SEISMIC AND HYDROACOUSTIC METHODS

Multichannel seismic (MCS) data were collected using a 600-m-long Syntron streamer, equipped with separately programmable hydrophone subgroups, which were optimized for the given water depth of >1100 m using 48 groups at a length of 6.25 m. Six remotely controlled birds kept the streamer depth within a range of 1 m, and magnetic compass readings allowed determination of the position of each streamer group relative to the ship's course. A GI-gun with 2 x 0.4 L chamber volume (100-500 Hz) was used along all seismic lines.

An area of ~2.5 x 5.5 km was covered by parallel, closely spaced (25 m) MCS lines oriented from NE-SW, i.e., in the direction of maximum variation of structural inclination. The three-dimensional data were supplemented by some longer MCS lines in both the in-line direction (Fig. 2) and the cross-line direction (Fig. 3), in order to provide quality control for three-dimensional processing and a link to the larger seismic grid measured at the Cascadia Margin. The cells of the final three-dimensional grid are 10 m wide (in the in-line direction) and 25 m long (in the cross-line direction), and coverage is between 5 and 8 in most cases. However, the best coverage is only given around the gas hydrate site within the center part of the grid, and decreases toward the edges, where line coverage is limited. Geographic positions of each shot location were provided by closely sampled (1 s) Differential Global Positioning System (DGPS) recordings, and custom software was used to calculate receiver positions and statics as well as to carry out three-dimensional binning. Standard data processing included editing, filtering, and stacking of the data. Due to the limited cross-line dimension of the grid, only a two-dimensional migration was applied in the in-line direction. Trace interpolation could be avoided due to the small in-line spacing.

Hydrosweep multibeam swath sounder coverage of the area is complete, and data were used to map seafloor bathymetry, as displayed in Figure 1 after editing and gridding. The Hydrosweep system uses hull-mounted transducers and compensates for heave, pitch, and roll.

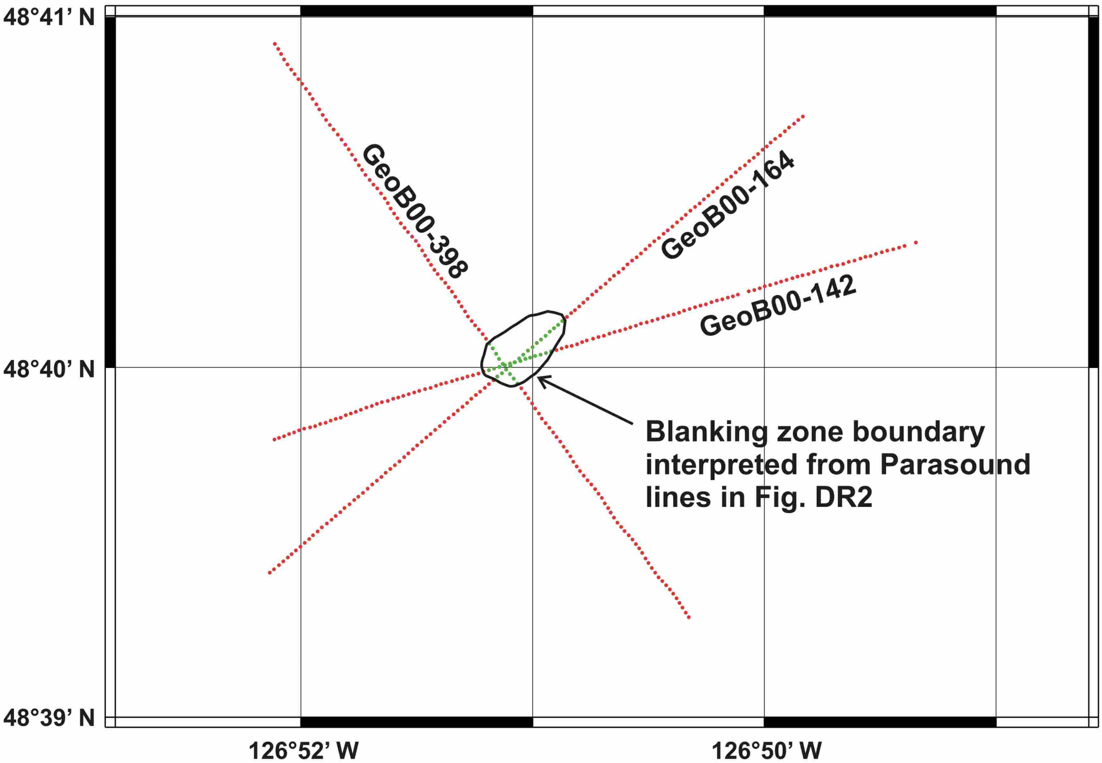

Figure DR1. Location of Parasound lines shown in Figure DR2. Parasound and seismic data (Figures 2 and 3) were collected simultaneously. Green dots mark the parts of the lines which are associated with amplitude blanking. Picked boundaries are indicated in Figure DR2.

