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Research Administration

February 25, 1992

National Aeronautics and Space Administration
George C. Marshall Space Flight Center
ATTN: COTR ES52/E. Reichmann
Marshall Space Flight Center, AL 35812

RE: Final Report for Contract No. NAS8-38609 D.O. 08

Dear Mr. Reichmann:

Please find enclosed six (6) copies of the Final Report for the above referenced contract for the period of August 1991, through December 1991. Additional distribution has been made as indicated below.

If you need additional information, please contact me at the above number.

Sincerely,

Hannah J. Whitaker

Hannah J. Whitaker
Contract Assistant

enc.

cc:	AP29M/V. Ivey	(1tr)
	CN22D	(1)
	AT01	(1)
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	UAH/Mr. C. Burns	(1tr)
	UAH/Dr. G. Emslie	(1tr)

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16. Abstract We have observed magnetic shear in several active regions prior to flaring activity. However, certain flares were observed with no apparent shear present. A more detailed investigation of such events is required.

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FINAL CONTRACT REPORT NAS8–38609, D.O. #8

A. G. Emslie, Principal Investigator

During the time period of the contract, a relatively large amount of solar activity occurred and magnetograph observations went well. A total of 42 data sets were obtained and analyzed, in real time, for magnetic shear as defined by Hagyard et al. (1984, Solar Phys., 91, 115). Magnetic shear was found in many of these active regions and solar flares occurred at many of the positions where the shear was observed. For instance, on October 7, a small flare occurred within Active Region (AR) 6861. Shear was seen along the neutral line where the flare erupted. On November 11, 16:38 UT, another flare associated with Active Region (AR) 6919 was observed by the Marshall Space Flight Center (MSFC) Hα instrument. Later, at 20:28 UT another flare was seen in plage associated with AR 6919. Finally, on December 6 yet another flare occurred (associated with AR 6952), while magnetograph observations were being carried out. The analysis of these data showed shear along the neutral line as well as a change in the structure and strength of the magnetic field over the time period of observation.

Although the above active regions showed shear close to the flare site, other flares were observed where no shear was evident. Many of these cases involved lower energy eruptive events, or C–class flares. Often, the azimuth of the transverse component of the magnetic field was not perpendicular to the neutral line, suggesting that the field was stressed, but it was not *sheared* enough to meet the criteria set up in the analysis programs. The data acquired during the short time of this study show that C–class flares are not easily predicted with this method of shear analysis.

The results of this study clearly show the need for further analysis of magnetic fields which give rise to C–class flares. Although the correlation between sheared fields and M and X–class flares is clear, further comparisons of the fields both before and after flares occur should be undertaken. If a flare does indeed involve a relaxation in the magnetic field after a build–up to a critical point and if the sensitivity of the MSFC magnetograph is high enough, the magnetograph observations should show this. Finally, on the basis of our results, we believe it would be worthwhile to determine the average length of time between the detection of magnetic shear and the occurrence of a flare.