



Korean Astronomical Facilities & Activities for Research on Space and Universe

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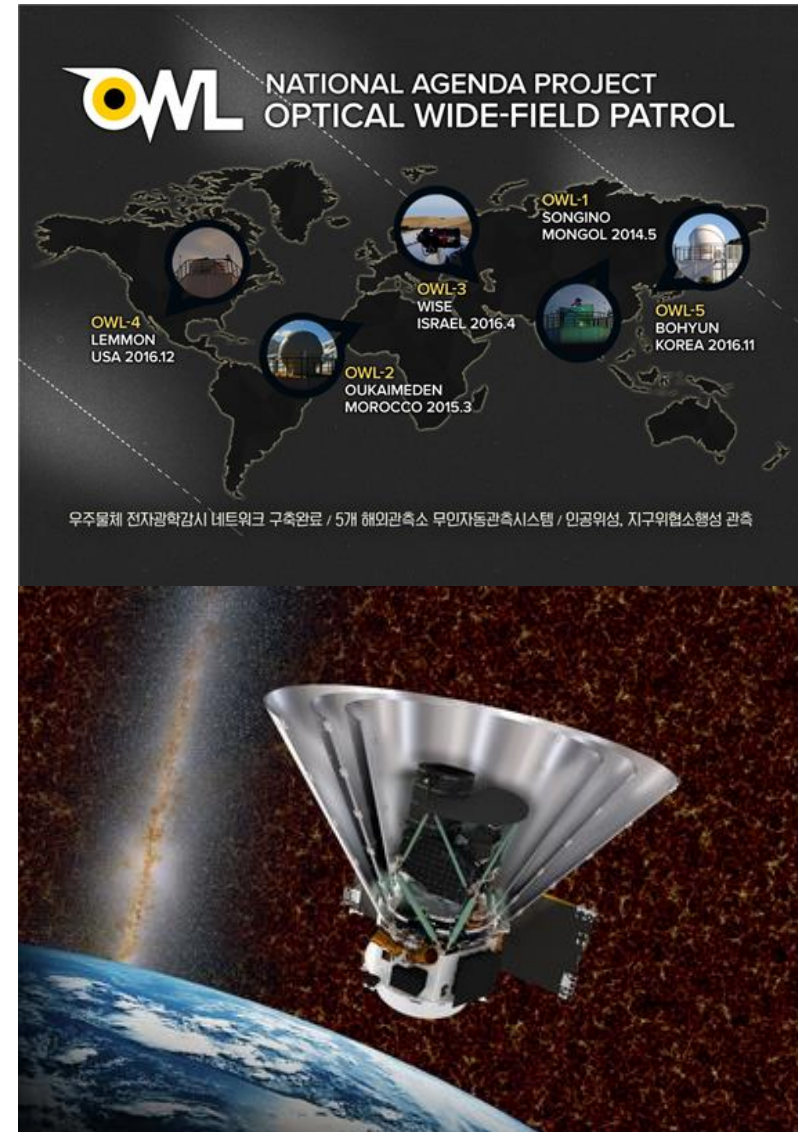
Korea Astronomy and Space Science Inst. (KASI)

66th Committee on the Peaceful Uses of Outer Space 2023

Vienna International Center, Austria.

KASI Activities in Space

- ❖ KASI is the Korean national astronomy and space science research institute
- ❖ Space Situational Awareness Network
 - ◆ OWL-Net to monitor space debris
- ❖ Space Weather
 - ◆ SNIPE (launched into orbit recently)
- ❖ Lunar & Planetary Science
 - ◆ Danuri (KPL0) under collaboration w/ KARI to investigate lunar surface
- ❖ Astrophysics
 - ◆ SPHEREx under partnership w/ NASA for infrared cosmology study



KASI Facilities

❖ KASI operations and facilities cover wide spectrum

- ◆ Wavelength: Optical to Radio (and beyond)
- ◆ Altitude: Ground to Space
- ◆ Operation Mode: Korean national to International partnership
- ◆ Sites: Local to Global (Worldwide)



