

**Keck Science Steering Committee
November 28, 2017, at Caltech**

Judy Cohen and Jean Brodie

Thank you Anne Kinney !

- The SSC thanks Anne Kinney for her 2+ years of service as the Keck Observatory's first chief scientist
- We especially commend her for her advocacy of the support astronomers and of efforts to improve communication between the Keck observers and the partner early career astronomers.
- Good luck in your new position as head of the directorate for mathematical and physical sciences at NSF

Observatory report

Review of publications and "impact factor".

- Keck still in a leading position, now number two.
- Discussion of movement of UKIRT above Keck as due to survey data releases and citations for photometry catalogs (vs PI investigations).
- New metrics may be needed to account for proliferation of surveys.
- Review of observatory metrics.
- No changes from recent trends (more unique programs, more split nights).
- TCS improvements should help minimize overhead
- DEIMOS fault time significantly reduced since May 2016 service mission

NASA partnership

- Renewal for 5 years (2018 Feb. onward).
- partnership oversubscriptions, usage metrics.
- NASA community productivity/papers same as rest of the community.
- MOWG supports twilight observing opportunities.
- CARA put NExScI director as ex officio on SSC.

Observatory report

Mainland-only observing

- Now above 50%
- Including eavesdropping, WMKO is connecting to the mainland over 70% of the time.
- Looking for alternative remote technologies to ISDN – in addition to reliability and obsolescence, there are problems with both Polycom connections (soon moving to Zoom) and firewall issues.

Support Astronomers

- SSC has concerns for SA workload in supporting all the split nights and increasing number of unique programs.
- WMKO should develop list of SA scientific interests for the next phase of Keck Visiting Scholar Program – intended for graduate students and postdocs of < 3 years hosted in Waimea with the intention to collaborate with SAs.

Observatory report

Instruments

- NIRES first light on 5 Oct and commissioning going well, though remaining issues with focus and flexure correction – expect to be ready for observing in 2018A. Private funding received for observing software development/improvement.
- OSIRIS imager upgrade and new filter wheels installed 15 Nov; warm tests went well and cold tests imminent.
- DEIMOS blue grating installed 23 Aug – now 1200B in addition to 1200G. Thanks to Evan Kirby
- K1DM in final test at UCSC; pre-ship review expected in Dec/Jan with projected install at K1 in Mar.
- NIRSPEC upgrade plan reviewed on 13 Oct. Review outcome was overwhelmingly positive. SSC notes science loss during the required 5 months downtime for commissioning.
- KCRM has a new project manager. Had another delta-cost review 19 Jul with yet another scheduled for Jan, 2018. SSC committee will review the science case in Feb.
- KPF had very successful PDR, with much of material closer to DDR quality than PDR. SSC requested improved accessibility of KCWI commissioning data so that community can understand what is possible with the instrument. MWKO is taking action to arrange this.

FY18 Key Projects *(infrastructure projects in*

Priority	Project	FY18 Deliverables
1	Segment Repair	Complete 33 segments
2	OSIRIS Imager	Commissioning complete
3	TCSU	Commissioning complete
4	K1 Deployable Tertiary	Commissioning complete
5	NIRES	Commissioning Complete
6	KCRM	Preliminary design
7	Spare Secondary	Complete polishing. Install in cell. Plan for exchange.
8	Keck Planet Finder Prelim Design	PD design support (FIU and facility mods)
9	NIRSPEC Upgrade	Pre-ship complete & installation begun
10	Key Infrastructure Safety Projects	Transformer Relocation; K1 Journal Grout Repair
11	PCS Camera Upgrade	K2 system operational. K1 system operational
12	Summit PV	System installed & operational
13	K2 NIR Pyramid Sensor	System installed & undergoing I&T
14	K1 Az. Brake & Yoke Base Jack	Brake install complete. Jacking demo'd for pad removal
15	AO Fiber Injection Unit	System installed & undergoing I&T
16	K2 AO Real-time Controller	Place RTC contract & complete PDR
17	Fiber Injection Coronagraph	DD design support (FIU mods)

Observatory report

Segment Repair

- Proceeding smoothly with 21 repaired so far and 15 installed at telescope.
- Keeping pace with routine segment exchanges.
- No impact on science operations.
- Average processing time is 28 days/segment (better than estimated 33).
- Overall slightly behind schedule <6 months.

TCSU

- In use for all instruments on K2 as of 16 Oct.
- K1 switchover in progress and planned to complete in Dec.
- 10x improvement in accumulated pointing errors relative to legacy DCS.
- Minor operational issues (e.g. alarms) remain to be resolved.

