Information regarding the cancelled (due to EGU 2020 being held online) short course 'Short Course on Age Models and geochronology: An introduction to different age-depth modelling approaches'.

We are planning on holding a 2-day course in Bremen this autumn, please keep an eye on the following website

https://www.marum.de/Ausbildung-Karriere/Courses-2020.html

and/or ask Christian.Zeeden@leibniz-liag.de to be informed on news regarding this.

Creating a robust depth-age relationship commonly includes dating and possibly inclusion of further information (e.g. sedimentation rates, sedimentological properties) in a formal or informal way. This makes the creation of such models challenging, especially when ages are to be assigned for depths without direct dating. In addition, inconsistencies in dating results (due to e.g. bioturbation or contamination) complicate such relationships and assigning realistic uncertainty. It is important to keep in mind that systematic uncertainty cannot be reduced through multiple dates and through modelling.

Below you find a (incomplete) list of relevant literature regarding age-depth modelling.

Blaauw, M., 2010. Methods and code for 'classical' age-modelling of radiocarbon sequences. Quat. Geochronol. 5, 512–518. https://doi.org/10.1016/j.quageo.2010.01.002

Blaauw, M., Christen, J.A., 2011. Flexible paleoclimate age-depth models using an autoregressive gamma process. Bayesian Anal. 6, 457–474. https://doi.org/10.1214/ba/1339616472

Blockley, S.P.E., Lowe, J.J., Walker, M.J.C., Asioli, A., Trincardi, F., Coope, G.R., Donahue, R.E., 2004. Bayesian analysis of radiocarbon chronologies: examples from the European Late-glacial. J. Quat. Sci. 19, 159–175. https://doi.org/10.1002/jqs.820

Bronk Ramsey, C., 2009. Bayesian Analysis of Radiocarbon Dates. Radiocarbon 51, 337–360.

Bronk Ramsey, C., 2008. Deposition models for chronological records. Quat. Sci. Rev., INTegration of Ice-core, Marine and Terrestrial records (INTIMATE): Refining the record of the Last Glacial-Interglacial Transition 27, 42–60. https://doi.org/10.1016/j.quascirev.2007.01.019

Buck, C.E., Cavanagh, G., Litton, C., 1996. Bayesian Approach to Intrepreting Archaeological Data. Wiley.

De Vleeschouwer, D., Parnell, A.C., 2014. Reducing time-scale uncertainty for the Devonian by integrating astrochronology and Bayesian statistics. Geology 42, 491–494. https://doi.org/10.1130/G35618.1

Heegaard, E., Birks, H.J.B., Telford, R.J., 2005. Relationships between calibrated ages and depth in stratigraphical sequences: an estimation procedure by mixed-effect regression. The Holocene 15, 612–618. https://doi.org/10.1191/0959683605hl836rr

Meyers, S.R., Siewert, S.E., Singer, B.S., Sageman, B.B., Condon, D.J., Obradovich, J.D., Jicha, B.R., Sawyer, D.A., 2012. Intercalibration of radioisotopic and astrochronologic time scales for the Cenomanian-Turonian boundary interval, Western Interior Basin, USA. Geology 40, 7–10. https://doi.org/10.1130/G32261.1

Millard, A.R., 2004. Taking Bayes Beyond Radiocarbon: Bayesian Approaches to Some Other Chronometric Methods, in: Buck, C.E., Millard, A.R. (Eds.), Tools for Constructing Chronologies, Lecture Notes in Statistics. Springer London, pp. 231–248.

Parnell, A., 2018. Bchron: Radiocarbon Dating, Age-Depth Modelling, Relative Sea Level Rate Estimation, and Non-Parametric Phase Modelling.

Parnell, A.C., Buck, C.E., Doan, T.K., 2011. A review of statistical chronology models for high-resolution, proxy-based Holocene palaeoenvironmental reconstruction. Quat. Sci. Rev. 30, 2948–2960. https://doi.org/10.1016/j.quascirev.2011.07.024

Parnell, A.C., Haslett, J., Allen, J.R.M., Buck, C.E., Huntley, B., 2008. A flexible approach to assessing synchroneity of past events using Bayesian reconstructions of sedimentation history. Quat. Sci. Rev. 27, 1872–1885. https://doi.org/10.1016/j.quascirev.2008.07.009

Telford, R.J., Heegaard, E., Birks, H.J.B., 2004. All age–depth models are wrong: but how badly? Quat. Sci. Rev. 23, 1–5. https://doi.org/10.1016/j.quascirev.2003.11.003