Crossdip Moveout in Feathered 2D Marine Studies

M. R. Nedimović[1] and Stéphane Mazzotti[1,2]

[1]Geological Survey of Canada-Pacific, P.O. Box 6000, Sidney, B.C., V8L 4B2, Canada
Phone: 250-363-6451, Fax: 250-363-6565, Email: nedim@pgc.nrcan.gc.ca

[2]School of Earth and Ocean Sciences, Univ. of Victoria, Victoria, B.C., V8W 3P6

For a typical 2D marine multichannel seismic reflection survey, crosscurrents will cause a receiver cable side drift and data collection will become a limited swath 3D survey to one side of the ship track. Commonly, data from such swath 3D marine surveys are processed by assuming a 2D straight-line geometry and by using standard 2D seismic imaging procedures. However, when the structures are 3D, more accurate imaging can be achieved by taking into account the 3D character of the data. To improve imaging of feathered 2D marine data, we adapt a method designed for better signal alignment before stack and extraction of local 3D structure from land 2D crooked line survey data. The method, called the optimum crossdip stack, requires the true source and receiver coordinates and is based on a normal moveout equation that incorporates the crossdip moveout term into the reflection traveltime calculation. The final products are a much improved stack and crossdip information. We apply the optimum crossdip stack to data acquired in the Philippine Sea over the eastern Nankai Trough. The optimum crossdip stack significantly improves the sections where reflector dips are gentle to moderate and lateral velocity variations are mild (e.g., trough sediments and crust, parts of the accretionary prism). Furthermore, the obtained crossdip information shows that much of the imaged structure does not lie directly below the processing line. The extracted 3D information and increased image resolution put better constraints on the geometry of the studied thrust and fold structures.