

LOIS ELIZABETH BAKER

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RESEARCH INTERESTS

I am a PhD candidate in Mathematics of Planet Earth at Imperial College London, advised by Dr Ali Mashayek. My background is in mathematics and I enjoy applying theoretical models to problems in physical oceanography. I am currently interested in the dynamics and mixing properties of flow-topography interaction, including lee waves and wake vortices, which I am approaching from both a theoretical perspective and in a realistic setting using regional simulations of the Drake Passage.

EDUCATION

2018 - Present **Imperial College London - Centre for Doctoral Training in Mathematics of Planet Earth**

MRes Research Project (Year 1): *Superharmonics of internal tides in non-uniform stratification. Advised by Prof. Bruce Sutherland and Dr Ali Mashayek.*

PhD Project (Years 2-4): *Transition to turbulence in topographically induced wave breaking. An investigation into the mechanisms of lee wave turbulence and implications for the buoyancy and momentum budget of the Southern Ocean. Advised by Dr Ali Mashayek.*

2012 - 2016 **Queens' College, University of Cambridge**
BA + MMath Mathematics Degree (4 years)

2016 Part III: Distinction (81%)
Masters Essay: *Submesoscale Instabilities of an Ocean Jet.*
Advised by Dr John Taylor

2015 Part II: 1st Class (73%)

2014 Part IB: 1st Class (80%)

2013 Part IA: 1st Class (77%)

2010 - 2012 **Parkstone Grammar School**

2012 A Levels Maths (A*) Further Maths (A*) Physics (A*) French (A*)
STEP Maths I (S) II (S) III (1), AEA Maths (Distinction)

PUBLICATIONS

Mashayek, A., Caulfield, C., Baker, L., & Cael, B.B. (2021). A generalized marginal stability criterion for shear-induced ocean interior diapycnal turbulent mixing, *preprint, submitted to Geophysical Research Letters*. doi:10.1002/essoar.10507781.2

Baker, L.E., & Mashayek, A. (2021). Surface reflection of bottom generated oceanic lee waves, *Journal of Fluid Mechanics*, 924, A17. doi:10.1017/jfm.2021.627

Baker, L.E., & Sutherland, B. R. (2020). The evolution of superharmonics excited by internal tides in non-uniform stratification. *Journal of Fluid Mechanics*, 891, R1. doi:10.1017/jfm.2020.188

Ellison, E., Baker, L. and Wilson, A. (2020), IPCC Special Report Meeting: Climate Change Around the Globe. *Weather*, 75: 293-294. <https://doi.org/10.1002/wea.3722>

CONFERENCES AND INVITED TALKS

L.E. Baker & A. Mashayek, 2021: Surface reflection of bottom generated oceanic lee waves, *Oral presentation, Woods Hole Physical Oceanography Seminar, August 2021*

L.E. Baker & A. Mashayek, 2021: Topographically generated waves in a realistic nested model of the Drake Passage, *Oral presentation, SOCCOM Modelling Telecon, May 2021*

L.E. Baker & A. Mashayek, 2021: Surface reflection of bottom generated oceanic lee waves, *Oral presentation, DAMTP Atmosphere Oceans Group Meeting, University of Cambridge, Feb 2021*

L.E. Baker & A. Mashayek, 2020: Lee waves and submesoscales in a high resolution nested model of the Drake Passage, *Oral presentation, Ocean Modelling Meeting, Sept 2020*

L.E. Baker and B.R. Sutherland, 2020: The evolution of superharmonics excited by internal tides in non-uniform stratification, *Oral presentation, AGU Ocean Sciences Meeting, San Diego, Feb 2020*

L.E. Baker and A. Mashayek, 2020: Overturning lee waves and hydraulic jumps in the Drake Passage, *Poster presentation, AGU Ocean Sciences Meeting, San Diego, Feb 2020*

L.E. Baker and B.R. Sutherland, 2020: The evolution of superharmonics excited by internal tides in non-uniform stratification, *UCL Postgraduate Fluid Dynamics Seminars, Nov 2019*

AWARDS

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| 2020 | Mathematics of Planet Earth CDT MRes Student Award
In recognition of academic achievement and success. |
| 2019 | Woods Hole Geophysical Fluid Dynamics Program Fellowship
10 week intensive summer program and research project ‘ <i>The evolution of superharmonics excited by internal tides in non-uniform stratification</i> ’. Advised by Prof. Bruce Sutherland. |
| 2015 | Bridgwater Summer Research Studentship - University of Cambridge
8 week computational research project simulating the effect of internal waves and convection on reactive biogeochemical tracers. Advised by Dr John Taylor. |

EMPLOYMENT

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| 2019 - Present | Graduate teaching assistant
Department for Civil and Environmental Engineering, Imperial College London |
| 2016 - 2017 | Account Manager , Brainlabs Digital |

SKILLS

Familiar with Python and MATLAB, including numpy, matplotlib, xarray, pandas. Experience with linux and shell scripting. Experience with running and analysing idealised and realistic regional ocean models.

POSITIONS OF RESPONSIBILITY

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| 2021 | Organiser and chair , Imperial College GFD group meetings. |
| 2020 | Student Rep. , Fluids section, Department of Civil and Environmental Engineering, Imperial College London. |
| 2017 | Watch Officer , Transatlantic Tall Ships Race. |
| 2014 - 2016 | Vice-President , Emmy Noether Society for female mathematicians. |
| 2014 | President , Queens’ College Cambridge Maths Society. |
| 2012 - Present | Watch Leader / Officer , Rona Sailing Project. |
| 2014 | Student Rep. , Maths Faculty Curriculum Committee, University of Cambridge. |