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Estimation of non-stationary fields, applied to seabed data

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Abstract

We extend an existing stationary Gaussian Markov Random Fields model to a nonstationary model by allowing for spatially varying range and precision parameters. The formulation of the model as a Markov field allows for analytical calculations of the derivatives, providing fast maximum likelihood estimates of the parameters through numerical optimisation. The fast, direct estimation of the nonstationary fields circumvents the computational burden of most existing models.

The model is used for seabed reconstruction, from sparse depth measurements.