

Keck Adaptive Optics Note 318

Laser Guide Star AO Weather Cancellation Policy

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1. Introduction

The Mauna Kea Laser Guide Star Policy states that the Keck 2 laser may not be propagated if the tip-tilt reference light is extinct by more than one magnitude; laser light scattered by clouds would impact other observatories on the summit of Mauna Kea^{1,2}. This restriction, combined with the large number of personnel involved in laser AO operations, leads us to propose a more conservative weather cancellation policy for LGS AO observations than that followed by the observatory as a whole. Also, note that laser alignment on-sky and LGS-AO checkout would take at least 30 min prior to any science observations.

This policy is solicited by the LGS-AO operation team in order to support the maximum number of productive science nights and was agreed to by the AOWG³ and the Observatory Director. It has been revised for 2006 and is described in this document.

2. Authority

The decision to cancel LGS AO observations for the night will be made by either the Observing Support Manager (R. Goodrich) or the acting lead of the LGS-AO Operations Team (R. Campbell or D. Le Mignant).

3. LGS AO cancellation policy

When conditions are questionable, we propose evaluating the cancellation of LGS AO operations at different critical times:

- **4:00 or 5:00PM, during the afternoon pre-observing meeting or once the afternoon weather forecast gets posted.**
- **8:00PM before the second laser assistant shift starts.**
- **2h before 12^o morning twilight.**

The evaluation of the situation should be based on the current summit conditions, the summit weather forecast, any peculiarity in the observing program, and the operational status of the LGS AO system. At these times, the acting lead of the Laser Operations Team shall call an informal meeting with other team members, the observing assistant if available and the night's observer to discuss the conditions.

LGS AO observing may be cancelled if one or more of the following criteria are met, and appear likely to persist throughout the night:

1. The summit facility is planning for evacuation or other winter weather conditions are such that laser propagation would not be possible (e.g. snow accumulation).
2. The LGS AO system is not operational and cannot be fixed for the night.
3. Weather outlook is very adverse **throughout the night**:
 - i. Summit crew reports marginal weather.
 - ii. Forecast for fog/precipitation is higher than 80% likelihood.
 - iii. Forecast narrative from the UH meteorology site calls for winter conditions (humidity, ice, fog, snow, thunderstorms, etc) and cloud coverage is predicted to be 80% or more.
 - iv. Satellite imagery for Hawaii Wide View shows a continuous flow of clouds over the state including the Big Island and beyond.
 - v. Clouds cover more than 80% of the area in the Hawaii State View satellite imagery.
4. Conditions are unsafe for spotters to remain outdoors for 30 minutes at a time (e.g. wind chill < 20°C).

If at least one of the cancellation criteria above is met, but it appears likely that conditions might improve sufficiently to allow LGSAO observations later in the night, then the decision shall be made to hold all spotters at Hale Pohaku. Conditions may be reevaluated at 8:00PM in order to allow the laser technician to safely shutdown the laser before finishing his/her shift.

Past 8:00PM, conditions will be reevaluated throughout the night, the second laser operator will start his/her shift and the spotters may be called up to the summit or released for the night depending on their evolution. Whether the spotters are held at Hale Pohaku or the summit, a final decision on canceling the night and releasing the spotters will be made **2h before 12^o morning twilight**.

Once the laser has been shut down, the laser propagation will be cancelled for the night.

4. Communication Channels

If the decision is made to cancel the night during the afternoon meeting, the recorded message on the Keck LGSAO hotline will be changed **by 5 PM** to reflect this. Spotters and the laser crew should call this line for the current status.

LGSAO hotline: x270; 881-3770

Keck Summit:	935-8643	
HP Dining Room:	935-7606	David Le Mignant (cell): 640-0917
HP Keck Office:	935-4414	Randy Campbell (cell): 937-7362

In addition, you may need to contact the LGS-AO assistant (C. Melcher) & the Lead Spotter (N. Jordan) to coordinate the logistics with the spotters and the laser team.

5. NGS AO or NIRSPEC backup programs

If weather or other conditions prevent LGSAO operations, the observer will be asked to switch to their backup NGS AO or NIRSPEC observing program. However, note that only one instrument switch from AO to NIRSPEC or NIRSPEC to AO can be accommodated. Please read the LGSAO backup instrument policy⁴ for details.

6. References

- [1] Wizinowich, P., D. Simons, H. Takami, C. Veillet, and R. Wainscoat, "Coordination and use of laser beacons for adaptive optics on Mauna Kea," *KAON* 153, 1998.
- [2] Le Mignant, D. & Bouchez, A.H., "Summary of laser propagation restrictions and procedures," *KAON* 269, revised in Oct. 2005.
- [3] Wizinowich, P., "Implications and Options for adding 5 LGS AO Shared-Risk Science Nights in 05A," http://keckshare.keck.hawaii.edu:3636/Get/File-21144/More_05A_LGS_nights_v21.doc, 2005.
- [4] Goodrich, R., "Policy on backup instruments during LGSAO runs," <http://www.keck.hawaii.edu/realpublic/optics/lgsao/lot/docs/InstrumentPolicy-2.doc>, 2005.