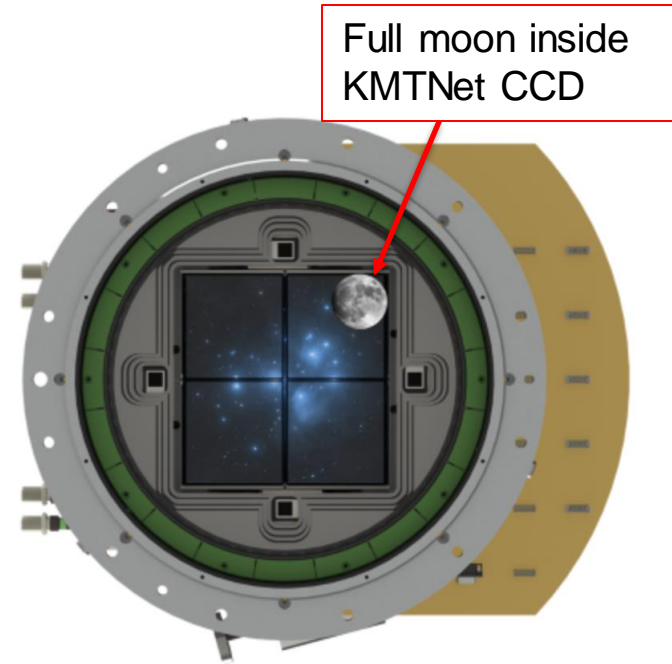
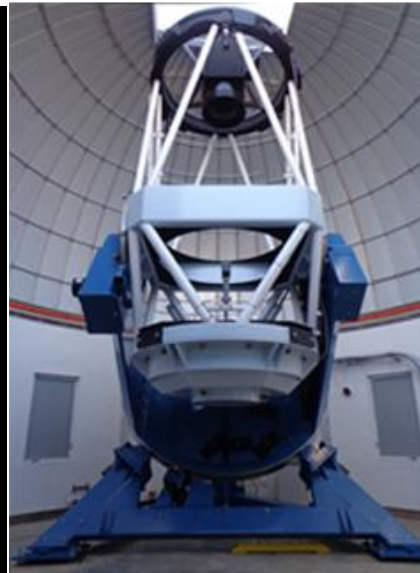
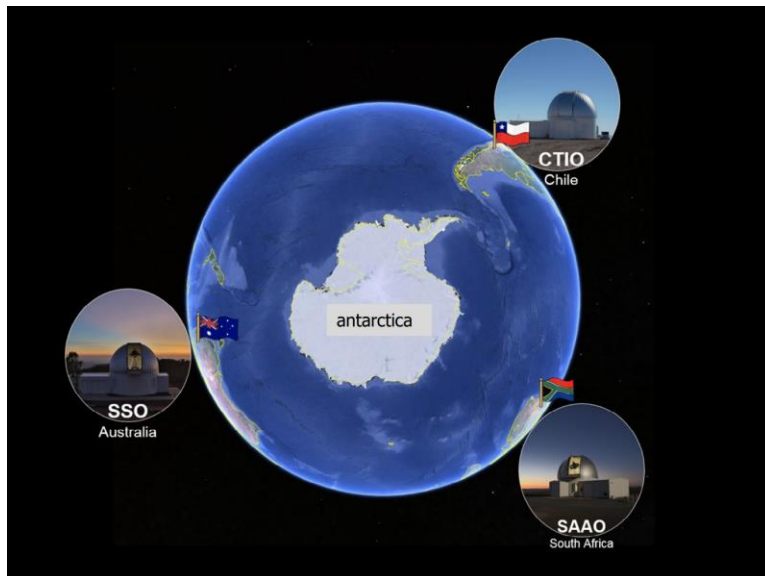
KASI's global network

- ❖ KASI operates (directly and indirectly) many ground-based observing facilities worldwide
 - ◆ Gemini Observatories are key optical facilities
 - ◆ ALMA and JCMT are key radio facilities
 - ◆ KASI will expand its network to include Rubin and GMT in Chile



