

Terrestrial Impact Cratering Chronology

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To date, 245 terrestrial impact structures have been cataloged. We have recently compiled up-to-date listings of impact crater properties, and from these we have selected 192 well-defined impact structures. Our crater listings supercede previous compilations, reflecting recent additions and corrections to the previously available data. Because terrestrial craters are readily modified, or "vanish", due to active processes (such as erosion, sedimentation, and tectonic drift), it is important to realize that the terrestrial impact record has strong, multiple biases which make clear, direct interpretations difficult. For this reason, we decided to analyze the impact structures found just in Australia, Europe, and North America; these have been relatively stable for considerably long geological periods, and thus have been best preserved. With our newly compiled database in hand, we examined the number and diameter distributions of the craters, as a function of geological epoch. We confirm a close correlation between the geological epoch boundaries, the epochs of mass extinctions in the fossil record, and the "timing" of impacts. We also found that the cumulative flux of objects larger than 20km to be $1.77 \times 10^{-15} \text{km}^{-2} \text{yr}^{-1}$ on the Earth's surface, over the last 120 Myr, which is much smaller than the published values in McEwen (1997) and Shoemaker (1998) ($5.6 \pm 2.8 \times 10^{-15} \text{km}^{-2} \text{yr}^{-1}$). For craters larger than 50km, we found that the apparent cumulative flux for the Earth, since the Precambrian era, is ~ 40 times smaller than the corresponding value for the Moon. If we assume that the Earth and the Moon have suffered the same level of bombardment, i.e. the same impact cratering flux, this preliminary result implies that the actual flux of impacting bodies, capable of making craters with $D > 50 \text{ km}$, was 50 times larger than the apparent flux estimated from the currently known terrestrial records.