

To the Awards Committee:

Please note: I do not write long letters meant to build up and sell a candidate. Please do not take the brevity of this letter as a sign of weak support for Michael Womack. I **strongly** recommend him for admittance to your graduate program.

I regard Michael Womack as a very strong candidate. While his on paper GPA (likely greater than 4.0) clearly qualifies him for consideration I would hope that numerical GPA carries with it rather little weight in comparison with the actual academic program of the applicant. In my view, Womack has had a relatively intense undergraduate research program - far more than most of his undergraduate peers. Being a double major in Physics and Math (and earning A+'s in those classes as well) is a formidable task. This academic aptitude and work ethic extends to his Honor College courses as well and he clearly was the most outstanding student in my Honor's College class of 18 students in winter of 2015. He consistently came to my class very well prepared, able, and willing to contribute to that day's topic. Womack shows good initiative, does comprehensive work and communicates quite well. Given his excellent academic record there really is no point in further praise of his course performance.

But what might set Womack apart from all the other applicants who have similar paragraphs written by their letter writers? - It's his Honors College research thesis. Womack has chosen to do something difficult and certainly not safe. His thesis explored various kinds of mathematical transformation (like wavelet transforms) that can be applied to noisy climate data to produce signals of climate change that have gone unnoticed in standard analysis of the data. To do this thesis, Womack had to learn three major things that have not been taught in any of the courses he has taken:

1. Learning to program in Python and D3 (javascript) so as to format, organize, analyze and represent real data.
2. To understand the Math behind the transforms to see how they work and how they are applicable to climate data.
3. To learn some of the physics associated with climate change.

Womack was able to use his Mathematical prowess in an area that he had never considered before. His Thesis was an overwhelming success and contains sufficient scientific insights that warrant publication. His investigation was original and difficult. This is a high level of achievement for any undergraduate, which is not met by most.

G. Bothun, Professor of Physics