[IS3] On periodicity hypothesis for terrestrial impact cratering rates

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A database of impact craters becomes available with more accurate and more precise age estimates due to the new decay constant. We present a new way to analyze the impact cratering rate as an oscillator in time domain. This technique aims to produce an accurate frequency of an oscillator whose phase is modulated and to reveal the slowly varying phase function.
Having applied the technique to recent cratering records which are grouped into 6 subsamples by criteria on the age and diameter of impact craters, we find the presence of a ~ 26 Myr periodicity in the impact cratering rate over the last ~ 250 Myr. Such a periodicity can be found consistently in the subsamples regardless of the lower limit of the diameter up to $D \sim 35$ km. We have also calculated the period of the impact cratering rate using the Lomb-Scargle periodogram method, which results in similar periods. The Lomb-Scargle periodogram method yields slightly more scattered periods, implying that our technique is more robust and stable than the Lomb-Scargle periodogram analysis. As for the reproduce $f(t)$, we find that its typical magnitude of $\varepsilon \overline{f(t)}$ is much smaller than that of the frequency. Therefore, we conclude that the impact cratering rate may be regarded as unimodal.

[IS4] First stars and near infrared extragalactic background light (EBL)

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Recent WMAP results of CMB polarization indicate that the reionization of the Universe occurred at ~17 or earlier. The reionization could be caused by UV photons from massive first stars (Population III stars). Individual pop.III stars are too faint to be observed, however, integrated light of pop.III stars constitutes background light, which was already observed by IRTS/NIRS and COBE/DIRBE.
The observed spectrum of near infrared EBL is stellar but has a spectral jump around 1mm. Significant fluctuations that have a specific angular scale of 2 degree were also detected.
We discuss the cosmological implications of the near infrared EBL and also present the prospect of the future observation with space born telescope.