SSC Meeting Notes

2021 March 10-11
Meeting held via Zoom

Introduction and Review of Actions

- SSC Membership changes:
  - The SSC welcomes IfA Interim Director Karen Meech
  - Ryan Chornock (Northwestern) has left the SSC
  - Mariska Kriek (UC Berkeley) will be moving to a new position at Leiden, and this will be her last SSC meeting

Observatory Report

- Big island COVID risk remains low, vaccinations are in early stages (ages 70+)
- WMKO risk matrix has been streamlined. Currently in WMKO Tier 3, based on Big Island case counts and positivity rate. Summit day ops limited to 21 people.
- Conditions may allow a move to Tier 4 if improved conditions hold for 4 weeks. Next steps include establishing a Tier 4 return to work policy, vaccine policy (possible), and post-COVID hybrid work policy.
- Observing policies:
  - WMKO is stressing slitmask submission deadlines
  - ToO interrupts are restricted to the current live instrument
  - Scheduling prefers fewer split nights
- WMKO welcomes new staff astronomers, Rosalie McGurk and Michael Lundquist

Observatory Report: Maunakea Update

- Long-term community support & engagement efforts:
  - MKO community engagement program underway
  - Hawaii workforce development: MKO apprenticeship program and Akamai internship
  - Educational outreach offerings continue with adaptations for COVID
  - Communications efforts including “Beyond the Impossible” video & staff profiles

Observatory Report, Instrument Update

- Instrument update:
  - LRIS: red-side detector unstable, to be refurbished in FY22 (April/May 2021). Plans for polarimeter repair are being developed.
  - DEIMOS: CCD5B alive, but noisy; rotator communication issues
  - KCWI: Dewar leak getting worse, but no immediate action needed
  - NIRSPEC: Issues with co adds and ghost images on SCAM in LM bands
  - OSIRIS: lenslet mask stage back in service

Major Project Updates

- Four major projects delivered within a year: LRIS, LFC, KPF, KCRM.
- LRIS red upgrade: detector and dewar. Currently being finished at UCO, shipping first week in April, integration and engineering in mid-end April. Two weeks off sky. Schedule slip by 1 month.
- LFC: Provides precision wavelength calibration for NIRSPEC and HIRES. Funding secured. Preparation of basement location and software developments in FY21. Schedule slip by 2 months.
- KCRM: Three months schedule slip (mainly due to Winlight delays and cryostat rework). WMKO preparing transport K2-cleanroom and completing guider sub assembly. Downtime 4-5 months starting in Feb.
    - Optics and hardware arriving for AIT
    - Mechanism parts delivered and assembled.
- KPF: Parts arrived and integration started at SSL. Zerodur bench machining complete, and many sub-systems complete. WMKO basement extreme makeover mostly completed. Arriving at summit January 2022.
- COVID: schedule slips for 3 projects (LRIS, KCRM, LFC). Restricted lab access and working from home inefficiencies. Vendor delays, labs shut downs, etc. Vendor visits may help. Staffing remains risk for all projects, with staff anxious and stressed.
- Suggested instrumentation topics for May: Summary status of concept studies and Phase A; draft white paper call; instrument retirement; project status presentations for KPF, KCRM, LRIS, KPIC, ASM.

IR Workshop Report

- Online workshop held on Jan 27+ with >100 participants with goal “What IR spectroscopy capabilities does Keck need over next decade?”
- The workshop included overview talks, community survey and a review of the competition and new concepts. This was further analyzed in the context of currently proposed instrument and unaddressed capabilities were identified.
- Landscape & Opportunities: compare IR capabilities of Keck and competitors: Keck is very competitive
- Community survey: collect feedback on current instruments, upgrades, and new concepts. 58 respondents, good representation institutes and fields, though biased (instrument teams) and incomplete.
    - All wavelengths and resolutions needed, though exoplanet and solar-system fields have preference for high resolution.
    - Uniform preference for AO/seeing-limited.
    - Detailed table on science cases matched to required capabilities.
- Major conclusions:
    - HISPEC, IGNIS, Liger, and SCALES capabilities are in demand by the community.
    - Keck competitive in JWST/ELTs era due to FOV, high spectral resolution, and long-term monitoring
    - Need very high multiplex (>100), wide-FOV MOS: capitalize on Roman and Rubin.
    - Visible-to-IR moderate resolution spectrographs needed, increasingly so in Rubin era
    - NIRES performance could be improved with upgrades
    - Community input/feedback on HISPEC, IGNIS, Liger, SCALES should be considered.
    - DRP, AO, and operations improvements should be considered by WMKO and Keck community
- Prioritization is the next step. Combine with strategic long-term plan, and instrument teams could use/refer to this report in upcoming white paper calls. The format of the workshop and community interaction was very successful, and could be used as a template for future similar initiatives.

Data Services Initiative (DSI): Update

- Mission: end-to-end data services infrastructure to coordinate preparation, execution, reduction & archiving data, with goal of increasing WMKO's science productivity.
- Based on Agile development practices: "done" is established by satisfaction of the end users, not just by fulfilling requirements. Getting/planning to get regular feedback from SAs & selected users.
- Will retain flexibility for observers to plan & modify observations (both in advance and at nighttime)
- First milestone releases coming this spring/summer: KCWI pipeline, DEIMOS quicklook.
- Significant work so far on defining underlying software protocols & infrastructure (e.g. API), also set up real-time ingestion into KOA.
- New observer homepage underway.

