling  
 relative to present conditions. The coldest European winter was 1708/1709;  
 2003 was by far the hottest summer.

## ADDITIONAL REFERENCES FOR INSTRUMENTAL DATA:

Mitchell, T., and P.D. Jones. 2005.  
 An improved method of constructing a database of monthly climate  
 observations and associated high-resolution grids.  
 Int. J. Climatol., 25, 693-712.

Hansen, J., R. Ruedy, M. Sato, M. Imhoff, W. Lawrence, D. Easterling,  
 T. Peterson, and T. Karl. 2001.  
 A closer look at United States and global surface temperature change.

J. Geophys. Res., 106, 23,947- 23,963.

GEOGRAPHIC REGION: Europe  
PERIOD OF RECORD: 1500-2004 AD

DESCRIPTION:

Seasonal averaged European land (25W-40E; 35N-70N) absolute surface air temperature 1500-2004. Data from 1500-1900 are reconstructions.

Reference for Winter and Summer data: Luterbacher et al. 2004  
Reference for Spring and Autumn data: Xoplaki et al. 2005  
References for Annual data: Xoplaki et al. 2005 and Luterbacher et al. 2004

Data from 1901-2002 are taken from: Mitchell and Jones 2005  
Data from 2003-2004 stem from: Hansen et al. 2001

Note that the winter and summer reconstructed values are slightly different from Luterbacher et al. (2004) for earlier centuries because the reconstructions have been redone (i) fitting to Mitchell and Jones (2005) observational data rather than New et al. (2000), (ii) using only instrumental temperature series and temperature-sensitive documentary and natural proxies, and (iii) including a few more instrumental series compared to Luterbacher et al. (2004).

The files in the /europe-seasonal-files directory located with this readme file contain seasonal data for a given year.

They are named with the year and then a two-letter code to indicate the season.

su = summer  
au = autumn  
wi = winter  
sp = spring

The first row of data in the files is the northernmost row(70N) with data values going from West to East in each row. The rows then proceed from North to South.

DATA:

Column 1: Year AD  
Column 2: Winter (December-January-February) averaged absolute surface air temperature, °C  
Column 3: Spring (March-April-May) averaged absolute surface air temperature, °C  
Column 4: Summer (June-July-August) averaged absolute surface air temperature, °C  
Column 5: Autumn (September-October-November) averaged absolute surface air temperature, °C  
Column 6: Annual averaged absolute surface air temperature, °C

Year	DJF	MAM	JJA	SON	Annual
1500	-0.945	7.157	17.483	8.990	8.166
1501	-0.850	7.435	17.401	8.687	8.163
1502	-1.053	6.872	17.906	9.071	8.194
1503	-2.134	7.210	18.331	8.922	8.077
1504	-1.881	7.254	18.223	9.075	8.163
1505	0.048	7.323	17.341	9.286	8.494
1506	0.064	7.116	17.572	8.958	8.422
1507	0.612	6.229	17.510	9.071	8.350
1508	-2.099	6.818	17.310	9.178	7.797
1509	-1.446	7.323	17.856	9.071	8.196
1510	-0.404	6.985	17.514	8.842	8.229
1511	-2.305	7.210	17.070	9.071	7.756
1512	-2.158	7.142	17.577	9.382	7.981
1513	-1.023	7.043	17.510	8.365	7.969
1514	-2.945	6.910	17.567	8.800	7.578
1515	0.163	6.654	17.031	8.922	8.187
1516	0.184	7.474	18.078	9.390	8.776
1517	-3.520	7.326	17.564	8.842	7.548
1518	-1.148	7.185	17.394	8.763	8.043
1519	-0.507	7.474	17.585	8.963	8.374
1520	0.030	6.552	17.620	8.856	8.259

