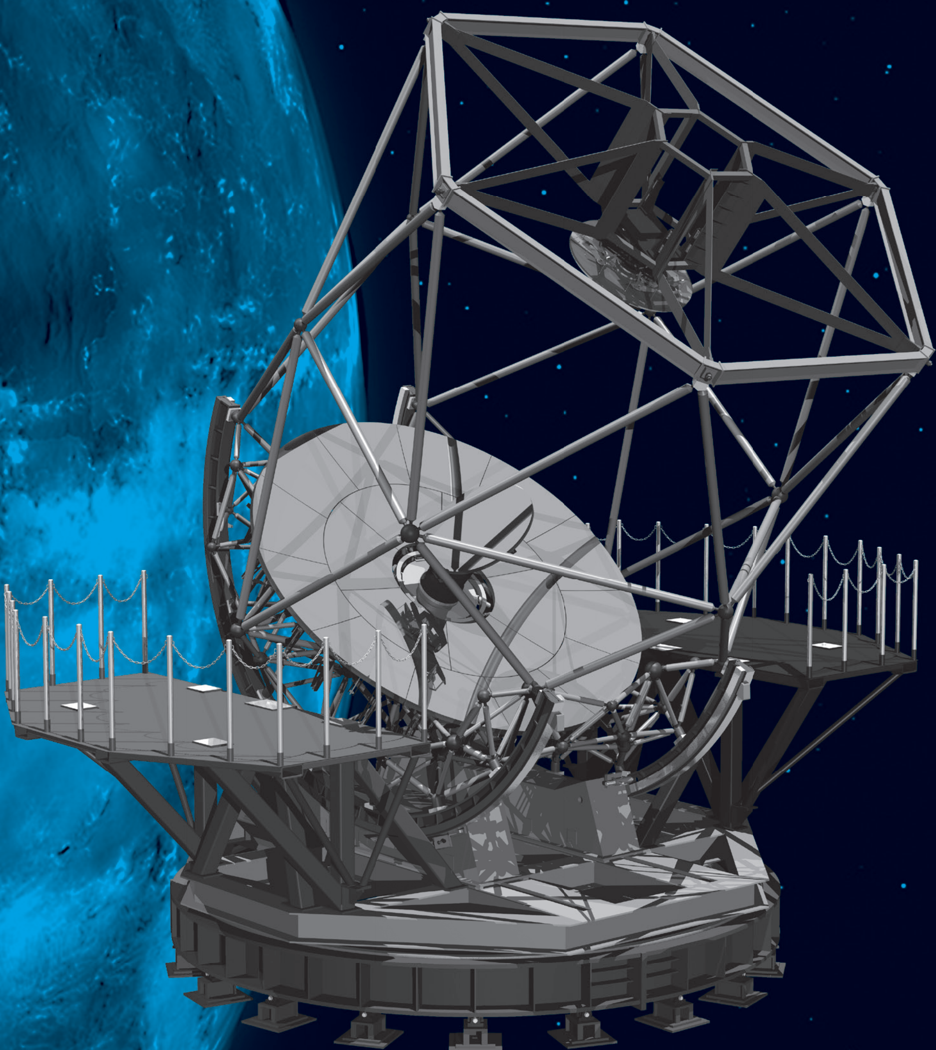
