Report recommends strategic actions to strengthen US optical and infrared astronomy system

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A new report from the National Research Council recommends improvements in observational, instrumentation, and data management capabilities as well as coordination among federal and private partners to better position the U.S. ground-based optical and infrared astronomy system to meet the long-term scientific goals outlined in the Research Council's recent decadal surveys on astronomy and astrophysics and planetary science. In addition, an ongoing, community-wide planning process is needed to identify and develop new capabilities in the short term to address the decadal science priorities.

The U.S. ground-based optical and infrared astronomy system includes a combination of public and private facilities and a range of small-, medium-, and large-aperture telescopes and instruments that vary in sensitivity and functionality. As the cost and complexity of new capabilities increase, and budgets remain flat or decline, both federal and non-federal entities must balance support for new and existing facilities to maximize the scientific return on investment.

According to the committee that conducted the study, the best science will be achieved through a system that is well-coordinated and facilitates broad access to federally and non-federally funded telescopes as well as the data they produce. The report recommends that the National Science Foundation direct the National Optical Astronomical Observatory to administer a telescope time exchange, in which participating public and

private observatories would barter facilities, swap instruments, and engage in partnerships for telescope time and data access.

The Large Synoptic Survey Telescope, the top-ranked large, ground-based facility recommended in the Research Council's latest decadal survey, will photograph the entire night sky every few nights, enabling a broad range of new science. When it becomes fully operational in 2022, its science output can be expanded through complementary and supplementary work at other facilities, the report says. This can be achieved through the development of software that identifies and prioritizes significant objects or transient events observed by LSST for follow-up studies by other telescopes. Coordination and communication among facilities would enable rapid and efficient response to those events.

Science output from other medium- and large-aperture telescopes can be enhanced with new instrument capabilities. The report says that NSF should continue to invest in the development of a number of critical instrument technologies, such as detectors and adaptive and active optics, which are necessary in the near term to achieve decadal survey objectives. NSF should also support the development of a wide-field multiplexed spectroscopic capability on a medium- or large-aperture telescope in the Southern Hemisphere that would advance studies of cosmology, galaxy evolution, and the Milky Way. The scientific return from all large surveys would be further augmented if their data and catalogs were publicly available and accessible using standard protocols.

Looking to the future, NSF should plan for investment in one or both Giant Segmented Mirror Telescopes expected to become operational in the 2020s, for example through shared operation costs, instrument development, or partnership in science projects. GSMTs are critical for addressing the next decade's principal science questions, including the physics of planet formation, the growth of black holes, and the advent of

the first galaxies.

Specialized training is essential for ensuring that the next generation of astronomers has the skills to accomplish the best science, the report adds. NSF should support a coordinated suite of schools, workshops, and training networks run by experts to extend general observing, instrumentation, software, and data analysis expertise to future generations.

More information: Optimizing the U.S. Ground-Based Optical and Infrared Astronomy System (2015): www.nap.edu/catalog/21722/opti … red-astronomy-system

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