

# Upper Atmosphere Varieties Study Using Long-term Data of Space Debris in-orbit

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It's a general method for studying upper Atmospheric characteristics and varieties to analyze satellite orbit elements change because atmospheric drag is important factor to affect decaying of the satellite orbit in LEO. Many atmospheric models were achieved based on orbital data analysis, such as Jacchia's CIRA72 and MET models, etc. By analysis, various characteristics including 11-year cycle, half-year cycle, day-night variety could be discerned and summarized to be experiential equations. The cause of some characteristics of them are still keep-unknown.

Now more and longer orbital data is added and more detailed and long-term data analysis is possible in atmospheric study. We could not only speculate atmospheric change regularities, but also acquired experience for exactly predicting satellite orbit. In this thesis, the author chose a debris with forty-years orbital data to try to analyze and distinguish periodicities of atmospheric characteristics. Some relations between orbital decaying and atmosphere were verified and some atmospheric characteristics and causes were discussed.