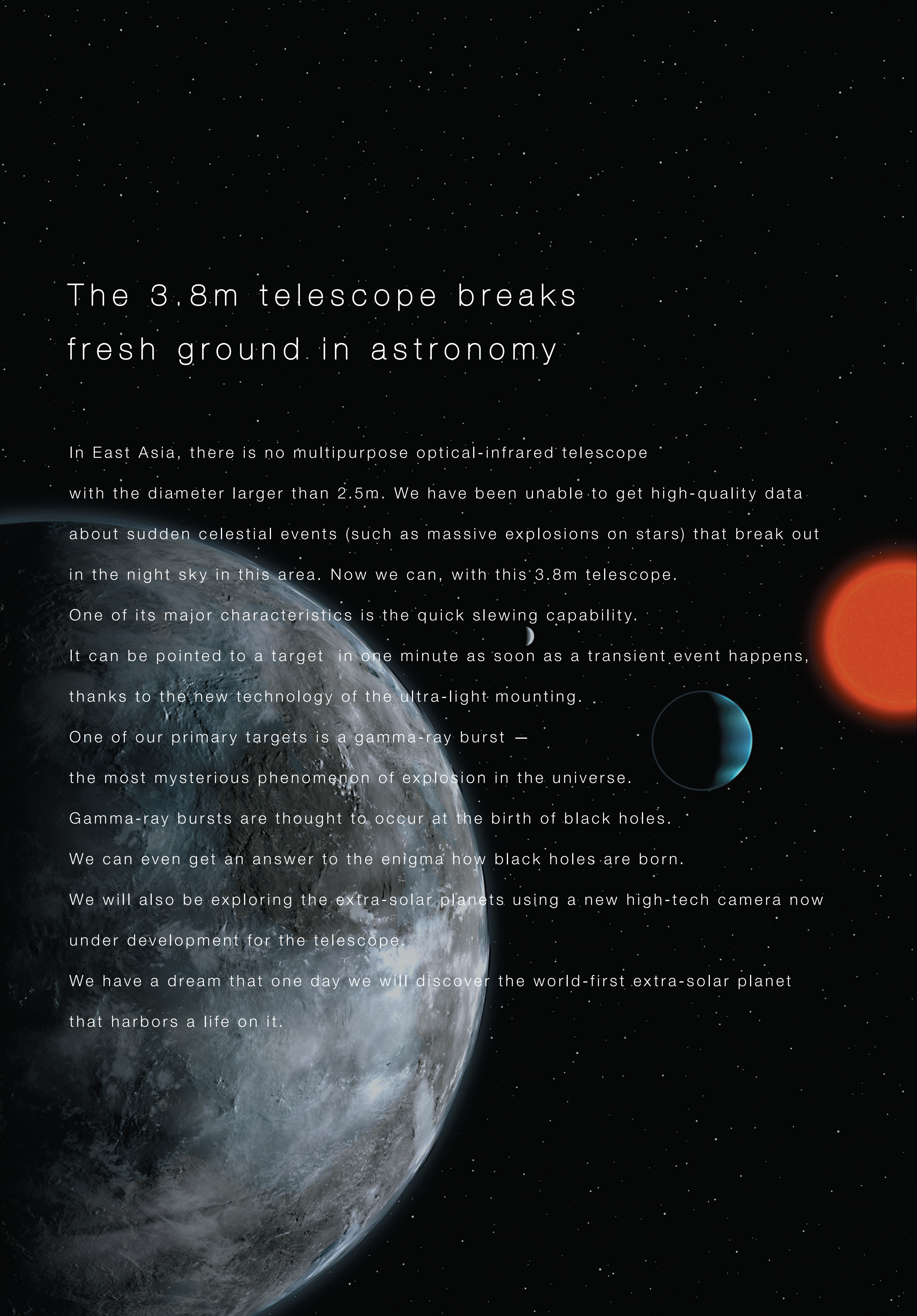
OKAYAMA 3.8M TELESCOPE



