THE H4/5 THUATHE METEORITE FALL OF 21 JULY 2002, LESOTHO: HISTORY OF THE FALL, STREWN FIELD DETERMINATION, AND MINERALOGICAL AND GEOCHEMICAL CHARACTERIZATION. W. U. Reimold[1], P. C. Buchanan[2], D. Ambrose[3], and C. Koeberl[4], [1]Impact Cratering Research Group, Geosci., Univ. of Witwatersrand, P.O. Wits 2050, Johannesburg, South Africa (reimoldw@geosciences.wits.ac.za), [2]Antarctic Meteorite Research Center, Nat'l. Inst. of Polar Research, 1-9-10 Kaga, Itabashi-ku, Tokyo 173-8515, Japan, [3] Inst. of Education, Nat'l. Univ. of Lesotho, Roma 180, Lesotho, [4]Geological Sciences, Univ. of Vienna, Althanstr. 14, A-1090 Vienna, Austria.

Synopsis: We report on a new meteorite fall on 21 July 2002 over the Thuathe Plateau of northwestern Lesotho in southern Africa. The strewnfield has been mapped in great detail. Mineralogical and geochemical characterization of this meteorite is consistent with a classification of H4/5, S2/3. The name "Thuathe" has been accepted for this new fall.

The Thuathe meteorite: A meteorite traveling east to west exploded above Lesotho in southern Africa and produced an elliptical strewn field of 7.4x1.9 km, over the western part of the Thuathe Plateau approximately 10 km east of Maseru, the capital of Lesotho. The oral history of this fall was researched in great detail. To date, more than 800 stones of masses between a few grams and 2.4 kg have been recorded, with several hundred others suspected. The total mass of this fall is estimated in excess of 35 kg. Our mineralogical analysis indicates that this meteorite is composed of – at the stone-size scale – chondritic material with either brecciated or unbrecciated texture. Sub-mm dark shock veining is abundantly observed and cuts across both phases – the massive leucocratic material and the slightly darker grey breccia matrix. On average, 20 vol% metal occurs, but in rare parts of the meteorite, this metal can reach >50 vol%. Fe/Ni metal occurs as kamacite with, on average, 6.03 wt% Ni (1σ std. dev. = 0.55 wt%) and 0.62 wt% Co (1σ std. dev. = 0.04 wt%, 11 analyses). This Co abundance in Thuathe kamacite is somewhat anomalous, as H group chondrites normally show 0.44-0.51wt% Co [1,2]. Taenite has also been observed. Sulfide is characterized by negligible Ni contents and has an average composition of 62.2 wt% Fe, 36 wt% S, 0.52 wt% Pb, and 0.11 wt% Co (1σ std. dev. are 0.28, 0.23, 0.39, and 0.01 wt%, respectively). Electron microprobe analyses of olivine indicate an average forsterite content of 82.6 mole% (1σ std. dev. = 0.79 mole%) and of orthopyroxene, an average composition of $Wo_{1.04}En_{83.8}Fs_{15.7}$ (1σ std. dev. 0.32, 1.0, and 0.9 mole%, respectively). This high degree of mineral equilibration, together with the observation that chondrules are distinct, but not abundant, suggests that this new meteorite should be classified as H4/5. Along with undulatory extinction in both olivine and pyroxene, irregular fracturing is strongly developed in many mineral fragments, and many fragments are internally brecciated. These features, together with the relative abundance of shock veins, places the Thuathe meteorite into the S2/3 shock classification of [3]. Chemical analysis (XRF and INAA) is in progress and results will be presented at the conference.

Thuathe is, to our knowledge, the first meteorite fall recorded and evaluated in Lesotho. The diligent and comprehensive study of its fall and distribution in a reasonably densely populated rural area, involving numerous villagers and particularly school children, has resulted in a phenomenal growth of knowledge about meteorites and awareness of the meteorite fall phenomenon in the wider region of Lesotho and parts of South Africa.

References: [1] Rubin, A.E., 1990, GCA 54, 1217-1232; [2] Smith, D.G.W. et al., 1993, EPSL 120, 487-498; [3] Stöffler, D. et al., 1991, GCA 55, 3845-3867.