

# ***Interactive comment on “Drought during early European exploration and colonization of North America, 1500–1610CE: A comparison of evidence from the archives of societies and the archives of nature” by Sam White***

## **Anonymous Referee #2**

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The paper presents the earliest available documentary evidence for drought for North America, covering the period 1500–1610, a period of early European exploration and colonization. These data are compared to PDSI data from tree rings. It is a valuable and interesting approach presented in a concise manner.

However, there are two major points, that need to be addressed.

The paper is very generous concerning the type of documentary evidence it considers to be an indication of drought. For example in Section 3.2.6 ‘six years of sterility and

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death' are interpreted as evidence for drought, because the tree-ring records show a multi-annual dry period, even though the actual documents only seem to mention 'intense cold and snow' as reasons for the harvest failures. In general the early expeditions (up to about the second half of the sixteenth century) only yield very vague information on the hydroclimate in the explored region, which is not surprising since the members of the expeditions must have been aware of their lack of information to contextualize experienced weather conditions. For the first two expeditions the only evidence for dry conditions are Native Americans asking explorers to pray for rain for averting drought, but it is not clear if this request was merely part of a general seasonal ritual or if it was an indication of dry weather beginning to stress the crops. It seems to be also difficult to precisely date and locate the first example. In Section 3.2.3. 'several mentioned heavy winter snows and none mentioned drought, even though most members of the expedition were expecting a Mediterranean climate' is interpreted as evidence for above-normal winter precipitation. It may be advisable to put more focus on the post-1560 data, because there the evidence for dry conditions is often stronger; this would also offer the possibility to give greater detail for the actual drought descriptions and drought impacts.

The assembled data is actually too sparse to form an outright reconstruction of droughts 1500-1610 – especially considering the vast geographical coverage of the paper – it is more like an assembly of case studies. This is relevant in the comparison to the North American Drought Atlas (NADA) PDSI data. In the discussion the author states: 'In contrast to historians' findings that the corresponding Old World Drought Atlas has been unable to reproduce well-verified historical climate anomalies [...], the NADA appears to consistently identify droughts found in the archives of societies.' The drought information supplied by the case studies presented in this paper is indeed coherent with the NADA PDSI information, but it is in itself not consistent and continuous enough to allow for a systematic comparison. Such a systematic approach should also not only cover the period 1500 to 1610, but the whole pre-instrumental period up to c. 1800 or 1850. This limitation of the data needs to be recognized in more detail.

It should also be added that the representation here of the relationship between hydrometeorological information in European documentary sources or early instrumental observations and the PDSI data in the OWDA is more complex than indicated in this paper. Some extremes are well represented in both types of data, others are not, and the source for the statement in this paper refers only to the decades around 1800, but does not take into consideration the whole available evidence from the Middle Ages onwards, or analyse regional and temporal variation in detail. So the abovementioned phrase should be remodelled to reflect this nuance.

Minor points: Canada. In Table 1 it is clear that the archives of society for Canada have been checked for drought information, but none could be found. This is also indicated in the paper ('evidence for drought and the occurrence of rain prayers in New England and Canada during the 1620s and 1630s (White, 2015a; Grandjean, 2011), which suggests that the absence of evidence during the expeditions under study here likely reflects a lack of observed droughts rather a failure to recognize droughts'). Maybe this lack of drought information in the period 1500-1610 could be somewhat more emphasized – it is easily overlooked – by adding the number of expeditions as well as their names and dates.

Cold and snow: Several times the paper refers to increased cold and snow in winter time, but omits to explain how these conditions would be connected to drought.

p. 1, 23-24. 'for the past five to six centuries in regions with abundant personal records and official archives, such as Western Europe and China': In this time frame a good number of records is available for most parts of Europe.

p. 9, 23-24. 'This suggests that the NADA summer PDSI reconstruction may be more sensitive to summer precipitation at some precise locations': This needs rephrasing.

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