Observatory report

Operations Review in June 2017

- Significant positives:
 - Culture of "on-sky tonight and every night",
 - Emphasis on safety,
 - Existence of planning schedules (though WMKO may want to go to 2-year schedule vs 1-year)
 - Dedication to infrastructure renewal.
- Key findings for further consideration:
 - Workload increase on the staff
 - Need for staff succession planning
 - Continued infrastructure renewal is critical given age of WMKO
 - Need better DRPs
 - 20% science time for SAs is the goal (estimated 6-15% currently)

Staffing issues:

- General perception of too few staff and/or too many high priority projects.
- Still trying to recruit a new SA.
- Looking for AO scientist as well; may need to consider a share with mainland.
- Currently overstaffing OAs in anticipation of retirements next 9-12 months.

Observatory report

Update on Mauna Kea situation:

- OHA actions - new lawsuit over alleged mismanagement of the ceded lands and breach of lease conditions may affect the present lease.
- Independent of the above, a major issue is the lease renewal for 2033 where changes in terms can be expected.
- Government and community engagement extremely important for all of the observatories. Major efforts already underway by MK observatories.

KCWI-B

- All existing modes meet or exceed efficiency requirements
- Wide range of science programs already underway with many topics. At least 15 papers already submitted or in preparation with another dozen or more in various stages of preparation.
- SSC congratulates Chris and team on wealth of data and early results
- The blue high resolution grating needs to be re-fabricated
- Pipeline essential to operation, SSC pleased with pipeline thus far, and look forward to continued improvements
 - Two gratings and all modes are supported
 - Improvements to flat-fielding ongoing
- Working on simplifying data acquisition modes such as mosaicing
- WMKO and team continue to work on documentation
- Data access:
 - WMKO has prepared a commissioning dataset for public release
 - Suggest releasing raw and processed datacubes for one or more of the datasets in published papers. Host on KOA
- KCWI has bluer coverage and higher spectral resolution than VLT/MUSE.

Summary of AO Projects: 2013-2017

- 5 completed projects in past 5 years
 - K2 center launch, K1 TRICK, K2 laser, K1 E-TRICK, K2 PSF-R
- Average cost overrun of 23% (best -8%, worst +80%).
- Time duration often ~2x longer than originally planned
- K2 center launch: +23% cost
 - No contingency in NSF proposal, formally not allowed by NSF
 - Vendor problems, in the end WMKO assembled the telescope
- TRICK: +80% cost
 - No contingency, personnel turnover, went on-sky too soon
 - In the end, performance has been good: K-band Strehl 1.45x boost
- Lessons learned
 - Better budgeting, c.f. new projects have 30% contingency.
 - Turnover of instrument personnel in Keck community boosts cost & risk
 - WMKO team is stretched thin, doing both development and operations. At partners, project management spread over too many activities

KPF Status

- KPF team did very well at recent PDR, excellent technical progress
- Because KPF will be on a 10m telescope at a very dry site, it will be the essential instrument to go after the most difficult and most Earth-like RV targets

Usage of engineering time

- 29 nights/semester allocated on average
 - ~24 nights used, ~5 nights of giveback (science/eng) time
- Time is allocated (off the top) via E-TAC process each semester
 - Allows for significant flexibility, enabling engineering time to ebb & flow between projects
 - On the flip side, can be challenging to request the exact time needed, which can lead to last-minute scramble for observing (e.g. original planned request not possible b/c new instrumentation not ready).
- Working on improving engineering time process for FY18
 - E.g., greater accountability to the projects asking for time.

Time-Domain Astronomy

- Snapshot and ToO time were separated in the 2018A proposal call (4 each per partner, rather than 6 total events per partner as in previous semesters).
- K1DM3 planned to be available for science in 2018B.
- TDA workshop held 9/13/2017 before the Keck Science Meeting.

TDA meeting topics

- Discussion topics among meeting attendees (these are not conclusions or recommendations, just topics that were brought up):
 - Need procedures to have pre-defined calibration sequences, automated ways to take calibrations in the morning, etc.
 - Need data/instrument handbooks for new users, calibration recipes.
 - Want configurations specified in advance, have them be vetted and stored at WMKO so they can be used easily at short notice.

ToO allocations and usage

2017A ToO programs:

- CIT: 2 programs approved, but not executed
- NASA: 1 program, not executed
- UC: 4 programs, only one interrupt executed (a self-interruption by one PI)

Policies are vague for intra-institutional interrupts: need clearer policies on instruments, non-interruptible programs, WMKO's role & responsibility, etc.

