

# Daniel Buscombe

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Research Geologist, United States Geological Survey,  
Grand Canyon Monitoring and Research Center, 2255 N Gemini Drive, Flagstaff, AZ 86001  
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## CONTACT INFORMATION

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## RESEARCH STATEMENT

My research is interdisciplinary in sedimentology, coastal and hydraulic engineering, and geophysics, applying methodologies ranging from field surveys and laboratory analysis to analytical and numerical modeling. Of special interest to me is geostatistical analyses, computational geomorphology and sedimentology, stochastic modeling techniques, community software development, instrument design, and the remote characterization of sedimentary environments, which includes sensing the properties of flows and particles at rest and in motion, in single and multi-phase flows, both terrestrial and subaqueous, by developing and applying novel acoustics and optics instrumentation and computational algorithms

## EDUCATION

**Ph.D. (2008), Coastal Geomorphology/Nearshore Oceanography, University of Plymouth**, Plymouth, UK. *Morphodynamics, Sediment Dynamics and Sedimentation of a Gravel Beach*. Advisor: Prof. Gerhard Mas-selink.

**BSc (Hons), 1st class (2003), Physical Geography with Minors in Environmental Sciences and Biology, Lancaster University**, Lancaster, UK. *Morphodynamics of a Ridge-and-Runnel System on a Macrotidal Beach*. Advisor: Dr Suzanna Ilic.

## EMPLOYMENT HISTORY

**November 2012 – present.** *Research Geologist, Grand Canyon Monitoring and Research Center, U.S. Geological Survey, Flagstaff, AZ, USA.*

**October 2009 – November 2012.** *Post-doctoral Research Fellow, School of Marine Science & Engineering, University of Plymouth, UK.*

**September, 2008 – 2011.** *Computer Programming Contractor, Marine Biology & Ecology Research Centre, University of Plymouth, UK.*

**October, 2008 – October 2009.** *Post-doctoral Research Scholar, United States Geological Survey, Santa Cruz, California, USA.*

**June, 2008 – September, 2008.** *Research Assistant, School of Geography, University of Plymouth, UK.*

**December, 2007 – April, 2008.** *Research Assistant, School of Earth, Ocean & Environmental Science, University of Plymouth, UK.*

**October, 2004 – July 2008.** *Associate Lecturer and Demonstrator (part-time), School of Geography, University of Plymouth, UK.*

**August 2003 - September, 2004.** *Assistant tutor, Field Studies Council, Castle Head, Grange-over-Sands, UK.*

## PEER-REVIEWED PUBLICATIONS

### IN REVIEW/PREPARATION

- 42 **Buscombe, D.**, Yard, M., and others, in prep, Mapping submerged aquatic vegetation in Glen Canyon, Arizona using underwater photography and high-frequency acoustics. Intended for *RIVER RESEARCH & APPLICATIONS*.
- 41 **Buscombe, D.**, Grams, P.E., in prep, Specifying uncertainty in acoustic classifications of riverbed sediment: Colorado River in Marble and Grand Canyons, Arizona. Intended for *JOURNAL OF GEOPHYSICAL RESEARCH - EARTH SURFACE*.
- 40 Grams, P.E. **Buscombe, D.**, and others, in prep, Patterns of channel and sandbar morphologic response to sediment evacuation in a debris-fan dominated canyon. Intended for *EARTH SURFACE PROCESSES & LANDFORMS*.

- 39 **Buscombe, D.**, Conley, D.C., and Nimmo-Smith, W.A.M., in review, Effect of bubbles on acoustic measurements of suspended sand in the surf zone. *JOURNAL OF GEOPHYSICAL RESEARCH - OCEANS*
- 38 Cuttler, M., Lowe, R., Falter, J., and **Buscombe, D.**, in review, Estimating the settling velocity of bioclastic sediment from common grain-size analysis techniques. *SEDIMENTOLOGY*.
- 37 **Buscombe, D.**, in review, Processing and georeferencing recreational-grade sidescan sonar data to support the democratization of acoustic imaging shallow water. *LIMNOLOGY & OCEANOGRAPHY: METHODS*

2016

- 36 Hamill, D., **Buscombe, D.**, Wheaton, J.M., Melis, T.S., Grams. P.E., 2016, Towards bed texture change detection in large rivers from repeat imaging using recreational grade sidescan sonar *Proceedings of the 8th International Conference on Fluvial Hydraulics*, St. Louis, Missouri, July 2016.
- 35 **Buscombe, D.**, Grams. P.E., 2016, Stochasticity of riverbed backscattering, with implications for acoustical classification of non-cohesive sediment using multibeam sonar *Proceedings of the 8th International Conference on Fluvial Hydraulics*, St. Louis, Missouri, July 2016.
- 34 **Buscombe, D.**, 2016, Spatially explicit spectral analysis of point clouds and geospatial data. *COMPUTERS & GEOSCIENCES* 86, 92-108, 10.1016/j.cageo.2015.10.004.