1521	0.528	7.652	17.744	9.286	8.797
1522	-1.223	7.210	17.567	8.958	8.123
1523	0.020	7.503	17.483	9.070	8.514
1524	0.101	7.097	17.567	9.071	8.454
1525	-1.483	6.663	17.824	9.467	8.113
1526	-1.188	7.500	17.458	9.183	8.233
1527	0.025	6.886	17.310	8.743	8.236
1528	-0.482	7.210	17.451	9.178	8.334
1529	-0.668	7.105	16.814	8.789	8.005
1530	0.934	7.320	17.662	9.243	8.785
1531	0.004	6.537	17.607	9.717	8.461
1532	-0.558	7.431	17.947	9.024	8.456
1533	-1.288	7.323	17.398	9.075	8.122
1534	-2.391	7.551	18.420	9.070	8.157
1535	-1.585	6.818	17.841	9.071	8.031
1536	-2.035	7.459	18.682	9.712	8.449
1537	-1.003	6.936	17.325	9.541	8.195
1538	0.540	6.788	18.019	9.229	8.639
1539	-0.384	7.264	17.748	8.591	8.300
1540	-0.368	8.190	18.678	9.910	9.097
1541	-1.772	7.329	17.283	8.689	7.877
1542	-0.443	6.434	16.657	9.127	7.939
1543	-2.146	6.644	17.295	9.462	7.809
1544	-2.619	6.800	17.401	8.905	7.617
1545	-0.398	7.364	18.101	9.523	8.642
1546	-2.577	6.856	17.724	9.071	7.763
1547	-1.086	7.210	17.684	9.071	8.215
1548	-1.789	7.090	17.907	9.178	8.091
1549	-0.866	8.050	17.725	9.018	8.477
1550	-0.735	6.821	17.441	8.635	8.035
1551	-1.503	7.233	17.735	8.508	7.988
1552	0.387	7.432	17.554	9.228	8.645
1553	-0.312	6.750	17.614	9.678	8.427
1554	-2.738	7.489	17.663	9.075	7.867
1555	-0.717	7.320	16.984	8.908	8.119
1556	0.125	7.635	18.414	8.911	8.766
1557	-2.888	7.021	17.814	9.608	7.884
1558	-0.722	7.770	17.783	9.234	8.511
1559	-1.085	7.412	18.223	9.015	8.386
1560	-0.356	7.306	17.059	8.803	8.198
1561	-3.178	6.896	17.828	9.341	7.717
1562	0.492	7.431	17.607	9.520	8.757
1563	-2.102	6.985	17.160	8.958	7.745
1564	-1.174	7.196	17.585	9.081	8.167
1565	-3.183	6.116	17.788	8.513	7.303
1566	-0.533	7.124	17.663	9.004	8.309
1567	-0.784	7.164	18.069	9.308	8.434
1568	-0.373	6.794	17.691	8.580	8.168
1569	-3.470	6.625	16.956	8.752	7.211
1570	-0.225	6.941	17.232	8.848	8.194
1571	-1.848	7.548	17.275	9.238	8.048
1572	-1.389	7.210	17.715	8.743	8.065
1573	-4.097	6.518	17.059	8.627	7.022
1574	-1.180	7.213	17.672	9.377	8.265
1575	-1.054	6.842	18.114	8.916	8.199
1576	-0.673	7.157	17.397	8.695	8.139
1577	-0.225	7.043	17.376	9.071	8.311
1578	-1.011	6.846	17.756	9.218	8.197
1579	-0.346	7.391	16.677	8.365	8.017
1580	-0.777	6.979	17.935	9.242	8.340
1581	-1.125	7.215	17.680	9.183	8.233
1582	-0.694	7.105	17.451	8.963	8.201
1583	-0.755	7.539	17.995	9.262	8.505
1584	-0.262	7.207	17.440	9.234	8.400
1585	0.238	8.123	16.863	8.876	8.520
1586	-2.625	6.694	17.742	9.081	7.718
1587	-2.495	6.367	16.954	8.474	7.320
1588	-0.667	7.168	16.799	9.018	8.074
1589	-1.726	7.310	17.478	9.240	8.070
1590	-1.900	6.925	18.520	9.564	8.272

