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The importance of ship log data: reconstructing North Atlantic, European and Mediterranean Sea Level Pressure back to 1750

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Local to regional climate anomalies at daily to seasonal time scales are to a large extent determined by the state of the atmospheric circulation. Knowledge of past large scale sea level pressure (SLP) is thus essential when addressing changes in past climate variability across Europe and the Mediterranean. However, a widespread distribution of instrumental station pressure measurements for the construction of gridded datasets of past SLP is only available since the mid-nineteenth century (e.g. Allan and Ansell, 2006, J. Climate). Prior to this period, SLP reconstructions for the eastern North Atlantic-European area rely on a multiproxy predictor dataset including a few very long instrumental records, documentary evidence and a couple of natural proxies (e.g. Luterbacher et al. 2002, Clim. Dynam.). However, for dynamical analyses, these reconstructions contain deficiencies. First, they share common predictors with temperature and precipitation reconstructions, thus causing circular reasoning in climate dynamical analyses. Secondly, they lack early information from marine regions that could capture the variability of the major centres of action (Azores High and the Icelandic Low).

Historical wind information preserved within ship logbooks provide a way to overcome these issues. The CLIWOC project (e.g. García-Herrera et al. 2005, Climatic

Change) has digitised and translated information on wind direction and wind strength from ship logbooks, producing a record of past wind conditions over the world's oceans for the period 1750-1850. Recent publications (Gallego et al. 2005, Climate of the Past; Jones and Salmon 2005, Climatic Change) have shown that this data set can skilfully reconstruct past SLP over the eastern North Atlantic back to the mid-eighteenth century.

Our study presents a first attempt to combine information from terrestrial instrumental station SLP series and marine wind information from the CLIWOC database to statistically reconstruct seasonal gridded SLP back to 1750. Prior to around 1800, the majority of predictors stem from CLIWOC data, while the number of instrumental records steadily increases afterwards. Preliminary results indicate a significant increase in reconstruction skill over the period 1750-1850 for the eastern North Atlantic and the Mediterranean area, i.e. the NAO variability, the strength of the westerly component as well as the location of the Azores High and Icelandic Low can be captured more accurately when the CLIWOC data is combined with terrestrial station pressure series. This new SLP reconstruction therefore allows a more accurate dynamic interpretation of pre- and post-industrial European and Mediterranean climate variability.