

Stardust Foil Group Report C2008N,1 (Denbigh) Foil

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1. Crater Counts

The whole foil (48 mm²) was manually searched for craters at x650, secondary electrons, 20 kV, 1024 horizontal pixel resolution. Quanta 200D SEM. The results are given in Table 1 and Fig. 1. The diameters of identified craters range from 610 nm up to 14.5 µm. During this search a cluster of craters (Table 1 and Figure 2 was identified). This foil is rich in craters with 150 logged in all (including those in the cluster).

A second survey was done over 5 mm² using images taken with the INCA *Automate* routine (20 kV, 2048 pixel width, fast acquisition, 3 combined 'Kalman' frames, working distance 7.5 mm) and results are given in Table 1 and Fig. 1. Within the errors (up to approx. 150 microns) of stage co-ordinate checking between the *Automate* images and the x-y co-ordinates on the SEM, the two datasets are consistent. Therefore we are confident that our crater searching protocol is accurate. There is one crater logged on the manual survey and Fig. 1 that was not refound on the *Automate* images. This may be because it is at the margins of the 5 mm² *Automate* survey and was not present on an *Automate* image.

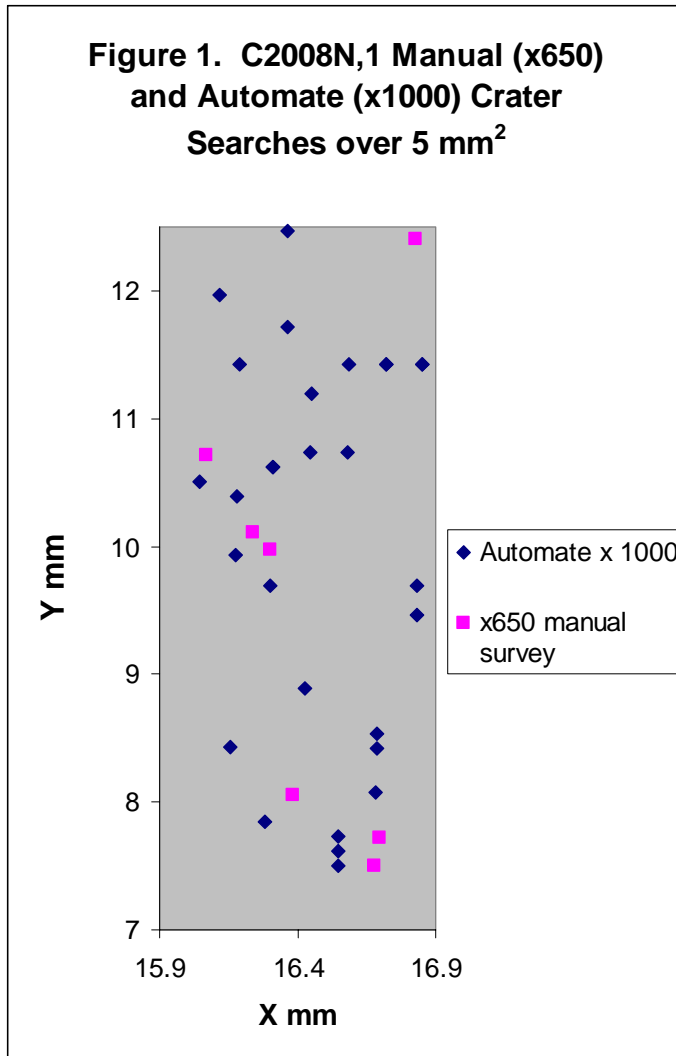


Figure 1. Comparison between manual search for craters a x650 and an *Automate* routine at x1000. Results suggest that the *Automate* routine is a reliable way of logging craters down to approximately 1 μm .

Cluster

A cluster of craters is show in Fig. 2. The number of craters is shown in Table 3. 37 craters with diameters from 120 nm to 2.6 μm were identified over 350 μm^2 around the main part of the cluster.

