1070-35-299   **Jun A Kitagawa*** (`jun@Math.Princeton.EDU`), Department of Mathematics, Fine Hall, Washington Road, Princeton, NJ 08542, and **Micah Warren**. *Regularity for the optimal transport problem with Euclidean distance squared cost on the embedded sphere.*

We consider regularity for Monge solutions to the optimal transport problem when the initial and target measures are supported on the embedded sphere, and the cost function is the Euclidean distance squared. Gangbo and McCann have shown that when the initial and target measures are supported on boundaries of strictly convex domains in $\mathbb{R}^n$, there is a unique Kantorovich solution, but it can fail to be a Monge solution. By using PDE methods, in the case when we are dealing with the sphere with measures absolutely continuous with respect to surface measure, we present a condition on the densities of the measures to ensure that the solution given by Gangbo and McCann is indeed a Monge solution, and obtain higher regularity as well. This is a joint work with Micah Warren. (Received February 15, 2011)