Wear analysis beyond dietary reconstruction – new insights and future perspectives

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In mammals, mechanical wear analyses have been widely applied to infer diet, use, habitat and climatic conditions, on individual, species and population level. During the last 15 years, combined studies of wear analyses on different scales, and based on multiple materials (in-vivo, in-vitro, field studies) have shed new light on the wear process. Yet, new questions were raised regarding how varieties of factors, for example structure, physical and mechanical properties of the diet, affect the wear process. Here, a synthesis will be given on the recent advances to characterize the old as well as new important key players of the wear process that are linked to approaches in biomechanical engineering, functional morphology and digestive physiology. Further, new tools are presented to highlight new ideas in standardization of experimental and analytical procedures (Figure 1), and potentially could foster future exchange of data. There is still more potential to utilize wear analyses in diverse research scenarios, including teeth of non-mammalian vertebrate and invertebrate taxa, but also for surfaces not related to feeding.
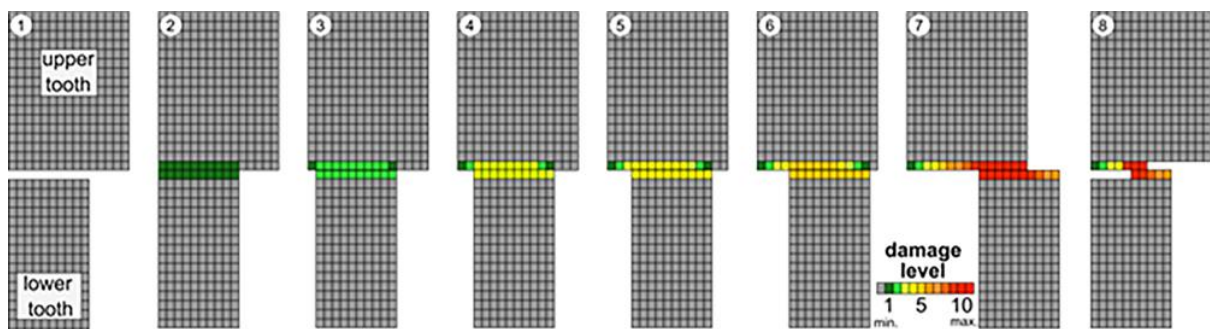
Figure 1: A simulation of surface damage by wear in a simplified equine teeth model (from Sterkenburgh et al.2022)