EPSC Abstracts
Vol. 8, EPSC2013-797, 2013
European Planetary Science Congress 2013


# The Chelyabinsk Fireball and Meteorite.

Galimov, E.M., Kolotov, V.P., Nazarov, M.A., Kostitsyn, Yu.A., Kubrakova, I.V., Kononkova, N.N., Roschina, I.A., Alekseev, V.A., Koshkarov, L.L., Badyukov D.D. and Sevastyanov, V.S.
Vernadsky Institute for Geochemistry and Analytical Chemistry RAS Kosygin str. 19, 119991, Moscow, Russia.
Pillinger, C.T., Greenwood, R.C., Verchovsky, A.B., Johnson, D., Tindle A.G. and Buikin A.
Planetary and Space Sciences, The Open University, Milton Keynes, MK7 6AA. United Kingdom.

**On 15th February 2013 an extraordinarily large fireball detonated in the atmosphere over Chelyabinsk, Russia, with a total energy equivalent to 440 kilotons of TNT. It was the most energetic natural atmospheric occurrence since the Tunguska incident in 1908 and caused many injuries and extensive property damage. Geochemical and isotopic data show that the meteorite samples recovered after the event are LL5 type ordinary chondrites with a S4 shock history. The many thousands of small fragments comprise either of two distinct lithologies: a chondrule-rich light coloured material (~66%) or a less-abundant (~34%) dark shock-melt rather than mixtures. The break-up of the object, i.e. the explosion, appears to have been dictated by the object's pre-entry two component structure, which probably formed during a major collision in the asteroid belt 290 My ago. The Chelyabinsk event demonstrates that effective asteroid-hazard mitigation requires structural knowledge of threatening body similar to that obtained by the Hayabusa spacecraft at asteroid Itokawa. The observations made for Chelyabinsk suggest that the Tunguska bolide may also have been a structurally weakened object.**

**Studies of the samples are still at an early stage. A full petrological description of the meteorite lithologies, geochemical and isotopic analyses, chronological data and fission track information will be available by the time of the conference**