ORDINARY CHONDRITE FALLS AND CONGENERS FROM VICTORIA LAND, ANTARCTICA: DERIVATION FROM DIFFERENT PARENT REGIONS; Patrick W. Kaczaral, Jane E. Dennison, David W. Lingner and Michael E. Lipschutz, Purdue University, W. Lafayette, IN 47907 U.S.A.

Antarctic meteorite discoveries have created great scientific interest due to the large number of specimens recovered (7000 so far) and because they include representatives of hitherto rare or unknown types. Some of these are paired: the number of different meteorites represented by the Antarctic collection in unclear therefore. We estimate this as 1400, a number comparable with the 2613 known non-Antarctic meteorites [1]. Antarctic meteorites are so abundant because they have fallen over long periods ($\leq 7 \times 10^5$ years, averaging 3×10^5 years in Victoria Land) and have been preserved, transported and concentrated by the ice sheet [2]. Since rare and unique Antarctic and non-Antarctic meteorites differ, we decided to investigate whether more common meteorites also differ. If so, this would have profound implications for planetary studies. Here, we report progress on that study.

We used RNAA to determine 13-15 trace elements (ppm-ppt levels) known from previous studies to yield important genetic information in meteorites. We focused our attention on H5 and L6 chondrites for several reasons. H and L chondrites each constitute 40% of non-Antarctic falls and petrologic types 5 and 6 are, respectively, the overwhelming majority of these chondritic types. We have recently been studying ordinary chondrite genesis and evolution and have therefore generated a great deal of useful data for non-Antarctic falls [3-6] useful for comparison with results for unpaired samples from Victoria Land.

We tested means and standard deviations using standard statistical tests for 18 Victoria Land and 20 non-Antarctic H5 chondrites [7] and for 13 and 25 L6 chondrites, respectively. Normal or lognormal distributions were chosen to represent the data. For H5 chondrites, 7 of 13 elements differ at >90% confidence level using a single-sided t-test: for L6 chondrites, 8 of 13 do (Table 1). While elements that differ overlap to some extent, those that do, differ in direction. From this and other data, we can show that differences do not reflect Antarctic weathering or incidental causes (sample selection bias, compositional modeling, analytical bias or chance [7]).

We interpret compositional differences as reflecting derivation of Antarctic meteorites predominantly from parent sources or regions different than those from which contemporary falls derive. Hence, the near-earth meteoroid complex sampled by Victoria Land 3×10^5 years ago differed from that sampled today [7]. For example, the Victoria Land, L6 chondrite sample population derived from a body or region much more heavily shocked, on average, than the one(s) we now study through contemporary L chondrites [3-5]. Antarctic meteorites truly constitute a solar system snapshot in time and space.

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Table 1. Comparison of statistically significant (>90% confidence level) differences in H5 and L6 chondrites from Victoria Land, Antarctica with contemporary non-Antarctic falls.

Element	H5 Ant.(18)	H5 Non(20)	H5 Sig.	Element	L6 Ant.(13)	L6 Non(25)	L6 Sig.
Co (ppm)*	810	879	*91*	Co (ppm)*	477	605	97
				Au (ppb)*	145	165	*90*
Se (ppm)*	9.1	8.2	99				
Rb (ppm)	1.91	2.50	98	Rb (ppm)	2.62	2.20	95
				Cs (ppb)	4.02	12.4	99
				Te (ppb)	337	379	*90*
Bi (ppb)	2.6	1.14	95	Bi (ppb)	0.58	2.67	99
				Ag (ppb)	45	71	97
In (ppb)*	0.17	0.49	99				
Zn (ppm)*	41.8	53.1	97				
Cd (ppb)	0.68	3.7	99	Cd (ppb)	1.6	14.2	99

*Arithmetic means: all others are geometric means.

Column headings: Ant. - Antarctic chondrites from Victoria Land; Non - Non-Antarctic chondrite falls; Sig. - Significance level at which it may be concluded that the respective sample populations do not derive from the same parent population. Numbers in parentheses are number of samples analyzed in that population.

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