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Weathering by endolitic lichens on limestone surfaces: a geostatistical approach

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The quantification of the surface erosion is one of the most important topics to understand the evolution both in karst and no-karst areas. Many Authors measured limestone erosion in different environments, e.g. marine (Stephenson & Kirk, 1998; Cucchi et al., 2006) and inner Karst (Cucchi et al., 1995; Cucchi et al., 1998) or the erosion of different lithologies (Cucchi & Forti, 1988), but there are a lot of unstudied environmental settings. Here we discuss two years of data, part of an extensive field surveying along two altitudinal transepts (Furlani et al., 2006), located in the Italian Eastern Alps (Trieste Classical Karst – Mount Canin, and in the Central Apennines - La Maiella Massif), from 0 to 2500 m altitude. 8 survey sites have been set in each transept, each with 8-9 measuring stations, i.e. horizontal, smooth rock surfaces colonized by endolithic lichens, or non-colonized rock surfaces exposed by mechanical break and cutting, and re-exposed horizontally. Lowering rates were measured in situ twice a year in each station using a micro-erosion meter (MEM) or a traversing micro erosion meter (t-MEM - estimated precision: 1 μm). A sample of the lichens colonizing each measuring station was taken for identification, and thin and polished sections (more than 100) were prepared to describe petrography and the most typical bioweathering phenomena caused by thallus growth.

The geostatistical analysis of the data collected from 2005 support the hypothesis that the presence of mature thalli of endolithic lichens reduces rock surface lowering. Throughout the Maiella transept, in fact, higher dissolution rates were observed in non-lichenised rock surfaces with respect to lichenised surfaces. Moreover, the lat-

ter show an higher standard deviation than the first one, probably due to the lichen morphology and water absorption. Similar results were observed also along the Karst-Mount Canin transept. No significant differences were observed along the sites of the same transept. On bare rocks, higher lowering rates have been recorded on micritic limestones than on microcristalline ones (Cucchi et al., 1995, 1998). On colonised surfaces, there are not substantial differences among lithologies.

In endolithic lichens, active carbonate dissolution still occurs in the pseudomedulla. However, this contribution seems to be negligible in comparison to the protective effects of the so-called "lithocortex", that forms the external surface exposed to the action of CO_2-containing water, that is particularly aggressive against the bare rock surfaces. The role of other structures, e.g. the fruiting bodies, are also thoroughly discussed.

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