Metallic Asteroids in the IRAS Minor Planet Survey – a NEOShield Study

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Studies of the compositions of asteroids, especially their metal content, are relevant not only to investigations of their nature, but also to estimations of their potential to wreak devastation on impacting the Earth. In this respect it is informative to compare the airburst of a stony object, such as the Tunguska event, which destroyed a forest but left no crater, with the impact of a similarly sized metallic object, which produced the 1.2 km diameter Barringer Crater in Arizona.

In view of the evident link between metal content and the near-Earth asteroid thermal model (NEATM; Harris 1998) fitting parameter, η, which carries information on thermal inertia (Harris and Drube, 2014; see abstract submitted to this conference), we are carrying out a re- analysis of Infrared Astronomical Satellite (IRAS) data (Tedesco et al., 2002) with NEATM to further explore the dependence of η and thermal inertia on metal content.

In addition to calculating best-fit values of η, we are calculating the angle between the spin vector and the solar direction, θ, for all IRAS sightings of each asteroid for which a spin vector is available. The η values of objects with high thermal inertia and moderate to high spin rates should depend strongly on θ, whereas those with low thermal inertia and/or low spin rates should not. By studying the relationships between θ and η, we aim to further explore the potential of the results of Harris and Drube (2014) and provide insight into relationships between asteroid thermal properties, taxonomic type, albedo, spin rate, etc. We will present the first results of our work and provide a demonstration of its potential.

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References:

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