

Jupiter – Friend or Foe? J. A. Horner¹ and B. W. Jones¹, ¹The Open University (Department of Physics and Astronomy, The Open University, Walton Hall, Milton Keynes, MK7 6AA; e-mail: j.a.horner@open.ac.uk).

Abstract: In the collective consciousness of both the general public and the academic world, it is widely accepted that the planet Jupiter has been of great assistance in the evolution and survival of life on the planet Earth. This old idea suggests that, without the giant planet, the impact regime experienced by the Earth would be significantly less clement, with life-threatening impacts occurring far more frequently. In such a regime, it is claimed, the development of life would have been stymied, even if life had had the opportunity to develop in the first place.

Here, we present the complete results of a detailed study into the effect of variations in the Jovian mass on the impact flux experienced at the Earth. For the first time, results obtained from populations representative of all three reservoirs of potentially hazardous object (Asteroids, Oort Cloud comets, and objects from the Trans-Neptunian region) are presented. Contrary to popular belief, it seems that the situation is far more complicated than previously thought. Jupiter is not merely the saviour of life on the Earth, but actually acts to enhance the impact flux experienced by our planet over that which would be expected were no such giant present in our Solar system. Further, were Jupiter significantly smaller, of a mass comparable to the planet Saturn, the incident flux of objects would be greatly enhanced over that observed today.

It is therefore clear that, at the very least, the idea that the planet Jupiter has acted solely as "friend" in the evolution of life on Earth is now under serious question. Future work will study the effect of varying the location of the giant planet, together with its brethren in the outer Solar system, to examine the effect of planetary location on the impact regime of the terrestrial planets, with the long term goal of finally answering the question - "Jupiter - friend or foe?".