Accuracy of earth's thermospheric neutral density models

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Abstract: Atmospheric drag remains the dominant uncertainty for low altitude satellite precision orbit determination. Empirical models are used to estimate satellite drag. Model accuracies have shown little improvement in the past 35 years. A new Jacchia-Bowman 2006 (JB2006) empirical model has been developed as part of the Air Force Space Command's High Accuracy Satellite Drag Model (HASDM) program. Significant new model features of JB2006 are solar indices based on satellite EUV and FUV sensors and an improved semiannual variation. This new model is compared to historic models vs altitude, latitude, local time, day of year and solar and geomagnetic conditions. Data are from a unique highaccuracy set of thermospheric neutral densities with one-day resolution, obtained from tracking of 38 satellites. The evaluation is carried out for the period 1997 to 2004, when the specific solar indices for JB2006 were available. The results provide improved understanding of quantitative relations between current solar inputs and the response of the thermosphere. New formulations incorporated into the JB2006 lead to a capability to more accurately specify thermospheric density.

Year: 2006
Source title: Collection of Technical Papers - AIAA/AAS Astrodynamics Specialist Conference, 2006
Volume: 1
Page : 422-441
Link: Scorpus Link
Document Type: Conference Paper
Source: Scopus

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