第5回オープンサイエンスデータ推進ワークショップ
(Kyoto University, 1-2 March 2018)

18－19世紀の欧州における社会・経済の動向と太陽・火山活動との関係

（分野間データの融合による新研究テーマの創出に向けた試み）

Takashi Watanabe
ICSU World Data System International Programme Office
National Institute of Information and Communications Technology
WDC for Cosmic Rays, Nagoya University

ICSU
WORLD DATA SYSTEM

INTERNATIONAL COUNCIL FOR SCIENCE
ICSU WORLD DATA SYSTEM
futureearth research for global sustainability
NICT
KYOTO UNIVERSITY FOUNDED 1897
CORE TRUST SEAL
WORLD DATA CENTER WDC KYOTO FOR GEOMAGNETISM
ISEE
KYOTO TRADITION MEETS INNOVATION
RADI
SGEPSS Society of Geomagnetism and Earth, Planetary and Space Sciences

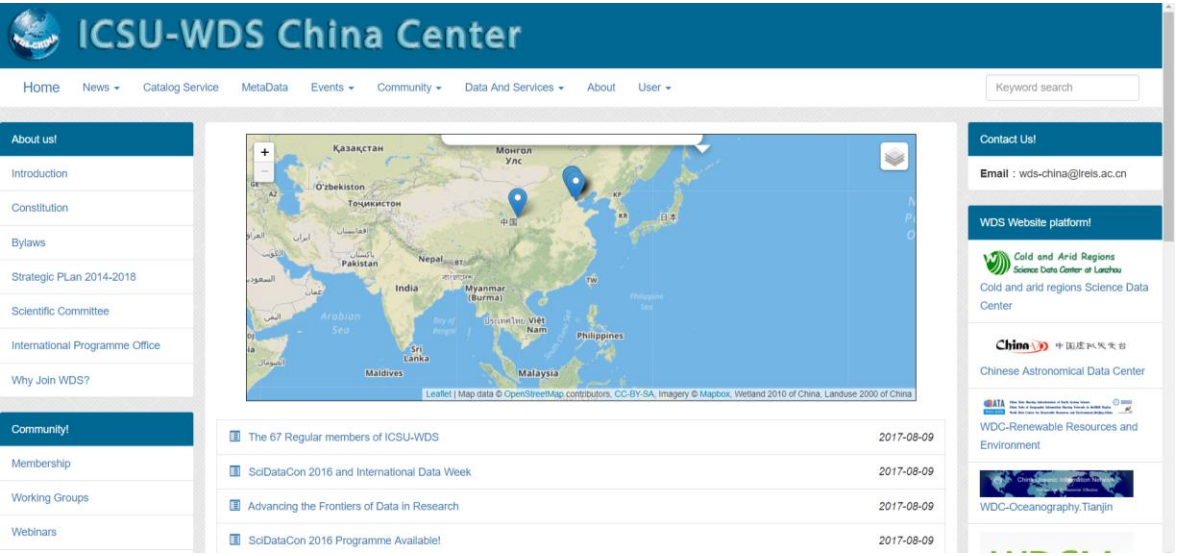
口頭発表53件、ポスター発表31件

WDS Asia-Oceania Conference 2019 （2019年、中国）に向けて：

- **WDS Asia-Oceania Network の構築**
- **WDSメンバーの拡大**
- **旧WDCとの連携態勢の確保**
- **Future Earth, GEO, RDA, CODATA,各分野のデータネットワークとの連携**
- **Data Repository 認証の普及**

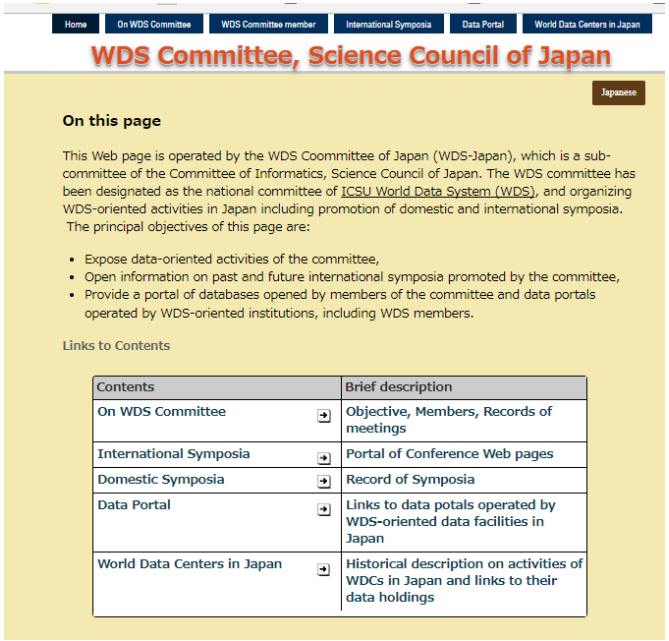
Australia	1
China	15
China-Taipei	1
Finland	1
France	1
Greece	1
India	3
Indonesia	1
Japan	68
S. Korea	1
Malaysia	1
Netherland	1
Philippines	3
South Africa	1
Switzerland	2
Thailand	2
USA	3
17	107

Examples of WDS-related regional networks



WDS China Office (under Chinese Association of Science and technology; CAST)

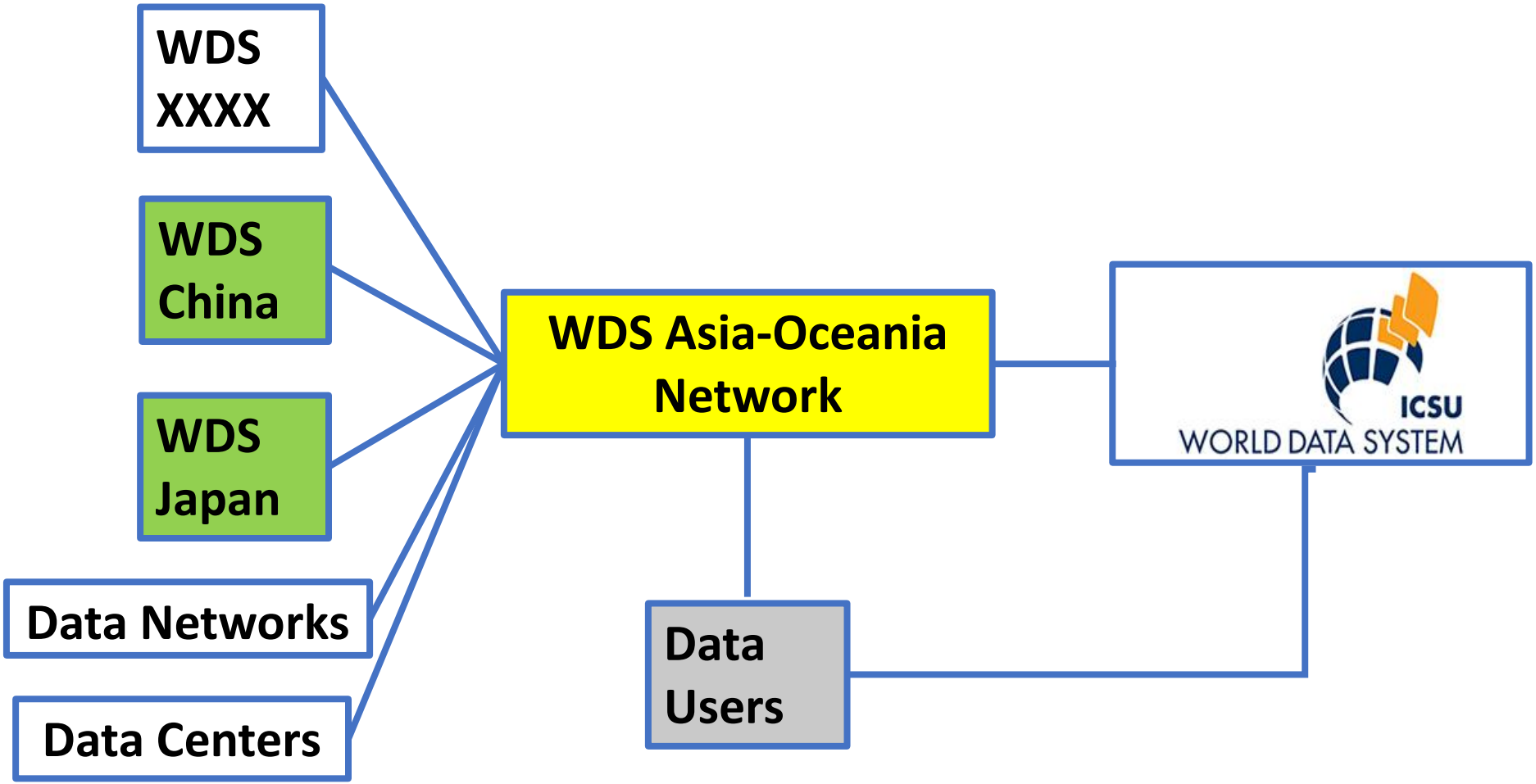
http://www.wds-china.org/



WDS Committee, Japan

http://takashiwatanabe.wixsite.com/wds-japan-en

A concept of WDS Asia-Oceania Network (provisional)



http://cidas.isee.nagoya-u.ac.jp/WDCCR/


Smoothed Sunspot Number
Monthly Averages
200
150
100
50
0
Cycle 19
Cycle 20
Cycle 21
Cycle 22
Cycle 23
Cycle 24
Counts/Hour/100
4500
4000
3500
Thule, Greenland, Neutron Monitor
Bartol Research Institute, University of Delaware
27-day Averages - data through December 2014
UNIVERSITY OF DELAWARE
1743
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
YEAR
R.Pyle, Jan. 2015

SPARC（Scholarly Publishing and Academic Resources Coalition）

2018年2月21日（水）10：30-17：00

国立情報学研究所　12階会議室　※同時通訳付

登壇者

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  (慶應義塾大学 三田メディアセンター 事務長)
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2003年のブタペスト・オープンアクセス・イニシアチブと2013年のG8オープンデータ憲章は、科学ア

Paul A. David

From Wikipedia, the free encyclopedia

Paul Allan David (born May 24, 1935) is an American academic economist who is noted for his work on the economics of scientific progress and technical change. He was formerly a president of the Economic History Association and is a Fellow of the Econometric Society, a Fellow of the American Academy of Arts and Sciences, a fellow of the British Academy, a fellow of the Oxford Internet Institute and All Souls College, Oxford, and he is a Professor Emeritus and Senior Fellow of Stanford University's Institute for Economic Policy Research.[1][2][3]

In 2006, Edward Elgar published a festschrift called *New Frontiers in the Economics of Innovation and New Technology: Essays in Honour of Paul A. David*.[4]

Paul David in 2014

Contents [hide]