2015

- 33 **Buscombe, D.**, Grams, P.E., Smith, S.M., 2015, Automated riverbed sediment classification using low-cost sidescan sonar. *JOURNAL OF HYDRAULIC ENGINEERING*, 10.1061/(ASCE)HY.1943-7900.0001079, 06015019.
- 32 Davies, E.J., **Buscombe, D.**, Graham, G.W., Nimmo-Smith, W.A.M., 2015, Evaluating Unsupervised Methods to Size and Classify Suspended Particles using Digital in-line Holography, *JOURNAL OF ATMOSPHERIC & OCEANOGRAPHIC TECHNOLOGY*, 32, 1241 - 1256. doi: 10.1175/JTECH-D-14-00157.1
- 31 Grams. P.E., **Buscombe, D.**, Topping, D.J., Hazel, J.E., and Kaplinski, M.A. (2015) Use of Flux and Morphologic Sediment Budgets for Sandbar Monitoring on the Colorado River in Marble Canyon, Arizona. *Proceedings of the 10th Federal Interagency Sedimentation Conference*, Reno, April 2015.
- 30 **Buscombe, D.**, Grams. P.E., Kaplinski, M.A., Tusso, R.B., and Rubin, D.M. (2015) Hydroacoustic signatures of Colorado riverbed sediments in Marble and Grand Canyons using multibeam sonar. *Proceedings of the 10th Federal Interagency Sedimentation Conference*, Reno, April 2015.
- 29 **Buscombe, D.**, Grams. P.E., Melis, T.S., Smith, S. (2015) Considerations for unsupervised riverbed sediment characterization using low-cost sidescan sonar: Examples from the Colorado River, AZ and the Penobscot River, ME. *Proceedings of the 10th Federal Interagency Sedimentation Conference*, Reno, April 2015.
- 28 **Buscombe, D.**, Tusso, R.B., Grams. P.E. (2015) Using oblique digital photography for alluvial sandbar monitoring and low-cost change detection. *Proceedings of the 10th Federal Interagency Sedimentation Conference*, Reno, April 2015.

2014

- 27 Puleo, J., Blenkinsopp, C., Conley, D., Masselink, G., Turner, I., Russell, P., **Buscombe, D.**, Howe, D., Lanckriet, T., McCall, R., and Poate, T., 2014, A Comprehensive Field Study of Swash-Zone Processes, Part 1: Experimental Design with Examples of Hydrodynamic and Sediment Transport Measurements. *JOURNAL OF WATERWAY, PORT, COASTAL, & OCEAN ENGINEERING*, 140, 2942. 10.1061/(ASCE)WW.1943-5460.0000210.
- 26 **Buscombe, D.**, Rubin, D.M., Lacy, J.R., Storlazzi, C., Hatcher, G., Chezar, H., Wyland, R. and Sherwood, C., 2014, Autonomous bed-sediment imaging-systems for revealing temporal variability of grain size. *LIMNOLOGY & OCEANOGRAPHY: METHODS*, 12, 390 - 406.
- 25 **Buscombe, D.**, Grams, P.E., Kaplinski, M.A., 2014, Characterizing riverbed sediment using high-frequency acoustics 1: Spectral properties of scattering. *JOURNAL OF GEOPHYSICAL RESEARCH - EARTH SURFACE*, 119, doi:10.1002/2014JF003189..
- 24 **Buscombe, D.**, Grams, P.E., Kaplinski, M.A., 2014, Characterizing riverbed sediment using high-frequency acoustics 2: Scattering signatures of Colorado River bed sediment in Marble and Grand Canyons. *JOURNAL OF GEOPHYSICAL RESEARCH - EARTH SURFACE*, 119, doi:10.1002/2014JF003191.

2013

- 23 **Buscombe, D.**, 2013, Transferable Wavelet Method for Grain Size-Distribution from Images of Sediment Surfaces and Thin Sections, and Other Natural Granular Patterns. *SEDIMENTOLOGY* 60, 1709–1732.

