
Plasticrusts, plastiglomerate and pyroplastic: new connections among novel plastic forms

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Abstract

Plasticrusts, plastiglomerate and pyroplastics are novel plastic forms that are currently being reported from marine coastlines worldwide. Plasticrusts consist of plastic encrusting rocky intertidal surfaces, plastiglomerates are bonds of melted plastic and (in)organic materials, and pyroplastic is burned plastic with a rock-like appearance. In this poster presentation, we show recent findings of these novel plastic forms from Madeira Island, Atlantic Ocean. During field surveys on the south-eastern Madeiran coast, we collected plasticrust, plastiglomerate and pyroplastic samples that we examined using macro-, micro-, and spectroscopic methods at the lab in Koblenz, Germany. We detected green, blue, and white plasticrusts that consisted of polypropylene (PP) and polyethylene (PE), respectively. Through Fourier-transform infrared (FTIR) spectroscopy, we linked these plasticrusts to co-occurring PP and PE plastic ropes which showed that plasticrusts can derive from such ropes being wave-scoured across raspy intertidal rocks. Through additional lab experiments with individual plastic rope fibers on a heating plate, we showed that such fibers glue together and form significantly thicker dual fibers when exposed to summer rock surfaces temperatures which indicates that such temperatures contribute to plasticrust formation. We also detected blue plastiglomerate and blue pyroplastic that consisted of a PP and PE mix. While the plastiglomerate included a pebble and several pebble shaped clasts, the pyroplastic included only pebble shaped clasts. Such pebble clasts either derive from plastiglomerate pebble loss or incomplete plastiglomerate formation. Regardless of the mechanisms involved, pebble clasts unequivocally relate plastiglomerate to pyroplastic and, thereby, establish the first link between these two plastic forms. Finally, microscopic examinations revealed strong signs of plastiglomerate and pyroplastic weathering including cracks, holes and plastic flakes which suggested that the weathering of both plastic forms contribute to marine microplastic pollution. Altogether, our findings established several new connections among these novel plastic forms.

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