

The National Solar Observatory (NSO)

Users Committee Report (2023)

To: Dr. Valentin Pillet, director National Solar Observatory

Committee members participating:

Rebecca Centeno, Damian Christian, Rachel Howe (remote), David Jess, Andy Marble (remote), Karin Muglach (chair), Sanjiv Tiwari, Steven White, Brian Welsch

NSF participants:

Carrie Black

NSO participants:

Alexei Pevtsov, Valentin Pillet, Thomas Rimmele, Han Uitenbroek, Friedrich Wöger (remote), Tom Schad

We are very grateful to Jennifer Ditsler (supported by Jill Baker and Jacqueline Ray) for her coordination of the meeting logistics which were particularly challenging as this year's meeting took place in Maui and included a site visit of DKIST on the day prior to the meeting. The Users Committee (UC) very much appreciates this site visit and also thanks everyone else helping with the tour!

James MacAteer, Haosheng Lin, Debi Prasad Choudhary and Roberto Casini are leaving the Users Committee, we would like to thank them for their valuable contributions, and we wish them all the best in their future endeavors. We would like to welcome five new members, Dr. Rebecca Centeno, Dr. Damian Christian, Dr. Sanjiv Tiwari, Dr. Brian Welsch and Dr. Xudong Sun.

The charter of the UC is to provide feedback and advice on status, desired enhancements, and future new developments of NSO facilities and operations. The aim of the UC is to provide such feedback and advice in this report as a bulleted list of recommendations and remarks. We look forward to hearing back from the director in response to each recommendation provided. The recommendations should not be considered ranked in any particular order.

The chair remains available to the Director to discuss any items at any time during the year.

Submitted in October 2023 on behalf of the NSO Users Committee

Dr. Karin Muglach (chair)

Preamble

The UC provides the following recommendations for the NSO director to consider at his discretion. We look forward to hearing back from the director in regard to which recommendations have been accepted and which actions have been planned. In particular, a mid-term UC meeting before the end of calendar year 2023 will be considered if discussion points arise that need to be addressed.

We accept the director's detailed response to the 2022 UC report.

The current NSO director Dr. Valentin Pillet will be stepping down as NSO director and a search for his follower is currently underway. The NSO Users Committee would like to thank him for his leadership. We appreciate the time and energy he has invested in this collaborative effort, and we wish him success in his future science adventures.

The UC acknowledges that as the current cooperative agreement will be ending soon, continuation of all projects will critically depend on the new contract. Additionally, the probably flat budget in the near future will have to be taken into account and impact future developments.

UC Recommendations arising from the May 2023 UC meeting

General Recommendations:

- Communication of NSO with the users community

The UC appreciates that NSO staff have made a good effort to address UC's prior concerns, and have also been working to become more transparent, e.g., via the release of GONG technical reports which inform the community about the changes and upgrades of GONG instrumentation. The UC encourages a continuation of this effort and provide more detailed reports.

Past communication about DKIST via community workshops, data analysis workshops and the ambassador program have helped to spread information about DKIST in the community. As many of these events have communicated the PLANNED capabilities of DKIST, it is now necessary to clearly communicate the current ACTUAL capabilities of the DKIST instruments. In particular, young scientists that have no prior experience in ground-based observing and, to some extent, the solar space community might have unrealistic expectations.

It is critical that NSO communicates openly with the community about both progress and ongoing challenges regarding DKIST instrument performance, data processing, data handling, and data availability.

Therefore, the UC encourages continued community involvement via presence at scientific conferences (e.g. with dedicated DKIST sessions but also DKIST related tutorials) and organizing user workshops (both in-person and remote workshops).

- The NSO web-page needs improvement, there are broken links and especially the older NISP pages need to be integrated. The UC encourages NSO to be vigilant in maintaining the usability and discoverability of public-facing web pages.

With the planned hire for outreach, we expect this item to have high priority for the new hire.

Recommendations for NISP:

- The UC understands that NISP projects have been negatively impacted and disrupted by recent weather related events: flooding (impacting SOLIS) and heavy snowfall at Big Bear, and the eruption of the volcano on Mauna Loa which has destroyed the access road to the observatory - although the GONG equipment was spared (and was properly shut down on time), GONG Mauna Loa is currently still not operational.

The UC is looking forward to get updates on the effect of these events, particularly on the situation on Mauna Loa.

- GONG refurbishment

The replacement of the primary GONG cameras represents a significant change to the network, the impacts of which will be a potential concern to users. We recommend intentional communication to the community of the pertinent camera specifications, any steps taken to mitigate differences, anticipated impacts to data products, and relevant quantification where available and appropriate. The technical reports about the expected changes due to the refurbishment have already been released and additional pertinent information is expected to be released soon.

- GONG zero-point correction

The GONG zero-point correction is a very important calibration issue of interest to both operational and science users of GONG magnetic field data. We affirm the importance of ongoing efforts by the NISP group to further mitigate zero-point bias via remote modulator tuning and encourage them to investigate methods for improvement.

