NI AND CO IN PYRITE MARK THE K/T BOUNDARY IN THE MANASQUAN RIVER BASIN, NEW JERSEY, USA

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Introduction: The Cretaceous/Paleogene boundary (K/T) on the New Jersey coastal plain was deposited in 20-30m deep offshore environments and recrystallized to glauconite-rich, fossiliferous, poorly consolidated layers. Landman et al. [1, p.39] measured ~500ppt Ir above ~100ppt background at a thin layer ~20cm *below* the last occurrence of ammonites and co-occurring fauna, all of which were buried in life positions [2], in a 20cm "Pinna layer"[1,2]. Ir analyses were made on bulk samples at 2cm intervals using INAA [1]. Here, we report the mineralogy and trace siderophile element content of 10-100μm grains of ilmenites and pyrites in three polished 2mm thick sections with a total outcrop length of 7.5 cm, including the ~8mm wide K/T boundary layer.

Methods: Oriented cores including the inferred K/T boundary [1] were collected in a 8x12x3cm steel box, then isolated in plastic wraps to prevent oxidation. Splits of the water-saturated, friable samples were wrapped tightly in aluminum foil and dried using acetone to expel water. Samples were then impregnated with Buehler Petro-Thin epoxy and dried in vacuum. This sequence was repeated until the entire mass was structurally robust. Portions of the epoxied blocks were impregnated again following their slicing to maintain the positions of the surface grains. Individual slices were polished using SiC paper and diamond slurry.

Bright grains were identified in BSE (e.g. zircon, barite) and reflected light (e.g. Fe-oxide, sulfide in both) images. Siderophile-rich grains were analyzed for major elements (Fe, S and Ti) by electron microprobe at AMNH. Due to small grain size, single-collector LA-ICPMS analysis (at LDEO-Columbia) was only done for Fe, Ni, Co, Ir and Si, in nominally Si-free phases.

Results: BSE images reveal significant abundance and textural differences of pyrites between the K/T layer [1] and above and below it. Pyrite was primarily framboidal, with varying amounts of intimately intergrown/replacement low-albedo minerals. Ni and Co contents in pyrites within the boundary were one to two orders of magnitude higher than the ones above and below it. Signal to noise ratios of Ir were too low for all grains.

LA-ICPMS result			**Co (ppm)**		**Ni (ppm)**	
	KT	*n*	Mean	Range	Mean	Range
ox*	above	12	32	4-79	25	2-43
	below	4	32	8-55	15	5-30
FeS_2	above	6	7	4-13	46	9-126
	within	14	965	102-4685	1623	136-6010
	below	8	13	2-25	97	13-249

* No Ti-Fe oxides were found within the K/T boundary.

Conclusions: These glauconite-rich sediments were in mildly reducing environments, leading to ubiquitous recrystallization of most minerals. The sharp spikes in Ir and other siderophile elements indicate minimal remobilization, at the scale of 1-2 cm. Our microstratigraphic results show an even smaller scale of remobilization. Present-day pyrites inheriting Ni and Co from original minerals may indicate the position of the K/T boundary.

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References: [1] Landman N.H. et al. (2007) Bull. of the AMNH **303**. [2] Ebel D.S., Mac Low M-M., Landman N.H. 2008. Abstract #1454. 39th Lunar & Planetary Science Conference.