



October 2009 • Issue 10

Currents

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ALTAIR Update ([Results of Survey on Possible New Instrument Start for Gemini](#)): Readers responded to a short survey in the last issue of *Currents* regarding their priorities for a possible new instrument start for Gemini in 2010. The comments received in the survey raise important issues, with many respondents describing the strategic and science-based arguments behind their preferences. The survey results provide valuable input to upcoming deliberations of the Gemini Science Committee and the Gemini Board.

System Update ([Toward an Integrated Ground-based O/IR System](#)): NOAO is evolving to enable a more structured approach to the development of the US system of ground-based O/IR facilities. This article describes the philosophy behind this approach, the roles that NOAO will play in meeting this challenge and, most importantly, the need for community input into the system development process.

Your input is welcome on any of these issues. Please send your thoughts to currents@noao.edu.

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Results of Survey on Possible New Instrument Start for Gemini

In the [last issue of Currents](#), we described the possibility of a new instrument start for Gemini in 2010. This development is an outcome of the Access to Large Telescopes for Astronomical Instruction and Research ([ALTAIR](#)) study, which called for an improved Gemini instrumentation suite that is more responsive to the needs of the US Community. In response, the US members of the Gemini Science Committee (GSC) and the Gemini Board have been working with NOAO to create a new instrument start for Gemini on a short time scale.



To provide input to this process, we asked readers to respond to an online survey to help identify the instrument that has the highest priority for a new start. The survey described three new instrument concepts currently being considered by the GSC: an optical echelle ($R \sim 40,000$), an IR echelle ($R \sim 30,000$; 1-5 microns), and an intermediate resolution O/IR spectrograph similar to the [X-shooter at the VLT](#) (single object; $R=4,000-14,000$; optical to K-band in one shot). Readers were asked to

indicate their highest priority, either from among these capabilities or an instrument they could specify. We also gave readers the opportunity to provide further comments regarding their selection.

We received 246 responses within the two-week survey period, with the IR echelle and the moderate resolution O/IR spectrograph receiving the largest number of endorsements. The table below shows the fraction of respondents that favored each capability among all respondents (246); US-based respondents (208); and US-based respondents that are currently grad students (14), postdocs (56), or in a more senior position (138).



The fraction of respondents who favored a high resolution instrument (optical or IR echelle) was comparable to the fraction favoring the moderate resolution instrument. A similarly significant demand for high resolution spectroscopy was indicated in the ALTAIR survey. The IR echelle was the highest priority among the small number of grad student respondents, while the X-shooter was the most requested among the postdocs who responded. Both the X-shooter and the IR echelle had significant demand among the more senior respondents.

Table 1. Instrument Priorities

	All (246)	US-based (208)	Grad Students (14)	Postdocs (56)	More Senior (138)
Opt. Echelle	13%	14%	21%	11%	14%
IR Echelle	31%	34%	50%	27%	35%
X-shooter	45%	43%	21%	57%	40%
Other	10%	9%	0%	5%	11%
None	1%	0%	7%	0%	0%

The comments showed enthusiasm for a new instrument start. One respondent noted that, "It is imperative that Gemini get a quick start on new instrumentation. Whichever instrument is built, it should be a desirable resource that is tradeable for complementary capabilities on other platforms." Another respondent commented, "The focus on highly capable single-object spectrographs is a wise move, as these are sorely needed, relatively straightforward capabilities that take advantage of Gemini's aperture while not being hurt by Gemini's narrow field of view." Many respondents also took advantage of the comments section of the poll to describe the strategic and science-based arguments behind their stated preferences.

Optical Echelle

Fans of the optical echelle pointed to the limited access that the NOAO open access community has to this resource. One respondent commented, "An optical echelle spectrograph would fill a large gaping hole in current Gemini instrumentation. To my knowledge, no other comparably large optical telescope on the planet has Gemini's... essential lack of instrumentation for moderate-to-high resolution optical spectroscopy." Since most optical echelles on large aperture telescopes are located in the northern hemisphere, Gemini South might be preferable over Gemini North for such an instrument.

However, other respondents reasoned that the very fact that there are other effective optical echelles out there on large telescopes made this a less competitive instrument for Gemini, adding that it would be more effective to trade Gemini time

for access to such instrumentation on other large telescopes (e.g., Keck/HIRES, Magellan/MIKE). This approach would only be effective if Gemini had a fairly unique, high-demand capability for which other observatories would be interested in trading time.

IR Echelle

Fans of the IR echelle thought that it might be the kind of instrument to enable time trades. They pointed to the near uniqueness of IR echelles on large telescopes (Keck/NIRSPEC, Gemini/Phoenix, VLT/CRIRES) and the broad range of exciting science that they enable. Respondents suggested that an IR echelle would be useful to follow up results from space missions (e.g., WISE, Herschel, JWST). The broad appeal of high resolution infrared spectroscopy is indicated by the results of both the ALTAIR survey and this survey, the popularity of NIRSPEC shown in the proposal statistics for TSIP and NASA Keck time, and for Phoenix on Gemini through the NOAO proposal process. It was also noted that CRIRES is highly oversubscribed at the VLT.

Proponents remarked that an IR echelle makes good use of the IR optimization of Gemini as well as its large aperture, thereby opening a large discovery space. The discovery space might be larger on Gemini North given its relatively colder, drier site. It was further noted that NIRSPEC is aging (more than 10 years old), and advances in detector format and sensitivity offer the opportunity to build a new, more capable instrument. The lack of other current initiatives to build an IR echelle on a large telescope suggests that Gemini could get there first.

