Suggested readings for breakout session on Non-Gaussian Processes
July 2017

In the analysis of most spatio-temporal processes in environmental studies, observations present skewed distributions, with a heavy right or left tail. Usually, a single transformation of the data is used to approximate normality, and stationary Gaussian processes are assumed to model the transformed data. The choice of a distribution for the data is key for spatial interpolation and temporal prediction. Initially we will discuss advantages and disadvantages of using a single transformation to model such processes. Then we will focus on some recent advances in the modeling of non-Gaussian spatial and spatio-temporal processes and discuss some possible avenues for research.

Suggested readings:

- De Oliveira V, Kedem B, Short DA (1997). Bayesian prediction of transformed Gaussian random fields. Journal of the American Statistical Association 92, pp. 1422–1433.
- Fonseca, T. C. O. and Steel, M. F. J. (2011) Non-Gaussian spatiotemporal modelling through scale mixing. Biometrika, 98, pp. 761-774
- Genton MG, Zhang H. (2012). Identifiability problems in some non-Gaussian spatial random fields. Chilean Journal of Statistics 3, pp. 171–179.
- Gräler, B. (2014). Modelling skewed spatial random fields through the spatial vine copula. Spatial Statistics, 10, 87-102.
- Kim HM, Mallick BK, (2004). A Bayesian prediction using the skew Gaussian distribution. Journal of Statistical Planning and Inference 120, pp. 85–101.
- Krupskii, P., Huser, R., and Genton, M. G. (2016) Factor copula models for replicated spatial data. https://arxiv.org/pdf/1511.03000.pdf.
- Palacios MB, Steel MFJ, (2006). Non-Gaussian Bayesian geostatistical modeling. Journal of the American Statistical Association 101(474): 604–618.
- Schmidt, A. M., Gonçalves, K. C. M., Velozo, P. L. (2017) Spatio-temporal models for skewed processes (with discussion). Environmetrics, DOI: 10.1002/env.2411
- Wallin J, Bolin D, (2015). Geostatistical modelling using non-Gaussian Matérn fields. Scandinavian Journal of Statistics 42, pp. 872–890.
- Xu, G., and Genton, M. G. (2017) Tukey g-and-h random fields, Journal of the American Statistical Association. http://dx.doi.org/10.1080/01621459.2016.1205501
- Zareifard H, Khaledi MJ, (2013). Non-Gaussian modeling of spatial data using scale mixing of a unified skew Gaussian process. Journal of Multivariate Analysis 114, pp.16-28.
- Zhang H, El-Shaarawi A, (2010). On spatial skew-Gaussian processes and applications. Environmetrics 21, pp. 33-47.

If you would like to suggest additional readings, please email Alex Schmidt.