Detection Efficiencies of Low-magnification Events in MOA-II Data

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Abstract: To date, nearly 20 exoplanets have been discovered via gravitational microlensing method. The statistical analysis using the 10 planets among these discoveries indicates that cold Neptunes are more common than Jupiters beyond the snow line (Sumi et al. 2010). Gould et al. 2010b derived the frequency of planets beyond the snow line from the analysis of 13 high-magnification events including 6 planets. Although the frequency of planets beyond the snow line which are hardly accessible by other techniques has been gradually understood from these statistic analysis, the uncertainty of the frequency of plantes is still large. More accurate frequency of planets beyond the snow line is required to constrain the planetary formation model. Gould et al. 2010b analyzed only high-magnification events. They conduct the high cadence observation around the peak of high-magnification event not depening on if there is any planetary signal or not. So they can be treated as controlled sample and the evaluation of the detection efficiencies in these high-magnification events is straightforward. In the case of low-magnification events, on the other hand, the calculating detection efficiencies is complicated because observational cadences are changed by responding the anomaly alerts. Since the half of the planetary microlensing events have been discovered in low-magnification events that are more sensitive to low mass planets, it is very important to include low-magnification events in the statistically analysis. We are currently working on evaluating the frequency of planets including the low-magnification events in MOA-II data. We select the homogeneous event sample with and without planetary signal and simulate the observation, i.e, survey, anomaly detection, issuing alerts and follow-up observation. Here, we present the current status of the analysis.