



EGUsphere, referee comment RC1
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Comment on egusphere-2022-148

Anonymous Referee #1

Referee comment on "Jet stream variability in a polar warming scenario – a laboratory perspective" by Costanza Rodda et al., EGU sphere,
<https://doi.org/10.5194/egusphere-2022-148-RC1>, 2022

I found Rodda et al. 2022 to be relevant, interesting and nicely presented work. Addressing my comments below will mainly improve its presentation and clarity.

Line 50. How does an atmospheric Rossby wave (ARW) differ from a thermal Rossby wave? Further, how are mid-gap baroclinic instabilities analogous to ARW's when this experimental system contains no beta-effect?

Line 80. What is the rotational Froude number for these experiments? Is it far less than unity?

Line 85. It says that the temperature in the outer gap is held fixed, but elsewhere it says the heating power is held fixed. So what is actually fixed? A time series of the bath temperatures showing thermal equilibration and then the final experimental phase would make all this clearer to the reader.

Line 119. Why does increasing Ta lead to a more turbulent flow? How do you define turbulent? Is it the value of the Reynolds number or is it the variability / irregularity of the flow field? Typically, higher Ta gives more organized rotating flows. Here, I think it makes the Rossby radius smaller, eventually allowing for multiple structures to fit within the fluid gap. Once this can occur more complex solutions can develop. Is that correct?

Table 1 appears at odds with my arguments above. The irregular m cases correspond to lower m values. Why would lower m be more complex? Also, why is lower Ro_T corresponding to fewer structures? I would expect from a Rossby radius argument that this would be just the opposite of what is reported here. Again, please explain this in more depth.

Line 158. It is not clear how the c_M equation is used to generate the data in Figure 5. It is a bit opaque as to how the thermography data is processed to measure $d\Phi/dt$. How is this done, operationally? ---Further, it is not clear why $c_M \approx U_T$.

Line 170. It is stated that the phase speed predicted is close to the measured c_M values. But this is not the case since $\zeta \sim 1/2$. That suggests $c_M \sim U_T^{1/2}$, which is far from $\sim U_T^1$. Again, please clarify.

Section 4: I had trouble connecting the first 3 sections to the analysis in sections 4 and 5. A schematic or two showing how the ARW dynamics lead to these different thermal field properties would be greatly appreciated I believe.