1591	-1.558	7.349	17.344	9.336	8.113
1592	-0.459	6.934	17.258	8.950	8.166
1593	-1.982	6.800	16.985	8.688	7.618
1594	-0.375	6.693	17.089	8.627	8.003
1595	-3.614	6.529	17.200	9.051	7.286
1596	-0.091	7.790	16.886	9.449	8.503
1597	0.485	6.321	16.823	7.652	7.815
1598	-1.704	6.816	17.189	9.017	7.824
1599	-2.515	7.938	18.179	9.483	8.266
1600	-3.223	6.265	17.242	8.237	7.125
1601	-2.817	6.474	17.137	8.022	7.199
1602	-0.369	7.252	17.549	8.958	8.342
1603	-1.895	7.591	17.998	9.339	8.253
1604	-0.152	7.320	17.798	8.640	8.396
1605	-0.459	7.210	17.658	9.453	8.460
1606	-0.717	7.323	17.080	8.800	8.116
1607	1.022	7.320	17.650	9.341	8.828
1608	-4.141	6.975	16.920	8.795	7.132
1609	0.635	7.264	17.313	9.011	8.551
1610	-0.748	6.637	17.783	9.506	8.289
1611	-0.970	7.704	18.027	8.575	8.329
1612	-1.524	7.043	17.684	9.071	8.063
1613	0.730	7.272	17.483	8.682	8.537
1614	-1.841	6.364	17.355	8.400	7.564
1615	-1.437	6.525	18.012	9.398	8.119
1616	-1.925	7.368	18.375	9.178	8.244
1617	0.583	7.545	17.229	9.178	8.629
1618	-1.246	7.100	16.992	9.356	8.045
1619	-0.430	6.863	17.619	8.682	8.178
1620	-2.010	7.156	17.627	9.234	7.997
1621	-3.028	7.381	16.826	8.860	7.505
1622	-2.465	6.804	17.621	9.126	7.766
1623	-0.829	7.043	17.998	9.018	8.302
1624	-2.781	7.838	18.012	9.341	8.097
1625	0.296	6.866	17.376	8.693	8.303
1626	-0.032	7.210	17.381	9.566	8.526
1627	-2.139	6.449	16.985	8.801	7.519
1628	-0.117	6.995	16.807	8.843	8.127
1629	0.014	6.851	17.944	9.286	8.519
1630	-0.033	6.934	17.867	9.013	8.440
1631	-1.214	7.320	18.044	9.280	8.352
1632	-1.134	6.863	17.320	8.458	7.872
1633	-0.080	6.971	17.351	8.851	8.268
1634	-1.187	7.097	17.684	8.625	8.050
1635	-2.932	6.396	17.532	9.017	7.498
1636	-0.877	7.958	17.743	8.681	8.371
1637	-1.784	7.416	18.070	8.518	8.050
1638	-0.998	7.763	17.945	8.579	8.317
1639	-0.433	7.043	17.230	9.360	8.295
1640	-1.250	6.232	17.574	8.478	7.753
1641	-1.559	6.866	17.356	8.630	7.818
1642	-0.444	6.093	17.546	9.075	8.062
1643	-0.164	6.065	17.806	8.358	8.011
1644	-1.302	7.033	17.915	9.234	8.215
1645	-1.260	7.658	18.033	8.913	8.331
1646	-2.572	7.435	18.044	8.963	7.962
1647	-0.577	7.489	17.493	9.621	8.501
1648	-0.462	7.269	17.302	8.955	8.261
1649	-1.958	6.883	17.581	8.748	7.808
1650	-0.066	6.734	17.776	9.081	8.376
1651	-1.149	6.753	17.768	8.856	8.052
1652	-0.724	6.612	17.793	9.513	8.293
1653	-1.393	7.419	17.641	9.018	8.166
1654	-0.418	7.084	17.494	9.013	8.288
1655	-1.802	6.666	17.571	9.123	7.884
1656	-1.602	7.097	17.623	8.908	8.001
1657	-0.223	7.323	17.414	8.870	8.341
1658	-3.592	6.717	17.298	9.183	7.396
1659	-1.267	6.739	17.467	8.835	8.079
1660	-2.505	7.279	17.584	8.859	7.977