2012

- 22 Williams, J.J., **Buscombe, D.**, Masselink, G., Turner, I., and Swinkels, C., 2012, Barrier Dynamics Experiment (BARDEX): Aims, Design and Procedures. *COASTAL ENGINEERING* 63, 3-12.
- 21 **Buscombe, D.**, and Conley, D.C., 2012, Effective Shear Stress of Graded Sediment. *WATER RESOURCES RESEARCH* 48, W05506.
- 20 **Buscombe, D.**, and Rubin, D.M., 2012, Advances in the Simulation and Automated Measurement of Granular Material, Part 1: Simulations. *JOURNAL OF GEOPHYSICAL RESEARCH - EARTH SURFACE* 117, F02001.
- 19 **Buscombe, D.**, and Rubin, D.M., 2012, Advances in the Simulation and Automated Measurement of Granular Material, Part 2: Direct Measures of Particle Properties. *JOURNAL OF GEOPHYSICAL RESEARCH - EARTH SURFACE* 117, F02002.
- 18 Lacy, J.R., Rubin, D.M. and **Buscombe, D.**, 2012, Currents and sediment transport induced by a tsunami far from its source. *JOURNAL OF GEOPHYSICAL RESEARCH - OCEANS* 117, C09028.
- 17 Puleo, J.A., Conley, D.C., Masselink, G., Russell, P., Turner, I.L., Blenkinsopp, C., **Buscombe, D.**, Lanckriet, T., McCall, R., and Poate, T. (2012) Comprehensive study of swash-zone hydrodynamics and sediment transport. *Proceedings of the 33rd International Conference on Coastal Engineering*, Santander, July 2012.
- 16 **Buscombe, D.**, and Conley, D.C. (2012) Schmidt number of sand suspensions under oscillating-grid turbulence. *Proceedings of the 33rd International Conference on Coastal Engineering*, Santander, July 2012.
- 15 Conley, D.C., **Buscombe, D.**, and Nimmo-Smith, A. (2012) Use of digital holographic cameras to examine the measurement and understanding of sediment suspension in the nearshore. *Proceedings of the 33rd International Conference on Coastal Engineering*, Santander, July 2012.

2010

- 14 **Buscombe, D.**, Rubin, D.M., and Warrick, J.A., 2010, Universal Approximation of Grain Size from Images of Non-Cohesive Sediment. *JOURNAL OF GEOPHYSICAL RESEARCH - EARTH SURFACE* 115, F02015.
- 13 **Buscombe, D.**, Rubin, D. M., and Warrick, J. A. (2010) An automated and 'universal' method for measuring mean grain size from a digital image of sediment. *Proceedings of the 9th Federal Interagency Sedimentation Conference*, Las Vegas June 2010.

2009

- 12 **Buscombe, D.**, and Masselink, G., 2009, Grain Size Information from the Statistical Properties of Digital Images of Sediment. *SEDIMENTOLOGY* 56, 421-438
- 11 Warrick, J.A., Rubin, D.M., Ruggiero, P., Harney, J., Draut, A.E., and **Buscombe, D.**, 2009, Cobble Cam: Grain-size measurements of sand to boulder from digital photographs and autocorrelation analyses. *EARTH SURFACE PROCESSES & LANDFORMS* 34, 1811-1821.
- 10 Williams, J., Masselink, G., **Buscombe, D.**, Turner, I., Matias, A., Ferreira, O., Meltje, N., Bradbury, A., Albers, T., and Pan, S., 2009, BARDEX (Barrier Dynamics Experiment): taking the beach into the laboratory. *JOURNAL OF COASTAL RESEARCH* SI 56, 158-162.

2008

- 9 Masselink, G., **Buscombe, D.**, Austin, M.J, O'Hare, T., Russell, P., 2008, Sediment Trend Models Fail to Reproduce Small Scale Sediment Transport Patterns on an Intertidal Beach. *SEDIMENTOLOGY* 55, 667-687.
- 8 Austin, M.J., and **Buscombe, D.**, 2008, Morphological Change and Sediment Dynamics of the Beach Step on a Macrotidal Gravel Beach. *MARINE GEOLOGY* 249, 167-183.
- 7 **Buscombe, D.**, 2008, Estimation of Grain Size Distributions and Associated Parameters from Digital Images of Sediment. *SEDIMENTARY GEOLOGY* 210, 1-10.

- 6 Masselink, G., and **Buscombe, D.**, 2008, Shifting gravel: A case study of Slapton Sands. *GEOGRAPHY REVIEW* 22 (1), 27-31.
- 5 **Buscombe, D.**, Masselink, G., and Rubin, D.M. (2008) Granular Properties from Digital Images of Sediment: Implications for Coastal Sediment Transport Modelling. *Proceedings of the 31st International Conference on Coastal Engineering (ICCE)*, Hamburg, 2008.
- 4 Ruiz de Alegria, A., Masselink, G., Kingston, K., Williams, J., and **Buscombe, D.** (2008) Storm Impacts on a Gravel Beach Using the ARGUS video system. *Proceedings of the 31st International Conference on Coastal Engineering (ICCE)*, Hamburg, 2008.
- 3 Austin, M.J., Masselink, G., Turner, I., **Buscombe, D.**, and Williams, J. (2008) Groundwater seepage between a gravel barrier beach and a freshwater lagoon. *Proceedings of the 31st International Conference on Coastal Engineering (ICCE)*, Hamburg, 2008.

2007

- 2 **Buscombe, D.**, Austin, M.J., and Masselink, G. (2007) Field observations of step dynamics on a macrotidal gravel beach. In Kraus, N., and Rosati, J., (Eds) *Proceedings of Coastal Sediments 2007 (Volume 1)*, ASCE, USA.

2006

- 1 **Buscombe, D.**, and Masselink, G., 2006, Concepts in Gravel Beach Dynamics. *EARTH SCIENCE REVIEWS* 79, 33-52.

