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A global circulation model for the asteroid impact simulations

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In this study, we present a three-dimensional global circulation model (GCM) to investigate the environmental effects of an asteroid impact on the global Earth system. The model is applied to model the atmospheric response of the Cretaceous–Paleogene (K–Pg) extinction event which took place 66 million years ago and resulted in the mass extinction of various animal and plant species. The atmospheric model is developed based on the planetWRF model. First, the paleoclimate model is validated using the proxy data. Then, the sensitivity to atmospheric co2 concentration is investigated. The radiation parameterization scheme of the planetWRF model is modified to include the effect of various climate-active aerosols and gases released after the impact event. The model is also coupled both to a simple one-dimensional ocean mixed layer and a three-dimensional ocean circulation model. Both the atmospheric and oceanic response is investigated.