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The spatial evolution of anisotropy along a jet in cross-flow GREGORY SAKRADSE, GRAHAM FREEDLAND, Portland State University, STEPHEN SOLOVITZ, Washington State University Vancouver, RAUL BAYOAN CAL, Portland State University — Volcanic plumes present a unique challenge in the realm of atmospheric flow modelling, and many current models rely on general parameters applied to a wide range of flows. Improvements in modelling can be made by tuning model parameters to specific flows with experimental data. In laboratory conditions a volcanic plume can be approximated as a buoyant jet interacting with a cross-flow. The present work examines a round jet emitted into a cross-flow. Stereo PIV is used to directly measure three components of velocity in the near to medium field of the jet on a plane parallel to the crossflow and on the central axis of the jet. Buoyant, neutrally buoyant and negatively buoyant cases are considered. The state of anisotropy is determined along lines parallel to the outer edges of the jet shear layers, and the progression of of the state of anisotropy is examined on an Anisotropy Invariant Map (AIM). The development in space of the state of anisotropy is used to refine coefficients in both linear and non-linear return to anisotropy models for the transport of the anisotropy tensor. These experimentally determined coefficients can be used to refine Reynolds-Stress models of atmospheric flows in the presence of a volcanic plume.

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