

All About Ice and Water in Our Solar System

- Earth is a special place because it has liquid water at its surface. All life as we know it requires liquid water to survive. Earth also is special because water exists in its three forms – states - at the surface: ice (solid), liquid (water), and gas (water vapor).
- One reason water is weird is that its solid form – ice – is less dense than its liquid form. Water expands when it freezes. This means ice floats! If ice sank, our oceans would freeze from the bottom up.
- Scientists are exploring our solar system searching for liquid water. If they find evidence of water, life may exist in that location. They also are looking for water ice because that is a resource for us when we travel in our solar system.
- Scientists use different tools to search for water or water ice. They collect images of the surface and look for features made by water (like channels) or features made of ice (like ice caps or floating ice “sheets”).
- Based on our exploration of the solar system, *liquid* water may occur in a few places, and many planets and moons and comets have water ice and ice of other substances like ammonia and carbon dioxide (dry ice!).
- Comets contain different ices – ices made of water and carbon dioxide, methane, ammonia.
- When a comet hits a planet or moon, it delivers its ice! If our Moon has water ice, it probably came from comets!
- Mercury’s surface is too hot to have water or ice. Deep craters on Mercury’s poles, however, never get direct sunlight and may be cold enough all the time to have water ice.
- Our Moon also is too hot for liquid water or water ice to exist at its surface – except in deep, dark craters at its poles.
- Because Mars has a very thin atmosphere liquid water would vaporize.
- Mars may have had a thicker atmosphere and liquid water flowing into deep oceans on its surface billions of years ago; scientists observe features like channels that are now dried up. Now, the water may be trapped as ice in the soil of Mars.
- Mars has polar ice caps; the north pole ice cap contains ice made of water and ice made of carbon dioxide.
- Saturn’s rings are made of ice chunks (and some rocks) that range in size from the size of a fingernail to the size of a car and many of Saturn’s moons are believed to have water ice.
- Enceladus, one of Saturn’s moons, reflects almost 100 percent of the sunlight that strikes it because it’s covered in water ice that reflects sunlight like freshly fallen snow. Enceladus has “ice volcanos” that spew water ice into Saturn’s rings.