Korea Microlensing Telescope Network

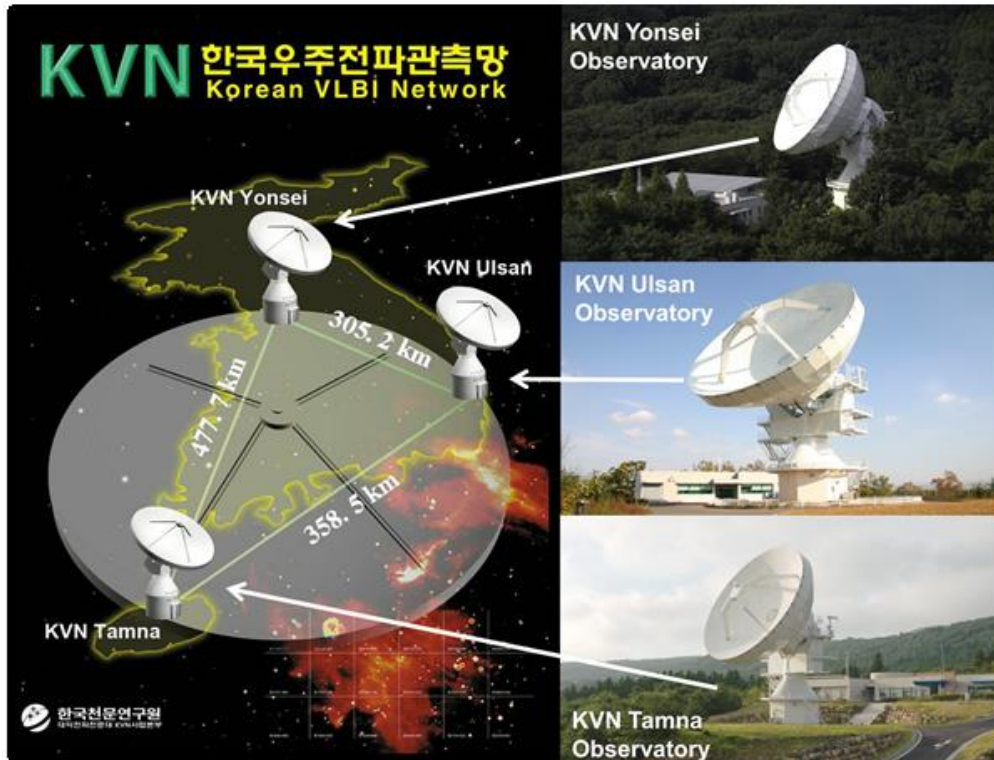
- ❖ Korea Microlensing Telescope Network (KMTNet, 2015~)
- ❖ 3x 1.6m Optical Wide Field Telescopes at Chile, Australia, and South Africa
 - ◆ 24 hour continuous coverage of southern night sky
 - ◆ 340 million pixel wide field CCD camera covering 2x2 deg of sky
 - ◆ Observing transients (supernovae, variable stars), asteroids, etc.



Korean VLBI Network

❖ Korean VLBI Network (KVN, 2009~)

- ◆ Three stations at Yonsei (Seoul), Ulsan, and Tamna (Jeju)
- ◆ To expand to include 4th station at Peyongchang (to be commissioned in 2024)
- ◆ Operates in 22, 43, 86, 129, and 230 GHz
- ◆ Connect with the East-Asian VLBI Network and Beyond



International Gemini Observatory

- ❖ 2x (twin) 8.1m Optical Infrared Telescopes at Hawaii, US and Cerro Pachon, Chile
- ❖ Enabling exciting observation programs over the entire (north + south) night sky

KASI 한국천문연구원
Korea Astronomy & Space Science Institute

Mauna Kea

Hilo, Hawaii

INTERNATIONAL GEMINI OBSERVATORY

KASI is Here

Cerro Pachon

La Serena, Chile

NSI **NRC-CMRC** **LNA** **Ministerio de Ciencia, Tecnología e Innovación Argentina** **KASI** 한국천문연구원
Korea Astronomy & Space Science Institute

