Structure of Proposed White Paper: Minutes of the Discussion

21st June 2014

What follows is a proposed outline for the white paper to follow the PASI conference.

1 Are Non-Stationary methods necessary? If so, when?

- Yes is implied.

2 Enumeration of the three methods for modelling non-stationarity presented at the PASI conference.

- Process convolution methods.
- Spatial deformation methods.
- Markov Random Field methods.

3 Demonstration of the three methods for modelling non-stationarity utilizing some standard data sets, both real and simulated.

4 Comparison of the three methods for modelling non-stationarity.

- Need for comparison metrics.
  - Predictive Distributions
  - Point Estimation and CI
- Comparison of computational burden between models/methods.

5 Difficulties and Shortcomings

- Lack of diagnostic tools.
- Why it is hard to fit non-stationary models.

- Lack of really fast methods.
- Comparing Bayesian vs. Frequentist approaches.

6 Software Meta-Package

- Data sets included here should include "hard problems" such as non-linear effects of covariates and/or repeated (co-located) observations to ensure flexible model approaches.
- Data sets should guage any approaches ability to distinguish non-stationarity and/or anisotropy.
- Should include some method for best visualizing covariance. The ability of some plot or plots to adequately and easily convey the important aspects of a nonstationary model
- Should include code for the methods presented at PASI.
- Should not mandate any rigid data formats or object type.

7 Research Agenda

- Ability to predict covariances between unobserved locations is a necessity for any proposed method, conditional on parameters and data.