

Satellite, Air and Ground Observations of Volcanic Clouds over Islands of the Southwest Pacific

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Abstract

Volcanic ash is dangerous to aircraft. In response to this, a warning system has been created: the International Airways Volcano Watch. Many of the world's active volcanoes are in relatively under-resourced regions of the southwest Pacific and eastern Indian Ocean. We show here examples of recent eruptions in the southwest Pacific and Indonesia, including major eruptions at Rabaul (New Britain, Papua New Guinea), Merapi (Java, Indonesia), and Ruang (Sangihe Islands, Indonesia). We examine the effectiveness of satellite, air, and ground observations. There is a great variation in reported eruption heights between different observations, and we explore some of the reasons for this. There are particular difficulties with the under-reporting of eruption heights from the ground. More funding and development of ground-based observations will improve the overall effectiveness of the warning system.

Key words: aviation safety, eruption height, volcanic ash, volcano

Introduction

The majority of the islands of the western Pacific are part of the 'Ring of Fire', the zones of volcanic and seismic activity near the boundaries of the Pacific and surrounding tectonic plates. The existence, topography and fertility of the islands are substantially influenced by past volcanic activity, and areas with presently active volcanoes are subject to the devastation of large eruptions.

Since the encounter of several commercial passenger aircraft with the eruptions of Galunggung in Indonesia in 1982 (JOHNSON and CASADEVALL, 1994), world awareness of the threat of volcanic ash to aviation has grown. In the most well known of these incidents, a Boeing 747 lost power from all four engines when volcanic ash melted inside them, recovering just in time to avoid ditching in the Indian Ocean. Many incidents, some as serious as this, have since occurred, and in fact it is widely suspected that the number of encounters around the world is greatly under-reported (e.g. SMITHSONIAN INSTITUTION, 2002).

During the past 20 years, an international warning system for aviation has evolved, the International Airways Volcano Watch (ICAO, 2000, 2001). This system, which covers most of the world, consists of a network of meteorological agencies and aviation authorities that exchange information and issue warnings to aviation. The most critical

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