The complexity and diversity of pyroclastic fallout forming eruptions and deposits: how do we study and classify them?

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Pyroclastic fallout deposits have commonly been classified into end-member types based on dispersal patterns and deposit grain-size characteristics. These deposit types have then been related to relatively simple end-member explosive eruption styles including aspects such as plume height, explosive fragmentation intensity, external water and magma explosive interaction. More recently attempts have been made to relate juvenile pyroclast vesicularity to the standard eruption styles. Although the dispersal and grain-size characteristic approaches are valuable for young fallout deposits whose original extent is still well preserved, there are many limitations in applying these approaches to older, variably eroded deposits. For these, the facies aspect or deposit characteristics at remaining, isolated outcrops are commonly used to infer the general eruption style. However, many recent explosive eruptions have demonstrated that explosive fallout forming eruptions can be very complex, pulsing from one eruption style to another or having characteristics of more than one style simultaneously, such as Etna, with simultaneous Hawaiian and micro-plinian styles. Can these multiple, simultaneous eruption styles be detected in the characteristics of the deposits, and can the deposits be distinguished from those of simple end-member eruption styles? Some explosive fallout deposit forming eruptions also experience multiple intraplinian column collapse events that produce pyroclastic flow deposits, apparently at the same time as fallout deposits continue to form, such as Pinatubo, Philippines, Fogo A, Azores. Are there distinctive differences between the fallout deposits before and after the collapses, should they be treated as discrete separate fallout events and deposits, or do they just represent an ongoing continuum of the one fallout forming event?

There are many complications in the eruptions that produce fallout deposits and these are not adequately represented in the current approach to classification. The aim of this symposium therefore is to invite presentations on the characteristics of fallout deposit forming explosive eruptions, the complexities that can occur in the eruption styles, how we recognize these complexities in the deposits, new approaches that can be used to study fallout deposits as a basis for classifying them and understanding the eruption styles, and the limitations of traditional approaches.