1661	0.002	7.315	17.953	9.465	8.768
1662	-0.126	7.112	17.594	9.058	8.398
1663	-2.780	6.598	17.741	9.097	8.098
1664	-0.376	6.738	17.877	8.591	8.241
1665	-2.453	6.601	17.441	8.732	7.697
1666	-1.066	7.113	17.828	8.944	8.062
1667	-1.999	6.491	17.852	8.881	8.189
1668	-0.363	6.270	17.582	9.521	8.482
1669	-1.105	6.970	17.791	9.621	8.157
1670	-3.102	7.241	17.390	8.886	8.060
1671	-0.188	7.448	17.419	8.943	8.572
1672	-1.887	7.044	17.494	9.035	8.089
1673	-0.141	7.106	17.437	8.837	8.388
1674	-2.318	6.922	17.170	8.817	7.919
1675	-0.556	6.170	16.999	8.093	7.863
1676	0.005	6.379	17.962	8.152	8.134
1677	-1.754	6.534	17.750	8.819	8.056
1678	-0.834	6.966	17.829	9.501	8.492
1679	-2.353	6.999	18.050	8.577	7.845
1680	-0.687	7.568	17.679	10.029	8.544
1681	-3.086	6.982	17.630	9.579	7.981
1682	-0.585	7.198	17.640	9.104	8.499
1683	-0.853	6.769	17.666	8.649	7.982
1684	-3.981	6.756	17.874	8.755	7.664
1685	-2.425	6.974	17.580	9.035	7.914
1686	0.495	7.739	17.770	9.076	8.629
1687	-1.469	6.707	17.479	9.141	7.975
1688	-2.145	6.431	17.285	8.719	7.726
1689	-1.391	6.911	17.486	8.856	7.965
1690	-0.205	6.811	17.419	8.929	8.198
1691	-2.662	5.849	17.629	8.434	7.515
1692	-2.605	6.757	17.332	8.712	7.688
1693	-0.454	6.266	17.537	9.029	8.338
1694	-2.218	6.963	17.180	8.351	7.780
1695	-4.040	5.163	16.623	8.690	7.433
1696	-0.039	5.850	17.419	9.135	8.271
1697	-3.497	6.297	17.302	8.598	7.490
1698	-2.868	6.847	17.197	8.507	7.669
1699	-0.697	6.024	17.660	9.086	8.185
1700	-0.882	6.601	17.123	8.549	7.851
1701	-0.731	5.339	17.685	9.433	8.287
1702	0.538	6.702	17.583	8.735	8.535
1703	-0.893	7.620	17.513	9.053	8.362
1704	-1.095	6.790	17.940	9.170	8.228
1705	-1.281	5.728	17.560	8.932	8.083
1706	-0.908	7.309	18.253	9.686	8.564
1707	0.156	6.835	17.951	9.046	8.480
1708	0.714	6.821	17.654	9.120	8.621
1709	-4.152	6.631	17.621	9.142	7.616
1710	-1.149	6.950	17.733	9.289	8.486
1711	-0.048	7.539	17.787	9.144	8.510
1712	-0.678	6.526	17.448	8.954	8.066
1713	-0.348	5.378	17.119	8.357	7.905
1714	-1.125	5.443	17.021	8.955	7.960
1715	-0.907	7.397	17.510	9.101	8.180
1716	-3.021	6.087	17.272	8.263	7.495
1717	-1.309	6.916	17.567	8.798	8.185
1718	-1.973	6.792	18.117	9.372	8.159
1719	-0.137	6.639	18.234	8.891	8.295
1720	-0.826	6.621	17.116	8.802	8.054
1721	-0.636	6.109	17.545	8.760	8.143
1722	0.149	6.842	17.504	10.082	8.856
1723	-0.576	7.453	17.625	9.236	8.646
1724	0.788	6.589	17.422	8.830	8.401
1725	-1.120	6.566	17.087	8.755	8.039
1726	-1.285	7.694	17.796	8.515	8.129
1727	-0.186	6.756	17.782	9.584	8.645
1728	-0.036	7.540	17.322	9.308	8.387
1729	-1.947	6.393	17.453	9.143	8.149
1730	0.015	7.296	17.945	8.305	8.267

