LAKE BOSUMTWI IMPACT STRUCTURE, GHANA: FIRST GEOCHEMICAL AND Sr ISOTOPE RESULTS FOR TARGET LITHOLOGIES S. Luetke[1], A .Deutsch[1], F. Langenhorst[2], B. Kreher-Hartmann[2] [1]Institut f. Planetologie, Westfälische Wilhelms-Universität Münster, Wilhelm-Klemm-Str.10, DE-48149 Muenster, Germany (luetke.s@uni-muenster.de); [2]Institut für Geowissenschaften, Universität Jena, D-07749 Jena, Germany,

Introduction: The Lake Bosumtwi impact structure, Ghana, W. Africa, was generated 1.07 Ma ago. This young and large (Ø ~ 10.5 km) crater is characterized by its extremely good preservation as well as its association to one of the only four known tektite strewn fields worldwide ([1] with refs.).

Aim of this work: As part of the "Bosumtwi Impact Crater Drilling Project" (BCDP, cf. [1]), we plan to characterize glass particles within impact breccias, Ivory Coast tektites, the related microtektites with mineralogical, geochemical, and isotope geochemical methods in order to better understand (i) relations between target – melt lithologies, and (ii) the formation processes of the melt.

Here we present first Rb-Sr isotope data (TIMS) for carbonaceous greywackes of core BCDP-8A and whole rock geochemical data (XRD) of samples from BCDP-8A, and the Bosumtwi crater rim.

Greywackes from core BCDP-8A: Based on XRD analyses, we discriminate five types of greywackes. They differ in modal composition, grain size, as well as in their CaO and MgO contents. Four varieties of the greywackes consist of polycrystalline clasts of quartz, carbonate minerals, and up to 1-cm-large feldspar in matrix of illite - 2T muscovite, ferroan clinochlore, and quartz. Additionally a light green colored phyllitic greywacke occurs characterized by pronounced foliation planes with silky sheen and an enhanced content of schist silicates.

At the microscopic scale, all greywackes are rather similar, except for the always significant yet varying contents of carbonate minerals. Quartz, carbonate minerals, and feldspar display frequently planar elements but diaplectic crystals have not been observed in the samples from core BCDP-8A, indicating that the shock pressure did not exceed 26 GPa [2].

Target rocks from the northern Bosumtwi crater rim: New samples collected between the villages of Nyameani and Nkowinkwanta comprise greywackes, different types of shale, two-mica schists and a staurolite-rich-mica-schist (cf. [3]). Most of these rock types are present as fragments in suevite.

Rb-Sr isotope data (Table 1): The $^{87}Sr/^{86}Sr$ ratios of the five different types of greywackes range from 0.707066 ± 15 (2σ) to 0.726376 ± 14. This spread mainly caused by the higher content of muscovite in the phyllitic greywacke.

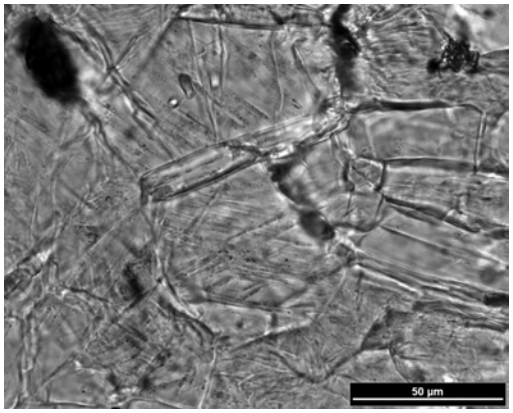

Figure 1. Example for sets of planar elements in a quartz xx; sample SR0016B0016-2-218,218, // nicols

Table 1 Rb-Sr analyses from greywackes of BCDP-8A

BCDP -8A	Rb [ppm]	Sr [ppm]	$^{87}Rb/^{86}Sr$	$^{87}Sr/^{86}Sr \pm 2\sigma^{+}$
SR0013B0013-1-248,248	69	1171	0.1706	0.708119 ± 15
SR0016B0016-2-218,218	-	879	-	0.707409 ± 16
SR0042B0042-1-73,73	146	2035	0.2069	0.707066 + 15
SR0044B0045-1-245.245	152	989	0.4459	0.710203 ± 13
SR0064B0066-1-34,39	243	731	0.9636	0.726376 ± 14

$^{\#}$ = normalized to $^{86}Sr/^{88}Sr = 0.1194$; $^{+}$ = uncertainties refer to the last significant digits. During the course of this work, analyses of NBS SRM 987 $SrCO_3$ yielded 0.710239 ± 15 for $^{86}Sr/^{87}Sr$ (unweighted mean ± $2\sigma_m$, Triton, ZLG Münster). Blanks were about 0.02 ng for Rb, 0.04 ng for Sr.

