

October 22, 2018

Report/evaluation of the research activity within the project:

**Study of dynamical variation of particles and waves in the inner magnetosphere using ground-based network observations (PWING)**

The formal Review meeting occurred on October 19, 2018. Participants were three External Reviewers, all the presenters and some other project-scientists including those who joined the meeting via Internet and several visitors.

Prior to the Review meeting, the PI of the Project, Professor K. Shiokawa of ISEE, provided the following information:

1. Summary of the PI's presentation to the PWING community and the External Reviewers.
2. Summary on new results obtained by the community over roughly 2 years of the project. Information on the Budget and explanations of how the funds are being spent up to the review point.
4. List of all publications within the project and a copy of the major instrument paper.
5. I had access to all publications via Internet and had chance to review some of them.

The meeting has been carried out according to the schedule, starting from detailed presentation by the PI with individual presentations afterwards.

My specific observations/opinions/impressions on the project are as follows:

- a) Installation of the hardware, envisioned at the outset of the project, has been almost completed with the data being continuously stored at ISEE or available via internet from institutions collaboratively supplying data to interested parties.
- b) The project WEB site provides information on major instruments and their PIs, with contact information.
- c) Although the project is at its middle point, there have been obtained several fundamentally new results. I would mention 1) discovery of nearly perfect synchronization of the periodic aurora and EMIC waves supporting the physics of particle energization in the radiation belts 2) prove of the longitudinal limit on the chorus waves excitation 3) identification of the factors affecting onset and detachment from the auroral oval of red auroral arcs and 4) discovery of occurrence of purple aurora in association with arrival of co-rotating plasma regions (CIR) from the Sun. The rate of PWING-related publications is exceptionally good; it is well above of what we have in my research institution.

- d) The project has started successful collaboration with ARASE/ERG direct measurements in space/radiation belts. This is expected to be the major activity area in coming years.
- e) The project successfully involves theoretical modeling of complex processes occurring in the radiation belts. The theorists update their models on the basis of data provided by PWING and ARASE measurements. The collaboration seems to be very healthy and critical for both sides.
- f) The project funds, and foster scientific growth, of several recent post doctoral fellows. It has been a great pleasure for me to witness excellent presentation from one of the undergraduate students involved in the PWING work. Clearly, the research activity is attractive to young people and would draw interest to graduate studies in coming years. Current level of graduate students involvement is excellent.

My overall evaluation is that the PWING project is progressing extremely well. I am very happy to congratulate the PI and the team with excellent performance in running the program, achieving great new results, and I wish them further successes.



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