VLBI, or Very Long Baseline Interferometry, is a technique that uses multiple radio telescopes to very precisely measure the Earth's orientation . VLBI – is a phenomenally complex but powerful tool. By linking together radio telescopes from around the world, astronomers can see the Universe in unprecedented detail. VLBI networks have studied exploding stars and powerful gas jets driven by supermassive black holes in the hearts of galaxies.

How it was developed?

. It was originally invented back in the 1960s to take better pictures of quasars, but scientists soon found out that if you threw the process in reverse, you could measure how the ground beneath the telescopes moves around, how long days really are, and how the Earth wobbles on its axis as it revolves around the sun.

Working mechanism of Vlbi

. Conceptually, geodetic VLBI uses radio waves from distant quasars at known positions on the celestial sphere and measures the difference in the time of arrival of signals from those quasars at stations (radio observatories) on the Earth's surface. Such data provide information on how the geometry of a network of stations evolves in time. This time-variable geometry can be inverted to study geophysical processes such as the Earth's rotation and plate tectonics and can be used to define a global terrestrial reference frame with high precision.

VLBI uses a hydrogen maser atomic clock, the most accurate clock on Earth, which loses only one second in 100 million years.

Some of the scientific achievements of VLBI

1. Motion of the Earth's tectonic plates

2. Regional deformation and local uplift or subsidence.

3. Definition of the celestial reference frame

4. Variations in the Earth's orientation and length of day

5. Maintenance of the terrestrial reference frame

6. Measurement of gravitational forces of the Sun and Moon on the Earth and the deep structure of the Earth

7. Improvement of atmospheric modelshe sun

8. The first resolved images of blackhole.

On going projects

*1.The VLBI community is currently working on a tremendous improvement of the VLBI technique, called VLBI Global Observing System (VGOS), and based on new fast slewing radio telescopes and increased observation bandwidth resulting in astrometric and geodetic quantities of unprecedented accuracies*.

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