The largest in Japan



The 3.8m telescope breaks fresh ground in astronomy

In East Asia, there is no multipurpose optical-infrared telescope with the diameter larger than 2.5m. We have been unable to get high-quality data about sudden celestial events (such as massive explosions on stars) that break out in the night sky in this area. Now we can, with this 3.8m telescope.

One of its major characteristics is the quick slewing capability.

It can be pointed to a target in one minute as soon as a transient event happens, thanks to the new technology of the ultra-light mounting.

One of our primary targets is a gamma-ray burst —

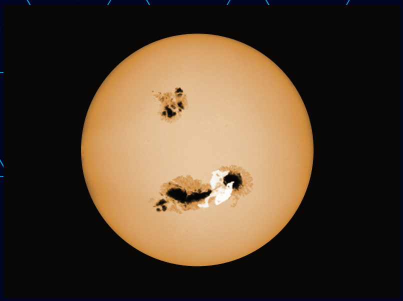
the most mysterious phenomenon of explosion in the universe.

Gamma-ray bursts are thought to occur at the birth of black holes.

We can even get an answer to the enigma how black holes are born.

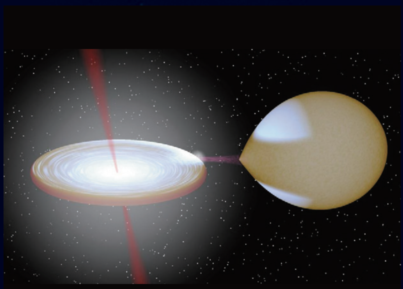
We will also be exploring the extra-solar planets using a new high-tech camera now under development for the telescope.

We have a dream that one day we will discover the world-first extra-solar planet that harbors a life on it.



Objective 1 Superflares

Flares are explosions that occur on the surface of the sun and stars. Superflares are the largest ones whose energies are more than 10 times higher than the largest flare ever observed on the sun. We have revealed superflares do occur on stars similar to our sun. Our next quest is to find out on what kind of stars, in what sort of conditions, and exactly how superflares occur.



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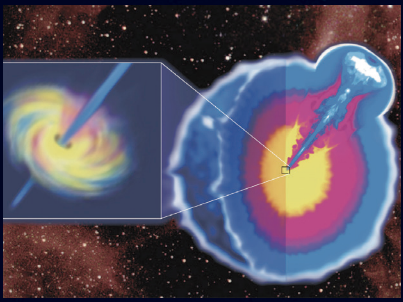
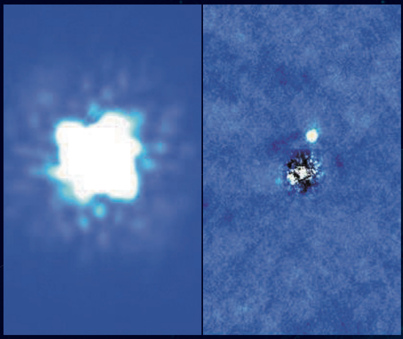
Objective 2 Black Hole Binaries

The black hole binary is the system, where a black hole and an ordinary star orbit each other. In black hole binaries, a structure called "accretion disk" is often formed out of the gas falling from the ordinary star to the black hole. Highly variable X-ray emission is often radiated from inside the accretion disk, as an enormous amount of gravitational energy is released. We have revealed strong variability in similar shapes can be observed in the optical band, too. We will solve the origin of the variability and try to unravel the enigma of the black hole.



Objective 3 Gamma-Ray Bursts

The Gamma-ray burst is the bursting phenomenon of sudden release of strong gamma-rays from a heavenly body, lasting only a few tens of seconds. It is suspected to originate in an explosion of extremely massive stars or in a merger of binary stars which form a black hole. However, the truth is, we really don't know. Gamma-ray bursts sometimes become very bright in the optical band, too, and can be observed even if one occurs at the far edge of the universe. Equally excitingly, they are likely to be related closely to the origin of gravitational waves. Our highly-responsive 3.8m telescope will be very useful to tackle this puzzle.



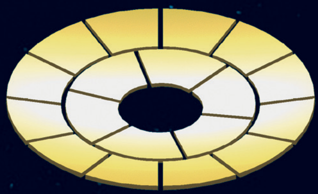
Objective 4 Extra-solar planets

In the last 20 years, astronomers have found clues in thousands of star systems to harbor planets. Unfortunately, the observations to catch the direct light from these planets are still very limited, if any. But we are not far off from investigating these planets with direct observations with modern technology. Our 3.8m telescope team studies the atmosphere and surface environment of the planets orbiting close to a central star, using the cutting-edge instrument SEICA, specifically developed to observe such exoplanets. (Left panel: The planet is embedded in the bright light from the central star in conventional observations. Right panel: SEICA can mask out the bright light and enables us to observe the faint planet).

