



A probabilistic assessment of volcanic ash hazard to aviation in Southeast Asia

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Southeast Asia is home to hundreds of active volcanoes, largely clustered over the island chains of the Philippines and Indonesia. The prominent large scale weather feature in this region is dominated by Monsoons. The prevailing winds during the monsoon seasons can drive volcanic ash clouds over the South China Sea. Since this region is a busy aviation corridor it is important to evaluate the risk to aviation operations. This study quantifies the long-term probability that this region will be adversely affected by volcanic ash, through calculating the probability of eruptions for a range of magnitudes as well as the trajectory of the resulting ash plumes. Approximately 750 active or potentially active volcanoes are identified in Southeast Asia. They are separated into five classes by their morphology and eruptive style. For each volcano class, the typical eruption magnitude and frequencies are determined. The volcanoes are further divided into 23 geographical zones and the likelihood of each magnitude eruption for all volcano zones is estimated. Dispersion modelling is employed to estimate the concentration and extent of volcanic ash plumes based on hypothetical eruptions of Volcano Explosivity Index of 3 to 8 and 3 years of historical meteorological data. Preliminary results show that in the next decade, there is a 30 to 60% chance that volcanic ash will affect any part of the air space above the South China Sea between 6096m to 10668m at a concentration exceeding 2mg/m³. Half of this region has a 43% or greater chance of containing more than 2mg/m³ of volcanic ash. This is largely in agreement with 30 years of observations, with the exception west of Sumatra, where more ash is predicted than has been observed. The findings in this study can be used to inform scenario planning and mitigation strategy for regional aviation industry.