

## ***Interactive comment on “A statistical method to validate reconstructions of late-glacial relative sea level – Application to shallow water shells rated as low-grade sea-level indicators” by Milena Latinović et al.***

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I appreciate the statistical approach proposed by Latinovic et al – it offers a quantitative solution to the vertical data of a sea-level index point in particular to its uncertainty which is often estimated through an informed decision only. Assessing to the highest precision possible the water-depth range in which biological sea-level indicators live is a significant step forward. Here, I wish to comment on some sentences which are, I believe, misleading, possibly due to some hard to read idiomatic expressions. I feel the text on sea-level indicators (page 2 line 9ff) is confusing: I wouldn't know any reliable

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biological indicator that form at the shoreline. These live at different water depths, i.e. in front of the shoreline or, if terrestrial, behind the shoreline. The indicator's height at time of sampling does not provide the 'indicative meaning' but just its position as encountered today. 'Indicative meaning' (van de Plassche 1986) is the indicator's living range with respect to the corresponding shoreline at the time when the species was alive. It comprises two parameters: the 'reference water level' (i.e. the elevation of the indicator as identified through a modern analogue) and the 'indicative range' (i.e. the vertical range over which the indicator's modern analogue exists) both contributing to the vertical uncertainty of a sea-level index point (e.g. Shennan et al., 2015). I believe the authors are after 'indicative range', not after 'indicative meaning'. They wish to improve the vertical data point in terms of its precision using the Bayes' theorem. This is very useful because it reduces the uncertainty of the sea-level prediction. Also, may I suggest to follow Shennan (2015) and replace the term 'relative sea level' with 'sea level' because the sea level is the difference between the geoid and the solid earth surface relative to the centre of the earth (Mitrovica and Milne, 2003). In fact, there is no difference between the sea level as defined by the geological community and the mathematical notation of the geophysicists (Shennan, 2015). This would facilitate reading (e.g. “. . .the depth of the sample, relative to RSL. . .”; page 3, line 17). In addition, may I suggest to replace the term 'transfer function' with other words (e.g. 'conversion by analogy' or similar). 'Transfer function' is used since the 90s in numerous publication (see Barlow et al., 2013 and references herein). The function describes the statistical relationship between the modern vertical distribution of diatoms or foraminifera and their fossil counterparts in order to establish the indicative meaning of a sea-level index point and its vertical uncertainty. The text (page 4, line 1) indicates that authors mean 'indicative range'.

Shennan, I., 2015. Handbook of sea-level research: framing research questions, in: Shennan, I., Long, A.J. and Horton, B.P. (eds), Handbook of sea-level research, Wiley, pp.3-25. Mitrovica, J.X. and Milne, G., 2003. On post-glacial sea level: I. General theory. Geophys. J. Int. 154, 253–267. Barlow, N., Shennan, I., Long, A.J., Gehrels,

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W.R., Saher, M.H., Woodroffe, S.A. and Hillier, C., 2013. Salt marshes as late Holocene tide gauges. *Global and Planetary Change* 106, 90-110.

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