New astronomy with new high-tech

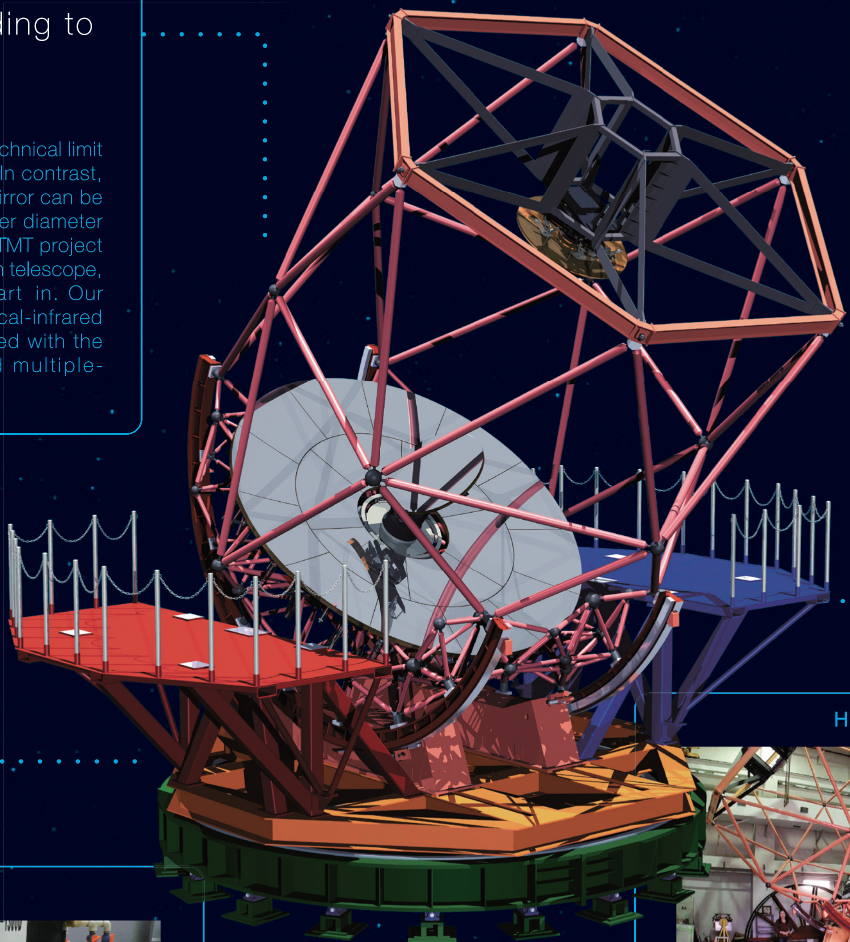
Innovation in technology for observations, such as telescopes, is essential in the development of astronomy. Our pioneering work, armed with world-renowned Japanese high-tech, paves the way to next-generation large telescopes and presents the yet unseen insights of the universe.

> High-tech No.1

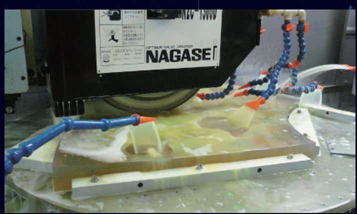


Technology leading to next-generation telescopes

A single-dish mirror has a technical limit for the maximum diameter. In contrast, a multi-panel segmented mirror can be constructed to a much larger diameter for a telescope. Indeed, the TMT project has already started for a 30m telescope, which Japan takes a part in. Our telescope is the largest optical-infrared one in East Asia, equipped with the world-first petal-shaped multiple-segmented mirrors.



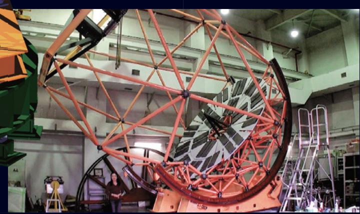
> High-tech No.2



Mirror manufacturing by grinding

Conventionally, mirrors are made with time-consuming polishing process of glasses. In our case, we ground the mirrors with extreme precision to just a step from the final processing, and have achieved a very precise optics. .

