Quarterly Report
July 1, 1995 - September 30, 1995

Contract No. 9F007-5-8005/01-SR
SSC File No. 019SR.9F007-5-8005

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Part 1:

1. The project is somewhat behind schedule. The Principal Investigator's relocation from Calgary to Saskatoon delayed progress during this quarter, as the work was transferred to a new computing environment. The major part of this transfer has now been completed, and it is anticipated that the delay will be made up over the remainder of this contract year.

2. The project is within budget.

3. The project is free of any areas of concern in which the assistance or guidance of Canada may be required.

Part 2:

1. Description of progress

    1.1 Patch signatures study

    This study involves the comparison of optical imaging observations of *F* region polar patches with simultaneous colocated ionosonde observations from Eureka. Prof. J. MacDougall has provided a CD-ROM of Canadian Advanced Digital Ionosonde (CADI) data from February 1995 observations at Eureka, with which initial comparisons with Polar Camera images will be made. Further data from the 1994-95 winter at Eureka will be provided by Prof. MacDougall. As well, both the Polar Camera and the CADI are operating at Eureka again this winter to extend the combined data base to two full winters.

    Comparison of the two data sets has been delayed, both by the PI's relocation to Saskatoon, and by lack of a suitable PC with a CD-ROM reader. An arrangement for the short-term use of such a PC has been made, and steps are being taken to procure a suitably equipped PC that will be dedicated to this project.

    1.2 Faint arc characteristics study.

    The chief activity on this task since my previous report was the presentation of a poster paper at the IUGG XXI General Assembly (Boulder, CO; July 2-8, 1995) on the preliminary results of my study of "polar diffuse aurora". My discussions with those who examined my paper will be very helpful in further investigating the magnetospheric significance of this previously unreported phenomenon.

A related study has been undertaken with Dr. Israel Oznovich here at the University of Saskatchewan. We are assessing whether single-station multi-wavelength observations of stable single auroral arcs can be used to fix the centroid height(s) of relatively prompt emissions. This would allow physically reasonable mapping of the emissions to the centroid height(s), and constrain the mean energy of the precipitating particles exciting the emissions.

1.3 Magnetospheric topology study

This task was to have begun in August but has been delayed by the PI's relocation. Unanticipated progress may result from the "polar diffuse aurora" study, as it appears that the diffuse emission location may be related to the open-closed field boundary. This possibility has not yet been investigated, however.

1.4 Mesopause wave spectrum study

This study has seen limited progress during this quarter, for the reasons mentioned above. The background subtraction tool mentioned in my previous report has been applied to one day of data as a test case, but conclusive results have not yet been obtained. The PC available on short-term loan will be used for further work on this task, as it is equipped with sufficient memory and the appropriate peripherals.

1.5 Stratospheric warming effects study

Investigation of this topic depends on the mesopause wave spectrum study discussed above, and therefore no progress has been made to date.

1.6 Search for alternate funding/permanent position

I did not apply for any permanent positions during this quarter, as none matching my qualifications and experience were available in Canada. I submitted a Notification of Intent to Apply for a Research Grant to NSERC in August, and will be submitting an Application for a Grant in the upcoming quarter. My appointment as an Adjunct Professor in the University of Saskatchewan makes me eligible to hold such a grant.

During this quarter, I declined an opportunity to teach an undergraduate course in Engineering Physics at the U. of Saskatchewan, reasoning that the most useful addition to my *curriculum vitae* would be further publications rather than additional teaching experience. Subsequent discussions with senior University and CSA personnel have reopened the

question, and I will be open to teaching, should subsequent opportunities become available.

2. Explanation of variation

Apart from the delays described and explained above, no variations from the plan of Work set out in the contract have taken place.

3. Trips and conferences

I attended the IUGG XXI General Assembly in Boulder, CO from July 2 to 9, 1995, and presented a poster paper entitled "Observations of Diffuse Auroras at the Geomagnetic Pole" (paper GAA51C-24). I received useful comments and expressions of interest from several scientists.

4. Major Equipment

No major equipment was purchased or constructed during this quarter. The Polar Camera was shipped to Eureka for another winter of operation at the AStrO Laboratory, at an estimated cost of approximately $3,000. The Polar Camera began operations on September 18, 1995, and will continue to operate until late March, 1996.