Data: filelist containing files with observation data $y_i = (\mu_{\psi_i}, \sigma^2_{\psi_i})$ indexed by location x_i, input variables from Table 2.

Result: Optimized β parameters for mean function and θ parameters for covariance kernel, gridded Gaussian process marginal means and variances or a sample from the Gaussian process evaluated in a grid.

Initialization: Create grid according to area *and* ω, *define* $k(x, x')$ *and* $m(x, t)$, *initialize* state;
if learn_m $= 1$ **or** learn_k $= 2$ **then**
  for file **in** filelist **do**
    D $\leftarrow$ ReadData (file);
    for $(x_i, y_i) \in$ D **do**
      if Bernoulli(η^i_{train}) **then**
        AddToState(state, x_i, y_i);
    end
  end
end
if learn_m **then** FindLocalMeanfunCoeffs (state);
if learn_k $= 1$ **then**
  ReInitializeState (state, fulldomain);
  for $i \leftarrow 1$ **to** $n_{\text{synthetic}}$ **do**
    $(x_i, y_i) \leftarrow$ SampleFromPrior ( );
    AddToState(state, x_i, y_i);
  end
end
if learn_k $\neq 0$ **then**
  FindCovfunCoeffs (n_{ref})
end
if not sampling **then**
  $(\mathsf{n}_{\text{sd}}, (\mathsf{sd}_{\text{i}})_{\text{i=1}}^{\mathsf{n}_{\text{sd}}}) \leftarrow$ Decompose($\mathsf{n}^{\max}_{\text{dom}}$, area, ω);
else
  assert $(\mathsf{n}_{\text{gp}} < \mathsf{n}^{\max}_{\text{dom}})$;
end
if sampling **then** **for** $i \leftarrow 1$ **to** n_{sd} **do**
  ReInitializeState (state, sd_i);
  AddSubdomainData (state, filelist, sd_i, η_{sample});
  for $x^* \in \mathsf{sd}_{\text{i}}$ **do**
    $A^{\text{obs}}_* \leftarrow$SelectObservations(state, x^*);
    $\mu^*, \sigma^2_* \leftarrow$ ComputeMarginal(x^*, A^{obs}_*);
    if sampling $= 2$ **then**
      $\widehat{\psi^*} \leftarrow$ Normal(μ^*, σ^2_*);
      AddToState(state, x^*,$(\widehat{\psi^*}, \sigma^2_{\text{synthetic}})$)
    end
  end
end