Volcanic flank collapse and ocean fertilization by volcanic ash: is there a common denominator?

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Subsurface magmas that feed active volcanoes expel sulphur and halogen gases either passively or explosively. At non-erupting volcanoes, these gases can form highly acidic condensates which further interact with the country rock. By drastically altering the mineralogy of the original rock, these hydrothermal reactions also modify the rock mechanical properties. There is evidence that the presence of hydrothermally altered rocks in a volcanic edifice decreases its stability and therefore, increases the risk of catastrophic flank collapse. However, our understanding of the relationship between volcanic flank collapse and hydrothermal alteration is still poor. At erupting volcanoes, a mixture of hot magmatic gas and silicate ash materials is suddenly injected into the atmosphere. Various reactions between sulphur and halogen gases and ash particles take place within the eruption column, and later during lateral dispersion of the ash cloud. These interactions are not well documented but may have a dramatic impact on the capacity of ash to deliver key nutrients upon deposition in the surface ocean. In this seminar, I will present recent research activities aimed at obtaining new insights into the role of chemical rock alteration and (i) volcanic flank collapse and (ii) volcanic fertilization of the ocean.