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Interactive comment on "7300 years of vegetation history and climate for NW Malta: a Holocene perspective" *by* B. Gambin et al.

B. Gambin et al.

belgambin@gmail.com

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CPD Reply to Reviewer 1 (C. HUNT)

First of all we would like to thank our reviewer for the positive comments and constructive remarks on our manuscript. Comments and responses are addressed below:

1) It is highly unlikely that sedimentation in these marginal marine situations was truly continuous or steady. Use of a smoothed sedimentation curve is necessitated by the rather few dates (this is a recurrent problem in the Maltese Islands where Frank Carroll and the FRAGSUS project have also struggled to find dateable material), but interpolated ages must therefore be treated with some caution.

Answer: Yes, we agree that the chronology must be treated with caution, although there

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is good correlation between cores BM2 and BM1. Reworking processes in low-energy ria environments such as these tend to be low. To overcome reservoir problems we have dated charcoal and short-lived plant material. Changes in sedimentation rates will essentially be mediated by shifts in fluvial sediment supply (climate or human-induced erosion episodes). In this paper, our interpretations are based on a chronological time scale established according to four radiocarbon dates. As stated above, we assume that the sedimentation rate in the intervals between dating points have remained relatively constant. However, we do not exclude the possibility that in some depths, some changes in sedimentation rate may have occurred leading to slightly different ages for the observed environmental changes.

2) I feel that the discussion generally and in particular the statement on p. 4522, 20 that there was little deciduous woodland on Malta in the Early Neolithic, neglects the emerging evidence for regional patterning of vegetation during much of the Holocene in the Maltese Islands. The evidence from the Marsa pollen diagram of Carroll et al. (2012, 31) suggests not deciduous but coniferous woodland before âĹij6500 cal. BP (very high Pinus and fairly high Juniperus). The Salina Bay pollen diagram of Carroll et al. (2012), a few km seaward of the Burmarrad core, did not show evidence for extensive woodland or scrub in any part of the Neolithic. Overall, given the evidence from Burmarrad, this is perhaps consistent with very localised patches of scrub and woodland at this time. This patterning of vegetation across Malta through the Holocene is all the more evident with the publication of a further pollen diagram, from Tas-Silg in southern Malta (Hunt, C.O. 2015. Palynology of some archaeological deposits from Tas-Silg. in Bonanno A. & Vella, N. C. (eds). Tas-SilÄa ÌÍ, Marsaxlokk (Malta) I: Archaeological Excavations.

Answer: p. 4522, 20: refers to microcharcoal and the possible use of fire in the modification of the landscape, no mention of the lack of deciduous woodland is made here. The main essence of this paragraph was that from the palynological results of this research, and that of Djamali et al. (2012), evidence of mainly open vegetation (low

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arboreal taxa) is shown for this northwestern region of Malta during the early Holocene. With regard to distances, the three cores from the Burmarrad catchment area are located as follows: BM2 (this manuscript), Djamali et al. (2012), and Carroll et al. (2012) are all within 175 to 355 metres of each other and all of them are within 1km of the current coastline. We agree with the reviewer regarding the patchwork nature of vegetation on the islands, as can be noted in our manuscript (e.g. present-day: 4511, 5 and past p. 4521, 22); however we will add another sentence to the manuscript to further highlight this point.

3) The characterisation of the Eastern Mediterranean as seeing an increase in precipitation before 6500 cal. BP (page 4537, 27) is correct only for the Northeast Mediterranean. South of the Dead Sea, a different pattern obtains, with generally decreasing precipitation through the Early-Mid Holocene (Hunt, C. O., Gilbertson, D. D. & El-Rishi, H. A. 2007 An 8000-year history of landscape, climate and copper exploitation in the Middle East: the Wadi Faynan and the Wadi Dana National Reserve in southern Jordan. Journal of Archaeological Science 34, 1306-1338.)

Answer: Noted.

4) The evidence for a real rise in olive cultivation in the Roman period parallels that from Tripolitania, Libya (e.g. Barker, G. W. W., Gilbertson, D. D., Jones, B. & Mattingley, D. J. (eds.) Farming the Desert: The UNESCO Libyan Valleys Survey. Paris: UNESCO.) as well as in the Levant and Spain. This reflects the intense demand for olive oil from Imperial Rome. Incidentally, the statement at the top of page 4532 that Carroll et al. did not record Olea at Marsa, is erroneous - it was plotted with other cultivated taxa.

Answer: Thank you for this additional reference, it will be added to the manuscript. Regarding Olea in the Marsa pollen diagram (Carroll et al. 2012) p4533, 1; thank you for pointing this out, it was an oversight and will be amended.

5) The statement (page 4529, 23) that Carroll et al. (2012) recognised a rise of Pinus after 3900 cal. BP neglects their statement (pp.36-37) that the high Pinus in this site

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most probably follows a non-sequence and relates to the mid 19th Century when the British established pine plantations on Malta.

Answer: p. 4529, 24: it is actually noted in the manuscript at this point that Carroll et al. (2012) suggest that the rise in Pinus might be due to 'infilling of a former dredged channel rather than indicative of local vegetation at the time'; however due to word limitations we excluded the date detail ('mid 19th Century') but will add it in to the manuscript.

6) Production: The English is mostly of a high standard, but could do with a little proof-reading. I found the pollen diagrams rather difficult to read because of the small font and colours used, even in full-screen on a large monitor. Similarly, the climate curves in Fig 8 would be easier to understand if the x-axis was doubled in length.

Answer: Noted, thank you: these production points will be addressed to ensure the figures are clearer.

Interactive comment on Clim. Past Discuss., 11, 4505, 2015.