

Marginal modelling of spatially-dependent non-stationary extremes

Paul J. Northrop

Department of Statistical Science
University College London, UK

Abstract: We describe a threshold-based approach for modelling spatial variation in the marginal extremal behaviour of a variable of interest. In particular, we have in mind a situation, such as the design of a marine structure, where a single spatial location is of particular interest and there is potential benefit in pooling information from other locations in the region. In such a situation the form of any spatial dependence is not of intrinsic interest but inferences should be adjusted appropriately for dependence: we do this using [1]. We use quantile regression ([2]) to set a spatially-varying threshold and consider how the quantile regression model and the non-homogeneous Poisson process extreme value model should be parameterised, in order that they are compatible. We illustrate the approach using time series of storm peak significant wave heights from 72 sites in the Gulf of Mexico. This talk is based largely on [3] and its discussion [4, 5, 6].

Key words and phrases: Extreme value regression modelling; spatial dependence; quantile regression; threshold selection; wave heights.

References

- [1] Chandler, R. E. and S. B. Bate (2007). Inference for clustered data using the independence loglikelihood. *Biometrika* 94(1), 167–183.
- [2] Koenker, R. (2005). *Quantile regression*. Cambridge: Cambridge University Press.
- [3] Northrop, P. J. and Jonathan, P. (2011). Threshold modelling of spatially dependent non-stationary extremes with application to hurricane-induced wave heights. *Environmetrics* 22(7), 799–809.

- [4] Chavez-Demoulin, V., Davison, A. C. and Frossard, L. (2011). Discussion of Threshold modelling of spatially dependent non-stationary extremes with application to hurricane-induced wave heights by P. J. Northrop and P. Jonathan *Environmetrics* 22(7), 810–812.
- [5] Cooley, D. (2011). Discussion of Threshold modelling of spatially dependent non-stationary extremes with application to hurricane-induced wave heights by P. J. Northrop and P. Jonathan *Environmetrics* 22(7), 812–813.
- [6] Papastathopoulos, I., Tawn, J. A. and Wadsworth, J. L. (2011). Discussion of Threshold modelling of spatially dependent non-stationary extremes with application to hurricane-induced wave heights by P. J. Northrop and P. Jonathan *Environmetrics* 22(7), 813–814.