- GONG helioseismic data releases

The UC is aware of some frustration in the user community over the reduced frequency of GONG helioseismic data releases. While it is good that communication around this has improved, users would still prefer more frequent and timely release of the data, particularly as we approach solar maximum. We suggest that NSO considers increasing the frequency of data releases as soon as resources allow.

- SOLIS

SOLIS first light has been delayed and is now expected for fall of 2023, the UC is looking forward to seeing SOLIS back online!

- Synoptic Map Development

While current GONG synoptic maps represent a critical input for modeling solar wind and CME propagation, this remains a data-limited enterprise. The NISP group's current efforts to improve upon existing synoptic maps by developing tools to incorporate far-side information, observations made from vantage points other than Earth, and future datasets is of significant value to operational users and modelers.

Also, as there is currently no other full-disk observatory planned that can replace SDO, GONG is an essential facility in addition to SDO/HMI.

- Development of a Next Generation Global Oscillations Network Group (ngGONG)

The committee strongly supports the scientific and operational rationales for ngGONG and encourages continued effort by NSO personnel to develop this project!

Recommendations for DKIST:

- Preparation for extended operation at DKIST

The UC would like to reiterate the importance of extending operation of the telescope. We acknowledge the complexity involved in its operation and the fact that project management is aware of the need to make the operation more efficient. We understand that current staffing does not allow for extended hours of operation. However, given the additional productivity and benefit to the community that an extended-hour operation will bring, we suggest the DKIST management starts the planning for extended hours of operation. We are looking forward to recognizing efficiencies in operation that will permit using as much of daylight for observing as is feasible. In addition, the UC fully supports any effort by NSO to find additional funding for more staff that will allow extended operation.

- DKIST L2 data development

The UC appreciates the progress of the NSO effort to produce level 2 data for selected observations. First tests with observed data gave very promising results! Additional work needs to be done on metadata (e.g., correct fits header, WCS coordinates). The UC also supports the idea to provide a cloud service to enable users to run their own inversions.

- DKIST observing coordination with other observatories and satellites

Using the Director's Discretionary Time (DDT) for coordination with Parker Solar Probe and Solar Orbiter was a first promising step. The immediate release of the DKIST data (without the six months proprietary period) can be considered a bonus for the community! Such observations have extremely high scientific value, as many science questions require data covering the full height range of the solar atmosphere (photosphere, chromosphere and corona). Therefore, the UC recommends that a timeline for the implementation of collaborative observations should be set up. Procedures for coordination should be developed and tested, as a next step to more

routine collaborative observing. And there is also a need for procedures for prioritizing coordinated versus routine observations. Having these operational procedures in place will open up many more projects to a wider range of users around the globe.

- DKIST observing proposals, OCP3?

Out of the 50 selected proposals of OCP Cycle 1, only 30 have received data; the remaining proposals were not rolled over to OCP Cycle 2, which was very disappointing for some members of the community. A roll-over also would have saved both proposer's and TAC reviewer's time. In current OCP Cycle 2, again 54 out of 93 proposals have been selected. The UC feels that this might be too many again. Maybe more guidance to TAC is needed to align the number of selected proposals more closely with expectations of available observing time. Nevertheless, with the expectation of increased efficiency in taking observations, the UC expects that data for all of these proposals will be taken within the planned OCP Cycle 2 period.

Community members have the expectation that opportunities to request DKIST observations will be offered periodically. If challenges in getting to routine operations require an extension of the shared-risk period and an OCP Cycle 3 is necessary, then NSO should reach a decision quickly. The UC recommends that NSO be open and transparent with the community about this decision.

It is critical that NSO issues a pre-announcement of an impending proposal call, well in advance of the actual call. Ideally, this would be ASAP after the broad parameters of the call have been resolved (e.g. timeline, which instruments, which spectral lines or filter settings will be available).

One priority for OCP3 should be that additional spectral lines should be offered with ViSP to exploit the full capabilities and versatility of the instrument. The database of DKIST Science Use Cases submitted prior to the OCP calls indicate which lines are of most interest to the solar research community.

Once individual instruments and data pipelines are fully ready for routine observations, it might be desirable to run both 'routine proposal calls' for those instruments, and shared-risk/OCP calls for instruments still being modified and/or under commission.

- Instrument status

The UC appreciates the presentations given on the status of each of the DKIST instruments.

In summary it seems that ViSP, VBI and Cryo-NIRSP seem nearer to readiness for routine operations, although there are still unresolved issues with these (e.g., multi-level gain and speckle reconstruction, and the pipeline).

To resolve DL-NIRSP issues will take considerable amount of time and effort. The UC recommends that getting the other instruments ready for routine observations should have highest priority.

VTF is expected to be delivered in fall of 2023, the UC is looks forward to hearing about its integration and performance.

- Data center

The UC appreciates the progress made on data distribution.

A listing of known issues with the data on the website is key, and must be constantly monitored and updated! Quick-look (maybe also movies) and improved search functionality would be helpful. In addition to the already existing 'help desk', the UC proposes a 'suggestion box' and possibly a yearly users' forum, where users can propose ideas on how to improve the service!

Recommendation on organization of the Users Committee:

- The UC agrees to expand UC membership (adding 1-2 people), in particular adding members of the modeling community and the space/satellite community that are interested in using NSO data.