A Trial to Identify Problems in Multi-disciplinary Data Usage: Study of Environmental Influences on Economic Activities in 18th-19th Centuries including the Sunspot Dalton Minimum

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The promotion of data-led multi-disciplinary researches will be important in the Open Science era but there still exist problems in the provision and usage of data crossing disciplines. To identify problems in data usage to be encountered by out-of-the-discipline scientists, a trial of data-led study of environmental influences on economic activities in Europe in the 18th/19th century is performed because this interval is characterized by revolutionary socio-economic movements under a relatively cold environment in the last half of the Little Ice Age. The majority of environmental data in this interval came from research works of reconstructions basing on proxy records, but we saw inconsistency among datasets in some cases. Having “standardized data” is highly desired in wider data usage by nonprofessionals. In this provisional analysis, we discuss the environmental aspect of the apparent correlation seen between the sunspot number and the wheat price at the London Market shown in Figure 1. A decrease of the Summertime precipitation in the Dalton Minimum of the solar activity (1790-1830) is shown to be the principal reason for recorded poor harvesting and high market prices of wheat in England in the interval. Solar connection through the North Atlantic Oscillation is suggested although the effect of strong volcanic eruptions (e.g. Tambola in1815) should not be ignored. In conclusion, the period of the 18th/19th century will be pertinent to the collaborative data-led study of the basic influence of the natural environment on socio-economic activities in the period before the anthropological environmental changes became prominent.

Figure 1. Time series of yearly sunspot numbers (x 0.1) and the wheat price in England (shillings per bushel) in the interval of 1700-1910. The interval of small sunspot numbers in 1790 - 1830 is called as the "Dalton Minimum".

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