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Comment on cp-2021-161

Gianluca Marino

Community comment on "Terrestrial records of glacial terminations V and IV and insights on deglacial mechanisms" by Fabrizio Marra et al., *Clim. Past Discuss.*,
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Marra et al. present new, valuable chronological ($^{40}\text{Ar}/^{39}\text{Ar}$) constraints on the timing of rapid ice-sheet melting/sea-level rise prior and at glacial terminations V and VI from the Liri fluvial-lacustrine basin in central Italy. The timing of rapid ice-sheet melting (at glacial terminations) is an essential piece of information, especially when this can be radiometrically constrained because it allows unambiguous comparison with the timing of insolation changes. Addressing the relationship between ice-sheet melting and insolation changes is one of the scopes of the study by Marra et al. and a key question in palaeoclimatology.

The "sedimentological" approach presented in the manuscript was used previously and successfully by Marra and his group both in the coastal and more inland sections of the Tiber catchment basin. Although it does not provide a quantitative sea-level reconstruction their approach is valuable, in that these sedimentary successions are sensitive "detectors" of past episodes of rapid sea-level rise (melt-water pulses), while the $^{40}\text{Ar}/^{39}\text{Ar}$ dating ensures firm constraints on the timing of these melt-water pulses.

The timing of meltwater pulses at the two terminations are consistent with previous studies centred on the Tiber catchment basin, which lends confidence to the reconstructions presented in this study. The most interesting (and to some extent surprising) finding of the manuscript is the occurrence of meltwater pulses/events during the glacial maxima that preceded both T-V and T-IV. The two intervals (glacial-interglacial cycles) have very different glacial histories (MIS 12 was plausibly way more glaciated than MIS 10, e.g., Spratt & Lisiecki, 2016 [*Climate of the Past*]) and insolation forcing. It is also worth mentioning that T-V and T-IV are very different terminations with the rates of ice-sheet melting/sea-level rise for the former (latter) being slower (faster) than for most (all) of the last five terminations (Grant et al., 2014 [*Nature Communications*]). I think the manuscript would benefit from a deeper discussion on this aspect prior to discussing the "mild insolation minima" mechanism (section 5.3). Glacial maxima are generally considered relatively stable intervals in which ice sheets are close to equilibrium with the forcing before their supercritical size makes them more sensitive to rising insolation (Raymo, 1997 [*Paleoceanography*]; Abe-Ouchi et al., 2013 [*Nature*]). Figure 9 shows that these events coincided with episodes of millennial-scale variability/Heinrich events. Do the authors think that these events of millennial-scale variability/meltwater pulse are entirely orbitally controlled?

Finally, the manuscript brings together a wealth of chronostratigraphic information from

various locations of the Liri fluvial-lacustrine basin that is instrumental to the determining the timing of past meltwater pulses around T-V and T-IV. In its present form the results are hard to read. I would recommend to better integrate and make more concise this section of the manuscript.