Process Modeling for Space-time Extremes

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Abstract. *Increasingly, data are being gathered to investigate the behavior of extremes of a process over space and time. By now, there is a considerable literature addressing this problem. This talk will focus on modeling for such a setting. In particular, there are several paths that can be taken to formulate such stochastic specifications. We can model the process directly and study the induced behavior for extremes. Though, perhaps attractive, this is very computationally demanding. We can model the sampled extremes directly, drawing upon the elegant characterizations of max-stable processes that have appeared in the literature. This approach runs into computational challenges as well, though recent work using composite likelihood ideas is promising. We can model the data in a hierarchical fashion, introducing a latent process model. Now, we have at our disposal rich and easily interpretable specifications and have access to familiar MCMC model-fitting machinery. After some review and discussion of the first two possibilities, we focus on the last, illuminating the range of modeling that is available and the computational issues. We illustrate with temperature and precipitation data from South Africa from 1950-2000. Finally, some new extensions using Dirichlet Process mixing will be proposed.*

Keywords. *Extremes; Hierarchical modeling; MCMC.*