**Explanation for how the Matlab tool incorporates cosmogenic age uncertainty on youngest boulder into the probability distribution of the abandonment window**

If the age of the youngest boulder were known with perfect precision, the probability distribution of the abandonment window could be placed in time directly adjacent to the boulder age. However, cosmogenic ages of boulders typically have absolute uncertainties of ca. 10 to 15% of the central age. Thus, where exactly the abandonment window should be placed has a defined uncertainty range. To take into account that uncertainty, we create multiple iterations of the probability distribution of the abandonment window, and weight each iteration according to the probability distribution of the boulder age. In essence, the low likelihood of the boulder age falling outside the 2-sigma uncertainty range of the reported age results in a low weighting of the abandonment window when it is shifted in time beyond the 2-sigma uncertainty range of the boulder age. The high likelihood of the abandonment window occurring close to the central age results in a high weighting of the abandonment window placed close in time to the central age.

To take into account this uncertainty on the youngest boulder age, the Matlab tool solves the final distribution of probabilities using the artificial data described earlier. After performing many iterations (10,000 or more), the results are binned according to a time window that is set to 1/10 the 1-sigma age uncertainty on the youngest cosmogenic age of the sampled boulders (a 1000-yr 1-sigma uncertainty range results in bins of 100 yrs). The total number of results falling into each bin is summed, and all results are divided by the total number of iterations in the artificial data procedure to produce a normalized distribution of results, which is equivalent to the probability distribution of the abandonment window. Next, the probability distribution must be weighted and shifted according to the probability density function (pdf) defined by the sample’s age and uncertainty (a normal distribution of uncertainty is assumed). The sample age pdf is plotted in temporal increments that are equal to that of the frequency distribution: 1/10 of the 1-sigma range. When the probability distribution of the abandonment window is placed on the central age of the sample, it receives a weight that is equivalent to the value of the sample pdf at the position of the central age. When the probability distribution of the abandonment window is shifted to the left and right, it receives lower weights, each determined by the sample pdf. This shifting and weighting occurs for every increment of the time axis on the sample pdf. Once all shifted and weighted probability distributions of the abandonment window have been calculated, they are summed, resulting in a full probability distribution of abandonment time that takes into account uncertainty on the youngest sample age.