Huge Water Reservoir Found on Mars

Scientists have discovered one of the largest water reservoirs on Mars, in the form of ice layers buried over a kilometer beneath the surface.

Key points

- This discovery was made using **measurements gathered by the Shallow Radar (SHARAD) on NASA's Mars Reconnaissance Orbiter**.
- SHARAD emits radar waves that can penetrate up to a mile and a half beneath the surface of Mars.
- They **found layers of sand and ice** that were as much as 90% water in some places.
    - The layers formed when ice accumulated at the poles during past ice ages on Mars.
    - Each time the planet warmed, a remnant of the ice caps became covered by sand, which protected the ice from solar radiation and prevented it from dissipating into the atmosphere.
- This finding is particularly important because the layers of ice are record of past climate on Mars.
    - Studying the geometry and composition of these layers could tell scientists whether climate conditions were previously favourable for life.

Mars Reconnaissance Orbiter (MRO)

- MRO was launched in 2005, on a search for evidence that water persisted on the surface of Mars for a long period of time.
- It contains a host of scientific instruments such as cameras, spectrometers, and radar, which are used to analyze the landforms, stratigraphy, minerals, and ice of Mars.
- The spacecraft carries mainly six instruments:
    - **(HiRISE) High Resolution Imaging Science Experiment:** This visible camera reveals small-scale objects in the debris blankets of mysterious gullies and details of geologic structure of canyons, craters, and layered deposits.
    - **CTX (Context Camera):** This camera provides wide-area views to help provide a context for high-resolution analysis of key spots on Mars provided by HiRISE and CRISM.
    - **MARCI (Mars Color Imager):** This weather camera monitors clouds and dust storms.
    - **CRISM (Compact Reconnaissance Imaging Spectrometer for Mars):** This instrument splits visible and near-infrared light in its images into hundreds of "colors" that identify minerals, especially those likely formed in the presence of water, in surface areas on Mars not much bigger than a football field.
    - **MCS (Mars Climate Sounder):** This atmospheric profiler detects vertical variations in temperature, dust, and water vapor concentrations in the Martian atmosphere.
    - **Shallow Radar (SHARAD) sounder:** It seeks geologic boundaries in the first tens to thousands of meters (up to 4 kilometers) below the surface of Mars.
        - SHARAD probe the subsurface using radar waves using a 15-25 MHz frequency band in order to get the desired high depth resolution.
        - The radar wave return, which is captured by the SHARAD antenna, is sensitive to changes in the electrical reflection characteristics of the rock, sand, and any water

present in the surface and subsurface. Water, like high-density rock, is very conducting, and will have a very strong radar return.
- Changes in the reflection characteristics of the subsurface, such as layers deposited by geological processes in the ancient history of Mars, will also be visible.
- SHARAD was provided by the **Italian Space Agency (ASI)**.