

# UNIVERSITY OF ULSTER

## PhD Studentship in Coastal Geomorphology: Storm deposits of tropical coasts

Applications are invited for a PhD studentship to look at storm deposits of tropical coasts. Candidates should hold a first or upper second class honours degree in Geology, Geography, Environmental Science or a cognate area. Successful candidates will enrol as of January 2012, on a full-time programme of research studies leading to the award of the degree of Doctor of Philosophy.

The studentship will comprise fees and an annual stipend of £13,590. It will be awarded for a period of up to three years subject to satisfactory progress and is tenable in the Faculty of Life and Health Science at the Coleraine Campus.

**The closing date for receipt of completed applications is November 25th 2011**

**Interviews will be held during December 2011 (by telephone for non-local candidates)**

If you wish to discuss the project further

please contact:

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or

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Apply online [www.ulster.ac.uk/applyonline](http://www.ulster.ac.uk/applyonline) or application materials are available from: Research Office, University of Ulster, Cromore Road, Coleraine, BT52 1SA, Tel 028 7032 4729, e-mail [researchstudent@ulster.ac.uk](mailto:researchstudent@ulster.ac.uk), Web [www.ulster.ac.uk/researchstudy](http://www.ulster.ac.uk/researchstudy)

**PhD Project title: Storm deposits of tropical coasts**

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**External advisor:** Dr Samuel Etienne (University of French Polynesia)

### **Background**

Tropical coasts are characterised by long periods of low wave energy, punctuated by periodic storms (hurricanes, typhoons and tropical cyclones; Figure 1). These storms have a variety of impacts on tropical coasts ranging from erosion to deposition of ridges of reef-derived rubble (Morton et al., 2008) and/or sand (Forsyth et al., 2010). Storms are the most important factor in the cycling of sediment through tropical coast systems (Hubbard, 2005). The deposits of tropical storms therefore contain a proxy record of past storminess which has been used in a few instances to extend the documentary record (e.g. Nott & Hayne, 2001; Hayne & Chappell, 2001; Forsyth et al., 2010) but this can only be properly interpreted if the mechanisms of deposition are known (Scheffers, 2005). Morton et al. (2008) for example speculated that the coarse coral rubble beaches of the Caribbean might originate from individual large storms or a succession of smaller ones and hence their role as past climate proxies remains uncertain. In several Caribbean islands, boulder and unsorted debris fields have also been attributed to tsunami, although none of the work rules out a storm origin. Identifying storm and tsunami deposits can be problematic (Morton et al., 2007). Tropical storms and hurricanes are an annual occurrence in the Caribbean, North and South Pacific and Indian Ocean; every year hurricanes affect the shores of at least a few islands. The susceptibility of an individual shoreline to hurricane impact is, however, dependent on the hurricane track and consequently, at any given location, hurricane impacts are a relatively infrequent occurrence.