1731	-0.725	6.518	16.895	9.489	8.147
1732	-0.233	7.589	16.910	8.973	8.150
1733	-0.184	7.171	16.933	8.913	8.599
1734	0.820	7.240	17.441	8.733	8.549
1735	-0.276	8.085	17.580	8.909	8.724
1736	-0.445	6.945	17.530	9.278	8.461
1737	-0.042	6.859	17.275	9.244	8.446
1738	-0.307	7.317	17.736	9.367	8.638
1739	-0.366	6.777	17.268	8.103	7.890
1740	-2.683	5.844	17.080	8.436	7.414
1741	0.607	6.670	17.076	9.449	8.381
1742	-0.107	6.244	17.074	9.080	8.040
1743	-0.712	7.204	17.877	8.946	8.458
1744	-1.122	7.906	17.567	9.418	8.405
1745	-1.537	7.254	17.824	9.285	8.175
1746	-0.521	6.783	17.527	8.877	8.390
1747	-0.250	6.878	17.612	9.655	8.338
1748	-0.744	6.531	18.270	9.161	8.392
1749	-0.301	7.283	17.837	9.062	8.366
1750	0.069	8.296	17.855	8.036	8.492
1751	-1.235	7.833	17.733	8.689	8.325
1752	-0.510	7.493	18.488	9.447	8.677
1753	-0.948	7.507	17.607	9.650	8.328
1754	-1.629	6.975	17.672	9.499	8.287
1755	-2.582	7.378	18.272	9.294	8.126
1756	0.025	6.718	17.734	8.745	8.267
1757	-1.562	7.878	18.849	8.244	8.423
1758	-1.836	7.175	17.442	8.269	7.718
1759	-0.272	7.053	18.232	8.607	8.238
1760	-2.088	6.737	17.764	9.033	7.982
1761	-0.849	8.081	18.616	9.048	8.485
1762	-0.862	7.421	17.665	8.442	8.269
1763	-1.650	6.646	18.406	8.315	8.084
1764	0.607	7.673	17.687	8.895	8.746
1765	-0.582	7.829	17.480	9.466	8.505
1766	-1.963	8.383	18.226	9.796	8.512
1767	-2.391	6.868	17.723	10.171	8.021
1768	-2.397	6.377	17.987	9.128	7.977
1769	0.380	7.407	17.856	8.341	8.335
1770	-1.443	6.518	17.740	10.199	8.333
1771	-1.263	6.263	17.835	8.988	7.989
1772	-0.496	6.800	18.042	10.536	8.645
1773	-0.365	7.904	17.834	10.198	8.884
1774	-0.566	8.185	18.521	7.596	8.141
1775	-0.822	7.080	18.804	10.158	8.838
1776	-1.246	7.105	18.534	9.060	8.350
1777	-1.478	7.199	17.465	8.939	8.010
1778	-1.177	8.056	18.258	8.573	8.456
1779	-0.389	8.881	17.761	10.120	9.026
1780	-1.274	7.641	17.776	8.915	8.088
1781	-1.725	7.573	18.446	9.859	8.553
1782	-1.967	6.763	17.869	8.589	7.778
1783	-1.292	7.570	18.474	9.545	8.520
1784	-2.350	6.506	18.177	8.906	7.836
1785	-1.598	5.075	17.442	8.900	7.418
1786	-1.582	6.825	17.737	7.631	7.690
1787	-1.043	6.927	17.528	9.331	8.218
1788	-0.924	7.037	18.529	8.732	7.734
1789	-3.540	6.741	18.388	9.924	8.437
1790	0.323	7.257	17.598	8.816	8.447
1791	0.736	7.842	18.037	8.798	8.882
1792	-0.954	7.263	18.267	9.094	8.282
1793	-0.651	7.039	18.411	9.457	8.542
1794	-0.326	8.897	18.179	9.276	9.082
1795	-2.056	7.423	17.764	9.397	8.200
1796	0.465	6.511	18.259	9.259	8.450
1797	-0.193	7.911	18.469	10.155	9.164
1798	-0.114	8.116	18.684	9.434	8.693
1799	-3.655	6.154	17.435	9.623	7.425
1800	-2.231	7.260	17.228	9.524	8.209