High-tech No.3 <



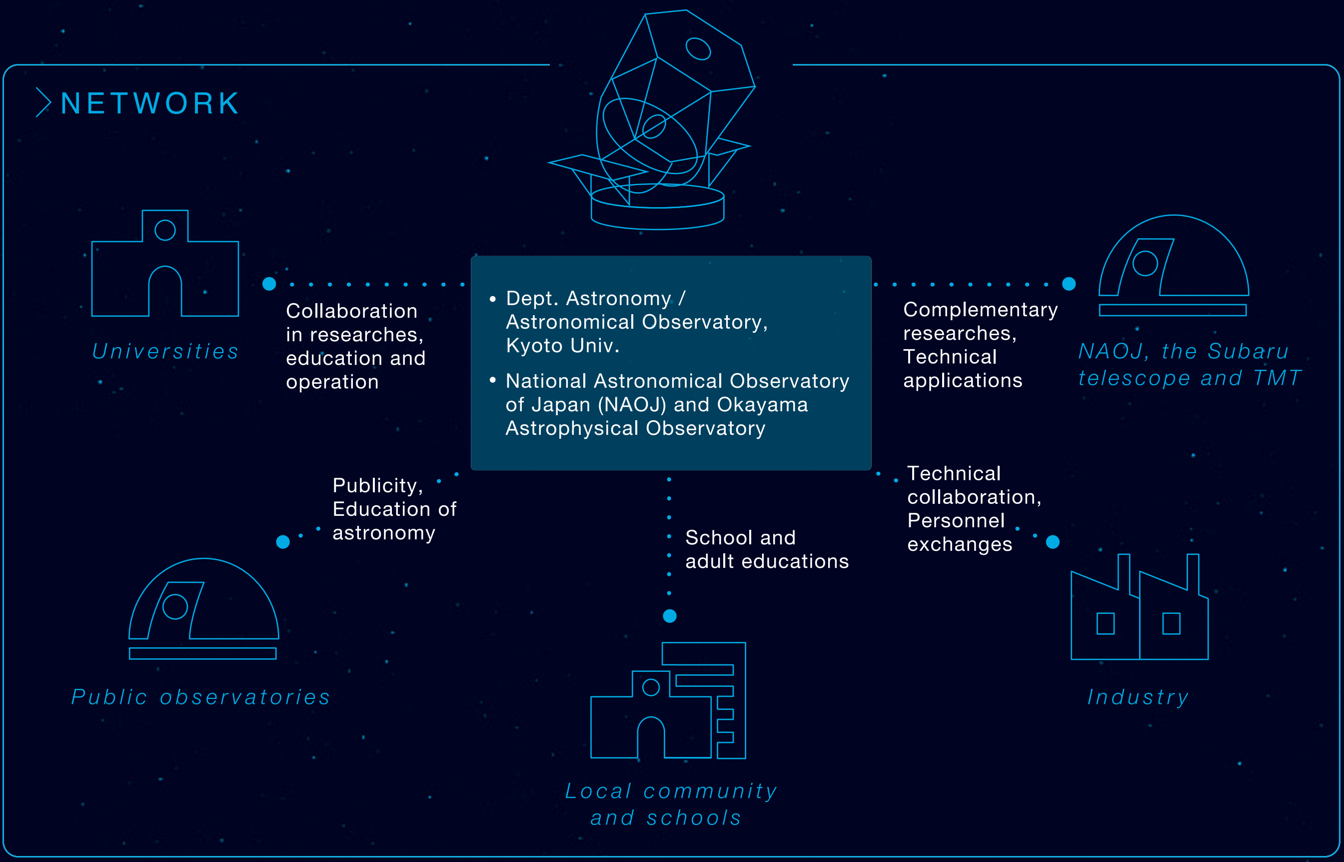
Quick slewing

The supporting mount of the optics has an ultra-light frame structure similar to modern 3-D buildings. The telescope is thus capable of quick slewing to any targets, which is a critical feature to enable us to start observing new burst phenomena in the universe as soon as possible in a matter of seconds.

Location map of the world telescopes with a diameter of over 2.5m

The significance of a responsive 3-m class telescope situated in Japan should be emphasized in the era when the international observation network is being developed to catch transient phenomena in the universe.

NETWORK



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Fund-raising for the Observatories, School of Science, Kyoto University

Donations to the projects, including the 3.8m Observatory, by the Observatories, School of Science, Kyoto University are always welcome. You can get tax relief in any donations to Kyoto University. Contact us by email for any inquiries.

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This brochure was made with the support from Building of Consortia for the Development of Human Resources in Science and Technology (Development of Next-generation Researchers Program), Ministry of Education, Culture, Sports, Science and Technology.

Photo by ESO / JAXA