

# Spatiotemporal sampling design adapted to heterogeneities and real-time observations

M.C. Bueso<sup>1</sup>, J.M. Angulo<sup>2</sup>, F.J. Alonso<sup>2</sup> and M.D. Ruiz-Medina<sup>2</sup>

<sup>1</sup> Department of Applied Mathematics and Statistics, Technical University of Cartagena, Paseo Alfonso XIII 52, Cartagena, E-30203 Murcia, Spain

<sup>2</sup> Department of Statistics and Operations Research, University of Granada, Campus de Fuente Nueva s/n, E-18071 Granada, Spain

**Abstract:** Entropy-based criteria for spatiotemporal sampling design naturally incorporate prior knowledge on structural heterogeneities of processes involved in environmental applications, an important aspect of variation to be considered for risk assessment purposes. Whenever possible, real-time observations must be also integrated for dynamic adaptation of the spatial sampling configurations, eventually under certain restrictions, to account for the actual evolution of the system. In this paper, such information is exploited to redefine, at each time, the region of interest in terms of local density. Procedures are applied to simulated examples where different ranges of memory and spatial dependence, as well as different levels of local variability (fractality), are specified to study the structural influence of the model in the entropy-based spatiotemporal sampling design.

**Keywords:** Risk assessment; heterogeneity; Shannon's entropy; spatiotemporal sampling.