

**TITLE OF REPORT : Evaluating the skill of new space weather forecasting models**

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I undertook the JSPS Bridge 2017 fellowship during October – November 2017, under Prof. Kanya Kusano at Nagoya University. Prof. Kusano, the Director of Institute for Space–Earth Environmental Research (ISEE), was also my previous supervisor during my first postdoc position as a JSPS fellow during 2010 - 2011.

Over the years, we had continued a close friendship and collaborated on several different scientific projects with his other postdocs since I moved to Washington DC. In particular, over the last year, we both had begun to focus efforts on the practical elements of using our fundamental solar and space physics discoveries to improve the operational space weather forecasts by our national agencies.

Earlier in 2017, I was invited for a month to visit Prof. Kusano’s team as part of his PSTEP program. PSTEP is the Project for Solar-Terrestrial Environment Prediction, which is a nation-wide research collaboration that was launched on the basis of the cooperation of researchers in various fields with the support of a Grant-in-Aid for Scientific Research on Innovative Areas from MEXT/Japan. We investigated practical methodologies of how to evaluate the skill of a model that forecasts the solar wind arriving at Earth.

On behalf of NASA CCMC (Community Coordinated Modeling Center), I am the team leader for their solar wind magnetic field forecasting assessment forum. In this role, I am coordinating the international community to agree towards a standard set of metrics that we can evaluate future models and allow them to contribute towards operational forecasts. Therefore, my collaborations with Prof. Kusano has been to share my expertise of data analytics and metric evaluations with his expertise in computational simulations and forecasting models.

As part of the JSPS Bridge 2017, we continued this theme of applied science and I created a new methodology by which we can assess solar wind forecasting models. We prototyped this methodology on the world’s most advanced operational-capable, solar wind simulation available.

The SUSANOO model was developed at Nagoya university and has already been partially transitioned into operational setting at the national agency in Japan – NICT (National Institute of Information and Communications Technology).

During the JSPS Bridge, I split my time between Nagoya University and NICT. This Bridge fellowship was also coordinated with international visits by additional US scientists from NASA CCMC and Johns Hopkins University Applied Physics Laboratory. Together, our multi-institute collaboration was facilitated with the assistance of JSPS Bridge, and the timing of our meeting was synced up to additional workshops on space weather forecasting that brought more international scientists under one roof at Nagoya university. The picture below is one of the workshop meetings we held at Nagoya with scientists from many different countries.

In terms of relocation and stipend on the JSPS Bridge, I found the expenses were easily sufficient to cover all costs. The administrative staff are always a great source of advice of how previous international scientists have solved problems. I found it very easy to find accommodation more suitable to longer-term living rather than a downtown hotel. With more advance planning on my part, I know it is possible (as I have used it in the past) for the university to provide very convenient and affordable accommodation solutions. With this cheaper solution, I was able to make a few additional trips to meetings outside Nagoya and not worry about the costs of the shinkansen. In summary, the relocation and expenses make the JSPS trip to Japan worry-free and convenient.



*I am near the center-back of the workshop photo, wearing a black/white shirt that was hand tie-dyed using a traditional Japanese technique from a town called Arimatsu. The name of this traditional pattern is called 'Hinode', which has significant meaning to solar scientists around the world because it is also the name of a JAXA spacecraft that observes the Sun.*