



## P R E F A C E

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**Director General of NAOJ**

It is my pleasure to present the Annual Report of the National Astronomical Observatory of Japan (NAOJ) for the fiscal year 2011 (FY2011).

The FY2011 began in the aftermath of the East Japan Earthquake. Although the earthquake caused significant damage to two antennas at the Mizusawa VLBI Observatory in Tohoku – including a 20-metre VLBI Earth Rotation Astrometry (VERA) antenna – and a further two VLBI antennas located in Takahagi

and Hitachi, they have all been restored and are fully operational. It is also worth noting that the supercomputer at the Mitaka headquarters was in fallback operations during the 2011 summer season in order to reduce energy consumption.

On July 2, there was a coolant leak from the prime focus of the Subaru Telescope. As a result, we were forced to temporarily stop the operation of the telescope as the primary mirror and observing instruments, including

Suprime-Cam, were inoperative. We apologize to Subaru users and other persons concerned for the inconvenience caused by this interruption. Corrective measures were taken immediately, by cleaning the primary mirror and repairing the damaged instruments. Furthermore, a special committee was established to investigate the cause of the leak in order to prevent a future recurrence.

The ALMA project is making steady progress at the Atacama plateau in Chile. Currently, 16 antennas out of 66 are available for observations. The Joint ALMA Observatory announced the call for proposals for Cycle 0 – a preliminary open-use period, with 16 antennas this year. By the end of June 2011, more than 900 proposals were submitted from all over the world, revealing extraordinarily high levels of interest from the global scientific community in ALMA. About 150 proposals were submitted to Cycle 0 from Japan, the second largest number of submissions among the ALMA member countries. The Cycle 0 observation began in October 2011 and we expect some exciting results from ALMA observations to be released to the public in the near future.

Meanwhile, the Subaru Telescope continues to be productive, despite the accident mentioned above. More than 120 scientific papers are published per year, which means about one research paper every three days. Many of the papers published in the FY2011 are categorized into two areas: the first is distant galaxies, clusters of galaxies and dark matter; the second is exoplanets and disks around young stars. These are the main streams of modern astronomy, where the Subaru Telescope plays an important role. In fact, the Subaru Telescope has made remarkable contribution to the advancement of evolutionary studies of distant galaxies and clusters of galaxies.

The most impressive feature of the Subaru Telescope is its wide-field capability. Now we have developed a 900-megapixel Hyper Suprime-Cam at the NAOJ Advanced Technology Center in Mitaka. It will provide a field of view several times larger than the current Suprime-Cam. Furthermore, new corrector optics will provide sharp and undistorted stellar images over the entire CCD area.

The Subaru Telescope has successfully imaged gaseous giant exoplanets, but imaging Earth-like rocky

planets is impossible. We need a larger light collecting area, sharper imaging resolution, and higher contrast. This will be achieved by the Thirty Meter Telescope (TMT), which will be constructed on Mauna Kea, at a slightly lower elevation than Subaru. Representatives from the prospective partners – Japan, USA (California and NSF), Canada, India and China – are busy coordinating the construction of TMT, which is expected to begin in the spring of 2014. Japan plans to assume the construction of the telescope structure and part of the primary mirror.

There are also growing aspirations for Solar-C, a next generation space-based solar observatory that will succeed Hinode. Recently, the solar activity appears to be slipping out of phase from its long sustained 11-year period, which has been attracting global attention because it might eventually cause significant environmental changes. The NAOJ recognizes the importance of such research and is always committed to fulfilling its societal responsibilities.

The FY2012 will mark the completion of ALMA and the 30th anniversary of the Nobeyama Radio Observatory, which has produced some astounding scientific achievements. Astronomy is always rapidly changing, with new telescopes being planned and realized, while those that were once at the frontier of science eventually become obsolete. It is the mission of the NAOJ to respond to these changes and to provide advanced facilities that attract top researchers from around the world so that we can return important scientific results to society.



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