5-Year Plan Update (1)

- Top goals are:
  - Securing Keck's future
  - Upgrading critical infrastructure, instrument, and AO capabilities,
  - Maintain operations at current service level,
  - Sustain the facility & staff
  - Position Keck to take advantage of new facilities coming online
- Risk areas: Funded (K1 Az pier, safety hazards);
  Obsolescence (workhorse insts., ACS upgrade, AO bench, guider)

- Program priorities for 2022 - 2026:
  - Complete and deploy instruments currently under construction
  - Address key obsolescence: LRIS, DEIMOS, primary mirror comm system, guiders, AO bench
  - Complete repair of Keck 1 azimuth pier
  - Complete Unattended Night Operations (UNO) project
  - Complete the Data Services Initiative as proposed

Science Strategic Planning Update

- Science strategic plan is part of overall strategic planning exercise.
- Vision for 5, 10, 15 years
- Inputs: SSC, decadal survey, WMKO, fed agencies, US community
- Summer 2021 kickoff including community workshop. Notional Nov. 21 draft report, with complete plan by March 2022.
- Seeking volunteers to lead the key question areas:
  - Strategic role of Keck in the ground and space astronomy ecosystem
  - Science capabilities/opportunities/frontiers.
  - New operating modes (survey, cadence, ToO) and data products/pipelines
  - When to decommission
  - How to fund and build instruments in ELT era
  - What technologies are needed
  - Enabling unknown, future science
- Comments/discussion from SSC:
  - Instrument timelines are lengthening (~10 years). Need to consider sizes, phasing and prioritization of new instruments
  - Need to decide whether we undertake an adaptive secondary and GLAO
  - Need to engage community to solicit ideas and for buy-in and implementation:
    - Consider focus by science topics as well
    - Engage early-career people who will be impacted by the plan
  - Need to plan for implementation
  - Needs to be phased so Astro2020 report can be digested and incorporated
  - Strategic planning process should be communicated soon to ensure efficient work
  - Science plan needs to be consistent with the new overall strategic plan

Instrument Development Process

- Many proposals (independent of agency) require approval (SSC, WMKO/UCO/CIT directors, CARA board).
- Proposers are asked to contact the Instrument Program Manager in advance to explain the approval process, requirements, cost sharing, required documents and timelines.
- Instrument Program Manager is now developing proposal developing guidelines and templates in order to support the community.

Planning for White Paper / Phase A Call

- May SSC Meeting will have opportunity to comment on the call for proposals, prior to it being issued.

Tech Demonstrator Policy Discussion

- Technology demonstrators are key a component of instrument development
- They do have a significantly larger support need though, from the science team and the WMKO. Therefore, WMKO cannot indefinitely support any given demonstrator.
- A process is needed for reviewing if such technology should be facilitized or continue to be offered. Evaluate on science, support, cost to facilitize, who funds.
- This review will avoid having non-facilitized technologies to be approved by TACs without guidance on the resources needed to support such operations.
- A review after initial demonstration may allow to judge how to proceed or how should this support would be covered for future operation or facilitization.
- The Chief Scientist/SSC will organize a working group to define a policy and learn from previous cases and facilization examples.

Cadence Policy Working Group Discussion

- Erik Petigura (UCLA) gave a presentation on initiating a plan for cadence observing with KPF for the WMKO community.
- Exoplanet PRVs (and other science projects with KPF) critically depend on distribution of time (cadence).
- Competitor facilities have solved or are solving how to implement cadence observing.
- Petigura and Howard propose forming committee to study models to support KPF cadence (more open and better supported than CPS), will present report to SSC.
- SSC endorses the activity with report and presentation for Nov. meeting.

ORCAS = ORbiting Configurable Artificial Star

- ORCAS = Very bright (R~5 mag) guide star in space
  - observing windows of ~1-3 hours
  - frequency of visits to each sky position every ~4 nights
  - also potential “survey mode” where just image along the path of the satellite
  - significant boost in Strehl, esp. for optical AO observing
- Goddard-led concept: PI Eliad Peretz, PS John Mather
- Call for science white papers: due April 5; STM workshop on March 7
- Things ORCAS can offer Keck:
  - Enhanced AO performance, also possible use as a PSF
  - Star-like flux calibrator source
- Things ORCAS needs from Keck
  - Improved AO system: higher order, higher bandwidth, higher reliability, etc.
  - Optical science instrument: imager (+polarimetry+coronagraphy?), IFU
  - Possible time allocation & AO operations issues
- ORCAS can also be used by other telescopes

PypeIt Presentation

- Open-source software for fully-automated science-ready reduction "for all spectrographs on all telescopes". Led by Hennawi (UCSB) & Prochaska (UCSC), with team of ~10 people.
- Heritage from previous Keck instrument and SDSS pipeline work.
- Does telluric correction using HITRAN models, no need for standard stars.
- Demonstrated photon-limited extractions in 2D and 1D.
- Can produce throughput & zeropoint measurements, results will be shared WMKO for more uniform reporting on instrument webpages.
- Handles many Keck & non-Keck spectrographs.
  - Keck: LRIS, MOSFIRE, NIRSPEC (low-R), DEIMOS
  - Upcoming plans: HIRES, ESI, NIRES
  - Relatively easy to add new modes or spectrographs.
- Contact developers if interested in having a PypeIt workshop.

→ The SSC offers its hearty thanks to the PypeIt team for the extensive development work that will further the scientific output of WMKO!