#### CONFERENCE PUBLICATIONS

2015

- 32 Grams. P.E., **Buscombe, D.**, Hazel, J.E., Kaplinski, M.A., Topping, D.J. (2015) Patterns of Channel and Sand-bar Morphologic Response to Sediment Evacuation on the Colorado River in Marble Canyon, Arizona *American Geophysical Union Fall Meeting*, San Francisco, Dec 2015.
- 31 Ashley, T., McElroy, B., **Buscombe, D.**, Grams. P.E., Kaplinski, M.A., (2015) Examining the relationship between suspended sand load and bedload on the Colorado River, using concurrent measurements of suspended sand and observations of sand dune migration *American Geophysical Union Fall Meeting*, San Francisco, Dec 2015.
- 30 Rubin, D.M., Topping, D.J., Schmidt, J.C., Grams. P.E., **Buscombe, D.**, East, A.E., Wright, S.A., (2015) Interpreting hydraulic conditions from morphology, sedimentology, and grain size of sand bars in the Colorado River in Grand Canyon *American Geophysical Union Fall Meeting*, San Francisco, Dec 2015.
- 29 Kaplinski, M.A., **Buscombe, D.**, Ashley, T., Tusso, R.B., Grams. P.E., McElroy, B., Mueller, E., Hamill, D., and Townsend, J. (2015) Observations of sand dune migration on the Colorado River in Grand Canyon using high-resolution multibeam bathymetry *American Geophysical Union Fall Meeting*, San Francisco, Dec 2015.
- 28 Hensleigh, J., **Buscombe, D.**, Wheaton, J.M., and Brasington, J. (2015) TopCAT and PySESA: Open-source software tools for point cloud decimation, roughness analyses, and quantitative description of terrestrial surfaces. *American Geophysical Union Fall Meeting*, San Francisco, Dec 2015.
- 27 **Buscombe, D.**, Wheaton, J.M., Hensleigh, J., Grams, P.E., Welcker, C., Anderson, K., and Kaplinski, M. (2015) Addressing scale dependence in roughness and morphometric statistics derived from point cloud data. *American Geophysical Union Fall Meeting*, San Francisco, Dec 2015.
- 26 **Buscombe, D.** (2015) Acoustic and topographic sediment classification in Lower Marble Canyon *2nd MBES in Rivers Workshop*, USGS Flagstaff, AZ, March 2015. (oral)
- 25 **Buscombe, D.** and Kaplinski, M.A. (2015) Characterizing sand dune migration on the Colorado River in Western Grand Canyon using repeat multibeam mapping *2nd MBES in Rivers Workshop*, USGS Flagstaff, AZ, March 2015. (oral)
- 24 **Buscombe, D.** (2015) Towards automated substrate mapping with low-cost sidescan sonar *2nd MBES in Rivers Workshop*, USGS Flagstaff, AZ, March 2015. (oral)

2014

- 23 Rubin, D., Topping, D., Grams, P., Tusso, R., Schmidt, J., **Buscombe, D.**, Melis, T., Wright, S. (2014) What sediment grain size reveals about suspended-sediment transport in the Colorado River in Grand Canyon. *International*

*Conference on the Status and Future of the World's Large Rivers, Brazil* (oral).

- 22 **Buscombe, D.**, Grams, P.E., and Kaplinski, M.A. (2014) Bed sediment classification using acoustic backscatter *1st MBES in Rivers Workshop*, Utah State University, Feb 2014. (oral)
- 21 **Buscombe, D.**, Grams, P.E. (2014) Topographic and acoustic estimates of grain-scale roughness from high-resolution multibeam echo-sounder: examples from the Colorado River in Marble and Grand Canyons. *American Geophysical Union Fall Meeting*, San Francisco, Dec 2014. (oral)

2013

- 20 Kaplinski, M.A., Hazel, J.E., Grams, P.E., **Buscombe, D.**, Hadley, D., and Kohl, K. (2013) Constructing a morphologic sediment budget, with uncertainties, for a 50-km segment of the Colorado River in Grand Canyon. *American Geophysical Union Fall Meeting*, San Francisco, Dec 2013 (poster).
- 19 Grams, P.E., **Buscombe, D.**, Hazel, J.E., Kaplinski, M.A., and Topping, D.J. (2013) Reconciliation of Flux-based and Morphologic-based Sediment Budgets. *American Geophysical Union Fall Meeting*, San Francisco, Dec 2013 (oral).
- 18 **Buscombe, D.**, Grams, P.E., Kaplinski, M.A. (2013) Acoustic Scattering by an Heterogeneous River Bed: Relationship to Bathymetry and Implications for Sediment Classification using Multibeam Echosounder Data. *American Geophysical Union Fall Meeting*, San Francisco, Dec 2013 (oral).
- 17 Davies, E.J., **Buscombe, D.**, Graham, G., Nimmo Smith, W.A.M. (2013) Evaluating Unsupervised Methods to Size and Classify Suspended Particles Using Digital Holography *American Geophysical Union Fall Meeting*, San Francisco, Dec 2013 (poster).

