

DR. ALEXANDER BEGG SMITH

Contact Information

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Research Interests

Coastal Geomorphology, Aeolian Processes and Landforms, Eco-Geomorphology, Climate Change, Sea Level Rise, and Coastal Adaptation, Human Altered Beach-Dune Systems, Remote Sensing, Digital Terrain Modelling and Mapping, Geographic Information Systems (GIS), Computational Fluid Dynamics (CFD), Machine Learning

Education

2017 Ph.D. in Environmental Science, Ulster University, Coleraine, U.K.

2013 M.A. in Geography, East Carolina University, Greenville, NC, U.S.A.

2011 B.S. in Geography, Salisbury University, Salisbury, MD, U.S.A.

Academic Work Experience

2019-Present Postdoctoral Research Fellow

School of the Environment, University of Windsor, Windsor, Ontario, Canada

2017-2018 Lecturer (Fixed-Term)

Department of Geography and Archaeology, National University of Ireland Galway, Galway, Ireland.

Teaching Experience

2017-2018 Lecturer: National University of Ireland Galway, Galway, Co. Galway, Ireland

Undergraduate classes:

Principles of Physical Geography (TI151)

- Lecturer on the key physical landforms and processes that shape fluvial, desert, and coastal environments (~ 320 students).

Earth Surface Landforms and Processes (TI255)

- Lecturer on the theory and practice of geomorphological concepts focusing on coastal, glacial, and fluvial environments (~100 students).
- Led a practice-based field trip to collect data on a coastal system including beach profiling, dune mapping, and an environmental/services evaluation.

Master's class:

Coastal Processes and Landforms (TI6104)

- Lecturer on advanced concepts in coastal systems, processes, and landforms. This module focused on the analysis of wave, tides, and aeolian dynamics and the resultant morpho-dynamic response of the coastline. Emphasis was placed on current research techniques including a lab exercise introducing wave (SWAN) and morphodynamic (XBeach) modelling approaches (9 students).

- Led a practice-based field to conduct beach dune surveys with GPS and demonstrated unoccupied aerial vehicle (UAV) survey methods.

2013-2017 Teaching Assistant: Ulster University, Coleraine, Co. Londonderry, U.K.

Marine Systems (EGM100)

- Guest Lecturer on near-shore marine processes and environments
- Field instructor on data collection and surveying in coastal environments (e.g. beach profiling and vegetation classification).

Atmospheric Science (EGM305)

- Laboratory teaching assistant

Coastal and Marine Processes (EGM327)

- Guest lecturer on environmental modelling.
- Laboratory teaching assistant.
- Field instructor on long-shore drift process and beach profiling techniques.

G.I.S. (EGM518)

- Laboratory teaching assistant.

Research Experience

| <u>Year(s)</u> | <u>Primary Duties</u> |
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| 2019 - 2021 | UAV surveys conducted at Pinery Provincial Park on Lake Huron, Point Pelee National Park on Lake Erie, and at Prince Edward Island National Park, Canada to monitor beach-dune interactions. |
| 2018 | UAV and GPS surveys conducted at Inis Mór, Ireland to monitor sediment and vegetation history of a beach dune system. |
| 2017 | Cross-shore beach profiles conducted at beaches in County Galway and County Mayo, Ireland to monitor beach-dune dynamics through time. |
| 2016 | TLS surveys, 3D airflow measurements, sediment flux, and video analysis of aeolian streamers conducted in County Donegal, Ireland to monitor turbulence driven aeolian transport patterns. |
| 2016 | TLS surveys, sediment flux, and 3D airflow measurements of a trough blowout on the Sefton Coast, England to measure airflow steering and topographic response. |
| 2014-2015 | 3D airflow measurements, sediment flux, TLS and GPS surveys conducted at Gran Canaria, Spain to monitor airflow dynamics over barchan dunes. |
| 2014 | GPS surveys and 3D airflow patterns measured at Mablethorpe, England to monitor foredune recovery following storm events. |

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| 2013-2016 | GPS surveys over multiple beaches in County Antrim, U.K., and County Donegal, Ireland to monitor decadal scale beach-dune dynamics. |
| 2012 | TLS surveys at Slumgullian Landslide, Colorado, U.S.A., to monitor topographic deformation of a slow-moving mass wasting event. |
| 2011-2012 | TLS and GPS surveys at the Outer Banks, NC, U.S.A., to monitor dune over-wash following hurricane events. |
| 2011-2013 | TLS and GPS surveys, 3D airflow, and sediment flux experiments at Province Lands National Seashore, Cape Cod, MA, U.S.A., to monitor dune blowout dynamics. |

Grants Awarded

- 2021** MITACS Accelerate: Quantifying Environmental and Anthropogenic Impacts on Coastline Instability at Point Pelee National Park (PPNP) and Peninsula (\$45,000 CAD)
- 2015** British Society for Geomorphology Postgraduate Conference Attendance Grant (£1,000)

