The 1815 Tambora distal ash fall: Implications for transport and deposition on land and in the deep sea

Jessica Kandlbauer[1], Steven N Carey[2], R Stephen J Sparks[1]

[1]University of Bristol, United Kingdom, [2]University of Rhode Island, USA

E-mail: jessica@aeroscience.ch

The 1815 Tambora eruption deposited an estimated 100 km^3 of tephra over large parts of Indonesia and the adjacent sea, providing a good example to compare the grain size distribution of distal ash samples on land with ash recovered from the deep sea. Subsequently, grain size analysis can contribute information on the transport and distribution during the Tambora eruption. The results show a continuous trend towards a finer-grained ash distribution with distance, indicating that the depositional environment does not influence the ash particle distribution. Indeed the finest ash particles (2-4 μm) are still present in the same relative proportions in the deep sea ash layers as seen on land. The gravity current model has been modified to simulate the ash transport in the Tambora cloud, and includes now an ash fraction depositing while the cloud advances, as well as an ash fraction accounting for the remaining ash in the cloud falling out once the eruption stops. The contribution of the two components depends mainly on particle fall velocity and eruption duration, as fall velocity and/or eruption duration increases, the amount of ash depositing from the advancing cloud increases. With the eruption duration (24 hours) and cloud velocity (1.5-2.5x10^{11} m^3 /s) calculated from historical records, and assuming a 3h Plinian and 21h co-ignimbrite phase, the new model estimate reduces the mean absolute error by half if both ash components are considered