Labeling for core samples is in accordance with nomenclature given online at GFZ Potsdam [4].

Whole rock geochemistry: *Rocks from core BCDP-8A* (Table 2): A relatively wide spread is observed for all elements; for example, the SiO_2 content varies from 59.9 to 75.8 wt %. Also remarkable are the high CaO and MgO contents in some greywackes. They correlate with observed carbonates in thin sections reach up to 8.4 wt % for CaO, and 8.7 wt % for MgO respectively. The chemical composition of the breccia matrix is situated within the spread defined by greywackes.

Target rocks from the northern crater rim (Table 3): This sample suite displays a much wider spread in all oxides than the above given greywackes. A matter of particular interest is the high aluminum content in the newly discovered staurolite-rich mica-schist which

is 22.3 wt % Al_2O_3. With the present set of data we expand the so far known chemical variation of target rocks at the Lake Bosumtwi Impact structure [5,6,7,8]. Based on the major element composition and Sr isotope data only we can not determine the precursor rocks of the Ivory Coast tektites and the associated microtektites [7]. Therefore we plan detailed trace element and isotope analyses using LA-ICPMS techniques.

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Table 2 Whole rock analyses of greywackes and one breccia (last column) from BCDP-8A

wt%	SR0013B0013-1-248,248	SR0016B0016-2-218,218	SR0042B0-42-1-73,73	SR0044B004-1-245.245	SR0064B006-1-34,39	SR0062B0064-1-78,81
SiO_2	67.2	75.8	62.6	59.9	62.2	68.7
TiO_2	0.5	0.3	0.7	0.6	0.5	0.4
Al_2O_3	16.0	10.1	17.3	12.2	14.4	16.0
Fe_2O_2	6.5	4.1	5.6	8.6	8.8	4.7
MnO	0.1	0.1	n.d.	0.2	0.1	0.1
MgO	2.1	1.1	3.6	8.7	4.7	2.5
CaO	1.8	3.9	4.5	8.4	6.1	2.5
Na_2O	4.6	3.7	4.2	0.8	0.2	3.4
K_2O	1.0	0.9	1.3	0.4	2.6	1.5
P_2O_5	0.1	0.1	0.2	0.3	0.1	0.1

Table 3 Whole rock analyses of Bosumtwi crater target rocks

wt%	BOT1 staurolite-rich-mica-schist	BOT2 two-mica-schist	BOT3 two-mica-schist	BOT5 greywacke	BOT8 greywacke	BOT7 graphitic shale
SiO_2	59.36	79.12	71.77	69.09	71.84	66.28
TiO_2	0.75	0.28	0.31	0.55	0.45	0.78
Al_2O_3	22.33	10.53	17.56	17.01	15.34	18.34
Fe_2O_2	8.18	3.21	2.09	5.39	4.93	6.99
MnO	0.04	0.07	n.d.	0.02	0.05	0.02
MgO	2.83	0.52	0.54	1.40	1.01	1.64
CaO	0.25	0.17	0.44	0.32	1.03	0.76
Na_2O	2.95	3.41	5.45	4.40	3.57	2.38
K_2O	3.30	1.34	1.85	1.80	1.58	2.02
P_2O_5	0.05	0.07	0.02	0.06	0.22	0.07

n.d. = not detected

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References: [1] Koeberl C. et al. (2005) *Lunar Planet. Sci. Conf. XXXVI*, Abstr. #1350. [2] Deutsch, A. et al. (2006) *LPS XXXVI,* Abstract #1292. [3] Langenhorst, F. and Deutsch, A. (2006) *LPS XXXVI,* Abstract. [4] http://www.icdp-online.org/sites/bosumtwi/index/ index.html. [5] Jones, W.B. (1985) *Geochi. Cosmochim. Acta, 49,* 2569-2576. [6] Koeberl C. et al.. (1997) *Geochi. Cosmochim. Acta., 61,* 1745-1772 [7] Koeberl C. et al.. (1998) *Geochi. Cosmochim. Acta., 62,* 2179-2196. [8] Dai, X. et al. (2005) *Meteoritics & Planet. Sci.,40,* 1493-1511.