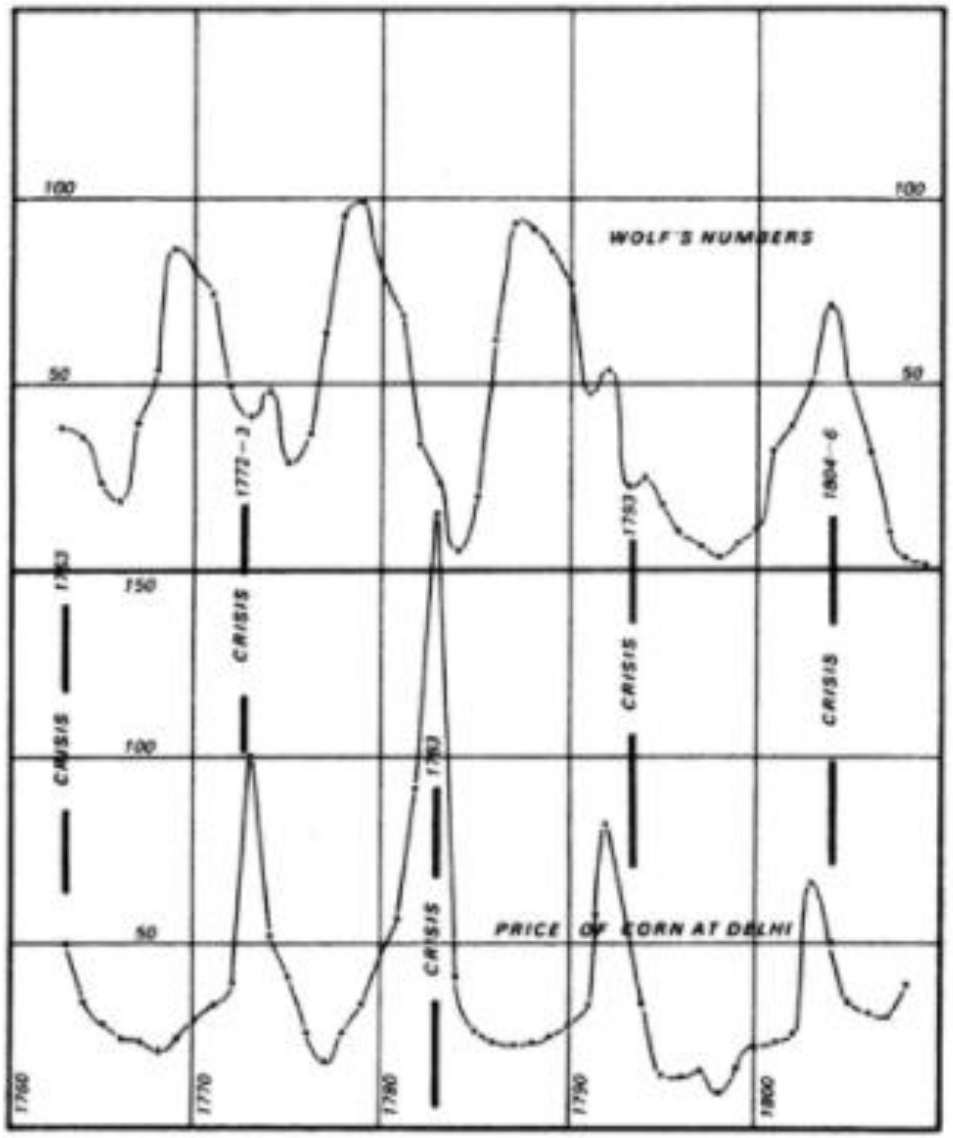
UNU-MERIT Working Paper Series #2014-082

The Republic of Open Science: The institution's historical origins and prospects for continued vitality Paul A. David

William Stanley Jevons (1835 – 1882)

I am perfectly convinced that these decennial crises do depend upon meteorological variations of like period, which again depend, in all probability, upon cosmical variations of which we have evidence in the frequency of sun-spots, auroras, and magnetic perturbations.

Nature, Volume 19, Issue 472, pp. 33-37 (1878)

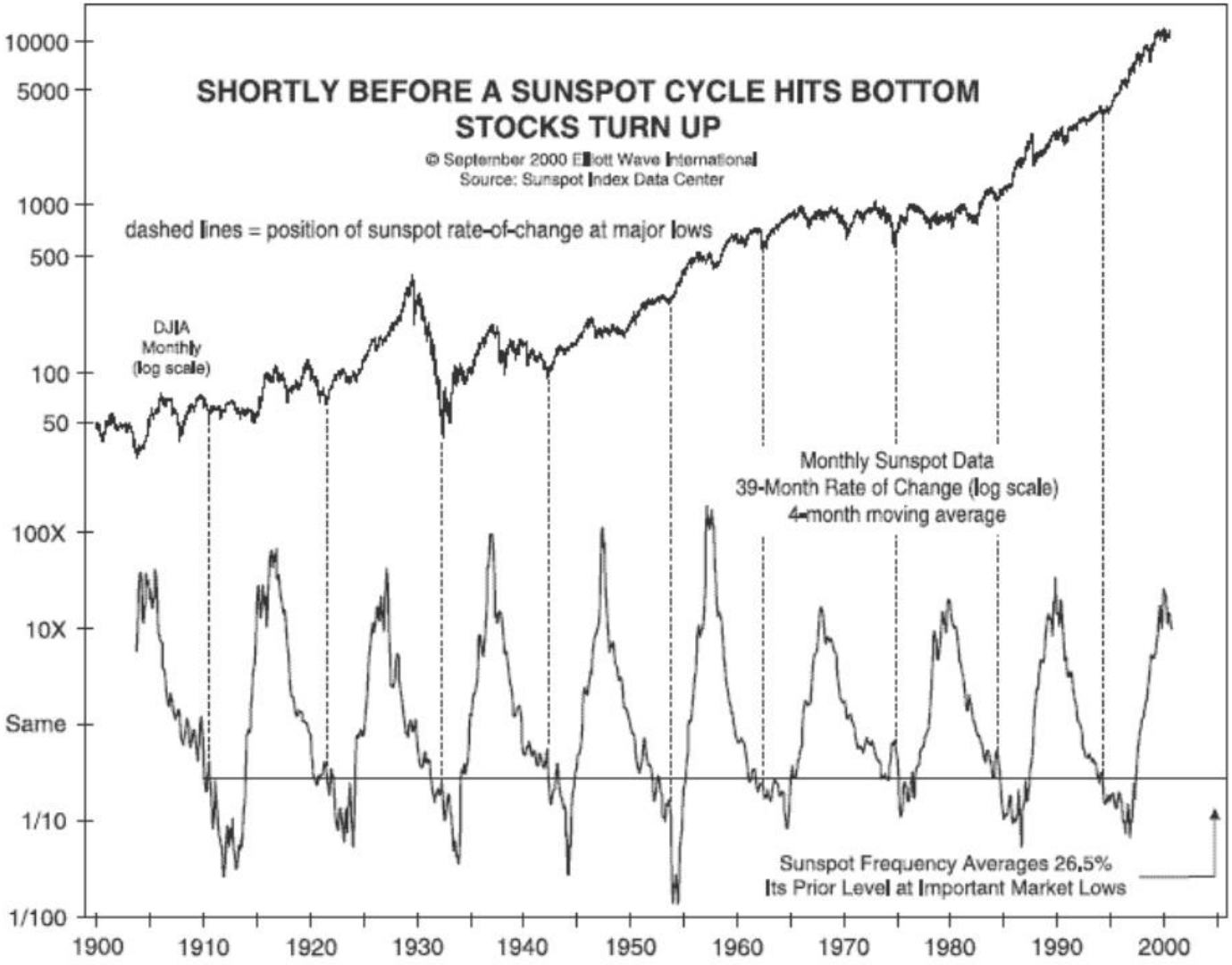


9-8. Jevons's diagram showing fluctuations in the sunspot activity (represented by Wolf's numbers) and fluctuations in commercial activity (represented by the prices of corn at Delhi). Time is depicted on the horizontal axis. Jevons did not provide a description of exactly what is stated on the vertical axis. From "The Solar-Commercial Cycle", 1882. Reproduced in *Papers and Correspondence* 7:112. Courtesy of Palgrave/Macmillan Press.

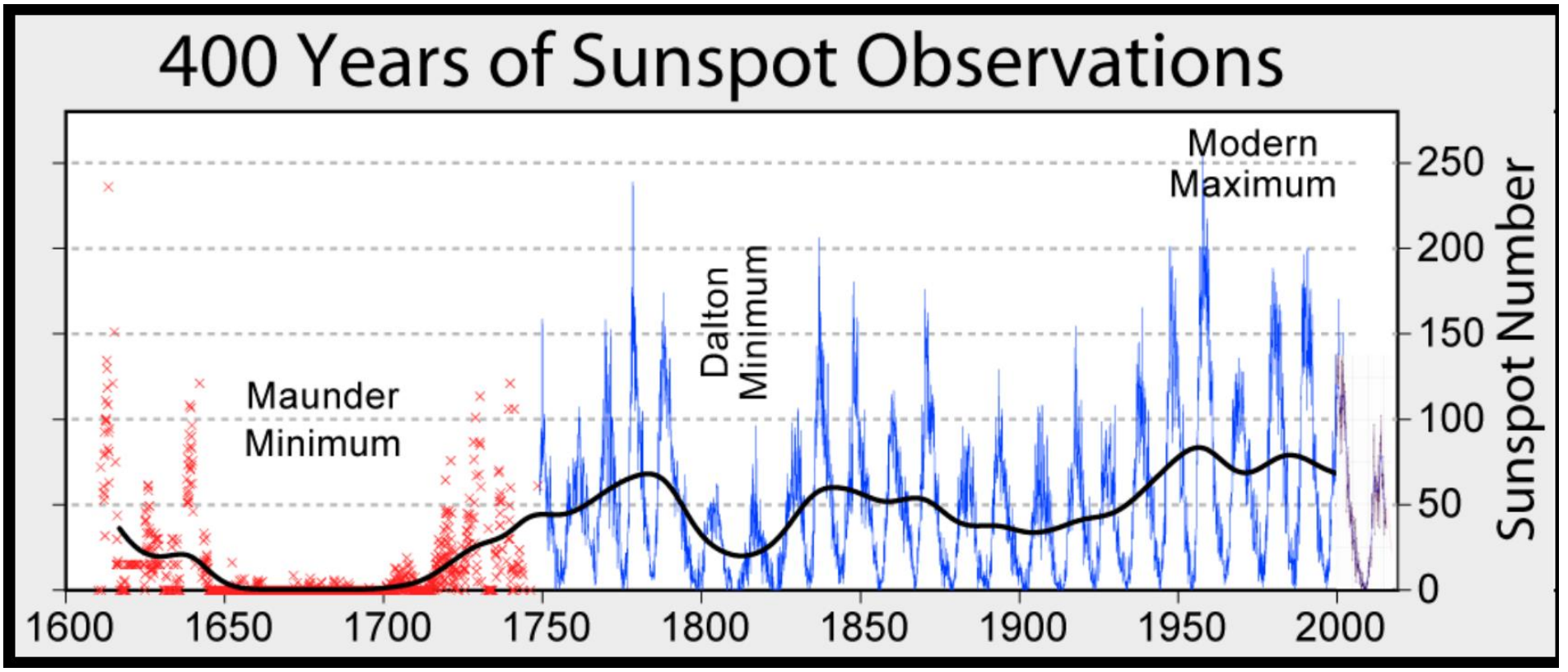
The Sunspot Cycle and Stocks

By Robert R. Prechter, Jr. and Peter Kendall,

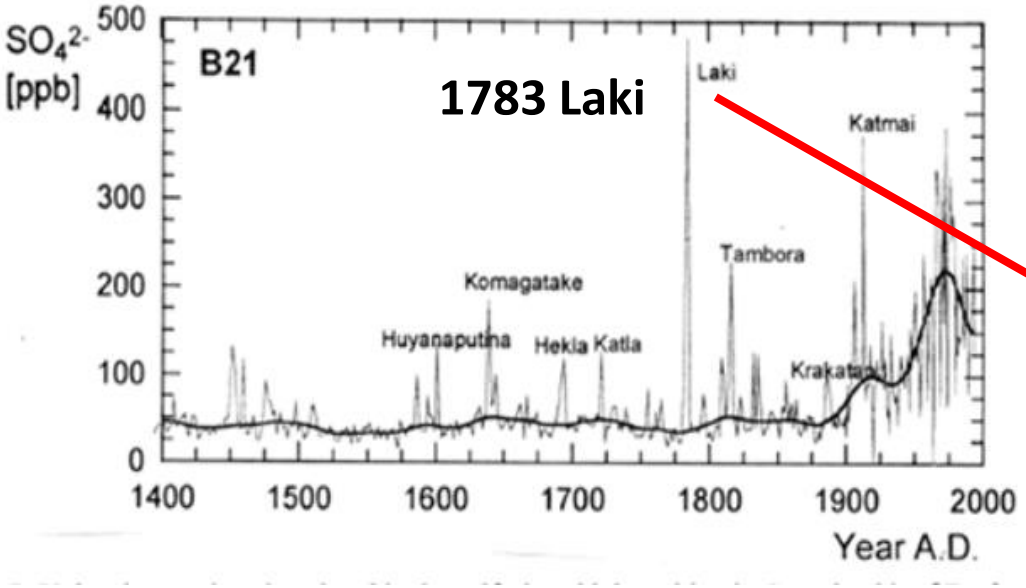
http://www.socionomics.net/2011/09/article-the-sunspot-cycle-and-stocks/

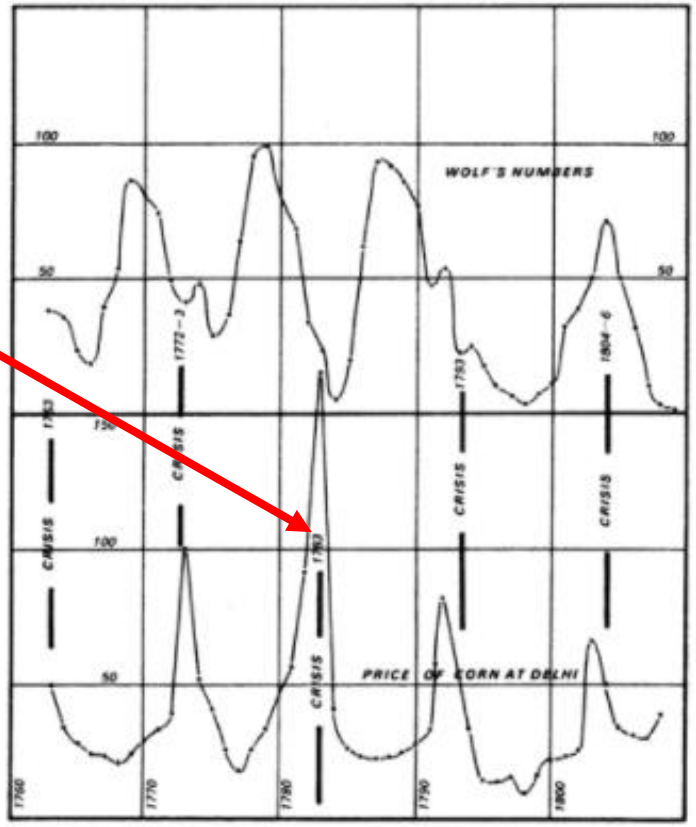


Log scale!



