Attached is the code I used to calculate whether or not the satellite goes into a dark spot. My program didn’t find anything that would be in the eclipse at that altitude, but it found some at different altitudes. Here are some results for some radii that I found:

(Note: All True Anomalies in Degrees)

R = 6978 km

None

R = 6700 km

Found possible satellite eclipse during Winter Solstice at trueAnomaly = 81

Found possible satellite eclipse during Winter Solstice at trueAnomaly = 82

Found possible satellite eclipse during Winter Solstice at trueAnomaly = 83

Found possible satellite eclipse during Winter Solstice at trueAnomaly = 84

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R = 6750 km

Found possible satellite eclipse during Summer Solstice at trueAnomaly = 253

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