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Carbon-Bearing Impactites from the Gardnos Impact Structure, Norway: No Evidence for Soot

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Poster Presentation 39

CARBON-BEARING IMPACTITES FROM THE GARDNOS IMPACT STRUCTURE, NORWAY: NO EVIDENCE FOR SOOT

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The Gardnos, Norway impact structure has a diameter of 4.5 km and is 400-900 Ma old. The structure has a carbon content of 0.1-1 wt%, 5-10x greater than those of exposed basement target rocks at Gardnos. The source of this high carbon concentration is still undetermined. Combustion of the impactor or carbon-bearing rocks might have occurred during the impact, producing carbon in the form of soot and charcoal. (Little combustible biomass existed on Earth at the time of the impact, 400-900 Ma ago.) To test this possibility, we searched for soot in a wide variety of Gardnos impactites and related rocks. We also analyzed post-impact crater-filling sediments and shales from distant localities that could have been present at the time of impact.

Dissolution and analysis procedures were based on those used for detecting soot from impact-produced wildfires at the Cretaceous-Tertiary (K/T) boundary. Reduced carbon was isolated using HCl and HCl/HF. Elemental carbon was separated from organic carbon by acidic dichromate oxidation. The elemental carbon was identified and characterized using SEM imaging and quantified by weighing and particle size analysis. Unlike K/T boundary rocks, many of these samples contained significant quantities of HF-resistant minerals which were in some cases left along with the desired elemental carbon following demineralization and oxidation. We corrected our post-oxidation carbon weights using SEM imaging and particle size analysis of carbon and mineral fractions. Soot contents were not considered significant unless the amount exceeded the estimated error.

After corrections were applied, none of the Gardnos impactites showed significant soot contents. Surprisingly, significant soot contents were found in three samples not directly related to the impact event, one from post-impact crater-filling sediments, and two from shale over 100 km east of the crater. The origin of the soot in these samples is not understood, and more research is in progress.