X-shooter

Supporters of the X-shooter concept commonly pointed to its flexibility and the broad range of science that it would enable. The anticipated high demand is indicated by the response to the survey. The high oversubscription rates at the VLT for X-shooter itself were also mentioned. The scientific flexibility of the instrument was also raised as an advantage in following up wide-field imaging surveys, in particular time domain studies (Panstarrs, LSST, etc), and results from space missions (WISE, Herschel, JWST). The need for high throughput was stressed by several respondents.

For many respondents, the attraction of the X-shooter was its ability to provide basic optical or NIR spectroscopy. However, a few respondents commented on their specific needs for the broad wavelength coverage (optical through K-band) that an X-shooter on Gemini would provide. These included the study of red or obscured objects (e.g., brown dwarfs and AGN), small solar system bodies, photometric redshifts, and SEDs of galaxies. A few respondents further commented that the broad wavelength coverage could lead to interesting, perhaps serendipitous discoveries.

Next Steps

The results of the survey are being forwarded to the US Science Advisory Committee (SAC) and the US members of the GSC. The results provide valuable input to the GSC, which is currently deliberating on this topic in preparation for its meeting in mid-October. The GSC discussion will provide input to the Gemini Board. We will report on developments on this topic in a future issue of *Currents*.

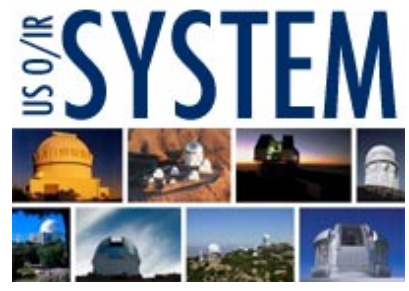
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Toward an Integrated Ground-Based O/IR System

For more than a decade, the NOAO program has embraced the idea of a system of facilities that could be used to carry out scientific programs. The initial focus was on our own facilities—KPNO, CTIO, and the US piece of Gemini—but the 2000 decadal

survey and events thereafter have broadened the thinking of the community to envision the combination of federal and non-federal resources into a much more capable and efficient system.

Through several "[System](#) workshops" and panels ([ReSTAR](#), [ALTAIR](#)) that brought together users of the federal and non-federal facilities, we have been working with the community to identify and prioritize the capabilities that are in demand for



future development. Some of these capabilities have been implemented through programs like the Telescope System Instrumentation Program ([TSIP](#)), and others will be developed through our NSF proposal to address the ReSTAR recommendations (see the [December 2008 issue of Currents](#)).

In anticipation of future development opportunities, the time appears ripe to take a more structured approach to system development that will foster the strategic evolution of the system. As part of this approach, the relationships among capabilities on facilities of different sizes (i.e., spanning a range in aperture and/or complexity) should play a role in determining their priorities. This would allow an evolution towards an integrated system.

An integrated system helps our community in several ways.

- Since the system includes facilities that span a range of apertures, the integrated planning that is needed for system development allows capabilities at one scale to be optimized, in part, to support capabilities at other scales.
- Limited resources can be used more efficiently and cost effectively through global optimization that will reduce the need for redundant capabilities where they are unnecessary.
- Because it allows for coordinated planning for more of the capabilities that are in the US system, the entire suite of capabilities can be more competitive at an international level.
- It would provide a context for the dialog among different segments of our community that is necessary for positive evolution of the system as a whole.

To meet this challenge, NOAO will be taking on three roles: (1) helping our community to understand the capabilities in the system and to use them effectively, (2) facilitating the creation of needed capabilities, and (3) working with the community (both federal and non-federal facilities and their user communities) to develop strategies for the future development of the system.

To better fulfill these roles, we are changing the internal structure of NOAO. Several existing programs will now be combined into two new programs: the NOAO System Technology Center (NSTC) and the NOAO System Science Center (NSSC).

The NSTC will carry out the technical and administrative aspects of system development. It includes Instrumentation, the administration of the TSIP program, LSST technology development, and GSMT/ELT technology development. The NSSC will assist users of the system with current facilities and understand their desires for the future. It includes System User Support (which includes the functions of the former NOAO Gemini Science Center), System Data Management (previously known as the Data Products Program), and System Community Development.

The newly formed System Community Development program has the goal of understanding community desires for the evolution of capabilities within the system and guiding its development to provide these capabilities. Foremost among its initial tasks will be to work with the community to create a roadmap for this development,

one that integrates the needs of all segments of the community. This will require working closely with the entire community—both those who have access to (or operate) their own facilities and those who depend on the open-access process—in order to produce a plan that can be supported by everyone.

Your input is needed to make this effort a success. Watch *Currents* over the coming year for opportunities to participate in this process.

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Contact Us

Did something interesting, inspiring, or surprising happen on a recent observing run? Please tell us about it! Is there a topic that you would like to see covered in a future *Currents*? If you are planning a regional astronomy meeting or department internal symposium, would you like someone from NOAO to give a presentation on our new program? Please contact us at currents@noao.edu. We look forward to hearing from you!

Currents is a sparkplug for communication between NOAO and our community. It provides updates—and solicits community input—on NOAO observing opportunities and NOAO programs and policies on a more rapid timescale than is possible with the quarterly *NOAO Newsletter*.

NOAO is the national center for ground-based nighttime astronomy in the United States and is operated by the Association of Universities for Research in Astronomy (AURA), Inc. under cooperative agreement with the National Science Foundation.

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