Crossdip Moveout in Feathered 2D Marine Studies

M. R. Nedimović and Stéphane Mazzotti

1Geological 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

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

For a typical 2D marine multichannel seismic reflection survey, crosstrack currents 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 calcula-
tion. 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.