2012

- 16 Conley, D.C., **Buscombe, D.**, and Nimmo-Smith, A. (2012) New understandings of sediment suspension in the nearshore from cross-comparisons of diverse sensors. *Ocean Sciences 2012*, Salt Lake City (poster).
- 15 **Buscombe, D.**, Conley, D.C., and Rubin, D.M. (2012) Co-variation of intertidal morphology, bedforms and grain size on a macrotidal sand beach: Praa Sands, UK. *Ocean Sciences 2012*, Salt Lake City (oral).
- 14 Nimmo-Smith, A., **Buscombe, D.**, and Conley, D.C. (2012) Use of digital holographic cameras to examine the measurement and understanding of sediment suspension in the nearshore. *Particles in Europe*, Barcelona, October 2012 (oral).

2011

- 13 **Buscombe, D.**, and Conley, D.C. (2011) Formula for Motion Threshold per Grain Size for Graded Sediments in Steady Flows. *European Geosciences Union General Assembly 2011*, Vienna (poster).
- 12 **Buscombe, D.**, and Rubin, D.M. (2011) How do you tell how big something is without direct measurement? Estimating grain size using an images spectrum. *American Geophysical Union Fall Meeting*, San Francisco, Dec 2011 (oral).

2010

- 11 **Buscombe, D.** Lacy, J.R., and Rubin, D.M. (2010) Fractional resuspension and sediment flux on a wave-dominated, non-cohesive, inner continental shelf. *Ocean Sciences 2010*, Portland (poster)
- 10 Rubin, D.M., **Buscombe, D.**, Lacy, J.R., Chezar, H., Hatcher, G., and Wyland, R. (2010) Seafloor sediment observatory on a cable and a shoestring. *Ocean Sciences 2010*, Portland (oral)
- 9 **Buscombe, D.**, and Conley, D.C. (2010) Modeling sand resuspension and stratification in turbulent nearshore flows: sensitivity to grain size distribution. *Ocean Sciences 2010*, Portland (oral)
- 8 Lacy, J.R., **Buscombe, D.**, and Rubin, D.M. (2010) Tsunami-enhanced sediment resuspension on the inner shelf in northern Monterey Bay, California. *Ocean Sciences 2010*, Portland (oral)
- 7 Conley, D.C., and **Buscombe, D.** (2010) Effects of Grain Size Distributions on Fluid-Sediment Feedback. *European Geosciences Union General Assembly 2010*, Vienna (oral)
- 6 Rubin, D.M., Chezar, H., **Buscombe, D.**, Warrick, J.A., Barnard, P.L., Lacy, J.R., Hatcher, G., Wyland, R., Storlazzi, C., Conaway, C.H., Topping, D.J., Melis, T.S., and Grams, P.E. (2010) New technology for in-situ grain-size

analysis from digital images of sediment, and resulting insights regarding sediment transport. *9th Federal Interagency Sedimentation Conference*, Las Vegas June 2010 (oral).

- 5 **Buscombe, D.**, Rubin, D.M., and Lacy, J.R. (2010) Hourly Measurements of Grain-Size from the Inner Continental Shelf Seabed Using a Fully-Automated, Hydraulically-Controlled Underwater Video Microscope. *Particles in Europe 2010*, Villefranche-Sur-Mer, France. (oral)
- 4 Williams, J.J., Masselink, G., **Buscombe, D.**, and 10 others (2010) BARDEX (Barrier Dynamics Experiments): a laboratory study of gravel barrier response to waves and tides. *Proceedings of Hydralab III Joint User Meeting*, Hannover, p. 4 (oral)

2009

- 3 Williams, J.J., Masselink, G., **Buscombe, D.**, and 7 others (2009). BARDEX (Barrier Dynamics Experiment): taking the beach into the laboratory. Abstract submitted for oral presentation at the *10th International Coastal Symposium (ICS)*, Lisbon, Portugal 2009 (oral).

2008

- 2 **Buscombe, D.**, Ruiz de Alegria, A., and Masselink, G. (2008). The relative importance of cross- and along-shore sediment transport in planform and profile adjustments of a gravel barrier beach: Slapton, Devon, UK. *American Geophysical Union Fall Meeting*, San Francisco, Dec 2008 (poster).

2007

- 1 **Buscombe, D.**, and Masselink, G. (2007) The relationship between sediment properties and sedimentation patterns on a macrotidal gravel beach over a semi lunar tidal cycle. *Eos Transactions American Geophysical Union Fall Meeting*, Abstract H53L-02 (oral).

## REPORTS

- 1 **Buscombe, D.**, and Scott, T.M. (2008) *Coastal Geomorphology of North Cornwall: St Ives to Trevoze Head*. Internal report for Wave Hub Impacts on Seabed and Shoreline Processes, University of Plymouth. 170pp.
- 2 **Buscombe, D.**, Williams, J. J., and Masselink, G. (2008) *BARDEX (Barrier Dynamics Experiment): experimental procedure, technical information and data report*. Technical report for the European Union Hydralab III, 219pp.

