Lunar Prospector mapping-phase orbit determination

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This paper details the model, method and results for lunar satellite orbit determination (OD) with the newly developed OD software PASAX. Lunar Prospector (LP) one-week S-band two-way doppler and range observations during the norminal mission will be used for the OD. Prior to the OD, LP orbital variation during this week will be analysed. During the OD, the accuracy for the OD and the orbit prediction will be investigated in great details. Orbit determination comparison with different gravity field, different planetary ephemeredes and different strategies will be examined. The OD results on two extreme geometries, i.e., when the orbit plane is perpendicular or parallel to the Earth-Moon line, will be discussed. Comparing the orbit on the overlap period indicates that the OD accuracy is on meters level. The range rate O-C residual is about 0.5mm/s close to the actual measurement noise. The position difference of orbit solutions produced by PASAX and GEODYN softwares is within 2m (1-Sigma).