Economic Cycle/Wave Name	Period (years)
Kitchin cycle	3–5
Juglar cycle	7–11
Kuznets swing	15–25
Kondratiev wave	45–60


SO_4^{2-} [ppb]
B21
1783 Laki
Laki
Katmai
Tambora
Komagatake
Huyanaputina
Hekla
Katla
Krakatau
500
400
300
200
100
0
1400
1500
1600
1700
1800
1900
2000
Year A.D.


WOLF'S NUMBERS
PRICE OF CORN AT DELHI
CRISIS
1760
1770
1780
1790
1800


I AM HERE, MY LOYAL SUBJECTS, WITH AID.
KRONE
Natural Hazards OBSERVER

Google

wheat price England 18 Century data

すべて ニュース 画像 ショッピング 動画 もっと見る 設定 ツール

約 1,300,000 件 （0.42 秒）

Datafiles of Historical Prices and Wages

www.iisg.nl/hpw/data.php ▾ このページを訳す

Africa. Wages, **prices** and welfare ratios in colonial Africa, 1880-1965 - Authors: Ewout Frankema and Marlous van Waijenburg - About this datafile: The **data** are explained and applied in Frankema, Ewout and Marlous Van Waijenburg. "Structural Impediments to African Growth? New Evidence from Real Wages in British Africa, 1880-1965", forthcoming in the Journal of Economic History. An earlier extended version appeared under this title as a Center for Global Economic History ...

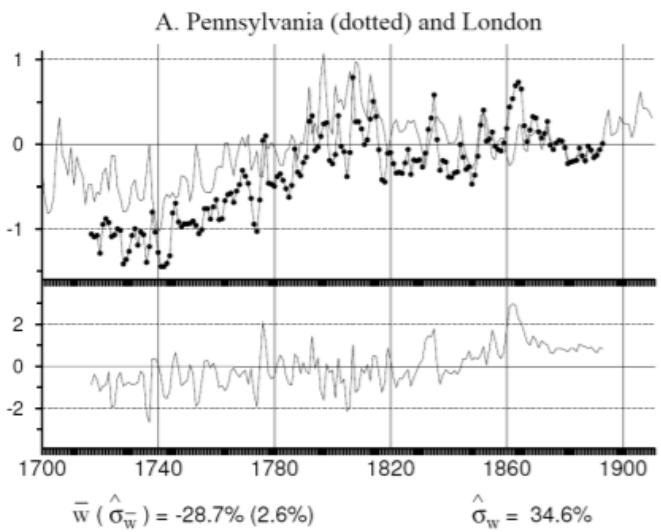
[PDF] The Integration of Grain Markets in the Eighteenth Century: Early R…

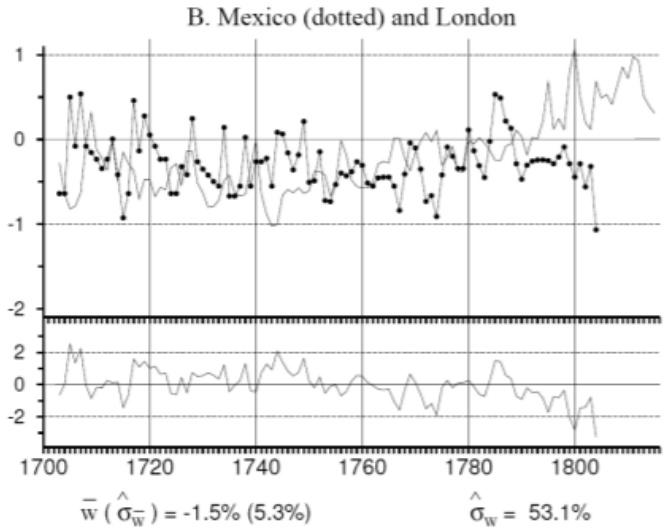
https://www.ucm.es/data/.../518-2013-11-05-The_integration_grain... ▾ このページを訳す

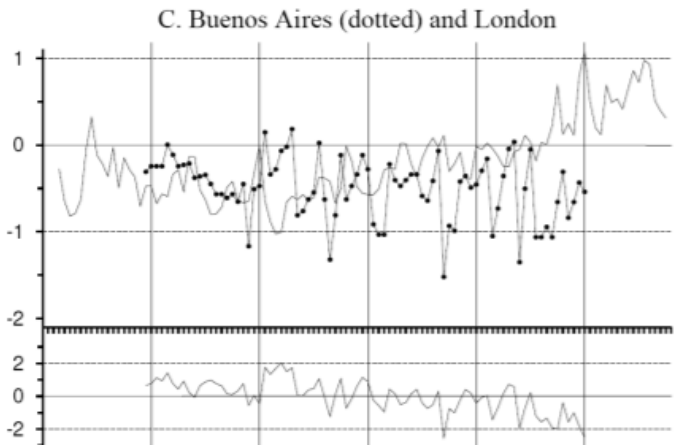
integration of **grain** markets across Europe and North America. We observe a general and substantial increase in dispersion during the late **eighteenth** and early nineteenth **centuries**. After this major backlash, market integration resumed at an ..... 2.1 **Data**. We consider ten series of yearly **wheat prices** in our empirical analysis: Amsterdam and. Holland (H), Arévalo (inner Spain, A), London and Southern **England** (L), Gdansk (G), Milan (M),. Strasbourg (S) and Vienna (V) in Europe; ...

Appendix 2.

Figure A.1 Price of wheat (logs) in the Americas and London and standardized relative pairwise price (plotted below)







	J	F	M	A	M	J	J	A	S	O	N	D
1706	37·0	39·5	43·0	47·5	53·5	60·5	60·0	60·5	53·0	51·0	43·0	41·0
1707	(38)	(37)	(41)	(47)	(52)	(61)	(63)	(61)	(57)	(47)	(44)	(38)
1708	(43)	(39)	(44)	(49)	(51)	(57)	(58)	(64)	(59)	(47)	(45)	(37)
1709	(29)	(35)	(37)	(48)	(54)	(58)	(60)	(60)	(56)	(50)	(48)	(41)
1710	(37)	(38)	(43)	(44)	(53)	(58)	(58)	(60)	(56)	(49)	(46)	(46)
1711	(41)	(36)	(42)	(49)	(52)	(60)	(59)	(59)	(55)	(49)	(45)	(38)
1712	(37)	(40)	(41)	(46)	(52)	(59)	(61)	(58)	(55)	(49)	(43)	(42)
1713	(37)	(42)	(38)	(41)	(50)	(56)	(57)	(59)	(57)	(49)	(40)	(39)
1714	(39)	(42)	(41)	(45)	(50)	(58)	(64)	(58)	(55)	(51)	(43)	(39)
1715	(39)	(41)	(44)	(49)	(52)	(57)	(59)	(59)	(57)	(51)	(44)	(34)
1716	(28)	(37)	(40)	(48)	(51)	(57)	(60)	(59)	(54)	(49)	(42)	(37)
1717	(40)	(37)	(40)	(45)	(50)	(57)	(59)	(59)	(56)	(49)	(42)	(41)
1718	(34)	(37)	(42)	(46)	(52)	(58)	(63)	(63)	(58)	(49)	(43)	(40)
1719	(38)	(40)	(41)	(44)	(53)	(58)	(64)	(63)	(57)	(48)	(43)	(38)
1720	(40)	(39)	(39)	(45)	(52)	(55)	(61)	(57)	(56)	(47)	(43)	(42)
1721	(41)	(35)	(37)	(47)	(49)	(57)	(58)	(60)	(57)	(48)	(43)	(40)
1722	(39)	(41)	(43)	(46)	(51)	(57)	(59)	(59)	(56)	(50)	46·0	39·0
1723	34·0	40·0	45·5	48·0	53·0	59·0	59·5	60·0	56·0	52·0	45·5	42·5
1724	42·0	39·5	40·5	45·0	52·5	59·5	59·0	61·2	58·0	47·5	41·5	38·0
1725	40·0	38·0	41·0	46·5	51·5	54·0	56·8	56·0	55·0	49·0	44·5	39·0
1726	34·0	39·5	39·5	47·2	56·2	61·5	60·8	60·0	58·5	50·3	43·0	35·2
1727	39·5	41·0	41·2	48·5	56·5	58·8	62·5	62·5	58·0	51·5	40·5	38·5
1728	39·0	36·3	44·7	46·9	54·5	61·5	62·5	60·8	55·1	48·4	45·0	34·8
1729	34·2	36·1	37·0	44·8	50·6	59·2	62·3	60·2	61·8	50·1	46·6	41·0
1730	39·3	40·4	43·1	47·7	54·3	57·2	59·5	61·4	59·5	51·6	48·5	38·1
1731	35·5	35·9	42·8	44·2	53·7	60·0	61·3	62·0	59·5	54·2	46·0	41·4
1732	36·3	43·5	43·0	48·0	52·6	58·3	60·8	61·9	58·1	51·7	43·3	36·0
1733	44·5	42·8	42·7	50·0	52·1	59·3	65·0	61·0	55·0	48·3	43·7	45·7
1734	39·7	43·5	46·6	48·7	52·0	57·3	61·1	61·1	56·0	47·1	43·1	39·2
1735	40·0	39·2	42·4	48·0	51·7	56·0	58·6	61·1	57·6	50·5	43·4	41·8
1736	43·5	37·5	44·5	47·5	51·0	60·3	61·5	64·0	58·0	50·8	44·4	43·5
1737	43·2	39·6	43·0	47·8	54·5	60·7	63·3	56·8	57·5	48·1	43·0	40·9
1738	40·2	40·3	41·9	49·9	52·5	57·5	61·5	60·8	54·5	50·3	43·4	43·0
1739	39·2	44·2	42·5	44·0	52·8	59·3	60·8	58·5	55·5	49·3	38·6	37·7
1740	27·0	29·2	39·0	43·5	47·5	55·0	59·5	58·5	57·2	41·5	38·0	36·0

Google に勝てるか？

論文からデータを探す場合、data をキーワードに加えて検索した項目（論文など）でも、データがどういう形で使われているのか。直ちには分からない（プロット？数表？単なる記述？）。結局は一つ一つ開けて見なければ分からず、非効率。元論文が簡単に見られない場合も多い。