## PUBLISHED

## SOFTWARE

- 1 **Digital Grain Size**. Software for automated analyses of grain size from images of sediment. Source code currently available in Matlab and Python. Webpage <http://dbuscombe-usgs.github.com>
- 2 **PyHum**. Software for reading, processing and analysis of Humminbird sidescan data. Source code available in Python/Cython. Webpage <http://dbuscombe-usgs.github.com>
- 3 **Benthic Analysis Tool**. Software for the semi-automation of species identification and measurement in deep-sea ROV/drop frame images. Source code available in Matlab.
- 4 **Sand Simulation Toolbox**. Software for generating 3D discrete particle models consisting of realistic particles (with a size- and shape-distribution) with user-defined properties. Source code available in Matlab. Webpage <http://dbuscombe-usgs.github.com>
- 5 **MATSCAT**. Software for analysis of multiple-frequency acoustic backscatter for suspended sediment concentration and particle size. Source code available in Matlab.
- 6 Generic software for serial data acquisition and real-time display. Source code available in Python.
- 7 Software for interfacing with machine-vision ethernet video cameras. Source code available in C.
- 8 **PySESA: Python program for spatially explicit spectral analysis** Software for spatially explicit analysis of point clouds and spatially distributed data. Source code available in Python. Webpage <http://dbuscombe-usgs.github.com>

FUNDED  
PROPOSALS

- 1 Principal-Investigator, *British Geomorphological Society Postgraduate award (£300)* to attend and present at Coastal Sediments 2007, in New Orleans, USA
- 2 Principal-Investigator, *American Geophysical Union Student travel grant (\$600)* to attend the AGU 2007 Fall Meeting in San Francisco, USA
- 3 Principal-Investigator, *International Association of Sedimentologists Grant (700 euros)* to investigate nearshore bedload transport and bedforms with stereo underwater video cameras.
- 4 Principal-Investigator, *International Association for Mathematical Geology research grant (\$2000)* to develop and trial algorithms for quantification of granular properties and coarse-grain sediment transport from images of the sea bed
- 5 Principal-Investigator, *Society for Sedimentary Geology Grant (\$500, President's Fund)* to investigate nearshore bedload transport and bedforms with stereo underwater video cameras.
- 6 Principal-Investigator, *Challenger Society for Marine Science travel grant (£150)* to attend and present at ICCE Hamburg 2008
- 7 Principal-Investigator, *Plymouth Marine Science Education Fund (£250)* to attend and present at ICCE Hamburg 2008
- 8 Co-Investigator; G. Masselink (PI), D.C. Conley, D. Buscombe., (2012 - 2014) *Proto-type Experiment and Numerical Modelling of Energetic Sediment Transport under Waves (PESTS)*. Engineering and Physical Sciences Research Council, UK. EPSRC EP/K000306/1 (£240,000)
- 9 Co-Investigator (multiple PIs J. Schmidt and others), (2013 - 2014) *Sandbars and sediment storage dynamics: long-term monitoring and research at the site, research and ecosystem scales*, Grand Canyon Monitoring and Research Center Biennial Work Plan. Glen Canyon Dam Adaptive Management Work Group (\$2,911,400)
- 10 Co-Investigator (multiple PIs P.E. Grams and others), (2014 - 2017) *Geomorphic Processes and Relations Among Flow Regime, Sediment Flux and Resource Conditions on the Green River in Canyonlands National Park*. National Park Service (\$232,016)
- 11 Co-Investigator (multiple PIs J. Schmidt and others), (2015 - 2017) *Sandbars and sediment storage dynamics: long-term monitoring and research at the site, research and ecosystem scales*, Grand Canyon Monitoring and Research Center Triennial Work Plan. Glen Canyon Dam Adaptive Management Work Group (\$4,253,400).
- 12 Principal-Investigator (2015 - 2016) *LOBOS (Limnological and Oceanographic Benthic Observation System): The next generation dual-scale submersible benthic imaging system*, jointed funded by the USGS Innovation Fund (\$16,497), the Innovation Center for Earth Science Director's Fund (\$17,497) and the USGS Southwest Biological Science Center (\$15,000) (\$48,994 total).
- 13 Principal-Investigator (2015 - 2016) *The digital grain size web and mobile computing application*, funded by the USGS Center for Data Integration (\$46,417).
- 14 Co-investigator: T. Sankey (PI), P. Grams, A. East, D. Buscombe., T. Sankey, (2015 - 2017) USGS Mendenhall post-doctoral fellowship, *The fluvial-aeolian- hillslope continuum: measurement and modeling of topography and vegetation to inform landscape-scale connectivity for sediment in river valley ecosystems* (\$200,000).

