Variable order smoothness priors for ill-posed inverse problems - Calvetti & Somersalo - The authors present a method for solving inverse problems that is informed by mixtures of variable weighted Gaussian autoregressive (AR) priors. Both the parameter determining the mixture (via convex combinations of different AR models) and the parameter for weighting each observation (termed innovation in time series literature) are allowed to vary over the domain. Their algorithm presents estimates of the maximum a posteriori (MAP) estimator and does *not* quantify uncertainty in these estimates. They implement the method on a deblurring example that is problematic for a standard fixed level AR prior, but is ideal for the structure of their algorithm.

A few hyper-prior distribution families are presented for both the mixture parameter, θ_i, and the innovation variance, γ_i. Two hyper-prior families are presented for θ_i. The first assumes that over most of the domain the solution will have one a particular AR model level smoothness. The other, which is implemented in a computed example, assumes a smooth transition in the values of θ_j. The hyper-priors given for γ_i are distributed with a generalized Γ distribution.