データに特化した検索エンジン？

- 論文中で使われているデータの種別、出所
- 数値データ（Table など）の有無
- データプロットを含むFiguresが見られる

The Price History of English Agriculture, 1209-1914

Gregory Clark

University of California

http://faculty.econ.ucdavis.edu/faculty/gclark/papers/Agprice.pdf

Year	Wheat (s./bu.)	Rye (s./bu.)	Barley (s./bu.)	Oats (s./bu.)	Peas (s./bu.)	Beans (s./bu.)	Potato (s./cwt.)	Hops Net Tax (s./cwt.)	Straw (s./load)	Mustard Seed (s./bu.)	Saffron (s./lb)
1690	3.27	2.34	1.40	1.26	2.07	1.69		45.79	14.40		
1691	3.11	2.34	1.33	1.23	1.79	1.78		42.33	12.22		
1692	4.45	2.80	1.76	1.42	2.21	2.12		69.11	14.68		
1693	5.44	3.12	2.56	1.69	3.31	2.64		70.50	14.81		
1694	5.32	3.12	2.18	1.54	3.32	2.55		77.34	14.81		
1695	4.34	2.86	1.98	1.42	2.82	2.75		112.44	13.34		
1696	5.27	2.60	2.12	1.56	3.21	3.02		179.54	14.61		
1697	5.93	4.17	2.30	1.31	3.16	2.60		203.59	14.61		
1698	6.69	4.56	2.70	1.70	3.60	2.93		240.82	15.20		
1699	5.65	3.12	2.81	1.53	3.53	2.87		208.85	22.03		
1700	4.24	2.86	2.11	1.68	3.49	2.62		115.90	16.01		
1701	3.38	2.08	1.80	1.32	2.24	1.64		68.34	13.53		
1702	2.93	1.96	1.85	1.42	2.64	1.94		113.56	14.23		
1703	2.88	1.96	1.67	1.33	2.17	1.94		88.31	15.43		
1704	3.72		1.78	1.35	2.42	2.02		72.81	17.26		
1705	3.10		1.63	1.42	2.36	1.96		147.66	14.29		
1706	2.89		1.92	1.64	3.04	2.09		110.63	15.43		
1707	2.97	2.08	2.02	1.28	2.40	2.14		109.04	13.94		

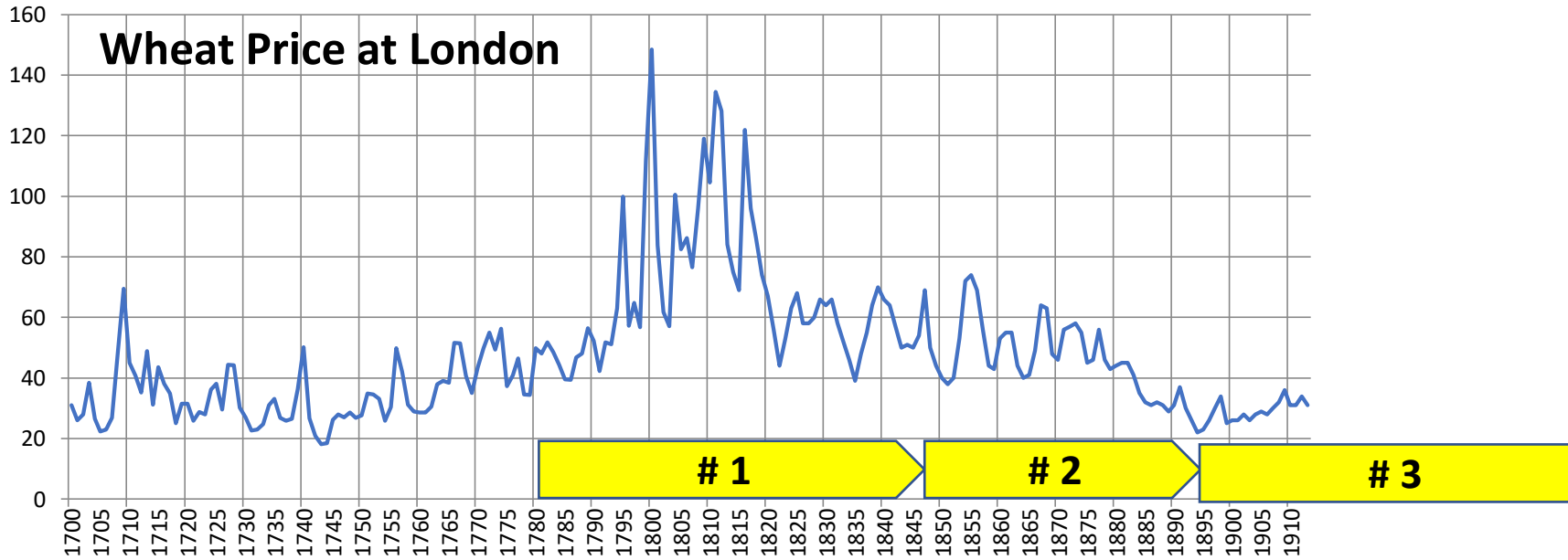
Chris Freeman and Francisco Louca: As times goes by. From the Industrial Revolutions to the Information Revolution

Oxford University Press 2001.

Capitalist development from the times of the industrial revolution to the present is divided in subsequent ***"Kondratiev Waves",***

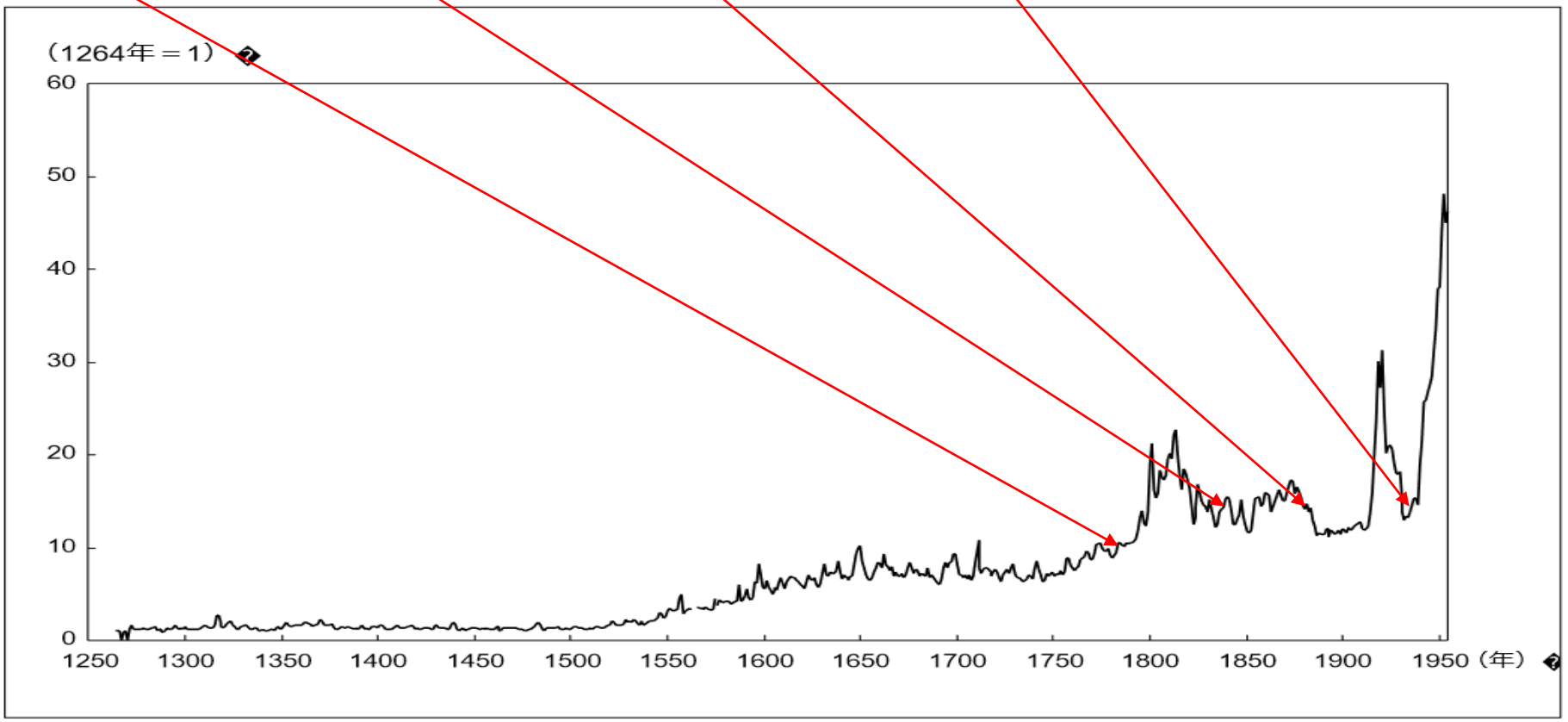
第１波．水力による産業の機械化	第２波．蒸気機関による輸送と産業の機械化	第３波．産業、輸送および家庭の電化	第４波．モータリゼーションと大量生産	第５波．経済のコンピュータ化
１７８０年代から１８48年	１８４８年から１８９５年	１８95年から１９40年	１941年から？	？

増山 幸一: 世界経済の発展と技術革新（1）第 1 次産業革命から 20 世紀初頭まで
file:///E:/Open%20Science/develop1.pdf

