Wavefield reconstruction of teleseismic receiver function with the stretching-and-squeezing interpolation method

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Modern high-resolution teleseismic receiver function (RF) imaging techniques require seismic records to be sampled densely and regularly. While most passive source seismic acquisition systems do not satisfy such conditions, teleseismic wavefield reconstruction techniques are necessary to be applied. In this study, assuming that the converted phases and multiples are coherent, a nonlinear stretching-and-squeezing approach is proposed for interpolation and regulation of teleseismic RFs of a regional seismic array. Synthetic experiments show that our method is robust and effective. Our method has the advantage that rapid horizontal variations of a subsurface interface can be recovered, and stair-step artifacts can be mitigated. Our method can also be applied to field datasets of both 1-D and 2-D seismic arrays. Common-conversion-point stacking and H-k stacking tests show that high-quality images can be obtained using the interpolated RFs with the nonlinear stretching-and-squeezing interpolation method. Our method can be used as a pre-processing tool in RF seismic imaging, migration, and inversion.