PLATINUM GROUP ELEMENT (PGE) RATIOS IN THE CORED IMPACTITES OF THE EYREVILLE DRILL SITE OF THE CHESAPEAKE BAY IMPACT STRUCTURE. S. Goderis[1,2], F. Vanhaecke[2], J. Hertogen[3], Ph. Claeys[1], [1]Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussels, Belgium, [2]Universiteit Gent, Krijgslaan 281 - S12, B-9000 Ghent, Belgium, [3]Universiteit Leuven (KULeuven), Celestijnenlaan 200E, PB 2408, B-3001 Leuven-Heverlee, Belgium (Steven.Goderis@vub.ac.be).

Introduction: The late Eocene epoch is characterized by both a 2.5 Ma long period of increased presence of extraterrestrial ^{3}He, first detected in the marine carbonates of the Massignano section, Italy [1], and the formation of possibly 5 or more impact structures (Popigai, Chesapeake Bay, Wanapitei, Haughton, and Mistastin). One scenario attributes the high impact rate and enhanced flux of interplanetary dust particles to the arrival of long-period comets in the inner solar system caused by a perturbation of the Oort cloud [1]. Determination of platinum group element (PGE) concentrations is one of the methods (next to Os and Cr isotopic analysis) capable of identifying sometimes minute (~0.2 wt.%) amounts of extraterrestrial projectile material in impactites. A comparison of the specific inter-elemental ratios measured in impact-melt with the same ratios in the different types of meteorites (e.g., chondrites), enables reliable projectile identification [2, 3, 4]. By using this method, both the Popigai [2] and Wanapitei [5] impactors proved to be L-type ordinary chondrites. The presence of two impact structures formed by the same type of projectile supports an asteroid shower on Earth after a major collision in the asteroid belt [6]. The aim of this study is to identify the projectile component in the 2005-2006 ICDP-USGS Deep Drilling Project cores using determination of the PGE together with nickel (Ni) and chromium (Cr).

Samples: Sixteen samples, macroscopically resembling impact melt-like material, were selected from the Eyreville core material [7]. Major and trace elements were determined with respectively ICP-OES and ICP-MS after acid-digestion, to ensure representativeness. The 6 samples with the highest siderophile element concentrations (based on Ni and Cr concentrations) were prepared for PGE analysis using ICP-MS after preconcentration with NiS fire assay, based on the procedure described in [2] and [8]. Sample intakes reach ~50 g. Determined detection limits are 0.01 ng/g Ir, 0.09 ng/g Ru, 0.03 ng/g Pt, 0.03 ng/g Rh, 0.20 ng/g Pd and 0.23 ng/g Au. The identification of the projectile component is carried out following the procedure described in [2].

Results: The results of the analyses of the Chesapeake Bay impactites revealed that major and trace element compositions are moderately heterogeneous. The Ni content varies from ~2 to 112 ppm between samples, while Co and Cr fluctuate from ~1 to 61 ppm and ~12 to 277 ppm, respectively. No clear link between stratigraphic interval and siderophile concentrations is revealed.

Discussion and conclusion: The determination of the PGE in six selected samples of the Eyreville drill site (sampled intervals: 524.09-524.18 m, 1382.10-1382.20 m, 1404.27-1404.36 m, 1418.72-1418.81 m, 1448.90-1448.99 m and 1607.93-1608.02 m) could allow the identification of the projectile responsible for the formation of the Chesapeake Bay impact structure. Projectile proportions of ~0.1-0.2% were quantified in a previous study [9] based on PGE concentrations and Os isotopic ratios in impact-melt rocks from an 823 m deep scientific test hole over the central uplift at Cape Charles, Virginia. According to this study, a meteoritic contamination alone cannot reproduce the observed PGE abundances in the impact-melt rocks, suggesting a high indigenous, but so far not yet sampled, target rock component. Possible fractionation during syn- or post-impact events and/or an unknown or undistinguishable (in comparison to the crustal values) projectile type could also not be excluded [9].

In this study, we therefore hope to constrain the chemical nature of the Chesapeake Bay projectile.

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