# EXPERIMENTAL RESULTS ON INERTIA GRAVITY WAVE EMISSION FROM BAROCLINIC JETS

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Large-scale balanced flows can spontaneously radiate meso-scale inertia-gravity waves (IGWs) and are thus in fact unbalanced. While flow-dependent parameterizations for the radiation of IGWs from orographic and convective sources do exist, the situation is less developed for spontaneously emitted IGWs. Observations identify increased IGW activity in the vicinity of jet exit regions. A direct interpretation of those based on geostrophic adjustment might be tempting. However, directly applying this concept to the parameterization of spontaneous imbalance is difficult since the dynamics itself is continuously re-establishing an unbalanced flow which then sheds imbalances by GW radiation. Examining spontaneous IGW emission in the atmosphere and validating parameterization schemes confronts the scientist with particular challenges. Due to its extreme complexity, GW emission will always be embedded in the interaction of a multitude of interdependent processes, many of which are hardly detectable from analysis or campaign data. The benefits of repeated and more detailed measurements, while representing the only source of information about the real atmosphere, are limited by the non-repeatability of an atmospheric situation. The same event never occurs twice. This argues for complementary laboratory experiments, which can provide a more focused dialogue between experiment and theory. Indeed, life cycles are also examined in rotating-annulus laboratory experiments. Thus, these experiments might form a useful empirical benchmark for theoretical and modeling work that is also independent of any sort of subgrid model. In addition, the more direct correspondence between experimental and model data and the data reproducibility makes lab experiments a powerful testbed for parameterizations. Here we show first results from a small rotating annulus experiments and we will further present our new experimental facility to study wave emission from jets and fronts.

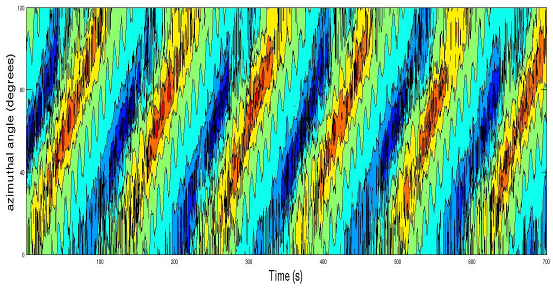


**Figure 1.** Hovmöller (time-space) plot of the radial velocity at a constant radial distance from the rotation axis. The data are measured in the rotating annulus experiment using the Particle Image Velocimetry (PIV) measurement technique.

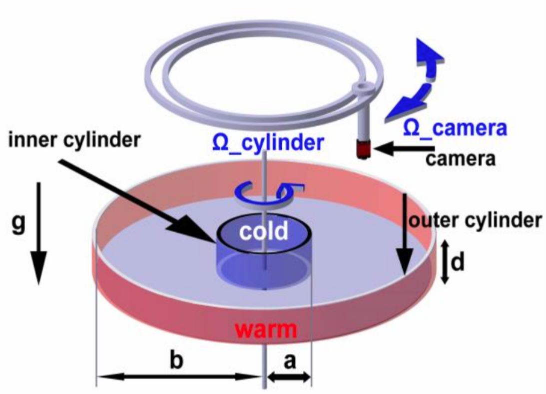


**Figure 2.** Sketch of the new experimental apparatus. The radius a (b) of the inner (outer) cylinder is 12cm (70cm), d=30cm. Also visible is the feature tracking system that consists of a camera that can follow flow features due to the fact that the camera can rotate with a different angular velocity than the confinement. This setup is ideal to follow a baroclinic jet that usually rotates somewhat faster than the annulus.