Future: Giant Magellan Telescope

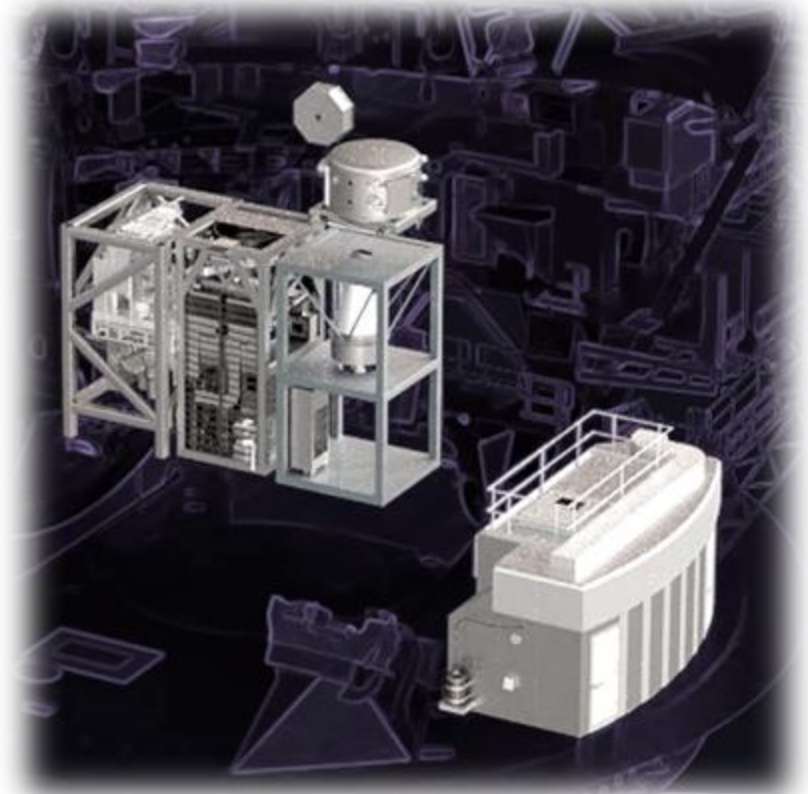
- ❖ KASI is a proud founding partner of Giant Magellan Telescope (GMT) since 2009, along with 12 institutes in Australia, Brazil, Israel, and the US.
- ❖ GMT will be one of the biggest eyes to the Universe on Earth, expected to commence operations in the 2030's.



Future: Giant Magellan Telescope

❖ To innovate the humanity's knowledge on the space and the Universe

- ◆ KASI actively contributes to the development of scientific research topics for GMT
- ◆ KASI is developing high resolution optical and infrared spectrographs for GMT



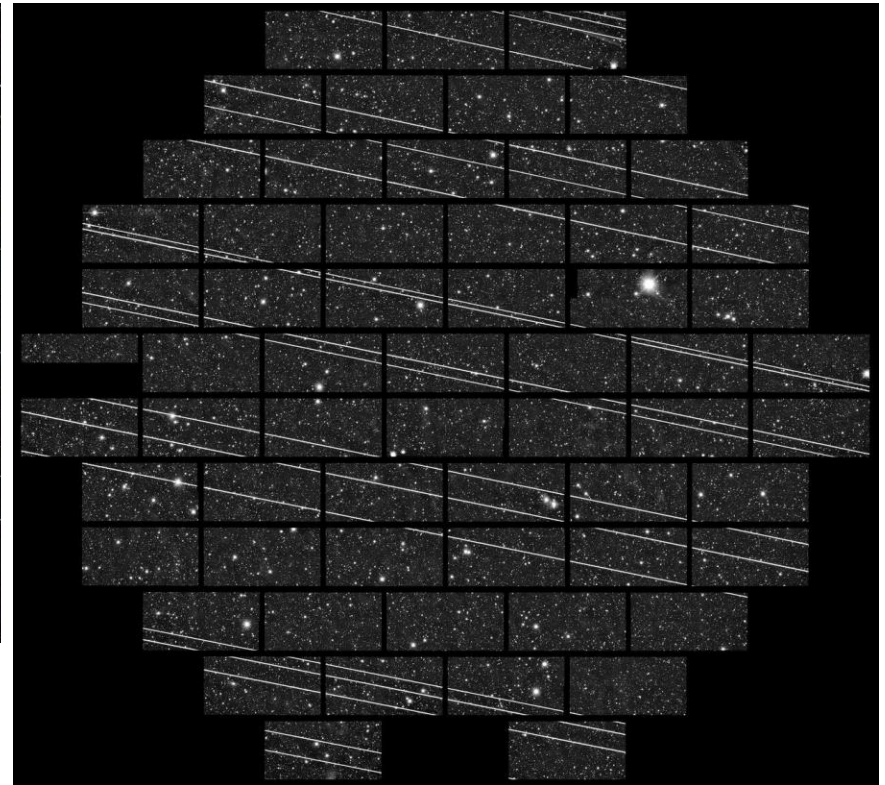
Satellites' Impact of Ground-based Astronomy

