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The possible influence of the Earth's magnetosphere on lunar surface hydration

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Evidence of discoveries involved with lunar water (e.g., polar ice and OH-/H_2O) have been observed in recent years. The dynamic H_2O loss and rehydration cycle over a lunar day indicated solar wind hydrogen should be an important source of lunar surface water. Solar wind is shielded over a period of 3-5 days as the Moon passes through the Earth's magnetosphere, during which a significant loss of hydration is expected from previous works. Here we study lunar hydration inside the magnetosphere using orbital spectral data, which unexpectedly found that the polar surficial OH/H_2O abundance remains at the same level when in the solar wind and in the magnetosphere. We suggest that particles from the magnetosphere (Earth wind, naturally different from solar wind) contribute to lunar hydration. From lunar orbital plasma observations, we find the existence of optimal energy ranges, other than 1 keV as previously thought, for surface hydration formation. These optimal energy ranges deduced from space observations may provide strong implications for laboratory experiments simulating lunar hydration processes.