
Microfabric of Altered Ash Layers, ODP LEG 131, Nankai Trough

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Abstract: Samples of ash layers and associated background sediments from Site 808 of ODP Leg 131 in the Nankai Trough accretionary prism were analyzed for changes in mineralogy, porosity and microfabric associated with alteration of volcanic ash. Ash layers range from incipient stages of alteration and dissolution to complete alteration to clay minerals and clinoptilolite. Ash layers contain greater abundances of total clay minerals and lower percentages of quartz than do surrounding background hemipelagic sediments. The clay-sized fraction of ash layers is dominated by pure dioctahedral smectite, whereas the background sediments contain primarily illite and chlorite with minor amounts of smectite. Analysis of microfabric revealed dramatic changes in the distributions and abundances of grains and pores during ash alteration. The relative abundances of large pores, grains, and matrix material were quantified on digital back-scattered electron images (BSEI) of ash layer and background sediment samples. During burial, the abundant glass shards of shallow ash layers are initially altered, presumably to smectite. Subsequent dissolution of the glass leaves open, shard-shaped pores, resulting in increased porosities. With greater burial, these pores are filled with clinoptilolite. Although the presence of ash and its alteration products clearly influences sediment physical properties, there is no apparent correlation of the abundance of ash or its alteration products with the formation of thrust faults or other structures within the Nankai Trough accretionary prism.

Key Words: Accretionary prism • Alteration • Ash • Microfabric • Nankai Trough • Physical properties • Porosity

Clays and Clay Minerals; August 1994 v. 42; no. 4; p. 428-436; DOI: [10.1346/CCMN.1994.0420408](https://doi.org/10.1346/CCMN.1994.0420408)

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