- ❖ Satellites trails captured by KASI telescope in Korea



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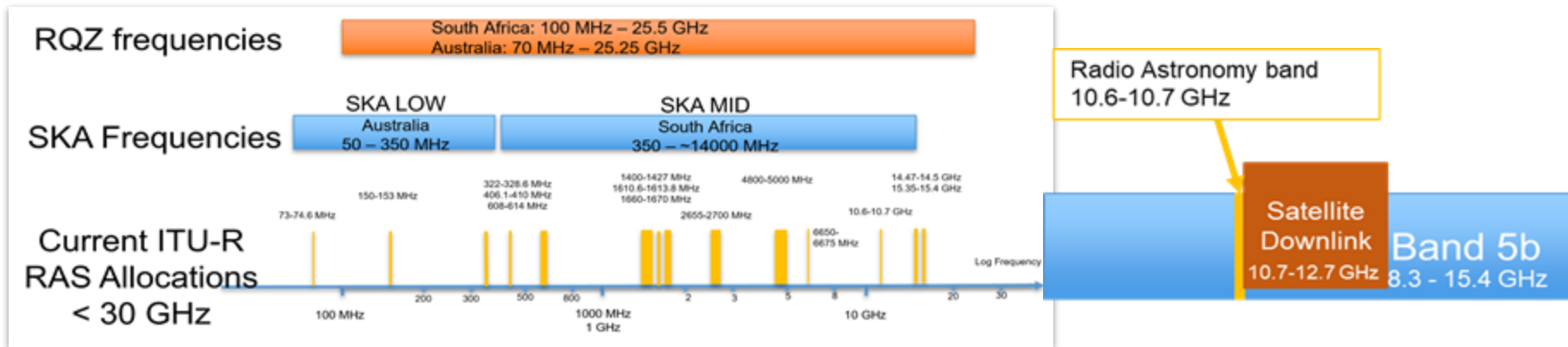
- ❖ Satellites trails captured by DECam/CTIO in Chile



DECam/CTIO/NSF's NOIRLab

Satellites Impact on Radio Astronomy

- ❖ Satellites radio emission can interfere radio astronomy observation
- ❖ Radio frequency bands of SKA, KVN, and mega-constellations



❖ Some overlaps of KVN frequency bands

KVN Frequency	Frequency	Band	Use	Protected RAS bands (primary)
	10.7 - 12.75 GHz	Ku	Users	(p) 10.6-10.7 GHz
18-26 GHz	19.7 - 20.2 GHz	Ka	Users/GW	(p) 22.21 - 22.5 GHz
35-50 GHz	37.5 - 42.5 GHz	V	Gateways	(p) 42.5 - 43.5 GHz
	71.0 - 76.0 GHz	E	Gateways	(p) 76 - 77.5 GHz

- 86-116 GHz
- 125-175 GHz
- 210-275 GHz

Source: IAU CPS/SKAO

Sustainable Research on Space and Universe

- ❖ KASI recognizes the importance of sustaining research on space and the universe to fulfill its mission and continue unraveling the mysteries of the Universe
- ❖ KASI and ROK understand the importance of “Dark and Quiet Skies Protection”
- ❖ KASI supports the IAU CPS activities
- ❖ KASI believes that protection of Dark and Quiet Skies forms the foundation of “Astronomy for All”, which is in line with the spirit of COPUOS.

Thank you