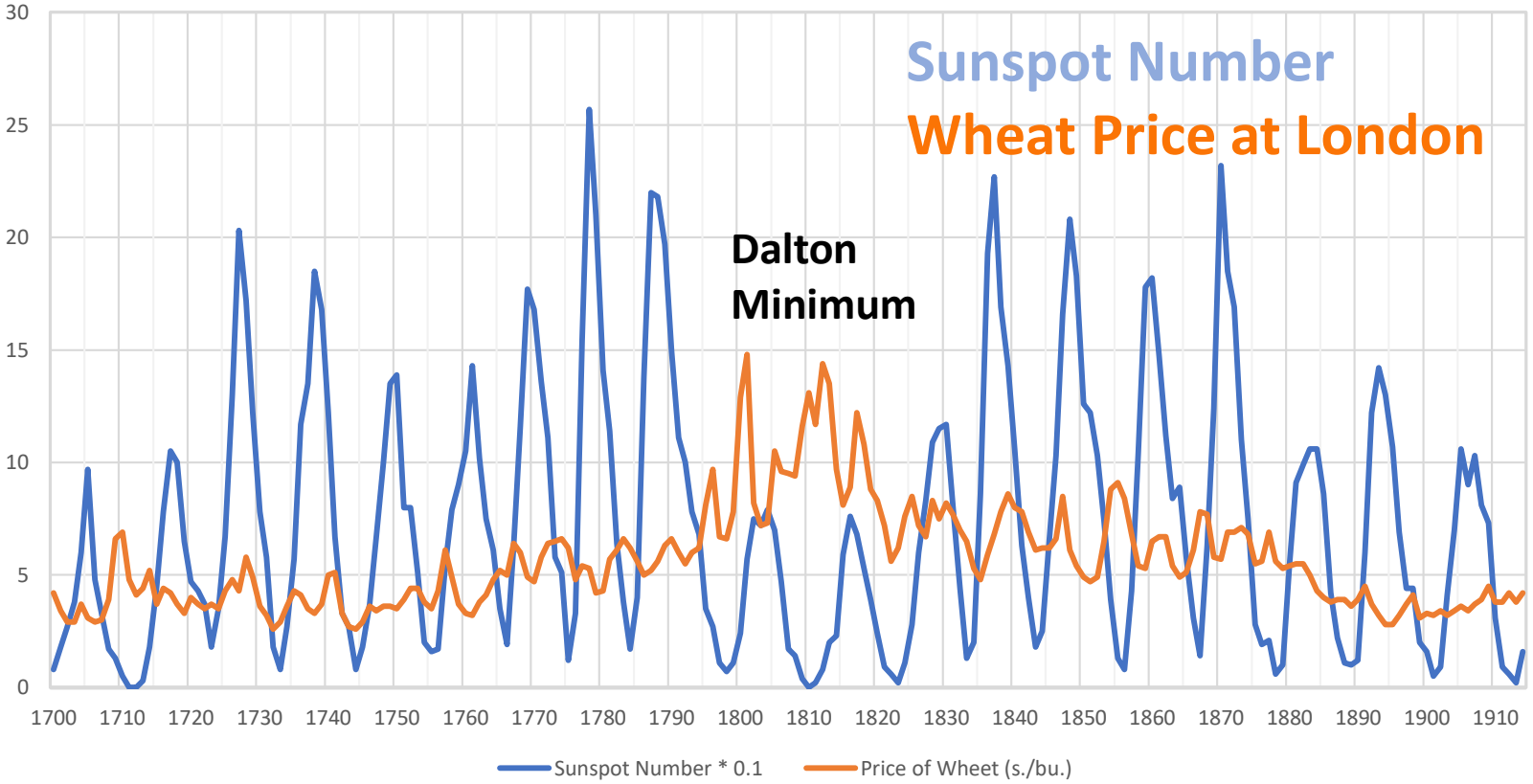


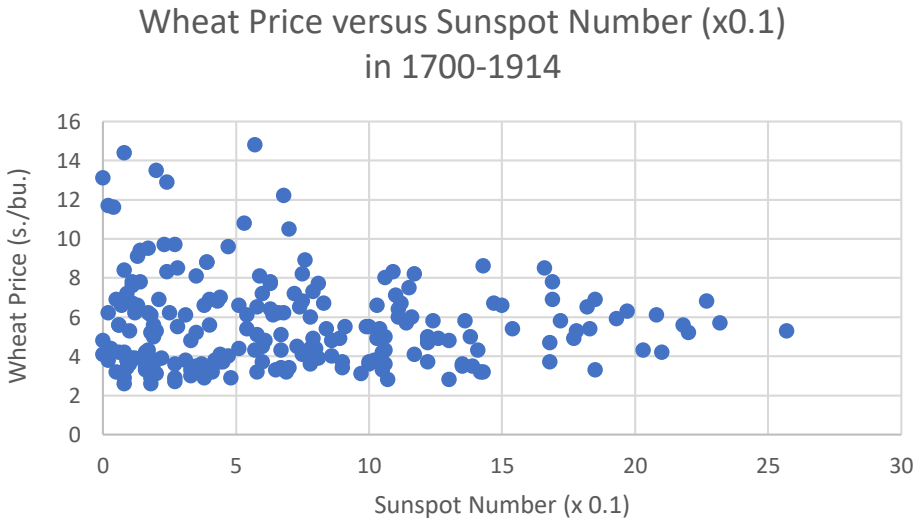
第１波．水力による産業の機械化	第２波．蒸気機関による輸送と産業の機械化	第３波．産業、輸送および家庭の電化	第４波．モータリゼーションと大量生産	第５波．経済のコンピュータ化
１７８０年代から１８48年	１８４８年から１８９５年	１８95年から１９40年	１941年から？	？

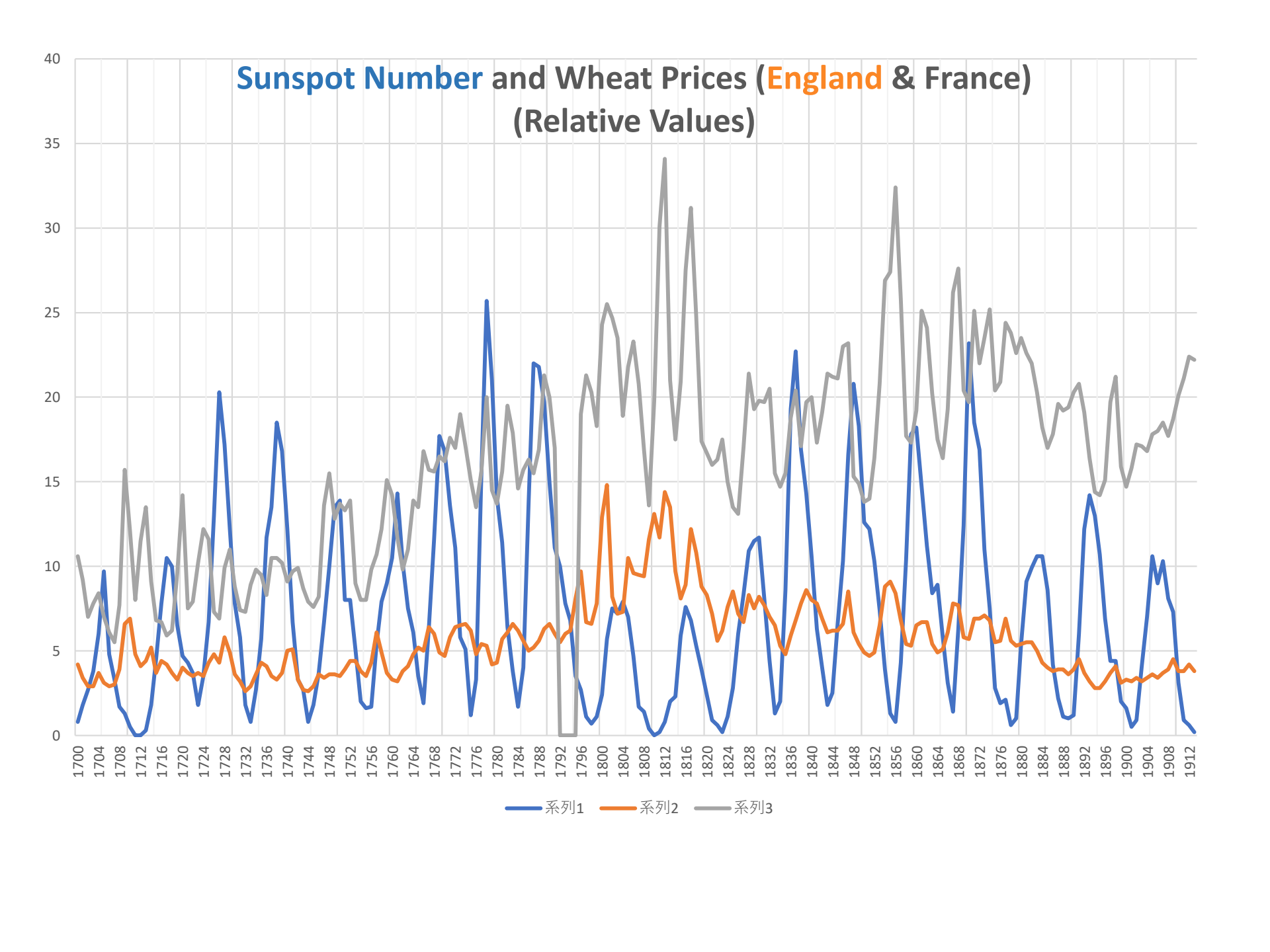
図1　イギリスの消費者物価指数 1264-1954



物価と景気変動に関する歴史的考察 北村行伸日本銀行金融研究所 / 金融研究 / 2002.3


Sunspot Number
Wheat Price at London
Dalton
Minimum
30
25
20
15
10
5
0
1700 1710 1720 1730 1740 1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910
Sunspot Number * 0.1
Price of Wheet (s./bu.)


Wheat Price versus Sunspot Number (x0.1)
in 1700-1914
Wheat Price (s./bu.)
16
14
12
10
8
6
4
2
0
0 5 10 15 20 25 30
Sunspot Number (x 0.1)


Sunspot Number and Wheat Prices (England & France)
(Relative Values)
40
35
30
25
20
15
10
5
0
1700
1704
1708
1712
1716
1720
1724
1728
1732
1736
1740
1744
1748
1752
1756
1760
1764
1768
1772
1776
1780
1784
1788
1792
1796
1800
1804
1808
1812
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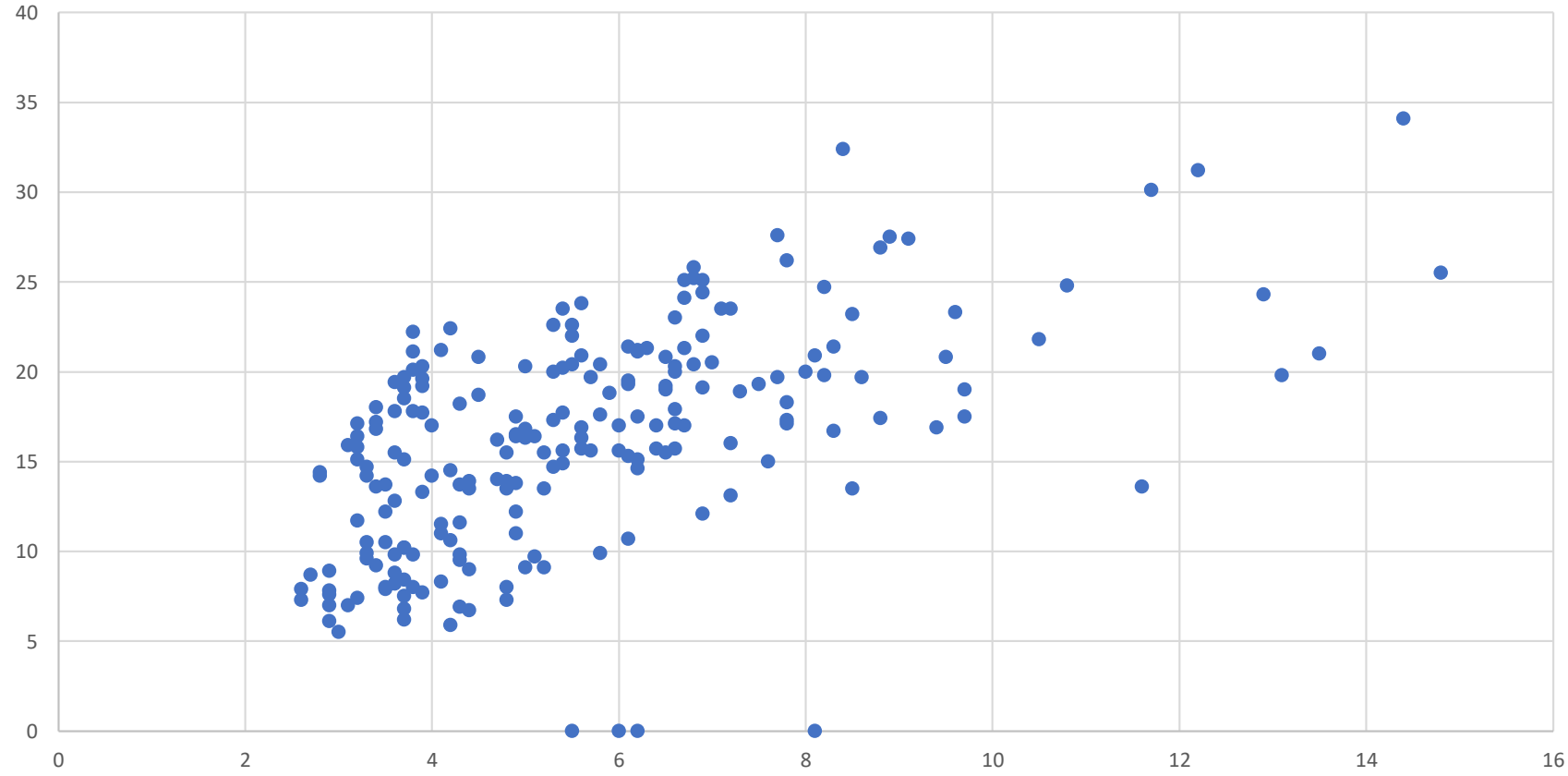
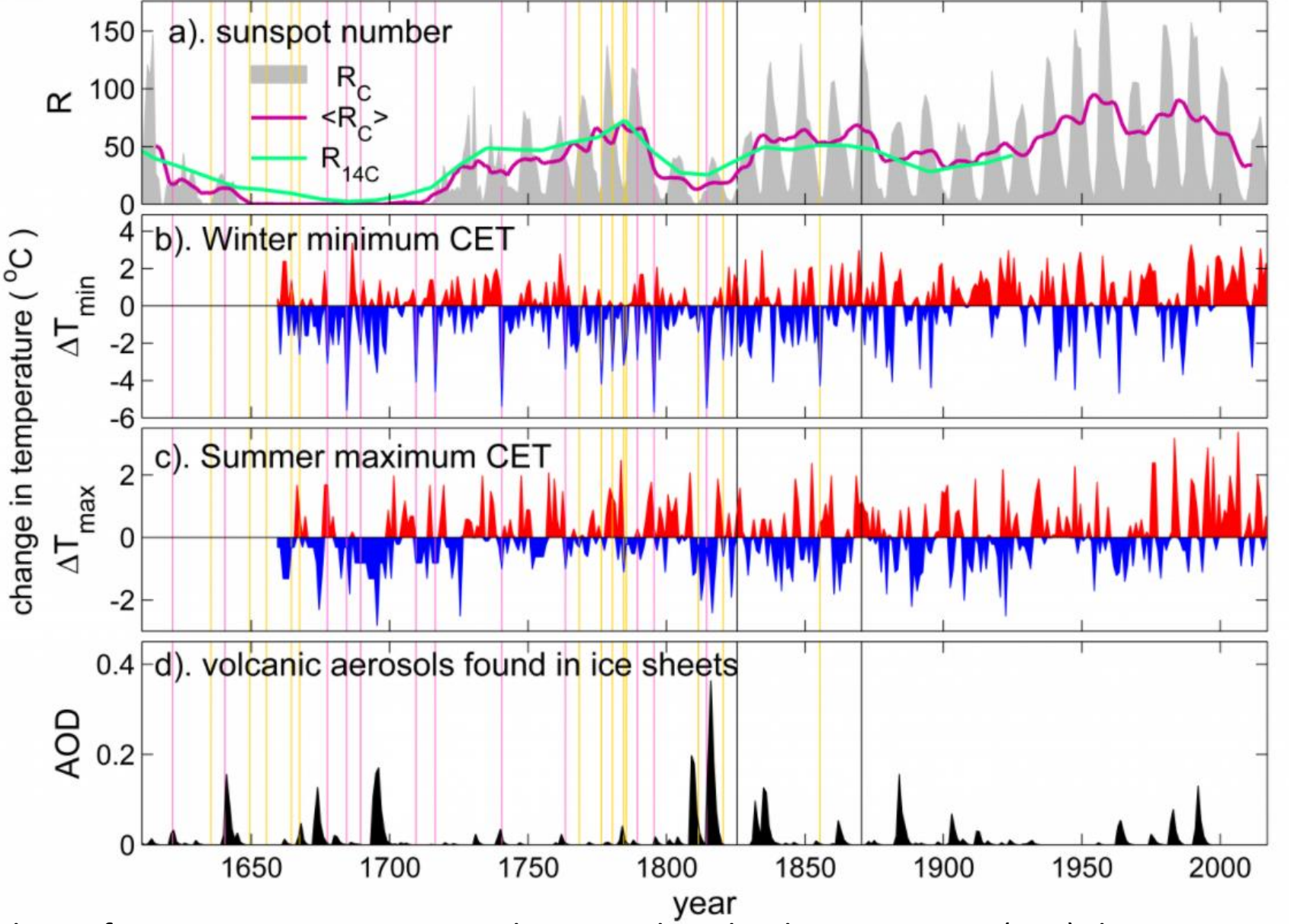
1888
1892
1896
1900
1904
1908
1912
系列1
系列2
系列3

