

Geochemical Fingerprinting of Holocene Tephra in the Willaumez Isthmus District of West New Britain, Papua New Guinea

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ABSTRACT. Electron microprobe analyses were conducted on volcanic glasses extracted from Holocene tephra marker beds on the Willaumez isthmus in West New Britain, Papua New Guinea. These tephra beds are pivotal in the dating of a wide range of human artefacts and manuports found in the intervening buried soils, extending back over the last 40,000 years. Three major groups can be easily separated: W-K1 and 2; W-K3 and 4; and the Dakataua tephra. Of the remaining post-W-K4 tephra, most show slightly higher FeO and CaO and lower SiO₂ contents than the W-K3 and 4 group, although there is some overlap. The combination of these geochemical data sets with the known stratigraphy and radiocarbon dates has helped resolve tephra correlation where these ashes become thin and less visually diagnostic or where pumice has been resorted and redeposited by the Kulu-Dulagi River.

Introduction

The volcanic alignment of the Willaumez Peninsula extends 60 km northwards from the main west-east axis of the island of New Britain in Papua New Guinea, near the provincial capital of Kimbe. Five km west-northwest of Kimbe, the Peninsula joins the main island by a narrow 18 km-wide strip of lowland hereafter referred to as the Willaumez isthmus (Fig. 1). Within this district, since the 1950s, oil palm plantation development has led to extensive deforestation, and the construction of roads has resulted in the cutting of many exposures into the dominantly tephra cover beds. Between these beds are numerous buried soils (palaeosols) in which abundant artefacts and manuports occur (Torrence *et al.*, 1990). Abundant obsidian flakes

extend back over 40,000 years (Torrence *et al.*, 2004) as do less frequent oven (*mumu*) stones. The district is also renowned for being the site of some of the earliest Lapita pottery in the Pacific (Specht and Torrence, 2007; Torrence *et al.*, 2009). Hence the region has been the centre of much archaeological research, principally conducted by staff of the Australian Museum.

Most of the Holocene human settlement has been disturbed by four plinian eruptions (W-K 1 to W-K 4) from the Witori caldera and one from the Dakataua caldera (McKee *et al.*, 2011), with numerous subsequent sub-plinian and phreatomagmatic events from Witori (Table 1). Machida *et al.* (1996) published the reconnaissance tephrochronology of this sequence and Neall *et al.* (2008) have summarised the volcanological impacts on human settlement.

Keywords: Papua New Guinea; New Britain; Willaumez Peninsula; Holocene tephra; geochemical fingerprinting

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