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# Lunar Effects on the Solar Wind Flow in the Nearby New Moon Phases at Earth's Magnetopause

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Magnetopause controls the flow of mass, momentum and energy entry of the Earth's magnetosphere. Solar wind parameters (solar wind speed, density, temperature, pressure, magnetic field components) play a significant role in understanding dynamic structure of this plasma region. In this study, we determined the suitable satellite locations when satellites pass through magnetopause at different new moon phases.For example, in the case of 11 January 2013 THEMIS D satellite moves out of the earths magnetopause. Figure 1. shows Themis satellite orbit for January 11, 2013. In this case the THEMIS D satellite moves out from the magnetopause, the change of solar wind parameters between 18: 45-19: 30 UT was investigated. In this process, temperature increased approximately 5 times. These results are in harmony with Chaston's study [1]. With this results, we can assume that because of lunar wake the magnetopause is expanding towards sun( outside from the earth). If we gather all this information, we can examine whether the solar wind is inside or outside of the magnetopause by looking at the shock wave or the reaction of Lunar Wake, just same as when it was outside of the magnetopause except average ion temperature.

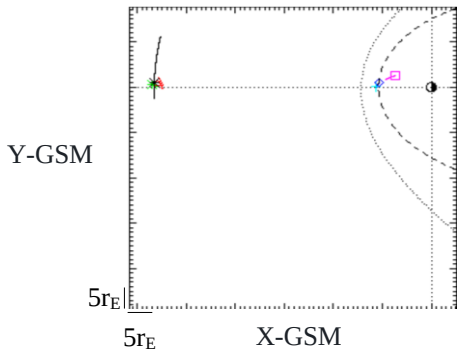


**Figure 1.** The orbits of THEMIS satellites projected onto the x–y plane in GSM coordinate system for 18.00-20.00 UTC interval on 11 January 2013. Object in the origin is representing the Earth, purple square is THA, red triangle is THB, green asterisk is THC, turquoise cross is THD, blue rhombus is THE, black asterisk is Moon, dotted lines are Bow Shock, dashes are Earth's magnetopause. Image could be found in http://themis.ssl.berkeley.edu/

If there are sudden and high increases in average ion temperature during these changes (the number density and the z component of the magnetic field tensor reaching the local maximum or minimums opposite each other), we could say that the solar wind is outside the magnetopause, if average ion temperature is nearly stable, it is in the magnetopause.

## References

[1] C. Chaston, "Wave Driven Transport of the Solar Wind into the Magnetosphere", 2008 THEMIS Science Nuggets, igpp.ucla.edu.