Editorial: Tephra

Tephra are the widest ranging direct hazard from a volcano and are capable of extending over areas as large as continents. The importance of tephra in establishing a chronological framework for volcanic and sedimentary successions can be not over-emphasized. Once a recognizable tephra layer has been dated, it provides a time horizon wherever it is located and is, therefore, pivotal in correlating equivalent-aged successions in a wide variety of terrestrial and marine settings. Traditional efforts have focused on the mapping and geochemical characterization of macroscopically visible (mm- to cm-thick) tephra beds in order to facilitate regional and inter-regional correlation, as well as erect tephrostratigraphic frameworks that underpin volcanic hazard studies and paleoenvironmental reconstructions. Consequently, many tephra records tend to be biased towards macroscopic tephra beds that represent the products of moderate to large magnitude eruptive events. Numerous other tephra representing small to moderate eruptive events are seldom noted since the combined effects of distance and bioturbation in the terrestrial (soil-forming) and deep-sea environments mean that they are not preserved as macroscopic layers.

Over the last decade, however, analyses of a wide range of Late Quaternary deposits have shown that very many contain well-defined layers composed of minute traces of microscopic volcanic ash (cryptotephra) not visible to the naked eye. It is with this material, rather than the larger products of volcanism, that future advances in distal tephrochronology will occur. The papers presented in this special issue of *PAGES News* report recent tephrochronological research from places separated by great distances. The result of these new studies has been to develop new methodologies capable of coaxing extremely small amounts from the most obdurate deposits, so that time frames and site-linkage techniques for past environmental studies have improved greatly in precision. Much of the success of the relatively new science of Quaternary distal tephrochronology is due to inexpensive and standard techniques that allow deposits to be searched quickly to determine if tephra is present, even if only represented by very few tephra shards. Additionally, the recent expansion of tephra studies has utilized analytical systems that can determine the precise geochemistry of single shards of volcanic glass. Certainly, continuing advances in single grain trace element geochemistry, as determined by the laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) technique, will make it possible in the future to establish more correlation tie-lines with a more complete spectrum of tephra events than is currently possible using only the macroscopic tephra record.

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