Refining the standardized growth change method for pointer year detection: bias-adjustment and definition of the relaxation period

Allan Buras, Tom Ovenden, Anja Rammig, Christian S. Zang, for correspondence: allan@buras.eu

Refined approach:
BSGC positive pointer year
BSGC relaxation period (+)

BSGC negative pointer year
BSGC relaxation period (-)

Former approach:
SGC

See also: Buras, Rammig, Zang, 2020: A novel approach for the detection of pointer years in Dendrochronologia
Fig. 1: RWI plotted against time (t) of an arbitrarily selected pseudo-population (a). Scatterplot indicating the negative relationship between growth changes (GC) at time t and ring-width indices (RWI) at time t-1 (b). Coloured dots in (a) and (b) indicate significant pointer years according to either SGC (light-blue = positive, yellow = negative) or BSGC (blue = positive, red = negative). $r^2$ in (b) indicates the explained variance of GC (t) using RWI (t-1) as predictor. The solid line in (b) represents the prediction of the corresponding regression.
Discussion slides

Fig. 2: Arbitrarily selected time-series with three example time-steps indicated (a). Panels b-j depict probability density functions of $GC$ (b-d), $GGC_i$ (e-g) and their conflation (h-j). The highlighted z-score (vertical dashed line in each panel) corresponds with the respective example time-step. Filled areas indicate significance. Numbers 1-3 in (a) refer to the numbers on top of panels b, c, and d, respectively.
Fig. 3: Results of the sensitivity analysis, comparing detection frequencies of SGC (red) and BSGC (black) along a gradient of deflection factors (a). Percentage of observations matching the possible combinations of estimated and actual length of the relaxation period based on pseudo-populations with a deflection factor of 1.7 (b). The black horizontal lines in (a) depict no detection (0) and a perfect detection rate of 1, while the dashed vertical lines in (a) indicate the deflection factors for which BSGC (black) and SGC (red) reached perfect detection. The black diagonal line in (b) indicates perfect estimation of deflection length.