- These rules are up to each partner, but need to be communicated to observers and accessible to WMKO staff so they will be aware of the policies.
- SSC requests this information be provided by partners to WMKO

ToO Implementation

Discussion of partner shares of ToO interrupt opportunities especially given expected rapid rise in transient events from new projects.

- Current trial arrangement was implemented to give each institution one or more ToO opportunities, in order to train the communities.

Policy will be revisited next year at the end of trial period.

Given that there has been under-utilization of the awarded ToO's, should the institutional allocations be increased?

Some re-hashing of the Aug 2017 GW follow-up at Keck and what happened when.

Points to be addressed could include:

- Does WMKO respond to all calls within X minutes or Y hours?
- Is redundant or only unique data taken?
- How are data shared among potentially competing groups?
- If important enough, should data simply be made public to all?
- Currently only 1ToO/night is allowed.

GW ToOs

- Suggest a short dedicated workshop at the next Keck science meeting on how to handle gravitational wave alerts at WMKO.
- Complex politics and the problems associated with the first EM detection of a GW source
- Output of workshop should be a set of policies for ToO observations of such events for consideration for adaption at WMKO and also for consideration at Palomar, Lick, IFA, etc.

NASA MOWG report

- MOWG report presented to SSC by Dawn Gelino
- NASA Keck Management and Operations Working Group assesses Keck's strategic importance to and impact on NASA.
- NASA approved next CAN for a 5 year term starting in Feb. 2018, after considering MOWG findings, APS comments, and external review comments.
- NASA's K1+K2 allocation is 1/6 of nights: ~45-47 nights/sem.
- NExSci manages the proposal process
- Oversubscription varies from 3:1 — 5:1 overall
- Most used instruments are HIRES, MOSFIRE, NIRC2, NIRSPEC, also Subaru swap time

NASA MOWG report (2)

- Proposal categories: general science, general mission support, and key strategic mission support
- Mission support proposals require letters of support from mission project scientist and from NASA HQ program scientist
- Key mission support proposals must directly support NASA mission science goals
 - Large programs of 10-60 nights spread over 2-6 semesters
 - Next KSMS proposal call will be in 2019B and will be open to TESS and JWST mission support
 - KSMS criteria: proposals require a plan for timely release of processed data through KOA
 - Funding up to \$75K/year/team will be available to support development of data products

NASA MOWG report (3)

Keck Observatory Archive updates:

- KCWI level 0 data now available to PIs
- KODIAQ quasar data release 2 (130 objects)
- Ongoing development of NASA-funded HIRES PRV pipeline, with goal to be ready for use by 2019A
- Upcoming: NIRES and NIRC2 PSF-R data
- Upcoming: California-Kepler survey data release of 1300 Kepler stars

NASA MOWG report (4)

- MOWG recognizes the need for DRPs and recommends that
DRP development needs an overall plan with priorities &
trade-offs, estimates of effort required, and schedule
- MOWG recommends consulting with Dr. Kelly Fast to clarify
impact of NIRSPEC upgrade (i.e. non-availability for use)
- MOWG recommendations on twilight observing:
 - advocates for improving twilight observing
 - concentrate on Uranus, Neptune, Io, and Titan, with
longer-term expansion to other science
 - Make data more visible outside of WMKO with public
release of images on web
 - Develop procedures for proposing & scheduling twilight
time

SSC Community Engagement

- SSC is charged with representing the interests of the scientific community to the Observatory and Board
 - Also proactively engage & inform the Keck community
- SSC is interested in improving communication with the science community and the Observatory especially as the number of instruments and observing modes is increasing and fewer people are traveling to WMKO
- Each partner is responsible for communicating with their own communities
- We recommend advertising the SSC contact information in Observatory newsletters, proposal calls and at the Keck Science meetings.
- SSC will resume posting of public powerpoint minutes of meetings on SSC web page

Future Keck Science Meetings

- 2017 meeting was a success but was not well organized.
- We need to choose the venue earlier (the previous year)
- Should KSM be changed in structure, content, or timing?
- Need to find the right balance between junior-level and senior speakers & incentives for senior faculty to attend
- Should make sure that groups getting a lot of Keck nights give presentations on their projects
- A goal should be to help build a user community that fosters collaborations between campuses and connections with WMKO staff
- Possibly include data reduction workshops or other topical sessions
- It could be helpful to use the “manual” created in 2017 for the organizing committee so they will know what needs to be done each year
- 2018 meeting: Sept 20-21 at Caltech.