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Moon plays key role in maintaining Earth's magnetic field

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The Moon plays a key role in balancing the magnetic field of earth.
 (photo TOI)

LONDON: The Moon may play a major role in maintaining Earth's magnetic field that permanently protects us from the charged particles and radiation that originate in the Sun, according to a new study.

The magnetic field is produced by the geodynamo, the rapid motion of huge quantities of liquid iron alloy in the Earth's outer core.

To maintain this magnetic field until the present day, the classical model required the Earth's core to have cooled by around 3,000 degrees Celsius over the past 4.3 billion years.

Now, a team of researchers from the National Centre for Scientific Research (CNRS) and Universite Blaise Pascal in France suggests that, on the contrary, its temperature has fallen by only 300 degrees Celsius.

The action of the Moon, overlooked until now, is thought to have compensated for this difference and kept the geodynamo active, researchers said.

The classical model of the formation of Earth's magnetic field raised a major paradox. For the geodynamo to work, Earth would have had to be totally molten four billion years ago, and its core would have had to slowly cool from around 6,800 degrees Celsius at that time to 3,800 degrees Celsius today.

However, recent modelling of the early evolution of the internal temperature of the planet, together with geochemical studies of the composition of the oldest carbonatites and basalts, do not support such cooling.

With such high temperatures being ruled out, the researchers propose another source of energy in their study.

Earth has a slightly flattened shape and rotates about an inclined axis that wobbles around the poles. Its mantle deforms elastically due to tidal effects caused by the Moon.

The researchers show that this effect could continuously stimulate the motion of the liquid iron alloy making up the outer core, and in return generate Earth's magnetic field.

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The Earth continuously receives 3,700 billion watts of power through the transfer of the gravitational and rotational energy of the Earth-Moon-Sun system, and over 1,000 billion watts is thought to be available to bring about this type of motion in the outer core.

This energy is enough to generate the Earth's magnetic field, which together with the Moon, resolves the major paradox in the classical theory, researchers said.