GRADUATE  
STUDENT  
SUPERVISION

- 1 Martin Meoli, MSc Applied Marine Science, University of Plymouth, graduated 2011 "Gravel transport under waves" (committee member)
- 2 James Sawyer, MSc Applied Marine Science, University of Plymouth, graduated 2012 "Holographic imaging of suspended particles" (committee member)
- 3 Rebecca Rossi, MSc Watershed Sciences, Utah State University, expected graduation 2016, "Pole-mounted SfM Platform for Monitoring Geomorphic Change in a Fluvial Environment: A Case Study of Sandbar Dynamics in Marble and Grand Canyons" (committee member)
- 4 Daniel Hamill, MSc Watershed Sciences, Utah State University, expected graduation 2017, "Quantifying Riverbed Textures Using Recreational Grade Sidescan Sonar" (committee member)
- 5 Thomas Ashley, PhD Geology and Geophysics, University of Wyoming, expected graduation 2019, "Bedload transport in sand-bedded rivers" (committee member)
- 6 Ryan Lima, PhD Earth and Environmental Sciences, Northern Arizona University, expected graduation 2020, "Remotely Sensing the Dynamics of Alluvial Sandbars in Grand Canyon" (committee member)

## SKILLS

- 1 Community models: General Ocean Turbulence Model (GOTM, <http://www.gotm.net/index.php>); Simulating Waves Nearshore (SWAN; <http://www.swan.tudelft.nl/>); Simulating Waves 'til Shore (SWASH; <http://swash.sourceforge.net/features/features.htm>).
- 2 Proficient with Linux operating systems, high performance computing and distributed computing.
- 3 Programming/Scripting: Python, BASH, Matlab (proficient); Cython, Kivy, Fortran (experienced); C, C++, R (beginner).
- 4 Full UK driving licence. Arizona State driving licence.
- 5 Certificate in Mathematical Methods for Coastal Engineering, June 2005.
- 6 LANTRA sit-astride ATV qualification, Jan 2011.
- 7 Motorboat Operator Certification Course (MOCC) completed, April 2016.

## INVITED TALKS

- 1 *Slapton Research Seminar, Field Studies Council, Slapton Ley*, 4th December 2004. Talk entitled 'A tale of two storms'.
- 2 *Slapton Research Seminar, Field Studies Council, Slapton Ley*, 18th November 2006. Talk entitled 'A view from the beach'.
- 3 *Centre for Coastal Dynamics and Engineering (C-CoDE)*, University of Plymouth, 6th December 2006. Talk entitled 'Field observations of morphological change and sediment dynamics from the nearshore of a gravel beach'.
- 4 *Slapton Research Seminar, Field Studies Council, Slapton Ley*, 3rd November 2007. Talk entitled 'A year in the life of Slapton Sands - but was it a typical year?' with Tom Deacon (SLFC).
- 5 *Lancaster University Environmental Imaging Network*, 20th May 2008. Talk entitled 'Optical sensing of gravel sediment transport and characteristics: recent advances and future challenges'.
- 6 *Coastal and Marine Geology, United States Geological Survey, Santa Cruz*, 28th January 2009. Talk entitled 'Morphodynamics and sediment dynamics of a macrotidal gravel beach'.
- 7 *Centre for Coastal Science and Engineering, University of Plymouth*, 17th February 2010. Talk entitled 'Turbulence, Sediment Stratification and Altered Resuspension under Waves'.
- 8 *Grand Canyon Monitoring and Research Center, Flagstaff, Arizona*, 27th February 2012. Talk entitled 'Nearshore Sediment Transport Through the Looking Glass'.
- 9 *British Geological Survey, Marine Geosciences Division, Edinburgh*, 13th July 2012. Talk entitled 'Digital Grain Size'.
- 10 *Glen Canyon Dam Adaptive Management Program Adaptive Management Work Group Meeting, Flagstaff, Arizona*, August 2014. Talk entitled 'Measuring bed sediments for improved sediment budgets and physical habitat assessment'.
- 11 *USGS Coastal and Marine Geology, Woods Hole, MA*, February 2015. Talk entitled 'The Digital Grain Size Project: Past, Present and Future'.
- 12 *Glen Canyon Dam Adaptive Management Program Adaptive Management Work Group Meeting, Phoenix, Arizona*, January 2016. Talk entitled 'Observations of sand dune migration on the Colorado River in Grand Canyon'.
- 13 *USGS Center for Data Integration, Denver, CO*, March 2016. Talk entitled 'The Digital Grain Size Web Computing Application'.
- 14 *Natural Resources Institute Finland (Luke), Helsinki, Finland*, November 2016. Talk entitled 'Acoustic remote sensing tools for classification and assessment of spawning habitats'.



CRUISES, FIELD &  
LABORATORY  
EXPERIMENTS

*Groundwater and swash sediment transport experiments at Slapton Sands, UK, October 2004.*

Member of the science team helping Martin Austin, Loughborough University. Topographic surveying, sediment sampling, ADV and EMCM current meters.

*Surveys of sediment transport, morphological change and clast burial at Cayeux Spit, France, February 2005.*

Member of the science team helping Jerome Curoy, Sussex University. Topographic surveying, sediment sampling, sediment tracing.

*XSHORE experiments, conducted at Sennen, UK, summer 2005.*

Member of the science team from University of Plymouth led by Paul Russell. Topographic surveying, optical backscatter sensors, various current meters.