Peer Reviewed Publications

- 1) Houser, C., **Smith, A.**, George, E., Lunardi, B., Lehner, J. 2021. Research Networks in Coastal Geomorphology. *Journal of Coastal Research*.
- 2) Houser, C., **Smith, A.**, Lilly, J. 2021. The impacts of recreational boat wakes on an inland lake. *Lakes and Reservoir Management*.
- 3) **Smith, A.**, Jackson, D.W.T., Cooper, J.A.G., Beyers, Meiring, Breen, Colin. 2020. Whole-island wind bifurcation and local topographic steering: implications for dune dynamics. *Science of the Total Environment*.
- 4) Houser, C., **Smith, A.**, Wernette, P., Lehner, J. 2020. Spatial Analysis and Data Integration in Coastal Systems. *Treatise on Geomorphology*.
- 5) **Smith, A.B.**, Houser, C., Lehner, J., George, E., Lunardi, B. 2020. Crow-sourced identification of the beach-dune interface. *Geomorphology* 367 (2020): 107321.
- 6) **Smith, A.B.**, Lunardi, B., George, E., Houser, C., 2020. Monitoring Storm Impacts on Sandy Coastlines with UAVs. In *Spatial Variability in Environmental Science-Patterns, Processes, and Analyses*. Intech-Open.
- 7) Smyth, T.A.G., Hesp, P.A., Walker, I.J., Wasklewicz, T., Gares, P.A., **Smith, A.B.**, 2019. Topographic change and numerically modelled near surface wind flow in a bow blowout. *Earth Surface Processes and Landforms* 44 (10): 1988-1999.
- 8) Delgado-Fernandez, I., Smyth, T.A.G., Jackson, D.W.T., **Smith, A.B.**, Davidson-Arnott, R.G.B. 2018. Event-scale dynamics of a parabolic dune and its relevance for mesoscale evolution. *Journal of Geophysical Research: Earth Surface* 123(11): 3084-3100.
- 9) **Smith, A.B.**, Jackson, D.W.T., Cooper, J.A.G. 2017. Three-dimensional airflow and sediment transport patterns over barchan dunes. *Geomorphology* 278: 28-42.
- 10) **Smith, A.B.**, Jackson, D.W.T., Cooper, J.A.G., Hernández-Calvento, L. 2017. Quantifying the role of urbanization on airflow perturbations and dunefield evolution. *Earth's Future* 5: 520-539.

- 11) **Smith, A.B.**, Gares, P.A., Wasklewicz, T., Hesp, P. A., Walker, I.J. 2017. Three years of morphological changes at a bowl blowout, Cape Cod, USA. *Geomorphology* 295: 452-466.
- 12) **Smith, A.B.**, Jackson, D.W.T., Cooper J.A.G. **2015**. Computational Fluid Dynamics (CFD) Modelling Over Multiple Dune Lengths at Maspalomas, Gran Canaria. *The Proceedings of the Coastal Sediments 2015*: 1 – 11.

Papers in Review

- 1) **Smith, A.**, Lunardi, B., George, E., Lehner, J., Houser, C. Coastal Dune Eco-Geomorphology: sUAS Applications and Opportunities. *sUAS Applications in Geography*.
- 2) Houser, C., **Smith, A.**, Lehner, J., George, E., Lunardi, B. The research geomorphologist in the time of machine learning. *Geomorphology*.
- 3) Houser, C., **Smith, A.**, Lunardi, B., George, E., Lehner, J. Textbook Dune. *Geomorphology*.
- 4) George, E., Lunardi, B., **Smith, A.**, Lehner, J., Wernette, P., Houser, C. Foredune recovery following an extra-tropical storm event. *Geomorphology*.

