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Rejoinder*

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1 Introduction

We would like to start by thanking the Editor of BA for the opportunity to discuss our work and the discussants Peter J. Diggle, Michael G. Chipeta, James V. Zidek, Noel Cressie and Raymond L. Chambers for a very thorough evaluation of our contribution and for their thoughts on the topic. Our rejoinder to the discussion will be presented in the following topics: Preferential Sampling; Auxiliary Information; Models for $[X|S]$; Utility Functions; Sequential Design; and Approximations.

2 Preferential Sampling

Preferential sampling plays an important role in surveys routinely carried out by Official Statistics agencies, as those developed in the Brazilian Institute of Geography and Statistics (IBGE), the institution that one of us is affiliated to. So we are well aware of the relevance of this issue. In addition to the areas of application of preferential sampling cited by the discussants, it is important to mention the very topical area of publication bias (see Bayarri and DeGroot, 1993; Franco et al., 2014).

The link between preferential sampling and the methodology of survey-sampling presented by discussants is also very helpful in clarifying the similarities of approaches. We agree with Cressie and Chambers (hereafter CC) that papers from the latter may bring important aspects of sampling design to the context of Geostatistics. However, an important distinction between the approaches is needed. While in the context of survey methods the population size is generally fixed at a finite N, this feature is not true in the context of Geostatistics. In fact, in Geostatistics a finite value of N may only be associated with the discretization of a continuous process. Thus, part of the similarity between the approaches stems from the current limitation of many approaches to handle inference and prediction in Geostatistics appropriately due to the use of discrete approximations.

We agree with Chipeta and Diggle (hereafter CD) that preferential sampling is a method of adaptive design, which may depend on the previous design without relying on the underlying process S. Similarly, inference may be simplified after assuming that the process X is governed by the values of a spatially distributed covariate W, thus rendering conditional independence between X and S given W. The main difficulty is finding and quantifying such a covariate. We will return to this issue in the next section.

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