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# Kinematics of Shot-Geophone Migration

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**Abstract:** Imaging of reflection seismic data requires the estimation of a velocity model (reference medium). Prestack migration is used to assess whether a choice of the velocity model is consistent with the data, by using the semblance principle. We compare shot-geophone migration with migration methods based on data binning, such as prestack Kirchhoff migration. Image artifacts, present in binning based methods due to multiple raypaths connecting source and receiver points with subsurface points, are absent in shot-geophone migration, when the migration velocity is kinematically correct and when events to be migrated arrive in the data along non-turning rays. Common image gathers produced by shot-geophone migration exhibit the appropriate semblance property in either offset domain (focussing at zero offset) or angle domain (focussing at zero slope). Thus shot-geophone migration may be a particularly appropriate tool for migration velocity analysis of data exhibiting structural complexity.