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## ***Interactive comment on “NALPS: a precisely dated European climate record 120–60 ka” by R. Boch et al.***

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Boch and co-authors present a set of very precisely dated speleothems records from four different caves from the northern rim of the Alps. The chronology of all speleothems is based on numerous and very accurate Uranium-series ages and an impressive number of stable isotope analysis. Dansgaard-Oeschger events (or Greenland interstadials) 19 to 25 are very well expressed in all oxygen isotope profiles and thus allow, to my knowledge for the first time, to test the accuracy of the age model of the NGRIP ice core for the time interval between 60 and 120 kyr before present. Because of its superior quality and strategic position, the new NALPS record has the potential to become a reference record for the timing of D-O events 19 to 25. The manuscript is thus very well suited for publication in Climate of the Past after some

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minor changes were made.

Detailed comments The authors decided to use the NGRIP ss09sea chronology for their comparison with the NALPS record. However, in order to avoid any confusions in the near future, I would recommend to use the recently proposed NGRIP modeled chronology, which was adjusted to match the annually layer counted GICC 05 chronology. Based on a quick check, age offset appear significantly smaller when the GICC05modelext chronology by Wolf et al., 2010 (Quaternary Science Reviews), is used. For instance, the GIC 19 isotope maximum occurs around 71.986 kyr BP in NGRIP (GICC modelext) and  $71.690 \pm 0.220$  kyr BP in the NALPS. The difference in age is thus only 300 years and not 1300 years as stated in the manuscript. Furthermore, I think the authors should present a table in which they compare the timing of D-O events in NGRIP (ss09sea and (possibly) GICC05 modelext chronologies) and NALPS.

In the manuscript Boch and co-authors compare their NALPS record with two other speleothem records from China (Sanbao Cave) and Italy (Corchia Cave). However, a figure showing the comparison between these speleothems records is not shown in the manuscript, making it very difficult for most readers to follow some of the discussions in paragraphs 5 and 6. The quality of the manuscript would be improved if such a figure would be included.

The authors use either the term D-O events or GI. I would recommend using just one term throughout the entire manuscript.

The authors state that "NALPS resolves recurrent short-lived climate changes within the cold Greenland stadial (GS) and warm interstadial (GI) successions, i.e. abrupt warming events preceding GI 21 and 23 (precursor-type events) and at the end of GI 21 and 25 (rebound-type events), as well as intermittent cooling events during GI 22 and 24. Such superimposed Last Glacial events have not been documented in Europe before." However, the GI's 21 to 25 cannot be considered as "Last Glacial events" as

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the occur during an interglacial, i.e. Marine isotope stage 5.

Lines 17-21: The authors state that “Previous studies showed that speleothems indeed capture the D-O pattern (e.g., Wang et al., 2001; Spötl et al., 2006; Genty et al., 2003; Drysdale et al., 2007; Fleitmann et al., 2009; Asmerom et al., 2010). Valuable contributions come from Asian (e.g. Dykoski et al., 2005; Wang et al., 2008; Cheng et al., 2009) and Brazilian caves (Cruz et al., 2005; Wang et al., 2007) “. Why are the studies from Asian and Brazilian caves “valuable”. I think that all of the listed studies are valuable.

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