AD-A160 612 ANALYSES OF EXTRATERRESTRIAL MATERIALS IN TERRESTRIAL SEDIMENTS(U) CALIFORNIA UNIV LOS ANGELES DEPT OF GEOLOGY F T KYTE 1983 N00014-81-K-0688 1/1

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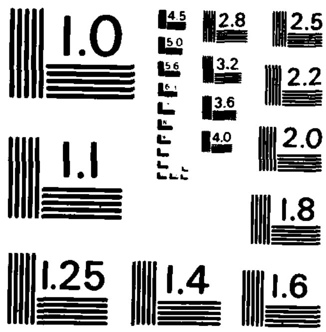

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ABSTRACT OF THE DISSERTATION

Analyses of Extraterrestrial Materials

in Terrestrial Sediments

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by

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Analyses of Cretaceous-Tertiary boundary sediments from Denmark and 2 Pacific sites (465A and GPC-3) have aided in demonstrating that the high concentrations of Ir in this boundary is a global phenomenon. This is consistent with the occurence of a major accretionary event at this time, one which may have resulted in the massive terminal Cretaceous extinctions. The presence of high Ir concentrations in a mid-Pacific carbonate sequence (465A) and abyssal clay (GPC-3) indicates that this phenomenon is not restricted to shallow continental shelf regions, but occurs in a variety of environments. Relative abundances of the siderophiles Os, Re, Ir, Pt, Ni, Co, Fe, Pd, and Au in the Danish samples sre similar to chondritic meteoritic abundances (within a factor of 3, relative to Ir) and indicate an extraterrestrial source. However, variations in siderophile abundances between sites and even between samples at each site indicate significant fractionation either during accretion, depo-

sition, or diagenetic alteration. These fractionations make it impossible at present to use siderophiles to establish a link between the accreting object and a known meteorite group. The best evidence for the impact of a compact asteroidal object (as opposed to accretion of fragmented materials) would be characterization of an ejecta component in boundary clays, but conclusive evidence is still lacking.

Anomalous concentrations of Ir and Au in a Late Pliocene (~2.3 Ma) section from the Antarctic Basin was the first such discovery since the KT boundary. Associated coarse-grained debris contains a vesicular impact melt and unmelted clasts of the projectile. Chemical and petrographic evidence indicates that this horizon resulted from the oceanic impact of an asteroid similar to mesosiderite or howardite meteorites. Estimates of the projectile diameter are in the range of 100 to 500 m.

Analyses of cosmic spherules separated from abyssal clays indicate that most stony spherules are destroyed by weathering before burial to a depth of 0.5 m. At least half of the iron spherules may be derived from chondritic precursors; these contain a majority of the total siderophiles. Revised influx rates suggest that >10% of the materials in the size range 10^{-5} to 10^{6} g survive atmospheric entry without vaporization.

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