THREE-DIMENSIONAL TARGET ORIENTED PRE-STACK MIGRATION (104)

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The main limitations of current 3-D migration techniques do not lie in the zero-offset migration algorithm itself but in the preceding stacking process which generates the input data: the conventional CMP stack (after NMO correction) handles single dips only; the refined stack (after DMO correction) properly handles conflicting dips, but it still assumes simple propagation velocity models. Therefore, for complicated subsurface structures alternative techniques must be developed. The ideal procedure would be full pre-stack migration by single-shot record inversion (SSRI), followed by true common depthpoint (CDP) stacking. However, for the 3-D case this promising technique is still too laborious. In this paper we discuss the principle of a computationally attractive 3-D target oriented pre-stack migration technique which basically consists of the following three steps:

(1) 3-D pre-stack redatuming of target oriented shot records to the upper boundary of a pre-specified target zone;
(2) wide-angle CDP stacking at the upper boundary of the target zone, yielding 'true' zero-offset data with a high signal-to-noise ratio;
(3) 3-D wide-angle zero-offset migration within the target zone.

For complicated subsurface structures, the CDP stack after redatuming (step 2) is superior to the CMP stack after NMO or DMO correction and therefore the outlined 3-D target oriented scheme represents an attractive alternative to current 3-D schemes. The validity of the scheme will be demonstrated with the aid of a watertank-data example.

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