1155-35-274 **Jeff Borggaard**, **Nathan Glatt-Holtz** and **Justin Krometis*** (jkrometis@vt.edu), Wright House, RM 202, Virginia Tech, 765 West Campus Dr, Blacksburg, VA 24061. *On Bayesian Consistency for Flows Observed Through a Passive Scalar.*

We consider the statistical inverse problem of estimating a background fluid flow field $\mathbf{v}$ from the partial, noisy observations of the concentration θ of a substance passively advected by the fluid, so that θ is governed by the partial differential equation

$$\frac{\partial}{\partial t}\theta = -\mathbf{v} \cdot \nabla\theta + \kappa\Delta\theta$$

on $[0, T] \times \mathbb{T}^2$. The initial condition and diffusion coefficient κ are assumed to be known and the data consist of point observations of θ corrupted by additive, i.i.d. Gaussian noise. We adopt a Bayesian approach to this estimation problem and establish that the inference is consistent, i.e., that the posterior measure identifies the true background flow as the number of scalar observations grows large. Since the inverse map is ill-defined for some classes of problems even for perfect, infinite measurements, multiple experiments (initial conditions) are required to resolve the true fluid flow. Under this assumption, suitable conditions on the observation points, and given support and tail conditions on the prior measure, we show that the posterior measure converges to a Dirac measure centered on the true flow as the number of observations goes to infinity. (Received January 16, 2020)