An overview of CHAMP radio occultation analysis at JPL

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The analysis and study of GPS radio occultations (RO) at JPL can be categorized under five overlapping activities: (1) Routine processing of available GPS occultations from all occultation satellites. This routine processing includes precise orbit determination, calibrations, retrievals, and quality control. (2) Validation of RO against other models and measurements such as NCEP, ECMWF and radiosondes, and between different platforms (e.g., CHAMP and SAC-C). (3) Testing various receiver tracking loops which include different "fly wheel" modes in the lower troposphere. (4) Testing various retrieval algorithms which include radio holography, backpropagation and a combination thereof. (5) Pursuing various scientific investigations such as the construction of climatologies of various atmospheric parameters at various time and spatial scales, observability and characterization of the planetary boundary layer, detection and categorization of gravity waves, etc.

In our talk we will summarize these activities in the context of the CHAMP occultation data analysis performed over the past year. In particular, we will examine the daily number of occultations obtained from CHAMP and the various failure modes and their causes. We will examine certain error sources (such as the non-perfect differencing of the CHAMP oscillator clock) and their effects on the retrievals. We will compare CHAMP retrievals to weather analyses, radiosondes and SAC-C. Such comparisons allow us to set upper bounds on RO retrieval errors and to identify possible biases. Sources of such biases and means of reducing or eliminating them are discussed. Our presentation will also examine the dynamics of the CHAMP signal in the lower troposphere, multipath effects, and its implications on the depth and accuracy of retrievals in that region.