

Recommendations for Hosting Trainees and Student Groups at Apache Point Observatory December 21, 2018

In Spring 2018, the Director of the Astrophysical Research Consortium 3.5-meter telescope formed the Training and Education Working Group (TEWG) to discuss expectations and practices for bringing observatory trainees and student groups to visit Apache Point Observatory (APO). Members of the committee were selected to represent the majority of ARC member institutions and leasing partners, with care to include institutions and individuals who have brought groups in the past. Two APO Observing Specialists, the 3.5-meter Telescope Engineer and the 3.5-meter telescope Director are also members of the TEWG.

Training and Education Working Group Members:

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The committee met via telecon multiple times between June and September and discussed the goals of various different groups and best practices for planning and executing visiting groups. The TEWG conducted a survey of participants in recent visits from multiple institutions; the survey respondents were asked to describe their experiences and identify positive aspects as well as those which could be improved. This report contains a summary of the TEWG's findings and specific recommendations for both APO and visitors.

The first section of this report contains a brief executive summary and recommendations that the TEWG felt were most important to implement for all visiting groups. The next sections outline more detailed suggestions for various types of visiting groups to consider. They are organized in sections: Goals, Preparation, Logistical planning and Activities while at APO. These suggestions should be reviewed by trip leaders and shared with trainees.

Executive Summary:

Each year, Apache Point Observatory hosts a number of group visits by students and trainees from many of the ARC member institutions and leasing partners. This report outlines some of the issues that need to be considered by both the APO staff and trip organizers. It includes recommendations for APO policies that are specific to groups, and suggestions for both observatory staff and trip organizers to ensure that these visits are smooth and successful.

Visiting APO, either as part of a class or as a research trainee, is often described as the experience that has had the most impact on students' university careers. These visits are a major reason for some institutions' membership in the Astrophysical Research Consortium. Overall, the students highly value hands-on experiences while training on-site at APO. In particular, they enjoy seeing the facility in person and familiarizing themselves with both TUI and the instruments. Creating positive and effective experiences is an important observatory goal, and the observatory staff and management has been extremely supportive, proactive and insightful.

The number of different groups and the variety of their goals and practices create challenges to providing these experiences. The TEWG has identified some of these and recommends the creation of clear policies to address them. **Of highest priority are requirements needed for safety and adequate supervision**, including numbers of trainees, supervisors and a clarification of their responsibilities.

APO staff members are, of course, central to the success of these visits. Students appreciate the guidance of the Observing Specialists. Having these experts on hand to address issues and answer questions in real time is one of the most valuable resources available as part of the on-site training experience. Personal interactions with observatory staff are invaluable and often inspirational for students who wish to continue their work in astronomy. Close communication between trip organizers and APO staff is essential, therefore this report **emphasizes the need for early communication** of expectations, level of preparation, on- and off-site activities and the relative roles of Observing Specialists and group supervisors.

This report also contains suggestions for planning and using time and resources at APO, derived from the collective experiences of the working group. **An online guide to effective group visit planning and practices should be maintained by APO** on the observatory web site, as a resource and basis for communication between visitors and the observatory.

Requirements for all group visits:

Groups of students/trainees and their instructors/supervisors visit Apache Point Observatory from nearly every ARC member institution and leasing partner. While the number of participants, goals and activities of these groups vary, the TEWG recommends that APO adopt the following policies for visiting groups:

- a) The maximum number of visitors at one time is 8 students/trainees and 2 supervisors. This is consistent with the availability of on-site housing. *Larger groups may be allowed*, and off-site accommodations may need to be arranged by the visiting group. Visits by these larger groups must be approved by the Director and the Site Manager prior to any other planning.
- a) A minimum of 1 supervisor is required for every 5 students/trainees in the group. For safety reasons, a minimum of two supervisors is required for each group. Each supervisor should be capable of both evacuating group members from the site in the case of an emergency situation and supervising any remaining on site. One supervisor must hold a Ph.D. Graduate students may serve as additional supervisors, but must be approved for driving, be familiar with the site, and capable of supervising all trainee activities. The group supervisors are legally responsible for the safety of other members.
- b) Groups should plan a minimum of 3 nights at the observatory.
- c) All visitors must be familiar with APO safety protocols and the symptoms of altitude sickness before arrival. All trainees are required to consult with their group supervisor if there are health or other concerns during the visit.
- d) There is no restriction on student level or ability, but instructors must be knowledgeable about their trainees' preparation and behavior. Group leaders should inform their group about safe and courteous behavior before and during their visit, and be proactive in monitoring group member activities while at the observatory.
- e) Group supervisors must communicate with APO staff during the planning stages. APO will maintain an online visitor's guide which includes requirements and guidelines specifically for group visits. Group supervisors must contact APO staff early in the planning stages to discuss logistical issues, including accommodations. At least three days before the visit, APO staff must be contacted to discuss the goals of the visit, the level of preparation of the trainees, observing plans and any daytime activities, including site tours and orientation, afternoon access to instruments and calibrations, and other requests to support their visit.

Suggestions and best practices for group visits to APO:

1) Goals of the Visit:

Group training visits can usually be characterized as:

Trainees visit with a course instructor or other supervisors. These visits are often part of an astronomical observations course or Research Experience for Undergraduates. For these groups, the primary goal is to **gain experience with observational techniques and analysis, but not necessarily to train for independent observations in the future.**

However, some participants may request this more rigorous training.