1801	-0.563	8.572	17.158	9.935	8.727
1802	-1.336	7.487	18.165	9.536	8.433
1803	-2.960	7.737	18.217	8.666	7.729
1804	-1.329	7.012	18.038	8.971	8.106
1805	-2.738	6.522	17.542	7.844	7.563
1806	0.169	7.151	17.533	9.615	8.735
1807	0.519	6.346	18.786	9.610	8.590
1808	-0.555	5.994	18.599	9.384	7.957
1809	-2.466	5.966	18.028	8.753	7.902
1810	-0.832	6.372	17.252	9.131	7.865
1811	-1.340	8.194	18.700	9.166	8.604
1812	-1.170	6.310	17.894	8.598	7.545
1813	-2.587	7.463	17.215	9.164	8.162
1814	-2.748	6.457	17.728	8.863	7.762
1815	-0.901	7.665	17.123	9.076	8.077
1816	-1.625	6.593	17.040	8.834	7.798
1817	0.454	6.765	17.740	8.419	8.233
1818	-1.316	7.592	17.746	9.159	8.570
1819	-0.182	7.415	18.378	9.288	8.526
1820	-2.515	7.874	17.674	8.853	8.013
1821	-1.475	7.650	16.527	9.622	8.404
1822	0.913	9.060	17.951	9.693	9.246
1823	-1.982	7.601	18.070	9.280	8.426
1824	0.585	7.473	17.528	9.919	8.891
1825	0.251	6.973	17.429	9.639	8.622
1826	-0.914	7.614	18.764	9.682	8.750
1827	-0.951	8.370	18.142	8.739	8.567
1828	-1.554	7.687	17.942	8.779	8.098
1829	-2.590	6.392	17.278	8.074	7.037
1830	-3.578	7.440	17.733	8.994	8.003
1831	-1.091	7.432	17.784	8.752	8.143
1832	-0.538	6.863	16.963	8.410	7.849
1833	-0.971	7.155	17.101	9.277	8.286
1834	-0.353	7.395	18.663	9.430	8.714
1835	0.110	7.003	17.311	8.265	7.915
1836	-1.987	7.738	17.065	8.878	8.235
1837	-0.692	6.135	17.309	8.838	7.776
1838	-3.298	6.511	17.104	8.918	7.398
1839	-1.010	5.856	18.207	9.584	8.086
1840	-1.556	6.109	17.314	8.911	7.484
1841	-3.104	8.174	17.795	9.583	8.530
1842	-0.566	6.793	17.962	8.104	8.008
1843	1.005	6.289	17.441	8.903	8.375
1844	-1.491	7.062	17.145	8.898	7.764
1845	-2.111	5.211	17.850	9.383	7.813
1846	-0.619	7.907	18.779	9.520	8.642
1847	-1.961	6.550	17.884	9.394	8.096
1848	-1.798	8.133	17.915	9.015	8.324
1849	-1.010	6.763	17.247	8.849	7.839
1850	-2.245	6.761	18.013	8.435	7.935
1851	-0.778	6.896	17.426	9.769	8.270
1852	-0.620	6.382	17.975	8.674	8.147
1853	0.188	5.895	18.061	9.252	8.151
1854	-1.870	7.234	17.946	8.789	8.189
1855	-1.659	6.847	18.060	9.059	7.719
1856	-1.684	6.385	17.146	7.827	7.664
1857	-1.548	6.957	17.587	9.269	8.141
1858	-1.635	6.958	18.306	8.852	8.019
1859	-0.102	7.780	18.231	9.259	8.704
1860	-1.306	6.744	17.647	8.504	7.843
1861	-2.278	6.724	18.459	8.823	8.033
1862	-2.494	7.761	17.041	8.552	7.613
1863	-0.077	7.878	17.553	9.879	8.954
1864	-1.624	6.710	17.343	7.831	7.443
1865	-1.906	6.891	17.340	9.311	8.068
1866	-0.017	6.878	17.547	8.830	8.294
1867	-0.673	6.082	17.000	8.323	7.448
1868	-2.395	7.719	18.412	8.908	8.505
1869	0.163	7.551	17.576	8.877	8.533
1870	-1.630	6.908	17.489	8.465	7.594

