Modelling the Chicxulub impact: is crater asymmetry produced by impact angle or asymmetry in target rocks?

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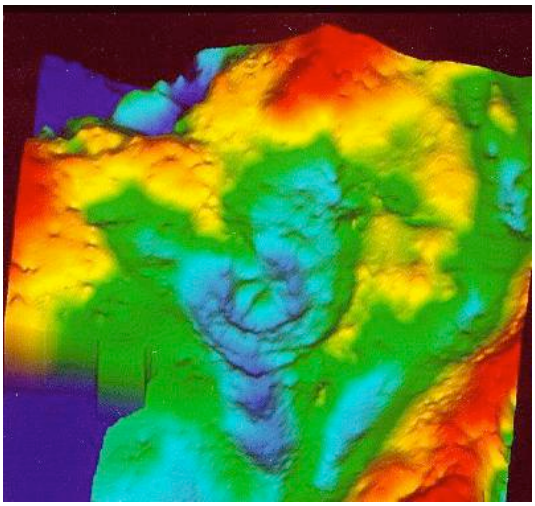
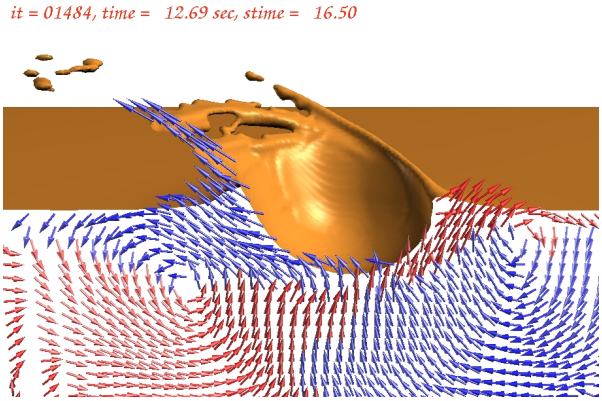


Background The Chicxulub impact crater in Mexico (see right) is one of the largest craters on Earth, and has generated significant interest because of its connection to a mass extinction [1]. It appears that the impact may have been particularly devastating because there was a thick sequence of carbonate and evaporite rocks at the site of impact, and large volumes of sulphur and carbon would have been released instantaneously on impact. It has also been suggested that the pollutant release would be greater if the impact angle were oblique [2]. Previous studies have suggested asymmetries in the Chicxulub crater were produced by an oblique impact, and have used crater asymmetry to suggest an impact direction and angle. However, seismic data acquired in 2005 across and the crater show that there were significant variations on the composition of the target rocks around the impact site. Both the water depth and sediment thickness are greater in the northeast direction. Hence, it is unclear as to whether the angle of impact or target heterogeneity (or both) is responsible for crater asymmetry [3].



The Project A new 3D dynamic modelling code that simulates crater formation has been developed at Imperial and the Natural History Museum in Berlin (amcg.ese.ic.ac.uk/iSALE). The student will use this model to perform a suite of numerical models that will test whether impact angle or target heterogeneity is the principal cause of crater asymmetry at Chicxulub.

The Candidate The successful candidate will join, and be supported by, a dynamic research group with world-class expertise in impact cratering and modelling geophysical flows. The candidate will have the opportunity to develop their career and profile by presenting at international conferences and publishing in high impact journals. Candidates for PhD positions should have a good mathematical background and a good degree in an appropriate field such as earth science, physics, mathematics, computer science or engineering.

[1] Schulte et al. 2010. Science, 327, 1214:1218.

[2] Schultz and D'Hondt, 1996, Geology, 24: 963-967.

[3] Collins et al. 2008. Earth Planet. Sci. Lett. 270: 221-230.

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This Information can also be found on our website: www.ese.ic.ac.uk