Or:

One to five trainees, with a research supervisor or collaborating scientist, visit APO with the intent to become **proficient with observing with one or more instruments. A primary goal is for the trainee to be capable of remote observing in the future.** The trainee becomes familiar with the site and personnel, gains observational experience and often will be taking data for their own research projects. Data are sometimes gathered for other institutional projects.

It is extremely important that the goals for groups and individuals be shared with the APO staff in advance of the visit.

Common goals for all groups:

- a) Experience the operations of a research observatory. This may include taking tours of each telescope on site, becoming familiar with one or more instruments, and interactions with Observing Specialists and engineers.
- b) Gain hands-on experience observing with research-class telescopes. Ideally, observing skills include using TUI to set up instrument parameters, acquire targets and guide stars, and monitor exposures and atmospheric conditions. It is highly recommended that trainees be prepared before the visit to perform preliminary real-time analysis of the acquired data and assess its quality.

Goals for trainees who must qualify for future remote observing:

- c) Learn to observe and operate the 3.5-m with the primary instrument they will need to use for their research (and a second instrument, if possible). Each trainee should have prepared an observing plan (which may be a team plan) and should be familiar with the calibrations needed for their instrument. Trainees should have enough pre-visit preparation to perform preliminary analysis of their data.
- d) At the end of the visit, the supervisor and the Observing Specialist should be satisfied that the trainees can operate the telescope and instrument(s) safely, and obtain, assess and calibrate data for their observing programs.

2) Logistics for group visits:

The committee recommends that APO staff prepare and maintain a detailed how-to guide for Planning Group Visits and post it on the APO website, in parallel with the current APO Visitor Information and Site User's Guide. The guide should include detailed information, suggestions for "best practices," and technical guidance specifically for group visits. Topics to be addressed include:

- Proposing group trips: requesting A, B or full nights to meet different goals
- Making room reservations for many people
- Travel to APO, instructions for arrival
- Preparing for observing, computer access, object catalogs
- How APO staff can support group visits
- Planning and scheduling group meals
- Courteous use of common areas
- Suggestions for additional daytime activities on- and off-site
- Leaving APO

3) Preparation and training for the visit:

Preparation for all trainees should include:

- a) Knowledge of observational terminology and technique (e.g, coordinates, sidereal time, airmass, telescope limits).
Experience with other telescopes is recommended.
Shadowing remote observations is very useful. This must be with permission, which might be brokered by APO scheduler if an observer within the same institution is not available.
- b) General understanding of the telescopes and instruments they will be using.
- c) A clear observing plan, including a strategy for all participants to have equal chance to observe. There must be contingencies for weather and a plan for calibrations.
- d) Practice with TUI and installation (and testing) on laptops, even if observing will be mostly in the control room.
- e) Knowledge of analysis tools needed for real-time assessment and familiarity with what “good” data will look like. Students report that they need more instruction on data analysis, and attention to preparing them for real-time analysis is highly recommended.
- f) Trainees whose observations are part of an ongoing research project should understand how their data support their scientific goals.

4) While at APO:

THERE IS NO ACCESS TO THE TELESCOPES WITHOUT PERMISSION OF THE STAFF!

Day-time activities:

APO staff members can lead or assist in a number of daytime tours and training activities.

Availability of staff members depends on their schedules, so these requests must be made well in advance. Possible activities include:

- a) Tour of the 3.5m, top to bottom; participate in instrument changes
- b) Tours of the Sloan telescope and the plug room
- c) Opening/closing and cartridge changes at the 2.5m
- d) Tour of ARCSAT
- e) Visit to Sunspot (if possible)
- f) Calibrations and test images:

The APO staff provides the opportunity to take test images and calibrations before observing starts. Instructors should request an earlier start for calibrations on the first night. Since this is a special request requiring the observing specialist to wake up early, it should be brought up in email discussion more than three days in advance.

Alternatively, if the group has time in the second half of the night, it may be possible to leave the instrument available for calibrations during the following day; this request would also require advance notice.

Workspace for visitors:

- a) Control room, when available and appropriate. Note that a limited number of people can use the room at one time, especially during observations.
- b) Conference room: better for larger groups and there is a projector available. Trainees can run TUI and perform data analysis on their laptops.
- c) Group work in the dorm kitchens and the operations common area is not recommended, as it can disturb other observatory users.

Night-time Activities and Observing:

- a) It is essential that there is a clear plan for observations, and that all members of the group understand the night's schedule and know what is expected of them. It is recommended that schedules be structured so that all trainees rotate through different observing tasks, rather than one person become "the expert" in a given role. Students from previous trips have expressed frustration with simply watching other students observe.
- b) The APO staff is more than happy to help in any aspect of training and has significant experience in doing so. Supervisors should communicate their training goals and what role the Observing Specialists should play. While staff members are eager that all observers get the most scientific value from their scheduled time, they also understand the importance of letting trainees make mistakes that can affect observing efficiency.
- c) If the weather is bad, the Observing Specialist may offer trainees the opportunity to perform test slews and practice other observing functions. Non-observing time at the observatory is ideal for data assessment and analysis and learning from the local experts.

Meals and down-time:

- a) Plan meals around observations and delegate responsibilities beforehand. Note that dinner may be difficult on the first night of observing.
- b) Pay attention to sleep schedules for both trainees and supervisors. A supervisor must always be available to respond to emergency situations.
- c) Trip leaders should remind members of their group to be courteous and to keep common areas clean and quiet.