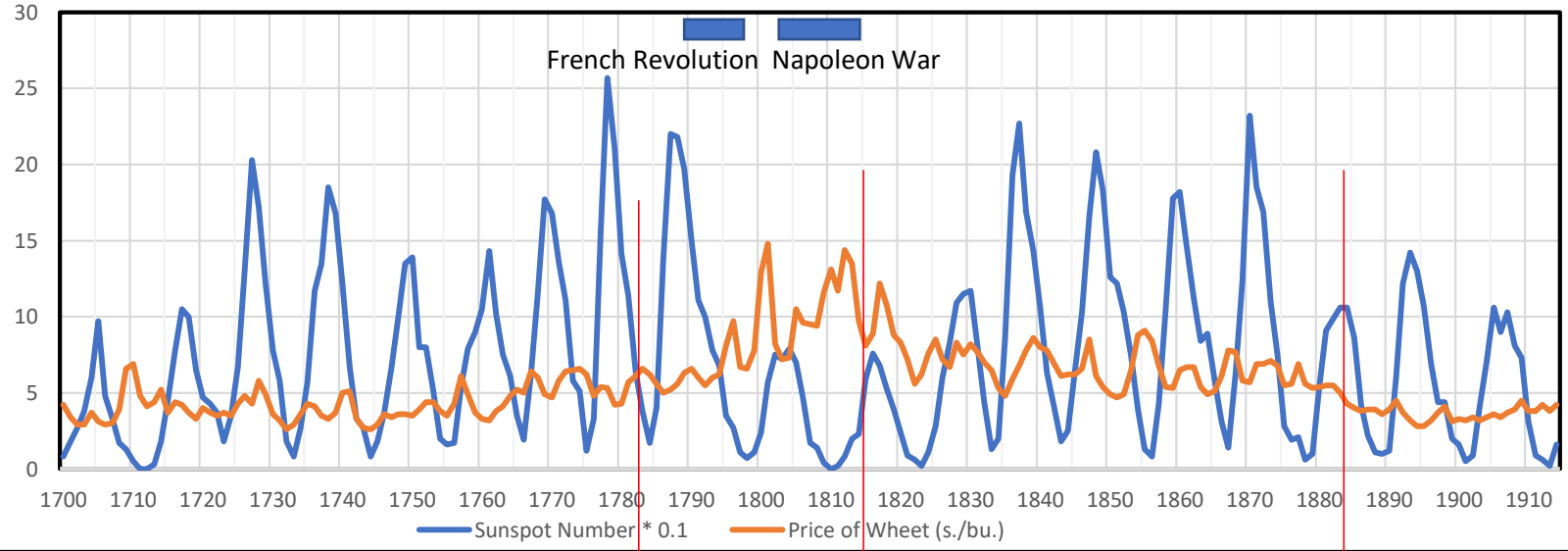
Wheat Prices (1700-1913)
X: England Y: France (Toullouse)



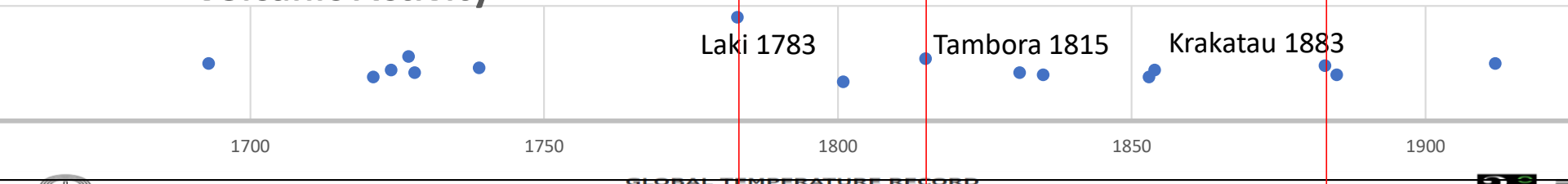


Analysis of extreme temperatures in the Central England Temperature (CET) thermometer record. Part (b) shows the lowest monthly average in each winter whereas part (c) shows the hottest monthly average in each summer. In both cases blue shows lower temperatures, and red shows higher temperatures than the long-term average. Credit: M. Lockwood

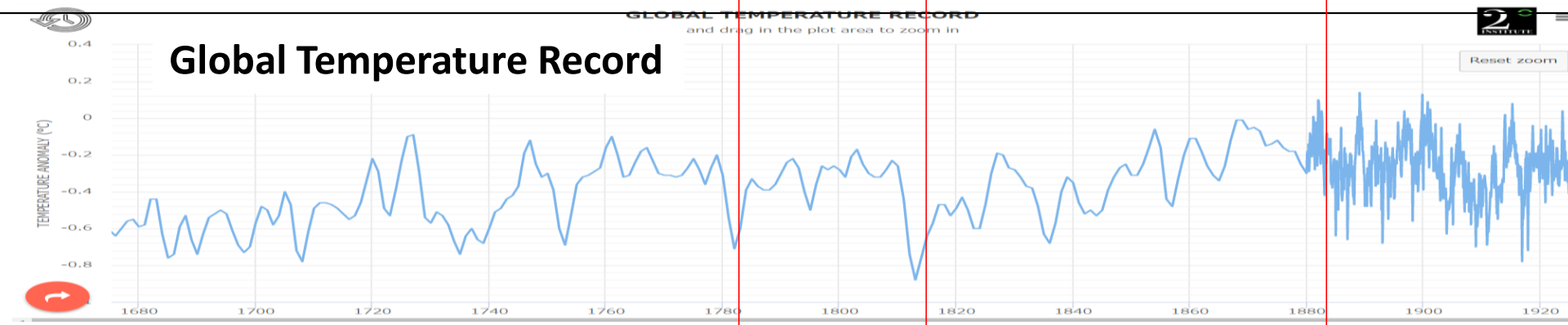
Sunspot Number and British Wheat Price in 1700-1914



