COEVAL AGES OF AUSTRALASIAN, WESTERN CANADIAN AND BELIZE TEKTITES. W.H. Schwarz[1], M. Trieloff[1], K. Bollinger[1], N. Gantert[1], V.A. Fernandes[2,1], H.-P. Meyer[1], H. Povenmire[3], E.K. Jessberger[4], C. Koeberl[5] [1]Institute of Earth Sciences, Heidelberg University, Im Neuenheimer Feld 234-236, 69120 Heidelberg, Germany. [2]Museum für Naturkunde, Leibniz-Institute, University Berlin, Invalidenstrasse 43, D-10115 Berlin, Germany [3]Florida Institute of Technology, 215 Osage Drive, Indian Harbour Beach, FL32937 [4]Institut für Planetologie, Universität Münster, Wilhelm Klemm Straße 10, 48419 Münster,Germany [5]Dept. Lithospheric Research, University of Vienna, Althanstrasse 14, 1090 Vienna, Austria, and Natural History Museum, Burgring 7, 1010 Vienna, Austria.

Introduction: Tektites are natural glasses found in four strewnfields: Australasian, North American, Ivory Coast and Central European. They were formed by large-scale meteorite impacts on Earth and represent primary (early) melt ejecta of sedimentary target materials [1]. While genetic links are established between the Nördlinger Ries and the moldavites [2], the Bosumtwi impact crater and Ivory Coast tektites [3], and North American tektites and the Chesapeake Bay structure [4], the situation is different for the Australasian tektite strewn field: although it is the largest and youngest among the four major strewnfields, no source crater has yet been found. The Australasian strewn field contains a number of different tektite types: I) simple normal or splash-form tektites that are the main type in other strewn fields II) aerodynamically shaped tektites ("button-flanged") III) Muong-Nong type tektites with an irregular blocky and layered structure IV) microtektites from deep sea drilling cores. Less well known than Australasian tektites are two further potential occurrences of tektites of quaternary age: In the early 1990's Hildebrand et al. [5] reported tektites from Guatemala. Later tektites in western Belize were reported, indicating a new strewn field in Central America, dated by the ^{40}Ar-^{39}Ar total fusion method to 820±40 ka (2σ) [6], indistinguishable from the age of the Australasian strewn field at ~770 ka [7]. As a potential source crater the Pantasma structure in Nicaragua was suggested [6,8]; however, the impact origin of this structure is not confirmed. In Canada tektites first were found near Tuktoyaktuk (north coast of Western Canada). A second finding site is near the Bennet Dam at the Peace River in British Columbia [9].

For Australasian tektites ^{40}Ar-^{39}Ar stepheating plateau ages are reported [10], but not all data were fully published, whereas for the Middle American, and Western Canadian tektites no stepheating data are published so far. ^{40}Ar-^{39}Ar *stepheating* data seem mandatory, as the K-Ar system of some Australasian tektites is occasionally disturbed by the presence of excess argon [11].

Samples and methods: We selected indochinites and australites covering localities across the whole strewn field. We used neither Muong-Nong-type glasses from Indochina nor button-flanged tektites from Australia for our study, because of possible interference by excess argon [11]. Further two tektites, from Central America and from western Canada were chosen. The Western Canadian and Belize melt glasses are round and dark-coloured comparable to Australasian tektites. Tektites were cut and only fresh glass from the interior was used. Australasian tektites were irradiated at the research reactor in Geesthacht (Germany), the Belize and Western Canadian samples at the RPI reactor in Sacavém (ITN, Portugal). The age monitor was the 24.18 ± 0.09 Ma old biotite HD-B1 [12]. All ages refer to the Steiger and Jäger [13] conventions. All uncertainties are 1σ unless noted differently.

^{40}Ar-^{39}Ar results of Australasian tekites: The ^{40}Ar-^{39}Ar age spectra of most of the 8 analysed tektites appear flat (two examples in Fig. 1) indicating that degassing of radiogenic ^{40}Ar during tektite formation was complete and that the K-Ar system remained closed afterwards. Flat spectra also indicate the lack of a *major* excess argon component that was possibly a problem in previous studies [10].

Extractions with constant, indistinguishable apparent ages from the main gas release between 1100°C and 1500°C were used to calculate plateau ages of 816±56, 810±35, 805±43, 792±21 ka, for australites A, B, C, D, respectively, and 779±22, 779±20, 786±18, 785±13 ka for the four indochinite, javanite, philippinite and thailandite, respectively.

However, some of the age spectra (australites A/C, javanite, thailandite) display a *slight* saddle shape indicative of a *minor* amount of excess argon. We checked the critical point of the reliability of the plateau ages by analysing the plateau extractions in an isochron plot, yielding an intercept of ^{40}Ar/^{36}Ar=307±5, slightly higher than atmospheric composition. Age recalculation using this trapped component yields plateau ages of 791±56, 803±35, 787±43, 785±21 ka, for australites A, B, C, D, respectively (Table 1), with a mean age of 789±16 ka instead of 800±16 ka, i.e. slightly lower, however not significant within uncertainties. This value is indistinguishable from the mean age of 783±9 ka of the South East Asian tektites.