1871	-3.935	6.801	17.156	7.861	7.024
1872	-1.649	8.104	17.585	9.883	8.846
1873	-0.016	6.562	18.021	9.049	8.382
1874	-0.484	6.445	17.357	9.182	8.074
1875	-2.336	5.761	17.804	7.670	7.006
1876	-2.525	6.843	17.976	8.190	7.792
1877	-1.368	5.919	17.530	8.475	7.784
1878	-0.678	7.488	17.359	10.170	8.580
1879	-0.745	6.628	17.260	8.373	7.588
1880	-2.723	6.698	17.588	8.770	7.870
1881	-1.845	6.207	17.183	8.116	7.386
1882	-0.133	7.947	17.308	8.689	8.405
1883	-1.260	6.184	17.519	9.372	8.043
1884	-0.251	6.729	16.755	8.343	7.908
1885	-0.681	7.007	17.131	8.307	7.875
1886	-1.535	6.789	17.226	9.234	8.079
1887	-0.264	6.899	17.318	8.675	7.994
1888	-2.499	6.234	16.646	8.252	7.163
1889	-1.915	7.064	17.607	9.042	7.917
1890	-1.082	8.031	17.574	8.459	8.253
1891	-2.541	7.011	17.195	8.696	7.901
1892	-0.923	6.810	17.121	9.128	7.790
1893	-3.810	6.696	17.362	8.982	7.562
1894	-0.486	7.797	17.457	8.363	8.246
1895	-2.218	6.818	17.515	9.350	7.914
1896	-1.524	6.885	17.696	8.983	7.996
1897	-1.111	7.814	17.906	8.615	8.315
1898	-0.707	6.921	17.310	9.343	8.378
1899	0.060	6.578	16.968	9.471	8.064
1900	-1.511	6.162	17.394	9.331	8.075
1901	-2.218	7.408	18.333	8.808	8.211
1902	-0.573	6.116	16.477	7.722	7.295
1903	-0.675	7.780	16.960	8.862	8.409
1904	-0.331	6.811	17.046	8.407	7.937
1905	-1.388	7.297	17.818	8.695	8.153
1906	-0.190	7.734	17.372	9.028	8.381
1907	-2.043	6.701	16.786	9.141	7.602
1908	-1.065	6.698	17.134	8.007	7.717
1909	-1.891	6.287	16.860	9.435	7.825
1910	0.783	7.602	16.945	8.546	8.489
1911	-1.076	7.103	17.510	9.384	8.214
1912	-0.984	7.273	16.989	7.532	7.681
1913	-0.355	7.835	16.853	9.544	8.387
1914	-0.282	7.821	17.385	8.120	8.341
1915	0.272	6.490	17.075	7.862	7.748
1916	0.100	7.218	16.984	8.835	8.395
1917	-1.956	5.769	18.034	9.538	7.645
1918	-1.133	7.201	16.692	9.614	8.263
1919	-0.365	6.575	16.965	8.401	7.763
1920	-0.547	9.139	17.468	8.308	8.627
1921	-0.395	8.761	17.485	8.248	8.482
1922	-1.479	7.535	17.343	8.189	7.945
1923	-0.478	7.124	16.619	9.973	8.276
1924	-1.875	6.933	17.392	9.640	8.088
1925	1.276	7.433	17.424	8.399	8.488
1926	-0.740	7.432	17.196	9.751	8.441
1927	-1.009	7.595	18.170	9.073	8.305
1928	-1.287	6.790	17.105	9.531	8.187
1929	-3.117	6.376	17.457	9.989	7.877
1930	0.877	8.033	17.862	9.626	8.914
1931	-1.051	6.991	17.801	8.494	8.004
1932	-0.977	6.681	17.883	9.859	8.561
1933	-0.511	6.804	17.501	9.096	7.814
1934	-1.143	8.477	17.911	10.282	9.231
1935	-0.241	6.836	17.701	9.671	8.460
1936	0.353	7.844	18.182	8.692	8.759
1937	-0.136	8.344	18.362	10.025	8.988
1938	-0.259	7.559	18.503	10.554	9.088
1939	0.386	7.092	18.124	9.046	8.642
1940	-3.149	6.603	17.405	9.409	7.468



