Victoria Elsbernd
Director, Heliophysics Division
NASA Headquarters
300 E. Street, SW
Washington, DC 20546

November 9, 2012

Dear Vicki,

The Japanese Solar-C mission will dramatically improve our understanding of the structure, dynamics, and energetics of the entire solar atmosphere, ranging from the photosphere through the corona. Using a carefully coordinated combination of imaging, spectroscopy, and polarimetry, it will reveal with unprecedented clarity the coupling between the different atmospheric regions. Instead of struggling with isolated and confusing pieces of information, we will for the first time observe and diagnose the complete life cycle of phenomena spanning a wide range of spatial, temporal, thermal, and brightness scales. The frontiers of parameter space will be pushed back on all axes (e.g., the highest spatial resolution and sensitivity ever obtained in the corona). Solar-C will allow us to finally understand how energy flows upward from the solar surface and is dissipated in the chromosphere and corona, thereby heating the plasma and driving explosive phenomena such as spicules, jets, coronal mass ejections, and flares (nano to X-class).

A significant NASA involvement in the Solar-C mission has been requested by the Japanese space agency JAXA and would be of tremendous benefit to the U.S. Heliophysics community. In addition to its obvious scientific strengths, Solar-C has the advantage of being highly leveraged. A NASA investment of $250M would allow U.S. scientists to participate in a flagship class (~$1B) mission. Furthermore, the contribution would be entirely in the form of science instruments and analysis, rather than spacecraft and launch costs.

International partnerships are being strongly encouraged, not only by NASA, but by the entire U.S. government. Solar-C is an excellent opportunity to advance this goal. Japanese-U.S. partnerships in solar physics have a long and highly successful history, including Hinode today and dating back to Yohkoh and Hinotori before it. One important aspect of these missions is the training of the next generation of scientists. It is traditional for students to be involved with day-to-day operations and science planning, which has benefited them greatly in finding positions after school and developing productive careers.

The Heliophysics community has recently completed the strategic planning effort that led to the Decadal Survey in Solar and Space Physics. The second highest priority, after the DRIVE initiative, is the acceleration and expansion of the Explorer Program. Missions of Opportunity (MOO) were identified as one way for NASA to maximize science return by partnering with

other nations to leverage limited resources. Solar-C was highlighted as a possible example of this approach. The Focused Opportunity for Solar Orbiter (FOSO) is a successful model that NASA might use to solicit proposals for U.S. instruments or components on Solar-C.

It is envisioned that Solar-C would launch in the 2020 time frame. This coincides nicely with the expected first light of NSF's Advanced Technology Solar Telescope. The scientific synergy of the two observatories is compelling. In addition, coordinated observations with other NASA missions like Solar Orbiter, Solar Probe Plus, and Magnetospheric Multiscale will facilitate important heliophysics systems science. Solar-C has already been well studied, including major input from U.S. scientists (see the Joint Solar-C Science Assessment Committee Report). The Decadal Survey recommends that a Science and Technology Definition Team be formed as soon as possible to define what role NASA should play in the mission.

Solar-C is an exciting opportunity for NASA to advance dramatically our understanding of the Sun, including the solar origins of space weather (flares, CMEs, spectral irradiance variability, solar wind, etc.), and to do so at relatively modest cost. The "bang for the buck" is enormous.

On behalf of the SH-MOWG,
Sincerely,

*Jim*

James A. Klimchuk, Chair

cc: Maura Hagan, Chair, Heliophysics Subcommittee
Edward DeLuca, Chair, Roadmap Committee
Larry Kepko, Co-Chair, Roadmap Committee

SH-MOWG members:

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| Doug Braun | Justin Kasper |
| Alan Cummings | Jim Klimchuk |
| Marc DeRosa | Kuen Ko |
| Jim Drake | David McKenzie |
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| Justin Kasper | Tom Woods |