3. Normalization of data and comparisons of time series

Most authors publish their laboratory results in 'conventional radiocarbon dates', expressed in radiocarbon years, and give their accuracy as one- (or two-) sigma statistical counting errors. Regarding these counting errors (given in general as plus and minus) widespread misconceptions prevail. Therefore, it should be emphasized that these ± numbers do not indicate the maximum but rather the minimum average error of a number of measurements. This means that the average error of a sufficiently large number of measurements can never be smaller, but may well be much larger than what is indicated by these ± values, because the uncertainty of the result of a measurement not only arises from statistical fluctuations but may result from a multitude of other experimental factors.

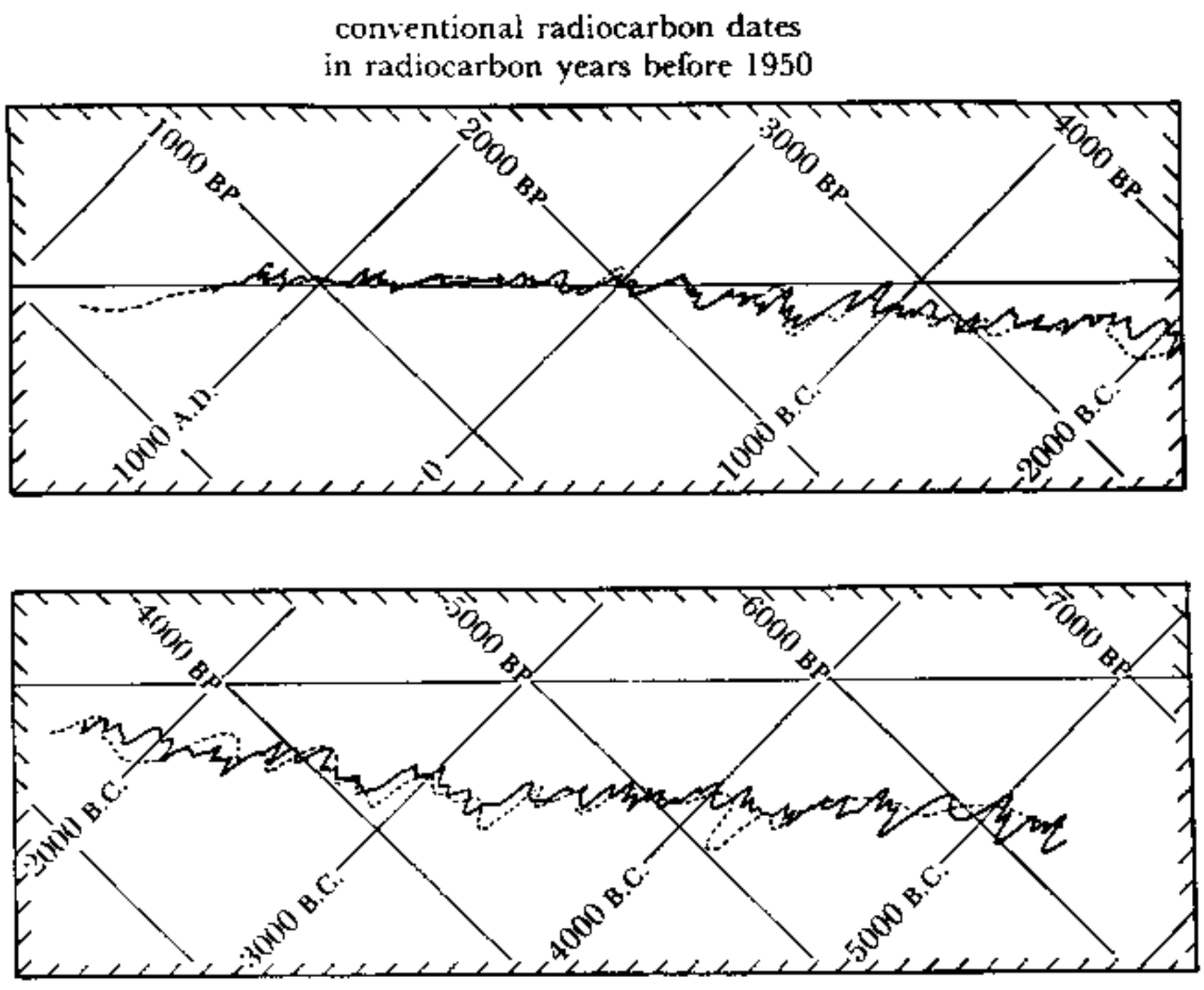

Figure 3. Dendrochronological age as a function of radiocarbon age determined in La Jolla, representing a calibration curve. The dotted line was published by Suess in 1970 to indicate the character of the expected curve. The solid line shows the same, but is based on about 700 individual measurements (Suess 1980). The diagram is tilted 45° to conserve space and a spline curve is drawn through the measured points.

In figure 3 we drew a line through the measured points free-hand with what was called cosmic 'Schwung'. This was taken by some of our colleagues as an indication of inaccuracy. This expression, however, was coined by the late eminent Austrian 'cosmic' (sic!) physicist and oceanographer Albert Defant, who, when plotting the amplitudes of ocean tides, used this expression to indicate that the amplitudes resulted from cosmic, extraterrestrial forces, and also, that these forces did not change abruptly. An ancient dictum, *natura non facet saltum* (nature does not make jumps), expresses this appropriately. Today one might say: the second time-derivative of (macroscopic) quantities in nature does not change abruptly. Therefore, unknown parts of a function in nature can best be approximated by spline functions.