

Lichenometry may be pseudo-science

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Lichenometry is defined as: “Measurement of the diameter of lichens [figures 1 and 2] growing on exposed rock surfaces as a method of dating geomorphic features.”¹ The date of the exposed surface is usually determined by measuring the diameter of the largest lichen on the surface and comparing it to its rate of growth. Despite potential pitfalls in the method, the maximum age limit is claimed to be about 10,000 years but is supposedly most accurate for younger surfaces.² Lichenometry can provide dates for glacial deposits, paleofloods, rockfalls, faults, talus, and other such youthful features. It is a common dating technique with 30,600 results from a 2012 Google search:

“Since its conception by Beschel (1950) the measurement and interpretation of lichen sizes have become a very common technique with which to determine the ages of deposits, most commonly moraines and bodies of colluvium.”³

Numerous problems

In a devastating critique of the method, Osborn *et al.* pointed out numerous problems that occur with its application, which apparently are mostly ignored:

“... neither authors/editors nor readers ask or seek answers to basic questions arising from the method. ... Despite the many published doubts, use of lichenometry continues, apparently oblivious to criticism. Its popularity stems no doubt from *apparent* ease of application and general lack of expense. The result is a plethora

of ages of glacial advances and landslides that may not have any basis in reality [emphasis in original].”⁴

They group the problems into (1) lack of agreement on procedures, (2) untenable assumptions, and (3) lack of experimental verification.⁵ Regarding the lack of agreement on lichenometric procedures, there is no accepted standard on the time range of validity, which lichens are to be measured, the number of lichens sampled, the appropriate search area, data handling, and the treatment of error.

Regarding untenable assumptions, the assumption that the largest lichen colonized the rock and continued to grow at a steady rate has not been verified. Growth curves are deduced from areas far from the research location. The ecology of lichens is not very well known, and the correct identification of a particular species in the field can be difficult.

Regarding a lack of experimental verification, different researchers come up with widely varying results

using the same method in the same area. Dates on surfaces of ‘known age’ are claimed to be incorrect. For instance, a lichenometry age on a moraine in the Sierra Nevada Mountains, California, USA, gave ages of 2,000–3,000 years.⁶ These ages were rejected because it was claimed the deposits were 10,000 years older and from the last glaciation. Therefore, they claim without evidence that a late Holocene climate change killed the lichens, which then started growing again 2,000–3,000 years ago. It appears that preconceived ideas from uniformitarian glacial chronology determined the dates, and not lichenometry. This is circular reasoning. There is a lot of evidence to suggest that circular thinking is all too common when it comes to the Ice Age and even the rocks and fossils.⁷

Method unreliable

Osborn *et al.* conclude that the method is unreliable, even suggesting it may be pseudo-science.² There is no way to tell a good date from a bad



Figure 1. The map lichen (*Rhizocarpon geographicum*), the lichen most used in lichenometry

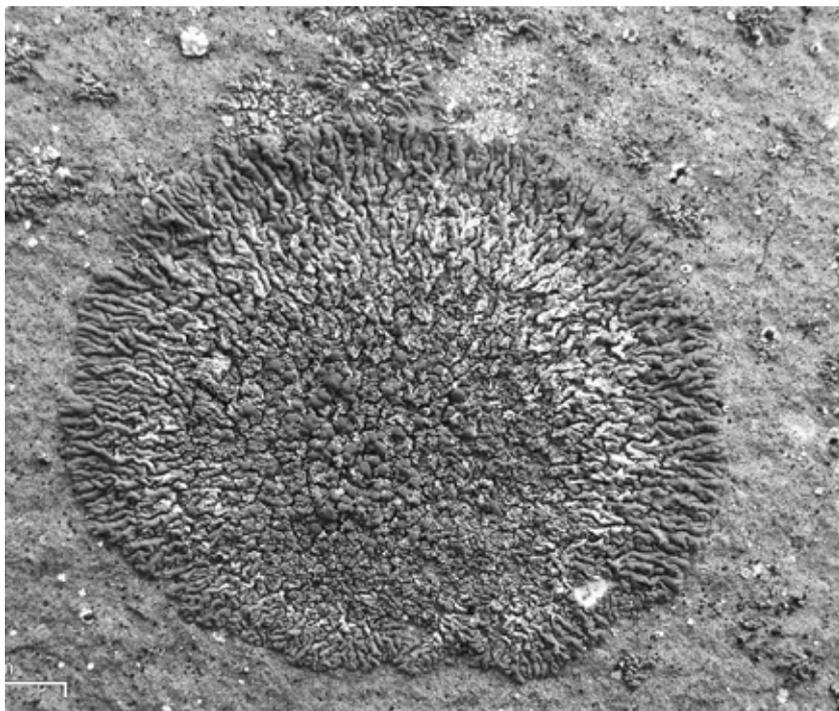


Figure 2. *Xanthoria elegans* was one of the first lichens used for lichenometry.

date, except by applying preconceived ideas: “But it cannot be foretold which lichen assemblages will provide good ages and which bad ages.”³ And of course there is the tendency to accept lichenometry dates, if they agree with preconceived ideas:

“It would seem that subjectivity, opinion, and accuracy that is only nominal are acceptable so long as the resulting lichenometric ages seem reasonable.”⁸

The conclusion is that lichenometry dates are likely useless: “It is not clear at this time whether lichen measurements will ever be able to provide reasonable numerical ages of geological substrates.”⁸

Other scholars are taking note of the problems in lichenometric dating. Kaufman *et al.* warn that many Holocene glacial moraines have been dated by lichenometry, but these dates must be applied with caution because of the new results by Osborn *et al.*⁹ The new results have made others who use lichenometry to be more cautious.^{10,11} Some researchers claim

that the method works best for younger ages, and in dating rock glaciers. Rosenwinkel *et al.* state:

“We conclude that lichenometry works better as a tool for establishing a relative, rather than an absolute, chronology of rock-glacier lobes in the northern Tien Shan.”¹²

The new result by Osborn *et al.* has caused some researchers to question previous results even for very recent debris flows.¹³

Wider implications

Although lichenometry is restricted to ages of less than 10,000 years, the study has implications for dating methods in general. If the situation with lichenometry is any indication, it appears that researchers do not question the assumptions behind a particular dating method. Nor do they investigate the problems associated with it. Apparently, they are satisfied to accept the results when they agree with their predetermined expectations. If the dates don’t agree, they will

find an arbitrary excuse for why the ‘wrong dates’ are to be rejected.¹⁴ In this way preconceived ideas are simply reinforced and given an impression of precision and accuracy. This reinforcement syndrome is a common problem in historical science.¹⁵ Lichenometry provides one more example of why we should not be enamoured by the ‘results’ of secular research that supports the evolutionary, deep time worldview.

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