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In geophysics, nearly all inverse problems are ill-posed because of the limitations of observations and instability during inversion computation. For instance, a direct effect of the limitations of acquisition is the sub-sampled data will generate aliasing in the frequency domain; therefore, it may affect the subsequent processing such as filtering, de-noising, amplitude versus offset analysis, multiple eliminating and migration imaging. In our recent work, we develop some sparse optimization methods for the geophysical data regularization and imaging problems. We consider sparsity-constrained regularization modeling and related solving methodology. Numerical experiments based on theoretical data and field data are performed and interpreted. (Received September 25, 2017)