Volcanic Activity



Global Temperature Record



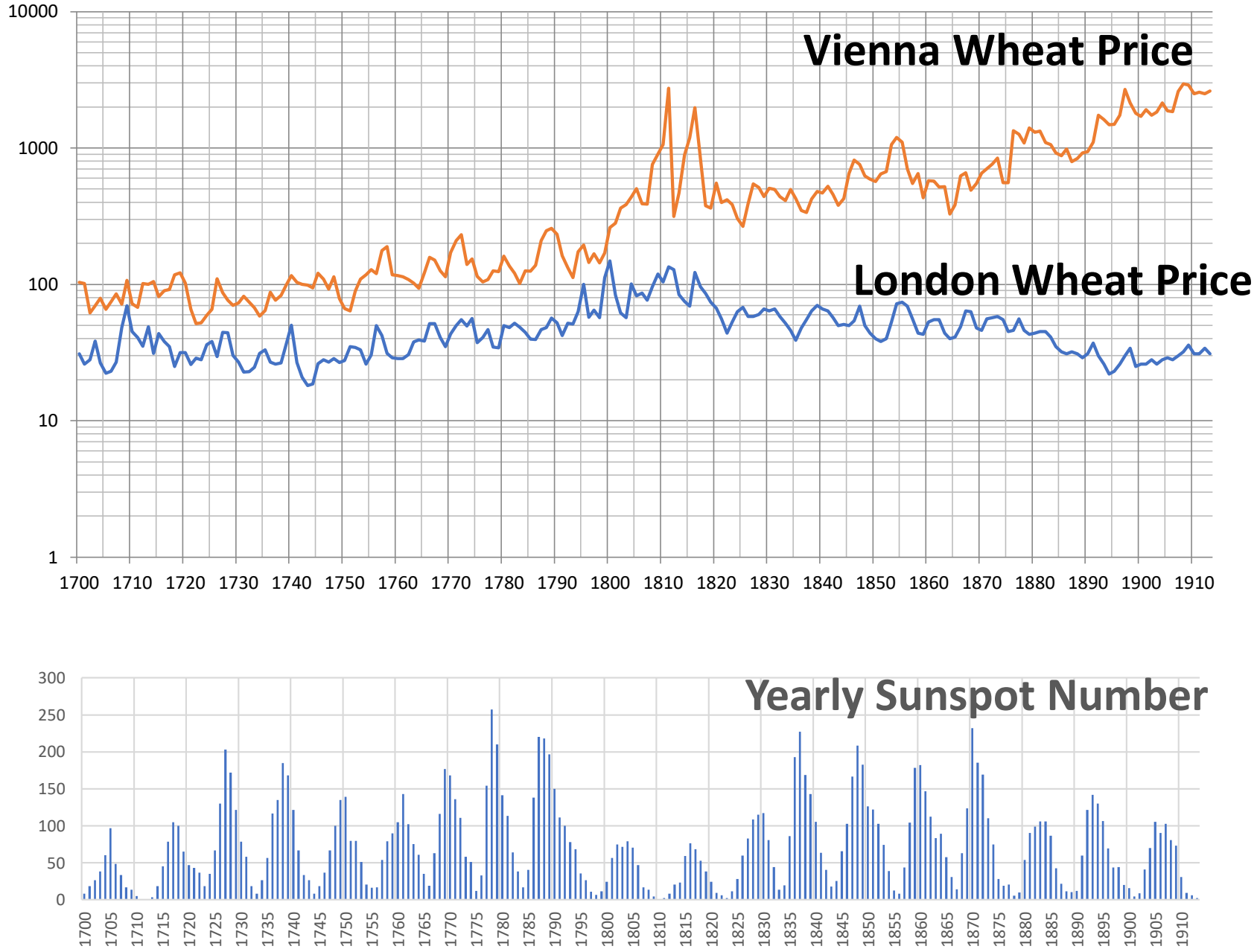
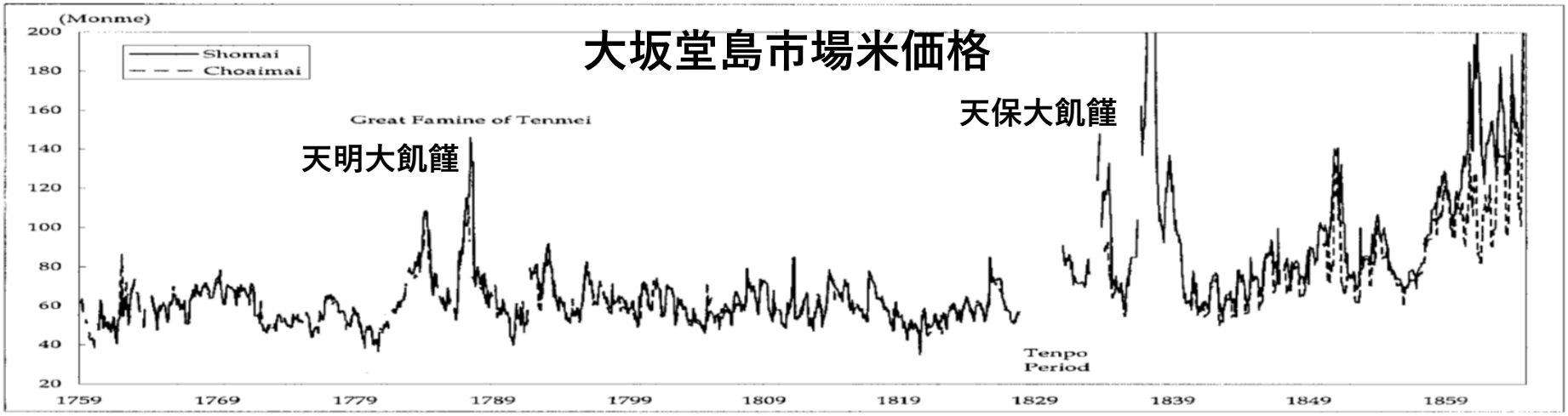
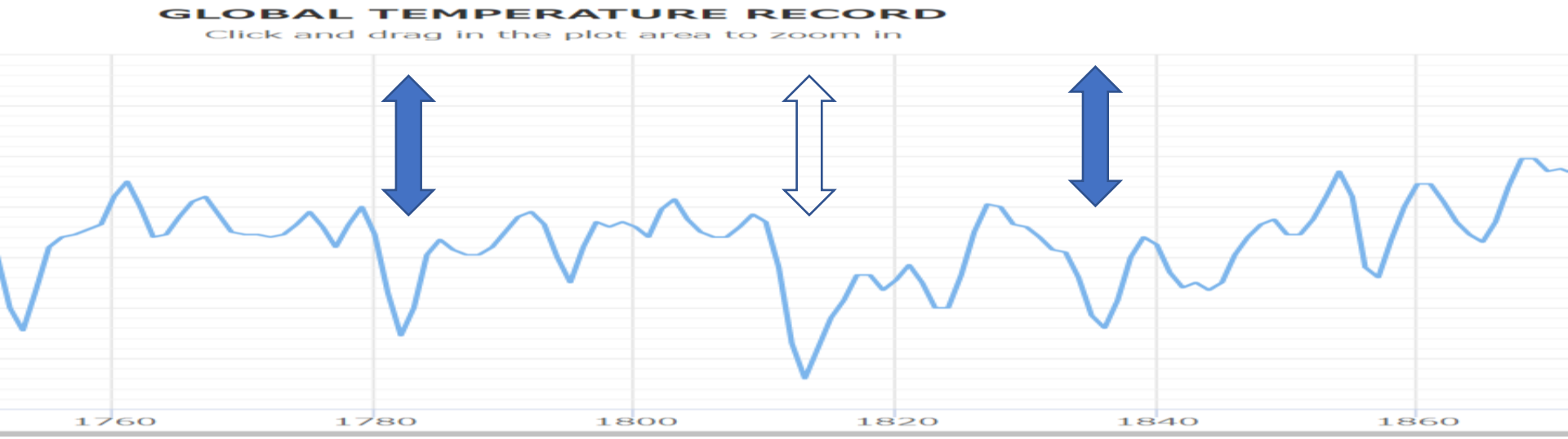
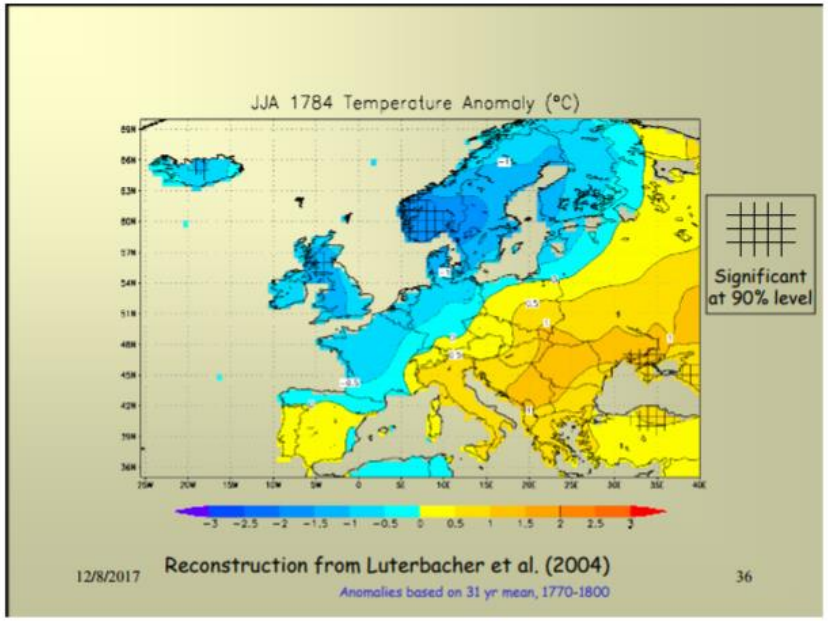

Vienna Wheat Price
London Wheat Price
10000
1000
100
10
1
1700 1710 1720 1730 1740 1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910
Yearly Sunspot Number
300
250
200
150
100
50
0
1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910

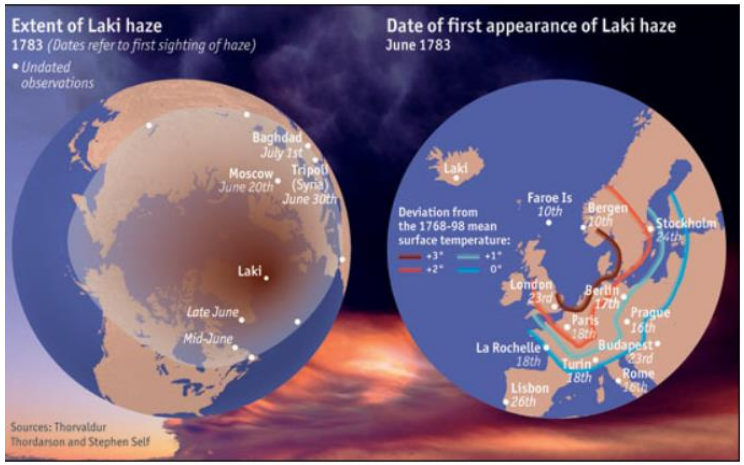
Fig. 1: Prices of shomai and choaimai.





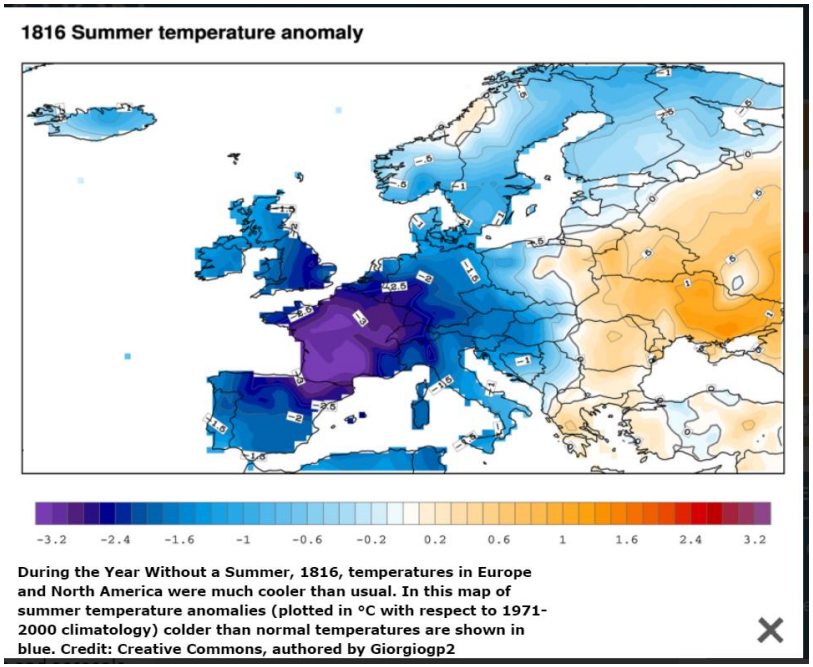
Laki (1783)





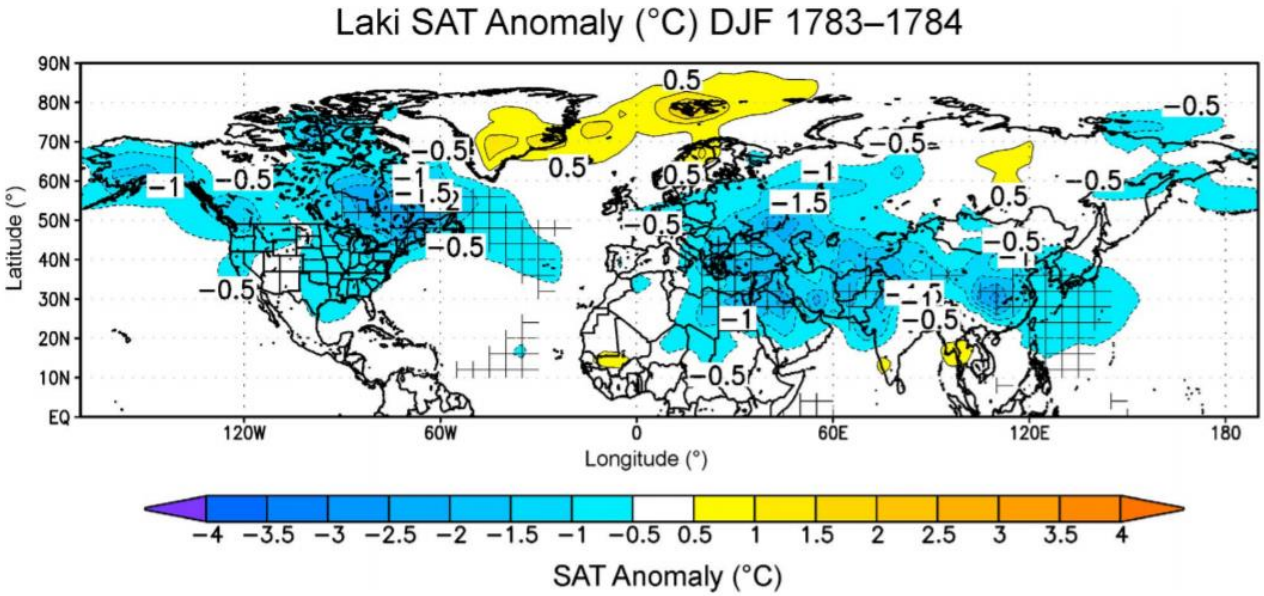
)th wrote Sæmundur Magnusson Holm at the University of Copenhagen, falling oured black the deck and sails of ships travelling to Denmark. The same day, a

Tambora (1815)