Table 1: Chemical composition (main elements)

S./wt%	SiO_2	Al_2O_3	FeO	CaO	Na_2O	K_2O	MgO
Belize	65.1	16.5	5.8	4.3	3.7	1.8	1.8
W.Can.	73.0	13.1	4.2	2.7	1.5	2.4	2.2
Austr.	72.7	13.1	4.2	2.9	1.6	2.4	2.3

Fig. 1

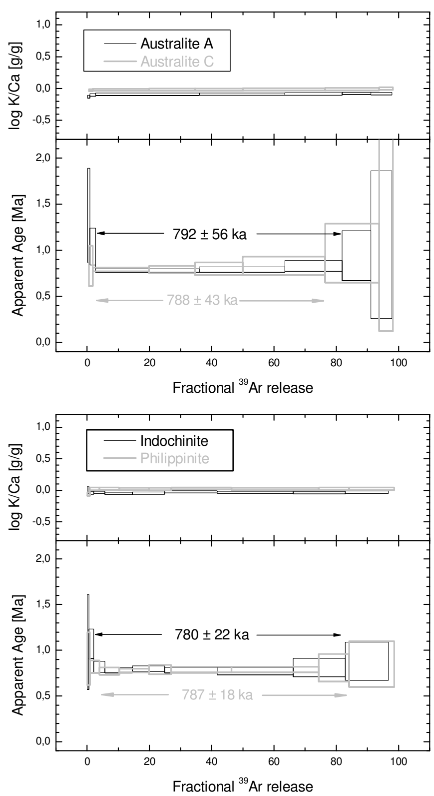
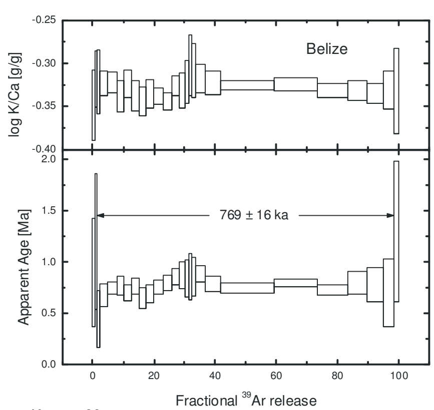
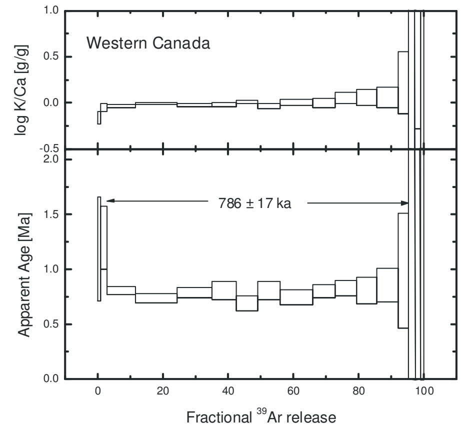


Fig. 2



^{40}Ar-^{39}Ar results of Belize and Western Canada tekites: For the Belize and Western Canada tektites, both measurements yield flat spectra (Fig. 2,3). Consistent with previously published values obtained by total fusion laser Ar-Ar dating [6], the tektite from Belize yields a total age of 779±25 ka. The plateau age is 769±16 ka. The total age for the western Canadian tektite is 860±30 ka with a plateau age of 786±17 ka, see Fig. 3. For both tektites, the initial $^{36}Ar/^{40}Ar$ ratio evaluated by a three isotope plot is indistinguishable from the atmospheric value, indicating that no excess argon is present.

Fig. 3



Conclusions: The ages for Belize and Western Canada tektites are indistinguishable from each other and agree within uncertainties with the age of the Australian and Asian tektites, indicating a contemporaneous formation at 781 ± 7 ka ago. Taking into account a forthcoming revision of the K decay constant [14,15] this age value is to be increased by ~1%, i.e. to 789 ± 7 ka, including the uncertainty of the age monitor HD-B1 [12].

The chemical compositions of the Western Canadian and Australites glasses indicate a close similarity between these glasses (Table 1), indicating that the Western Canadian tektite may be an Australite transported to its finding place by man or a subfield of the Australasian strewnfield.

The chemical composition of the Belize tektite is different for all main elements, so it seems plausible that the Belize tektite does not belong to the Australasian strewnfield, but formed independently ca. 800 ka ago.

Nevertheless, even though the ages of all glasses agree, it has to be confirmed if the Belize and the western Canadian glasses are related to an impact event, and if either of them actually occur in situ. Further chemical and isotopic analyses, as well as field work, would be necessary to clarify their origin.

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