1941	-2.157	6.152	17.623	7.723	7.302
1942	-4.029	6.259	17.435	9.461	7.479
1943	-0.401	8.136	17.845	10.007	8.947
1944	0.482	7.008	17.700	9.643	8.623
1945	-0.902	7.717	18.133	9.092	8.412
1946	-0.915	7.803	18.350	9.153	8.633
1947	-2.471	7.900	18.653	9.597	8.493
1948	0.169	8.330	17.467	9.327	8.787
1949	0.496	7.592	17.309	10.242	9.012
1950	-0.688	8.519	17.946	9.572	8.721
1951	-0.332	7.217	17.799	9.409	8.600
1952	0.472	6.914	17.853	8.738	8.384
1953	-1.007	7.715	18.161	9.390	8.630
1954	-2.196	7.342	17.857	9.699	8.254
1955	0.553	6.251	17.691	9.509	8.245
1956	-2.571	6.518	17.060	8.052	7.344
1957	0.617	7.314	17.872	9.485	8.794
1958	-0.292	6.532	17.254	9.768	8.337
1959	0.059	8.217	18.237	8.595	8.766
1960	-0.704	7.688	17.876	9.285	8.684
1961	1.192	8.419	17.811	10.171	9.159
1962	-0.150	6.892	16.922	9.770	8.259
1963	-3.222	6.891	17.768	10.178	7.911
1964	-1.492	7.097	17.681	9.401	8.335
1965	-0.850	6.568	16.946	8.560	7.808
1966	-0.708	7.628	17.673	9.572	8.467
1967	-1.173	8.121	17.663	10.437	8.632
1968	-1.937	7.891	17.351	9.046	8.196
1969	-1.893	6.654	17.429	9.530	7.765
1970	-1.795	7.144	17.840	9.291	8.277
1971	-0.033	6.905	17.469	8.644	8.333
1972	-0.637	7.786	18.213	8.695	8.552
1973	0.665	7.626	17.827	8.252	8.366
1974	0.387	7.505	17.398	9.372	8.909
1975	1.386	8.418	17.791	9.410	9.087
1976	-1.164	7.016	17.094	8.451	7.812
1977	-0.162	7.803	16.987	9.208	8.442
1978	-0.901	7.298	16.701	9.019	7.859
1979	-2.051	7.635	17.553	9.035	8.313
1980	-0.747	6.380	17.370	8.913	7.860
1981	-0.454	7.489	17.713	9.628	8.545
1982	-1.046	7.659	17.532	9.936	8.710
1983	0.686	8.442	17.805	9.391	8.955
1984	0.069	7.572	17.031	9.666	8.544
1985	-3.115	7.373	17.525	9.030	7.681
1986	-1.548	7.983	17.831	9.321	8.313
1987	-2.339	6.123	17.189	9.562	7.732
1988	0.505	7.700	18.336	8.657	8.770
1989	1.328	9.263	18.199	9.574	9.644
1990	1.734	8.968	17.865	9.574	9.539
1991	-0.169	7.547	18.120	9.792	8.756
1992	0.443	8.239	18.146	8.841	8.959
1993	0.504	8.155	17.224	7.859	8.459
1994	0.193	8.361	18.432	9.924	9.204
1995	1.443	8.195	18.424	9.260	9.123
1996	-1.489	7.327	17.918	9.402	8.352
1997	-0.026	7.609	18.282	9.218	8.851
1998	0.896	7.913	18.190	8.836	8.868
1999	-0.195	8.513	18.829	10.121	9.436
2000	0.743	8.947	18.177	10.475	9.664
2001	0.996	8.489	18.665	9.987	9.284
2002	0.207	9.214	18.905	9.301	9.508
2003	-1.101	8.521	19.615	9.838	9.374
2004	0.187	8.297	18.325	10.073	9.235