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Interactive comment on "The extreme drought of 1842 in Europe as described by both documentary data and instrumental measurements" *by* Rudolf Brázdil et al.

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Dear Authors I am satisfied that necessary changes, as suggested by the referees, have been made and that the paper is now publishable. Please see the attached file with a few small editorial changes indicated. The paper will require further language editing but will leave that to the editorial office.

Sincerely Stefan Grab

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Discussion paper

The extreme drought of 1842 in Europe as described by both documentary data and instrumental measurements

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Abstract. Extreme droughts are weather phenomena of considerable importance, involving significant environmental and societal impacts. While those that have occurred in the comparatively recent period of instrumental measurement are identified and dated on the basis of systematic, machine-standardised meteorological and hydrological observations, droughts that took place in the pre-instrumental period are usually described only through the medium of documentary evidence. The extreme drought of 1842 in Europe presents a case in which information from documentary data can be combined with systematic instrumental observations. Seasonal, gridded European precipitation totals are used herein to describe general DJF, MAM and JJA precipitation patterns. Annual variations in monthly temperatures and precipitation at individual stations are expressed with respect to a 1961–1990 reference period, supplemented by calculation of selected drought indices (Standardised Precipitation Index SPI, Standardised Precipitation Evapotranspiration Index SPEI and Z-index). The mean circulation patterns during the driest months are elucidated by means of SLP maps, NAO and CEZI indices. Generally drier patterns in 1842 prevailed in January–February and at various intensities between April and August. The driest patterns in 1842 occurred in a broad zonal belt extending from France to eastern central Europe. A range of documentary data is used to describe the peculiarities of agricultural, hydrological and socio-economic droughts, with particular attention to environmental and societal impacts and human responses to them. Although overall grain yields were not very strongly influenced, a particularly bad hay harvest, no aftermath (hay from a second cut), and low potato yields led to severe problems, especially for those who raised cattle. Finally, the 1842 drought is discussed in terms of long-term drought variability, European tree-ring-based scPDSI reconstruction, and the broader context of societal impacts.

1 Introduction

Dry events, generally caused by reductions in precipitation totals compared to normal climatic conditions in a given area (meteorological drought), do not usually have such immediate and dramatic consequences (e.g. immediate loss of human lives, material damage) as might result from other hydrometeorological extremes – torrential rain, hailstorms, windstorms, floods, etc. The impacts of droughts appear over time, with some delay in the case of meteorological drought and progressively in agriculture (agricultural drought), water resources (hydrological and underground water drought), and society (socio-economic drought) (Heim, 2002; Mishra and Singh, 2010;

Fig. 1.

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