EDS analyses and X-ray mapping has not so far pinpointed stoichiometric phases and we will delay before passing on analyses. However, it is clear that there is residue in some of the craters, particularly the larger ones. The residue consists mainly of Mg-silicate. The atomic proportions are closest to pyroxene but all analyses taken so far have a deficiency or excess of Si compared to calculated O. In addition to Mg and Si, Fe and S have been detected. We are not yet certain how much of the Fe is part of the silicate phases and how much is associated with the S as sulphide. The residue composition is similar between different craters apart from the Fe and S contents. Further studies are being pursued including FEG-SEM and FIB/EDS analyses on separated residue.

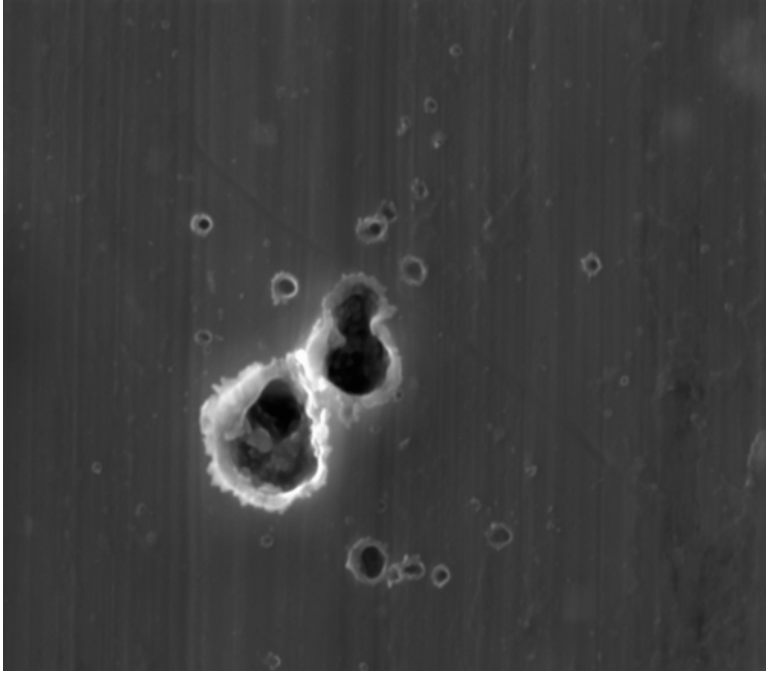


Figure 2. Cluster of Craters in Foil C2008N, 1. Secondary electrons image, 15 kV. Residue is clearly seen in the largest crater (2.6 μm diameter).

Table 1. Crater Counts in C2008N,1

A. 5mm ² x1000		B. 48 mm ² x 650						C. 350 µm ² around cluster, x9000		
Microns		Microns						Nanometres		
2.2	1.6	1.9	1.5	1.5	2.1	4.4	1.8	130	2.6 µm	260
1.3	1.1	Cluster	2.2	1.2	1	1.3	1.1	150	280	150
1.4	2.6	3.5	1.1	1.1	2.1	2.2	1.6	280	130	130
1.5	1.3	1.5	1.8	1.1	2.1	1.8	1.3	220	180	180
1.3	1	1.6	2.6	1.4	1.8	2.9	2.8	170	150	120
2.2	1.6	1.2	2.4	1.1	1.3	2.1	1.3	350	150	130
1.4	1	4.1	3.7	1.3	890 nm	1.2	1.5	360	190	130
1.6	1	4.0	1.5	2.3	1.6	3.1		350	200	150
1.4	720 nm	2.4	1.2	3.3	2.9	2.3		290	180	
1.2	740 nm	2.4	2.8	1.2	730	1.4		420	180	
1.2	510 nm	1.8	1.4	1.4	4.7	1		300	390	
1.7	1.5	1.6	2	1.9	1.9	610 nm		490	750	
950 nm	1.1	1.6	1.6	2	1.6	1.2		520	310	
1.6	1.9	14.5	1.8	3.8	2.2	1.4		1.0 µm	420	
1.2	1.7	2.2	2.3	1.2	2.2	1.8		1.6 µm	330	

A. Crater count over 5mm² at x1000; B. Crater count over entire foil (48 mm²) at x650; C. Crater count around cluster in Fig. 2 (350 µm²).