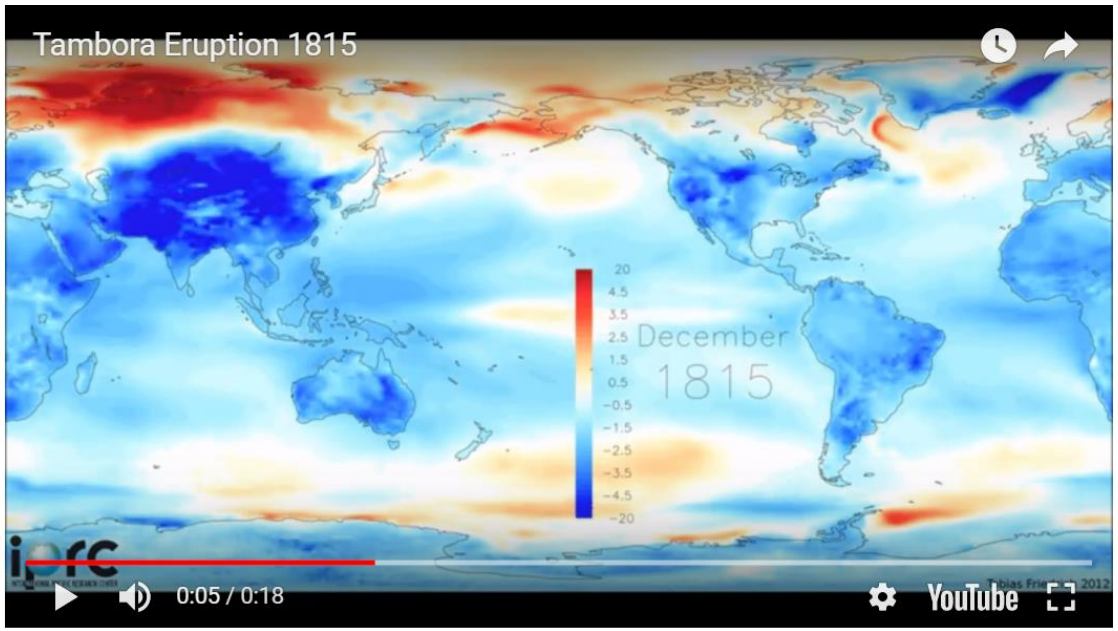
https://en.ru.is/media/veldu-flokk/ESW2017-Atmospheric-effects-of-Laki-flood-lava-eruption.pdf

LAKI 1783



A. Scmidt et al., JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 117, D23116, doi:10.1029/2012JD018414, 2012

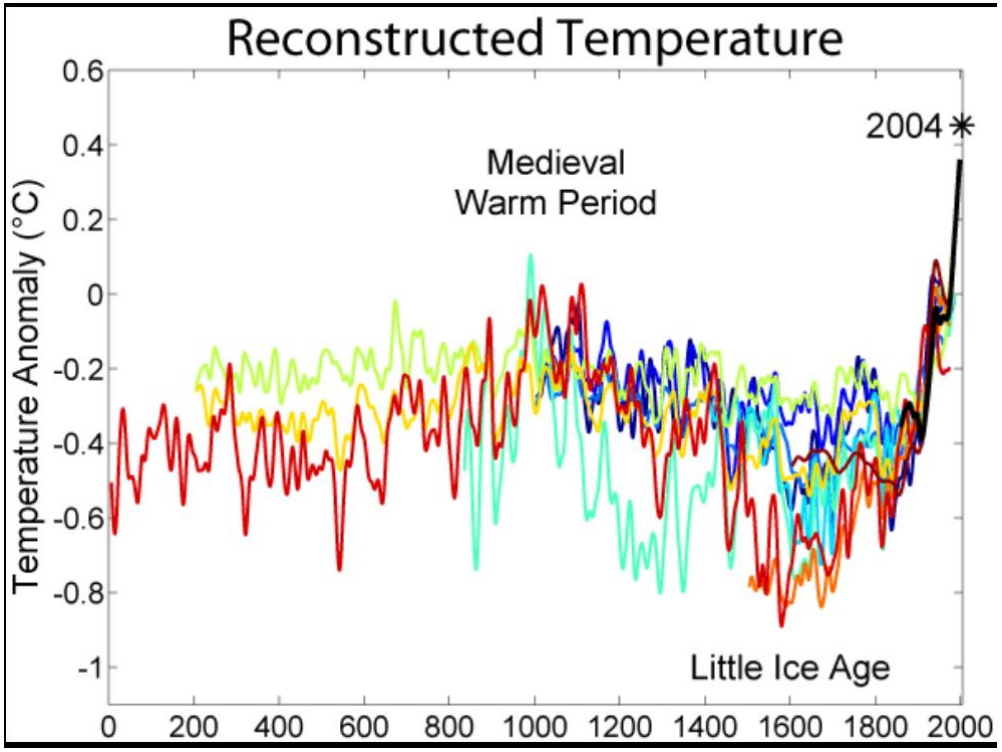
TAMBORA 1815



http://apdrc.soest.hawaii.edu/projects/SOS_MP/past_climate_2.php

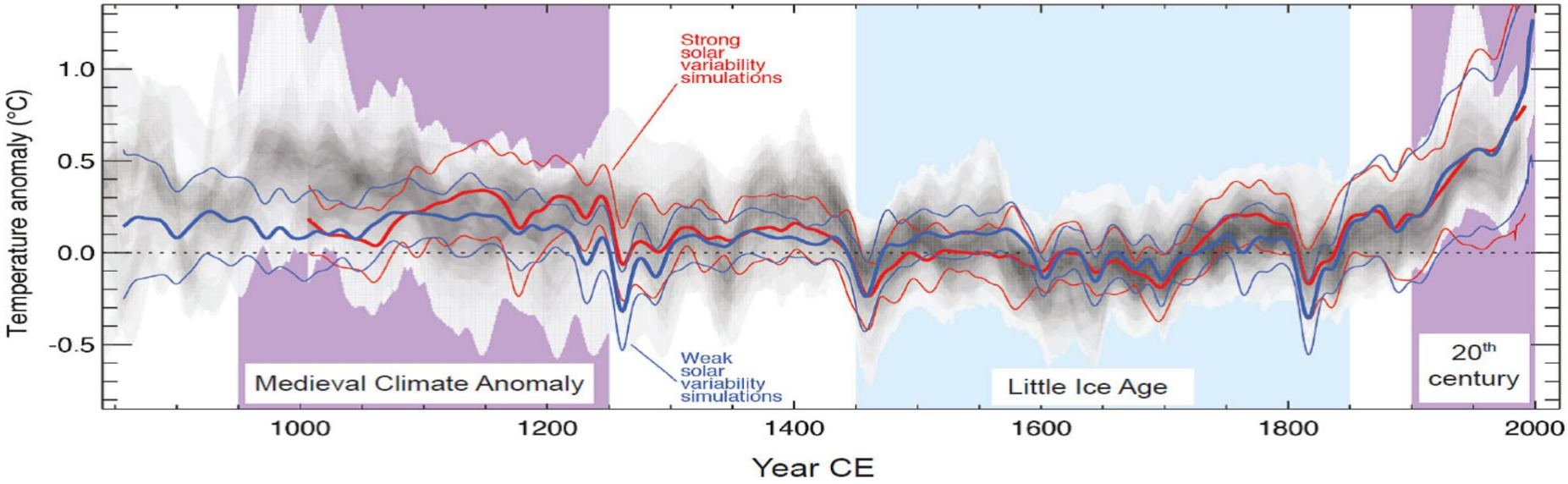
近世・それ以前の環境・社会研究に使用するデータの問題点

- 測器観測時代以前のProxy Data や再現データの場合、データの創成自体が研究活動であり、論文中のプロット図のみ公開されている場合が多く、数値データによる解析が難しい。データの発掘も困難。
- データの信頼性や適用範囲などの判断は、分野外の研究者の手に負えない場合が多い。分野間の共同研究が必須。



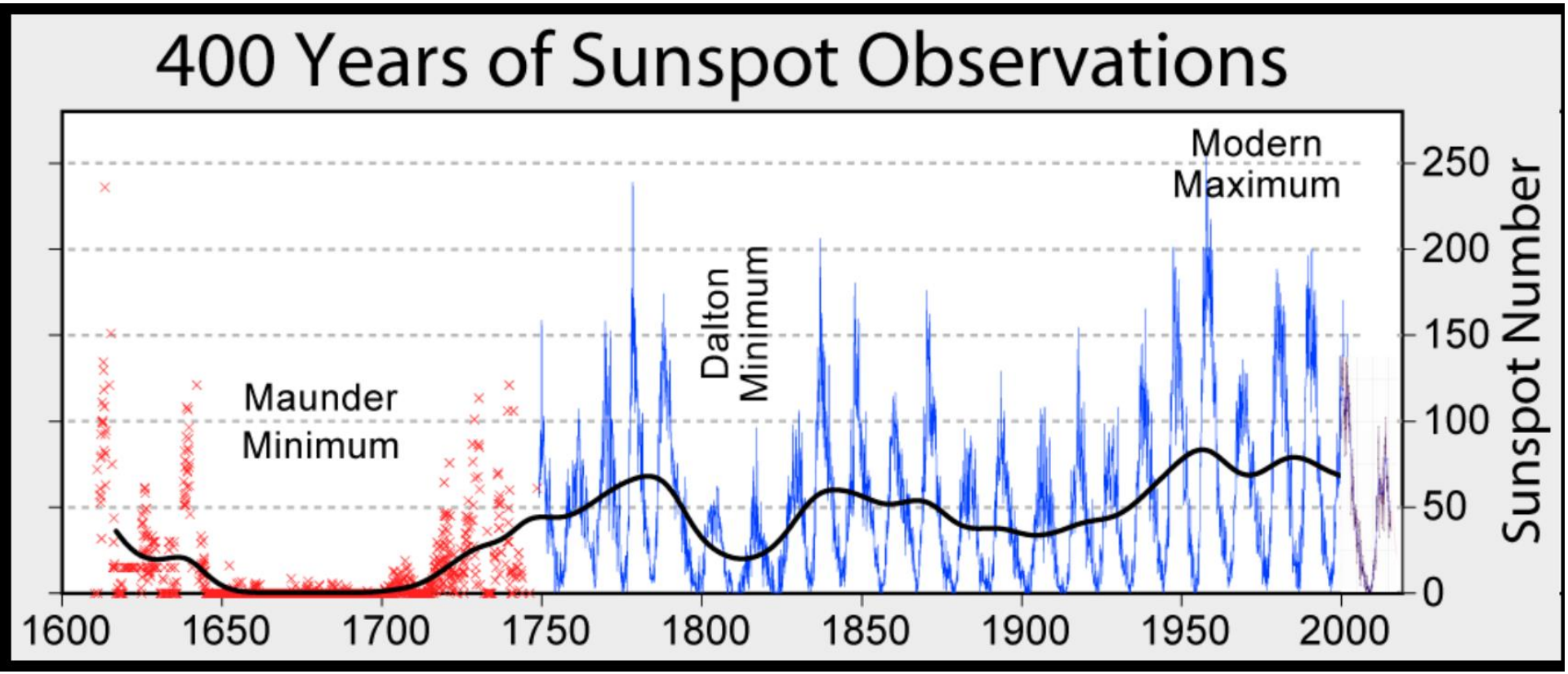
まとめ（暫定）

- 自然現象、技術革新、政治動向（革命、戦争など）、社会・経済のマインド（期待）、地政学的要因等を含んだ、高度の複雑系。
- 近世（18－19世紀）は、比較的太陽活動が低く、時期における、自然現象と社会・経済活動との関係を研究するのに適しており、環境に対する人為的影響の少ない、ベーシックな地球環境と社会・経済との関係に関する知識を得ることが出来る。将来の予測にも役立つであろう。
- 近世における社会・経済活動の歴史学・経済学的研究は既に多く行われており、火山活動などの自然的要因も議論されている。新しい観点による問題提起は、どの程度可能なのか？
- オープンサイエンスが有効かも？



Why 18 – 19 Centuries?

- A Transient periods from the Little Ice Age to the anthropological warm period since 20C.
- Several big volcanic eruptions and social movements were occurred.
- Time of revolutions in the industrial technology
- A good interval for multi-disciplinary studies to know a “basic” relationship between socio-economic movements and environmental changes.



Knowledge on 18 – 19 Centuries will be useful also to predict what will happen in the coming period of low solar activity (the next Little Ice Age in 21 – 22 Centuries?) .

FAIR for Data Repositories

- Findable
- Accessible
- Inter Operative
- Re-usable

FAIR for trance-disciplinary Data users

How to:

- Find data?
- Access to data
- make an Interdisciplinary research?
- Reuse data in old publications? (Reliability, Credit, etc)