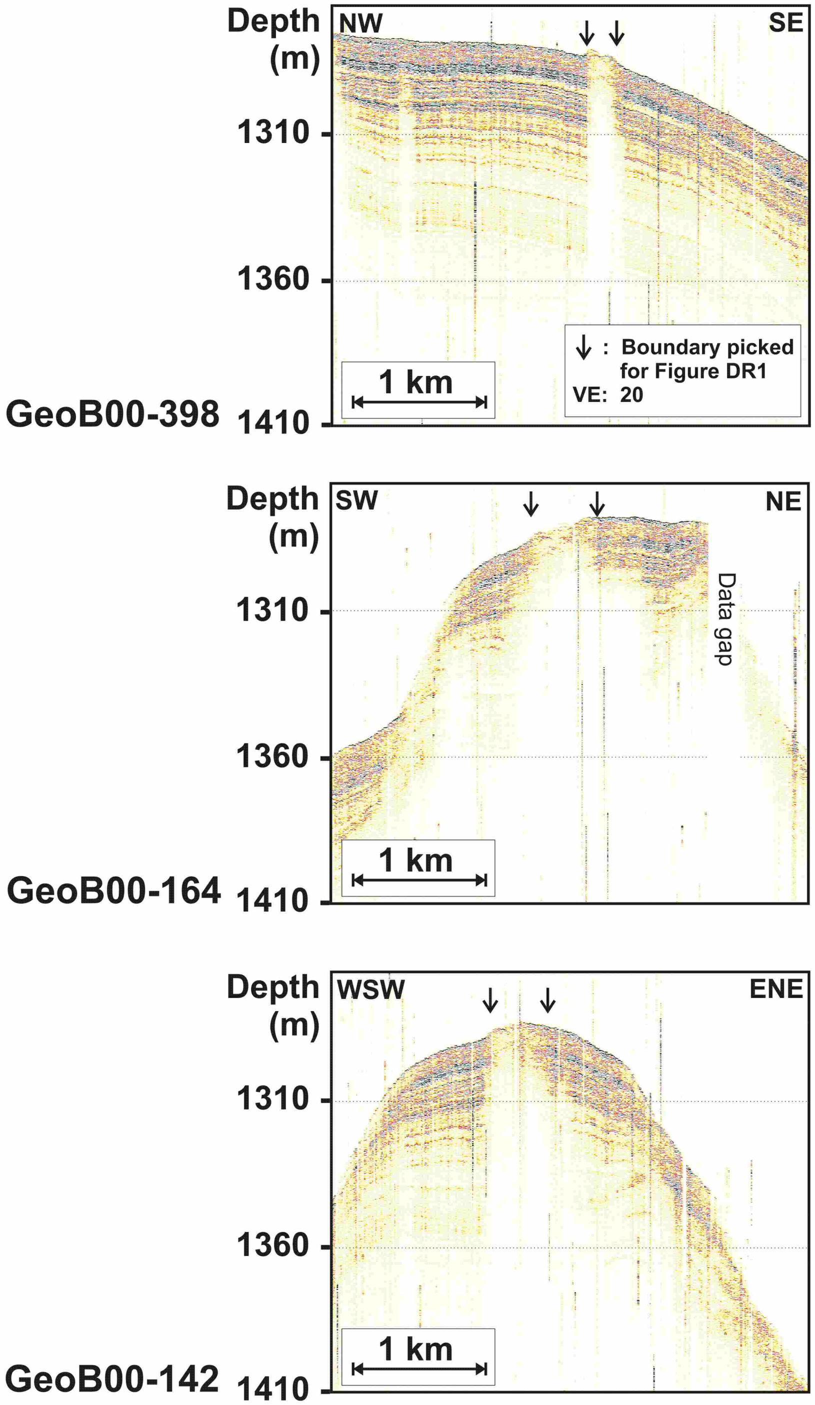

Figure DR2. Parts of three Parasound echosounder lines (for location see Figure DR1). GeoB00-142 and GeoB00-398 correspond to the seismic data in Figure 2 and Figure 3, respectively. Parasound (4 kHz) is a narrow-beam system, which is heave, pitch, and roll compensated and provides much better lateral resolution than a 3.5 kHz echosounder. A combination of Figures DR1 and DR2 shows that (a) the Parasound lines (as well as the simultaneously collected seismic lines) intersect at the blanking zone, (b) the blanking zone is elongated at the surface and its length further increases at greater depth, (c) the orientation of the blanking zone close to the seafloor is the same as shown in seismic time slices at greater depth (Figures 4 and DR3), and (d) the surface feature is most pronounced at Line GeoB00-398 and much less in other directions. Data were printed on the same horizontal and vertical scales. It is indicated where the boundary of the blanking zone was picked for mapping in Figure DR1.