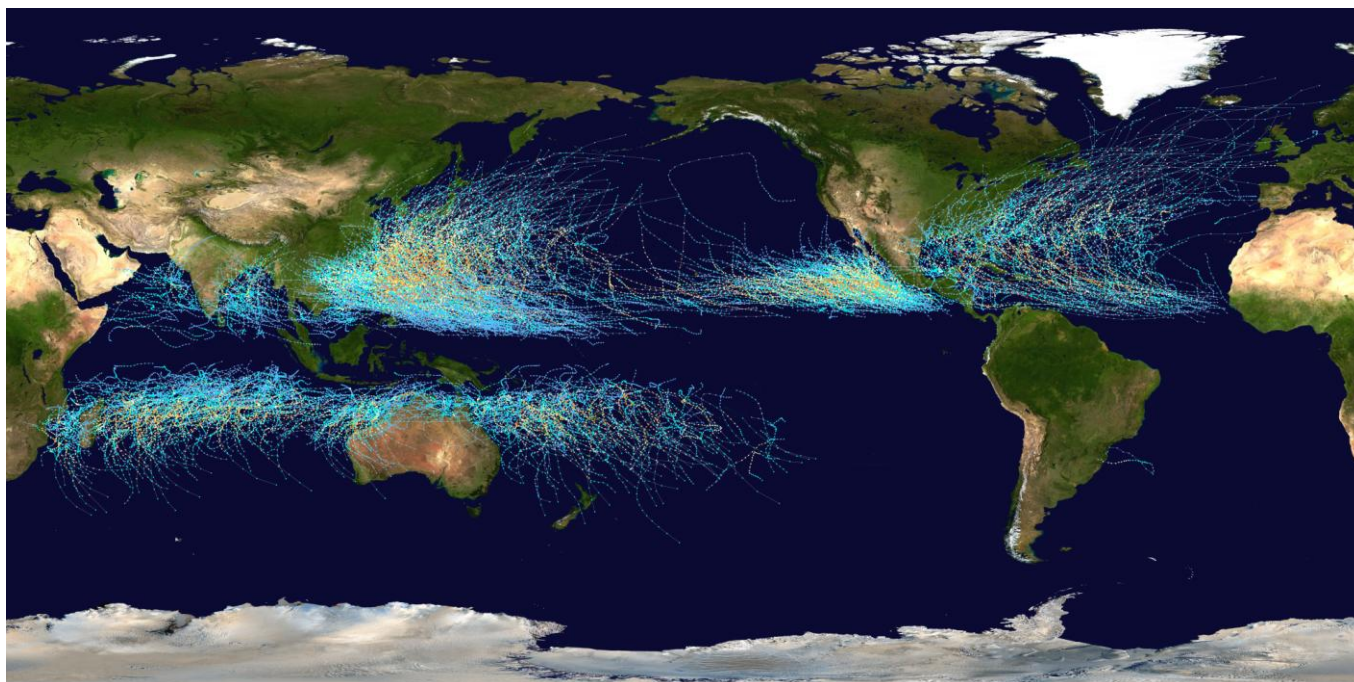


Figure 1. Global chart of tropical storm tracks 1985-2005

### **Project objectives**

The aim of this project is to investigate the origin and palaeoenvironmental significance of selected storm deposited ridges at selected sites in the tropics (Caribbean and South Pacific).

Specific objectives are:

- To measure and map the geomorphology of the selected deposits (sand ridges and rubble ridges)
- To investigate the sedimentology (texture, composition, bedding) of the deposits and surrounding area
- To evaluate the various depositional modes for ridge emplacement (via field measurement and modelling).
- To assess the potential of storm ridges as palaeo-storm proxies

### **Methodology**

The project will require the student to:

- Review the state of knowledge of coastal storm deposits in the tropics
- Review the nearshore dynamics of various storm types and categories
- Conduct fieldwork to map, measure and sample storm deposits and surrounding areas
- Assess the historical record of storm occurrence and impact at the study sites
- Evaluate potential depositional models for storm deposits

### **Skills required of the applicant**

The project will be suitable for a student with an Oceanography, Earth Sciences, Environmental Sciences or Marine Science background. Good field mapping skills, a willingness to spend several weeks mapping in tropical islands, practical survey skills and previous experience in sedimentology would be advantageous.

### **References**

- Forsyth, A.J., Nott, J. & Bateman, M.D. 2010. Beach ridge plain evidence of a variable late-Holocene tropical cyclone climate, North Queensland, Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 297, 707-716
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- Hubbard, D.K. 2005. Hurricane-induced sediment transport in open-shelf tropical systems; an example from St. Croix, U.S. Virgin Islands. *Journal of Sedimentary Research*, 62, 946-960.
- Morton, R.A., Gelfenbaum G. & Jaffe, B.E. 2007. Physical criteria for distinguishing sandy tsunami and storm deposits using modern examples. *Sedimentary Geology*, 200, 184-207.

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Nott, J. & Hayne, M., 2001. High frequency of super-cyclones along the Great Barrier Reef over the past 5000 years. *Nature*, 413, 508-512

Scheffers A. 2005. Coastal response to extreme wave events-hurricanes and tsunami on Bonaire. *Essener Geographische Arbeiten* 37:100