

Thermal effects of impacts on the Hadean Earth

OLEG ABRAMOV* AND STEPHEN J. MOJZSIS

Dept. of Geological Sciences, University of Colorado,
Boulder, CO 80309-0399, USA

(*correspondence: Oleg.Abramov@colorado.edu)
(Stephen.Mojzsis@colorado.edu)

To better understand the thermal effects to the Hadean Earth's crust by asteroid and cometary bombardments, and the timescales for cooling subsequent to very large impacts, we constructed two new numerical models: 1) A thermal conduction/radiation model of the lithosphere, which simulates the integrated thermal consequences of all impacts scaled to Earth as constrained by the lunar crater record, the size/frequency distribution of the asteroid belt, and dynamical models; and 2) A hydrothermal model for a detailed study of global layers of hot ejecta which are emplaced by giant impacts. Parameters tested in the study include the duration, mass flux, and average impact velocity, surface temperatures, and geothermal gradients. We also estimated the amount of water vapor released into the atmosphere by large impacts and its effect on surface temperature using the Eddington approximation to the radiative transfer equation. Results of this study indicate that the timescales of thermal equilibrium between global meltsheets and underlying crust are longer than the cooling time of the melts, that the top 4km of crust was not thermally metamorphosed to a significant degree, and that at least 2.8×10^{20} kg of water (corresponding to an average global depth of 560 m) was released into the atmosphere from the oceans and hydrothermal venting following the largest plausible impactor (500km in diameter).

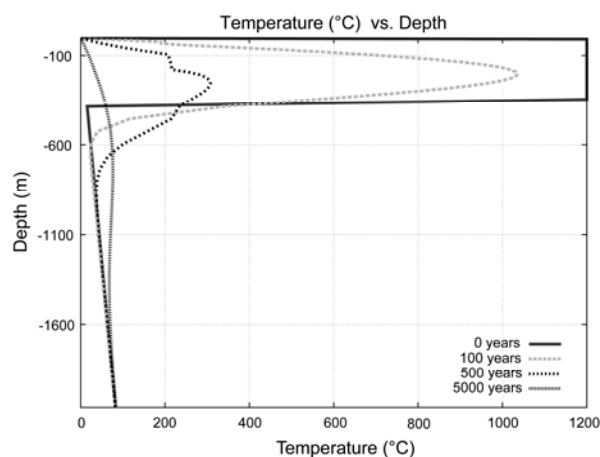


Figure 1: Cooling of a 350 m thick, 1200°C global ejecta blanket as modeled using HYDROTHERM.

New human activities in Africa affecting the ozone layer

B. ABUBAKAR, B. RUFAL, E.D. ORUONYE,
M. MUHAMMED AND A.T. WAKIL

Since the beginning of the 1990's when the importation of fairly used Refrigerators, Air-conditioners and propellants that can easily go broken containing chlorofluorocarbon substances that is capable of destroying the Ozone layer started in commercial quantity in Africa, the African refuse mountains began metamorphosing into mountains of dumped broken Refrigerators, Air-conditioners and Propellants which are collectively becoming a threat to the Ozone layer, because of the continuous discharging of the Chlorofluorocarbon gases by the refuse in to the atmosphere in each passing second..

Nobody can actually quantify the numbers of Refrigerators, Air-conditioners and Propellants imported and disposed in Africa over the last fifteen years, but the facts still remains that the numbers of metamorphosing mountains keeps on increasing in both size and numbers in each passing day. They have even become sources of raw materials for the local blacksmiths, children and refrigerators repairers who use parts of the dumped refrigerators, Air-conditioners and Propellants for their constructions, toys and repairs respectively.

This explains the reason why despite the global efforts toward protecting the Ozone layer by the United Nations (UN), governments, International Organizations and climatologist among many others, but yet the hole in the Ozone layer keeps on expanding and the global temperature keeps on rising which resulted in the unusual phenomenon like the hurricanes "Katrina" and "Rita" the unusual floods in China, Thailand, Mozambique and to some extent even the Tsunami disaster that claims millions of lives in 2004. The Rapid rising in temperature of the Tropical world countries and increase in the cases of cancer patients among many other unusual happenings over the last eight years.

It was in review of the above situation that this research work was conducted and came up with the under listed suggestions/Recommendations:

1. The UN should use its capacity to discourage the importation of fairly used refrigerators, Air-conditioners and propellants to Africa and at the same time assist in the subsidy of the newer ones coming to Africa, so that the average African can afford buying them.

2. The UN through her specialized agencies on climate and meteorology in collaboration with sister related organizations should send their teams of researchers to come and investigate the trend of this ugly situation in other to proffer possible lasting solutions.

3. The African Union (AU), UN and other stakeholders on the World climate change should jointly encourage the companies manufacturing Refrigerator, Air-conditioners and propellants to open their factories in Africa, where their products are needed most, as this will help stop the importation of the fairly used refrigerators, Air conditioners and Propellants.