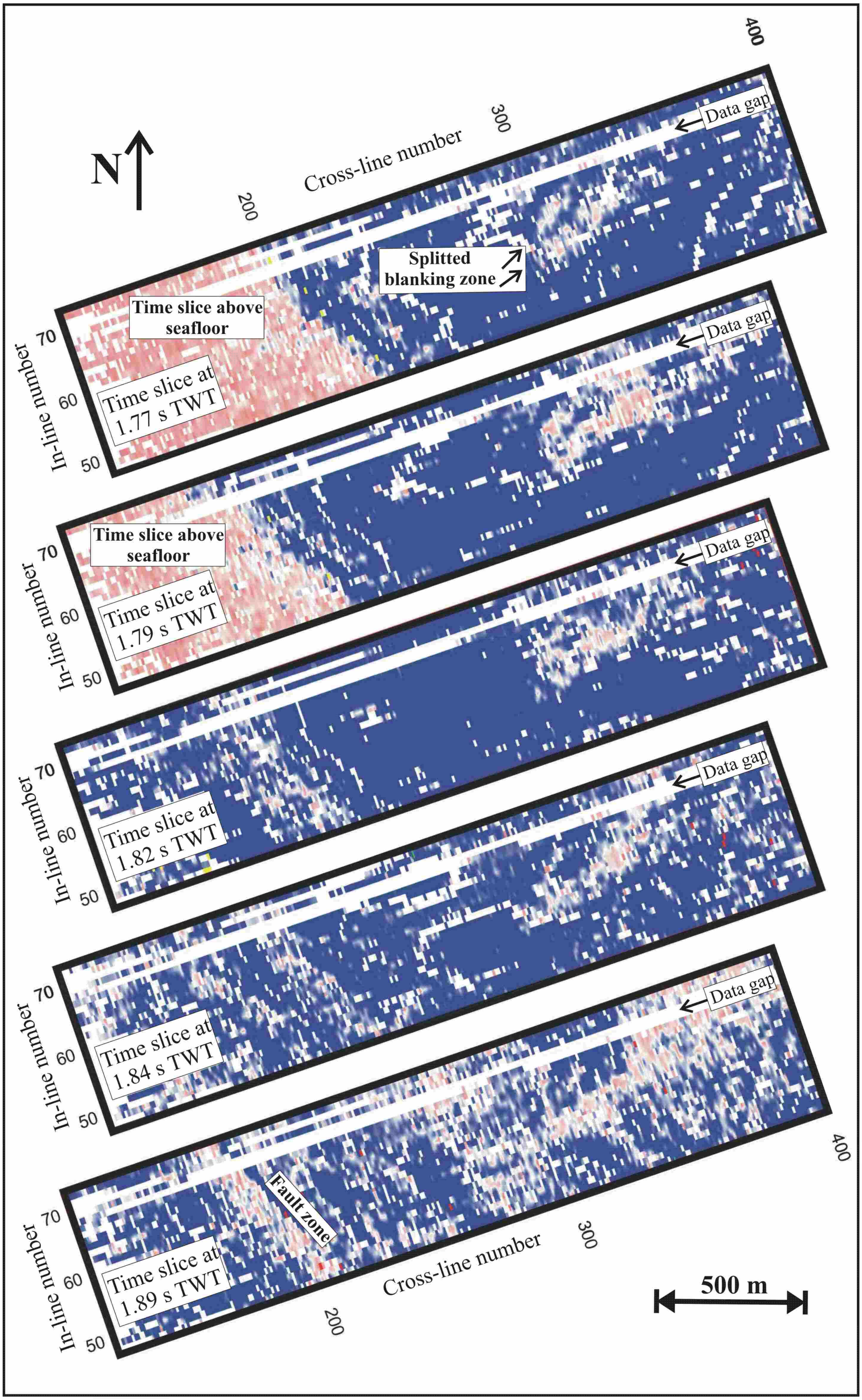

Figure DR3. Time slices, i.e., horizontal cuts through three-dimensional data cube, show average seismic energy (square of reflection strength averaged between instantaneous phase peaks). Light colours indicate amplitude blanking. See text for more information.