PREFACE

Masahiko HAYASHI
Director General of NAOJ

It is my pleasure to present our Annual Report for the fiscal year 2012.

FY 2012 celebrated the inauguration of ALMA, which has almost finished the installation of the total 66 antennas, and acceptance/commissioning of the receivers and correlators. The inauguration ceremony was held at the Operations Support Facility (OSF) at an altitude of 2900 meters on March 13, 2013 with the attendance of over 400 guests including President Pinera of Chile. From Japan, more than 50 people attended the ceremony. Teru Fukui, Senior Vice Minister of Education, Culture, Sports, Science and Technology, made a speech expressing continued strong support of the Japanese government to ALMA. On the following day, most of the guests visited the Array Operations Site (AOS) at 5000 meters.

ALMA started its open-use early science observations (Cycle 0) with 16 antennas from 2011, and began to deliver its early results from the second half of FY 2012. Although the current angular resolution of ALMA is

only 1 arcsec (1/3600 of one degree), ALMA has already achieved overwhelmingly high sensitivity. ALMA revealed a totally unexpected spiral structure of gas around a low-mass star (similar to the Sun) which is emitted at the end of its life before evolving to a white dwarf. This is a whole new picture of the universe that we have never seen before. We are excited to see what will be discovered by ALMA with further improved resolution and sensitivity.

On the other hand, we had very sad news of the accidental death of Professor Koh-Ichiro Morita in Santiago, a leading scientist in the field of radio interferometer who worked for the realization of Japan' s participation to ALMA by proposing the enhancement of the array with the Atacama Compact Array (ACA). In honor of the late Professor Morita, the ALMA Board gave the name of "Morita Array" to the ACA. We always remember his achievement seeing the array with his name, which brings us small comfort and relief. I believe the only thing we can do is to devote ourselves toward the achievement of maximum scientific results with ALMA.

Meanwhile, Subaru Telescope started test observations with new Hyper Suprime-Cam, a next-generation prime-focus camera with a field of view about 10 times wider than the old one. This "hyper" camera has newly-developed 116 wideband CCDs for astronomical observations and 900 million pixels in total. It will be a powerful tool not only in the search for distant unknown objects where Subaru telescope demonstrates unparalleled strength but also in the high-sensitivity survey of a wide field to study the distribution of dark matter and dark energy which is yet to be explored.

Remarkable scientific results on exoplanets with Subaru Telescope should also be mentioned. Its improved function enabled direct imaging of Jupiter-like gaseous planets and revealed the existence of a giant gaseous planet in a place far from the central star, equivalent to the distance between the Sun and Pluto in the solar system. Also, Subaru successfully imaged a number of protoplanetary disks, many of which have a spiral or ring structure. It is expected that further study using ALMA observation data as well will enhance the understanding of planetary formation.

The Thirty Meter Telescope (TMT) is making steady progress in the preparation for the construction. TMT is an optical-infrared telescope to be built on the summit of Mauna Kea in international partnership of National Astronomical Observatory of Japan (NAOJ), California Institute of Technology (Caltech), University of California (UC), Department of Science and Technology of India, Association of Canadian Universities for Research in Astronomy (ACURA), and National Astronomical Observatories of the Chinese Academy of Sciences. We still have a lot to discuss about the share of contribution to the construction among partners and how to ensure each partner's budget acquisition as planned, etc. This kind of collaborative work is inevitable for a large-scale international project. In spite of various difficulties to overcome, we are pleased to have the opportunity to lead a global project and take the initiative in building a strong organization for TMT construction.

FY 2012 celebrated the 30th anniversary of Nobeyama Radio Observatory and we held a commemoration ceremony in September. The NRO 45-m Telescope has produced significant results such as the discovery of many kinds of new interstellar molecules and finding of evidence for the existence of a massive black hole in the center of a galaxy. Although its aging deterioration is not avoidable, it will still be a front-line telescope with overwhelmingly improved receiver sensitivity.

Also, FY 2012 marks the 10th anniversary of the completion of VERA at the Mizusawa VLBI Observatory for which a commemoration ceremony was held in Oshu, Iwate. VERA provides accurate measurement of the distance and the motion of astronomical objects thousands of light years away from the Sun, thereby revealing detailed kinematics and structure of the Galaxy. A recent result shows that the Sun orbits the Galaxy at a rate 10% faster than previously believed.

The Center for Computational Astrophysics relocated the supercomputer from Mitaka campus to Mizusawa VLBI Observatory at the renewal of the lease. The new supercomputer, named Aterui in tribute to a hero in the Tohoku region where Iwate prefecture is situated, will start operation from FY 2013.

In this time of dynamic change, rapid development is required also in astronomy. While new telescopes are planned and realized one after another, once the most advanced telescopes become soon out of date. In this rapidly changing world, we reaffirm our mission to keep up with global scientific advances and continuously provide frontier facilities for world-wide researchers in order to return the results of research to society as an institute of the Inter-University Research Institute Corporations.

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