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DISSERTATION TITLE:	*Volcanic Ash: Properties, Atmospheric Effects, and Impacts on Aero-Engines*

Vulkansk aske i atmosfæren medfører en risiko for flytrafikk, såvel som helserisiko for samfunnet og kan påvirke klimaet. I denne avhandlingen er det undersøkt ulike typer aske, lokalisering, konsentrasjon, og spesielt partikkelstørrelse og den implikasjonen denne har for flymotorer. Studien gir en bedre forståelse av risiko for å fly gjennom luft med vulkansk aske.

Airborne volcanic ash particles from explosive volcanic eruptions are a known hazard to society, climate, and the environment as well as to aviation. This doctoral thesis has the aim to improve our understanding of volcanic ash properties, in order to mitigate its impacts, with the focus on aviation and to reduce uncertainties and limitations in observations and models in the context of risk analysis of gas turbine powered aircraft flying through volcanic ash clouds.

The finding of the doctoral study show that comprehensive volcanic ash particle properties from several types of volcanic ash help to reduce the uncertainty in ash location, concentration, composition, and particle size distribution measurements and modelling. Furthermore, the thesis demonstrates the importance of the size of volcanic ash particles on ingestion mechanisms into an aero-engine and on predictions of volcanic ash dosage during an encountered. This leads to a better understanding of critical safety concentrations inside the engine core section, which is the most vulnerable engine part.

The research conducted in this study had a strong-multidisciplinary approach and covers different research fields and techniques, from computational fluid dynamics simulations of particle-laden airflows through an aero-engine, direct in-situ measurements of volcanic ash particles inside an artificially created ash cloud, to laboratory based particle characterization analysis.

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