ESTIMATING RELATIVE ABUNDANCES OF METEORITE TYPES: W. A. Cassidy, Department of Geology and Planetary Science, University of Pittsburgh, Pittsburgh, PA 15260

It is of as much interest to know the relative abundances of different meteorite types as it would be to know the bulk composition of any planet or moon. Estimates of the relative abundances of meteorite types should be based on mass. This is difficult to accomplish with the modern falls. Antarctic meteorite stranding surfaces are better sources of mass data because virtually the total meteorite mass present can be recovered.

There is a current debate over whether or not the antarctic meteorite collection is different in character from the modern falls. If it is, it is probably because the modern falls represent too short an accumulation time to be a representative sample. In this case, too, antarctic meteorites would be favored as a data source.

A factor that could decrease confidence in the reliability of the antarctic collection would be a demonstration that differential weathering rates cause bias in the sample. This cannot be shown at present, but may be possible in the future. Until that can be done, I make the assumption that selective loss of major meteorite types does not occur from this cause.

Harvey (1988) has tabulated mass distributions within the antarctic meteorite collection; using data available up to August, 1988. He has also recalculated the modern falls collection on a mass basis for comparison. His tabulation is given as Table 1. Antarctic irons and stony irons, however, are very small subsamples by numbers within the antarctic collection and their data are not considered reliable; at this time, therefore, it seems prudent to calculate relative abundances only between the three major types of stony meteorite. This comparison is made in Table 2. The size-frequency distributions of antarctic meteorites within the classes of Table 2 appear to approach normal curves on a log (mass) scale. If the curves are normalized, somewhat different mass estimates emerge for antarctic stony meteorites. These are given in Table 3. Note that while all abundances are different, it cannot be concluded that the differences are real: both achondrites and carbonaceous chondrites differ between the two collections by a factor of 3. All the differences between the two collections could be explained by postulating an appropriate decrease in ordinary chondrites among modern falls.

Harvey, R.P. (1988), submitted to Meteoritics.

Table 1. Comparison of masses and abundance estimates of antarctic meteorite (AM) and modern falls (MF)

Types	Masses (kg)		Abundances (wt%)	
	AM	MF	AM	MF
Ord. chond.*	143.40	10725.5	88.6	72.0
a chond.**	50.8	1405.0	3.1	9.4
carb. chond.	39.8	456.9	2.5	3.1
stony iron	9.9	619.5	0.6	4.2
iron	83.5	14904.9	5.2	11.4
Totals	1618.0	14904.9	100.0	100.1

*"ord. chond." here includes H, L, LL, and E chondrites.
**SNC meteorites and lunar meteorites omitted.

Table 2. Comparison of masses and relative abundance estimates within stony meteorites for antarctic meteorites (AM) and modern falls (MF)

Types	Masses (kg)		Rel. Abundances (wt%)	
	AM	MF	AM	MF
ord. chond.	1434.0	10725.5	94.1	85.2
a chond.	50.8	1405.0	3.3	11.2
carb. chond.	39.8	456.9	2.6	3.6
Totals	1524.6	12587.4	100.0	100.0

Table 3. Comparison of "normalized" masses of antarctic stony meteorites with modern falls masses

Types	Masses (kg)		Abundances (wt.%)	
	AM	MF	AM	MF
ord. chond.	1242.6	10725.5	95.0	85.2
a chond.	50.2	1405.0	3.8	11.2
carb. chond.	15.1	456.9	1.2	3.6
Totals	1307.9	12587.4	100.0	100.0