Research Presented

- 1) 2021 Houser, C.*, **Smith, A.**, George, E., Lunardi, B. The Textbook Foredune: Is there a representative and scale invariant beach-dune profile? *Coastal Zone Canada 2021*. Iqaluit, Canada.
- 2) 2019 **Smith, A.**, Houser, C., Chittle, B., Krueger, T. Collating and Predicting North American Beach-Dune interactions through time and space. *AGU 2019*. San Francisco, CA, U.S.A.
- 3) 2019 **Smith, A.** Multi-scale considerations for aeolian research: a case study of the Maspalomas dunefield. Invited Speaker. Naval Research Laboratory, Stennis Space Center, MS, U.S.A.
- 4) 2018 Jackson, D.W.T.*, Baas, A., **Smith, A.** Turbulence in boundary layer flow over a sandy beach surface. *ICAR X*. Bordeaux, France.
- 5) 2018 Jackson, D.*, Baas, A., **Smith, A.** 3D boundary layer flow behavior over a sandy beach surface: empirical and modelling analysis. *EGU 2018*. Vienna, Austria.
- 6) 2018 Delgado-Fernandez*, I., Smyth, T.A.G., Jackson, D.W.T., Hesp, P.A., Davidson-Arnott, R., **Smith, A.** Multi-scale evolution of a large-scale coastal blowout using aerial photography and DoDs. *EGU 2018*. Vienna, Austria.
- 7) 2017 **Smith, A.**, Jackson, D.W.T.*, Cooper, J.A.G., Beyers, M. Large Scale Airflow Perturbations and Resultant Dune Dynamics. *EGU 2017*. Vienna, Austria.
- 8) 2017 Gares, P.*, Wasklewicz, T., Heffentrager, M.L., Adams, K.V., **Smith, A.** Development of Pothole Blowouts and their role in dune field evolution. *Association of American Geographers 2017*, Boston, Massachusetts, U.S.A.
- 9) 2017 Delgado-Fernandez, I.*, Smyth, T., Jackson, D., Davidson-Arnott, R., **Smith, A.** Morphological response of a large-scale coastal blowout to a strong magnitude transport event. *EGU 2017*. Vienna, Austria.

- 10) 2016 **Smith, A.***, Jackson, D.W.T., Cooper, J.A.G. The impact of urbanization on the regional Aeolian dynamics of an arid coastal dunefield. EGU 2016. Vienna, Austria.
- 11) 2016 Delgado-Fernandez, I.*, Smyth, T., Jackson, D., Davidson-Arnott, R., **Smith, A.** The persistence of large-scale blowouts in largely vegetated coastal dune fields. EGU 2016, Vienna, Austria.
- 12) 2015 **Smith, A.***, Jackson, D.W.T., Cooper, J.A.G. Measured and Modelled Airflow Perturbation Over Barchan Dune Topography. Windy Day Conference 2015. University of Reading, Reading, U.K.
- 13) 2015 **Smith, A.***, Jackson, D.W.T., Cooper, J.A.G. The Impact of Urbanization on the Morphodynamics of an Arid Coastal Dunefield, Maspalomas, Gran Canaria, Conference of Irish Geographers, Belfast, U.K.
- 14) 2015 **Smith, A.***, Jackson, D.W.T., Cooper, J.A.G., Byers, M. Airflow and Sediment Dynamics in Arid Dune Fields Using Field and Modelling Techniques. AAG Annual Meeting, Chicago, Illinois, U.S.A.
- 15) 2015 **Smith, A.***, Jackson, D.W.T., Cooper, J.A.G. Computational Fluid Dynamics (CFD) Modelling Over Multiple Dune Lengths, Maspalomas, Gran Canaria. Coastal Sediments 2015, San Diego, California, U.S.A.
- 16) 2014 **Smith, A.**, Jackson, D.W.T.*, Cooper, J.A.G. Airflow and Sediment Dynamics in an Arid Coastal Dunefield, Maspalomas de Gran Canaria. Windy Day Conference 2014. University of Oxford, Oxford, U.K.
- 17) 2014 Hesp, P.*, Smyth, T., Walker, I, Gares, P., Wasklewicz, T., Abhar, K., Hilton, M., **Smith, A.**, Haynes, M. Evolution and Morphodynamics of a Bowl Blowout. ICAR VIII, Lanzhou, China.
- 18) 2013 **Smith, A.***, Gares, P., Wasklewicz, T. Geomorphic Analysis of Coastal Blowout Dunes in Cape Cod National Seashore Using High Resolution Terrestrial Laser Scanning. AAG Annual Meeting, Los Angeles, California, U.S.A.
- 19) 2012 **Smith, A.***, Gares, P., Wasklewicz, T. Geomorphic Analysis of Coastal Blowout Dunes in Cape Cod National Seashore. SEDAAG Annual Meeting, Asheville, North Carolina, U.S.A.

Public Outreach

- 2019** CBC Radio Interview: Impacts of Storm Dorian on Prince Edward Island National Park, Canada
- 2019** Windsor Star Newspaper Interview: Discussing Storm Dorian and University of Windsor's Coastal Research Groups involvement at Prince Edward Island National Park, Canada
- 2017** GeoSpace (AGU Blogsphere): Human impacts on the Maspalomas Dunefield

Professional Organizations Past and Present

Member of the Association of American Geographers
 Member of the Geological Society of America
 Member of the Irish Geomorphology Group
 Member of the British Society for Geomorphology
 Member of the European Geophysical Union
 Member of the American Geophysical Union

Technical and Computer Skills

- TLS, UAV, total station, and GPS surveying
- Ultrasonic Anemometry
- Sediment Flux Measurements and Grain Size Analysis
- ArcGIS
- OpenFOAM CFD software
- Pix4D SfM software
- Leica Cyclone and Faro Scene Laser Scanning software
- Keras Deep Learning
- Python
- Matlab
- Microsoft Suite