*Measurements of beach hydrodynamics, video observations of sediment transport under shoaling waves, morphological change and sediment dynamics. Surveys at Slapton Sands, UK, October 2005, May 2006, throughout 2007.*

Conducting research for my PhD, setting up an ARGUS coastal video monitoring system, and implementing a long-term survey protocol for this beach which is still in operation. Topographic surveying, sediment sampling, bed sediment cameras, video measurements, wave resistance wires, ADV and EMCM current meters.

*Measurements of beach hydrodynamics, sediment transport, and morphological change. ECORS-2008 at Truc Vert, France, March 2008.*

Member of an international science team led by University of Bordeaux consisting of individuals from the universities and research institutes in the UK, USA, France, Australia, and New Zealand. Topographic surveying, current meters, optical backscatter sensors. Webpage: <http://ecors.epoc.u-bordeaux1.fr/index.php?page=2>

*WHISSP, Spring 2008.*

Member of the science team from University of Plymouth led by Jon Williams, carrying out topographic surveys using an ATV equipped with RTK-GPS, setting up ARGUS coastal video monitoring systems, and implementing a long-term survey protocol for the beaches of north Cornwall which is still in operation. Webpage: <http://www.perc.plymouth.ac.uk/whissp/>

*BARDEX, The Netherlands, summer 2008. EU-funded 6-week laboratory experiment at the Deltaflume large wave test facility.*

Member of an international science team from the universities and research institutes in the UK, The Netherlands, Portugal, and Australia. Topographic surveying, bed sediment cameras, video measurements, optical backscatter sensors, various sonars and current meters. Webpage: <http://www.connectedwaters.unsw.edu.au/news/bringingthebeach.html>

*Video observations of sediment transport under shoaling waves at Slapton Sands, UK, summer 2008.*

Conducting research with Dr Alex Nimmo-Smith using a rig with current meters and two stereo pairs of high resolution underwater cameras.

*Measurements of shelf hydrodynamics and sediment dynamics. Santa Cruz Seafloor Observatory, various times 2008 - 2009.*

Member of the science team led by Dave Rubin consisting of individuals from from USGS Santa Cruz deploying and maintaining two benthic tripods just offshore from Santa Cruz, on the R/V Snively. Various sonars and point current meters, bed sediment cameras, optical backscatter sensors, LISST, CTD, ADCP, PCADP.

*Colorado River cruise, summer 2009.*

Member of the science team led by Ted Melis consisting of individuals from USGS Santa Cruz, USGS Flagstaff, USGS Sacramento, Utah State University, and University of California Santa Barbara. Sidescan sonar, bed sediment cameras, fathometer.

*Beaches of Elwha, Washington State, August 2009.*

Member of the science team led by Jon Warrick, USGS Santa Cruz. Topographic surveying and bed sediment cameras. Webpage: <http://walrus.wr.usgs.gov/elwha/>.

*Installation of HF-Radar systems at Perranporth and Pendeen, North Cornwall, various times in 2010. These systems are designed to provide large-scale measurements of waves and surface currents over the Celtic Sea.*

Member of the science team led by Daniel Conley, Plymouth University.

*Cruises to L4, English Channel, various times in 2010. Measurements of column turbulence and the onset of stratification.*

Member of the science team led by Jaimie Cross, Plymouth University, on the R/V Quest. Wire-walker, microstructure profiler, holographic particle imaging system.

*TSSAR Waves (Turbulence, Sediment Stratification and Altered Resuspension under Waves) experiment, conducted at Praa Sands, UK, May 2011.*

Lead member of an international science team consisting of individuals from the Universities of Plymouth (UK)

and USGS (USA). Topographic surveying, bed sediment cameras, video measurements, optical backscatter sensors, various sonars and current meters, optical and fibre-optical backscatter sensors, holographic particle imaging system, acoustic backscatter system. Webpage: [http://www.research.plymouth.ac.uk/tssar\\_waves/](http://www.research.plymouth.ac.uk/tssar_waves/)

*Oscillating grid turbulence tank laboratory experiments, University of Plymouth, 2011 - 2012.*

Shaking grid experiments started. Measuring suspended sediment and turbulence using fibre-optical backscatter sensors and Vectrino high-frequency ADVs.

*BEST (Beach Sediment Transport) experiment, conducted at Perranporth, UK, October 2011.*

Member of an international science team led by Gerd Masselink consisting of individuals from the universities of Plymouth (UK), Delaware (USA), and New South Wales (Australia). Topographic surveying, optical backscatter sensors, ultrasonic bed-level sensors, various current meters, fibre-optical backscatter sensors, conductivity concentration profiler. Webpage: <http://www.bbc.co.uk/news/uk-15270548>

*DRIBS (Dynamic Rips and Implications for Beach Safety) experiment, conducted at Boscombe, Bournemouth, UK, October 2012.*

Member of a science team led by Dr. Tim Scott. Measurements of rip currents using drifters (drogues), videoed dye releases, and acoustic measurements of flow fields.