Display Gain

Jon F. Claerbout

Parameters of the display of seismic data are important. They often influence the amount of information we are able to extract from seismic data. We have very sophisticated analysis procedures for processing wavefields. But our understanding of the display process is intuitive and unsophisticated.

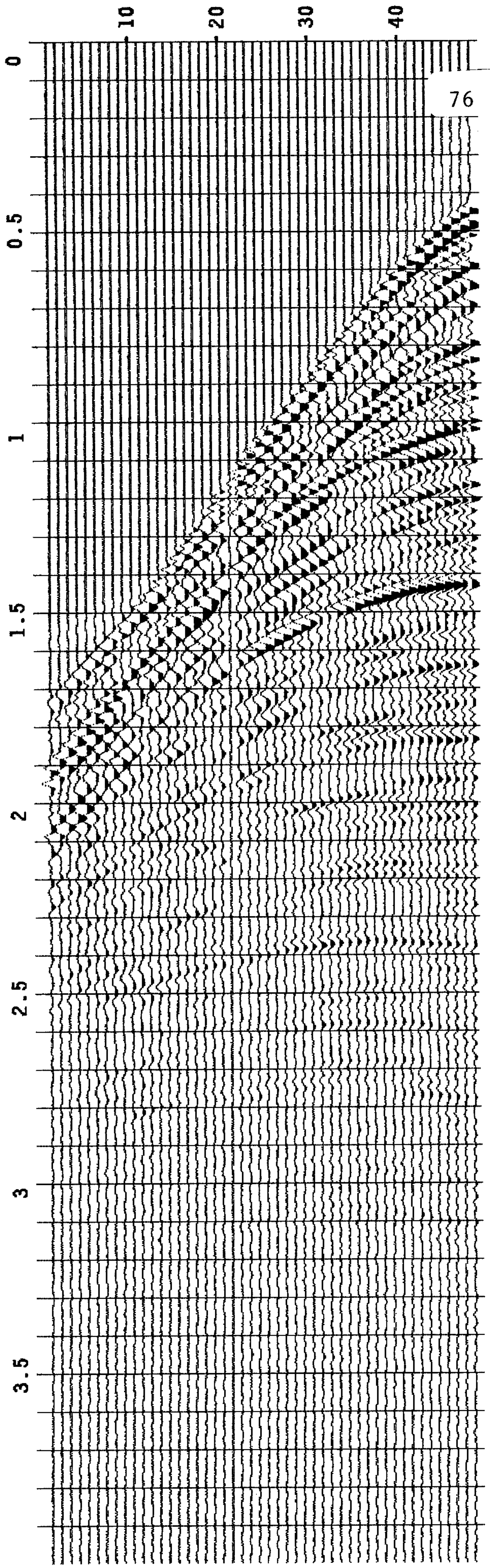
The utility of automatic gain control (AGC) is well known. AGC is the division of a trace by its smoothed envelope. The main purpose is to compress the dynamic range. This compression facilitates visual correlation of traces. Another kind of trace scaling is nonlinearity. It is not much used in the seismic industry, but it probably should be. The next two pages show several displays of a marine common shot profile. All were processed by the formula

$$output(t, t_{env}, power) = \frac{t\ x(t)}{<|t\ x(t)|>_{t_{env}}^{power}}$$

The notation $<>_{t_{env}}$ denotes tridiagonal smoothing over a window of length t_{env}. Familiar cases in the order they are displayed are

spherical divergence only	$pow = 0.$
clip	$pow = 1.\quad t_{env} = 0.$
AGC	$pow = 1.\quad t_{env} = 15 \times 4ms$
Square Root	$pow = .5\quad tenv = 0.$
Quarter Power	$pow = .75\quad tenv = 0.$

Carefully studying the final display I believe I can see more than one refracted arrival. A weaker one emerges at about 1.16 seconds. On the quarter power plot, a still weaker one also appears to emerge at 1.16 seconds at an intermediate velocity.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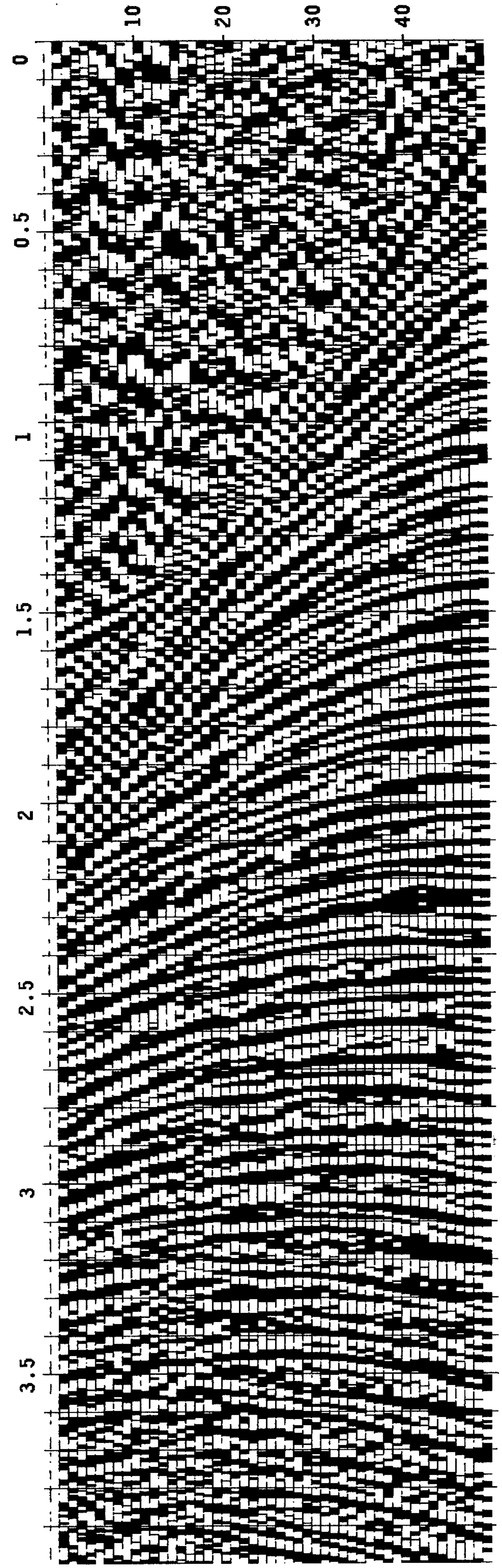
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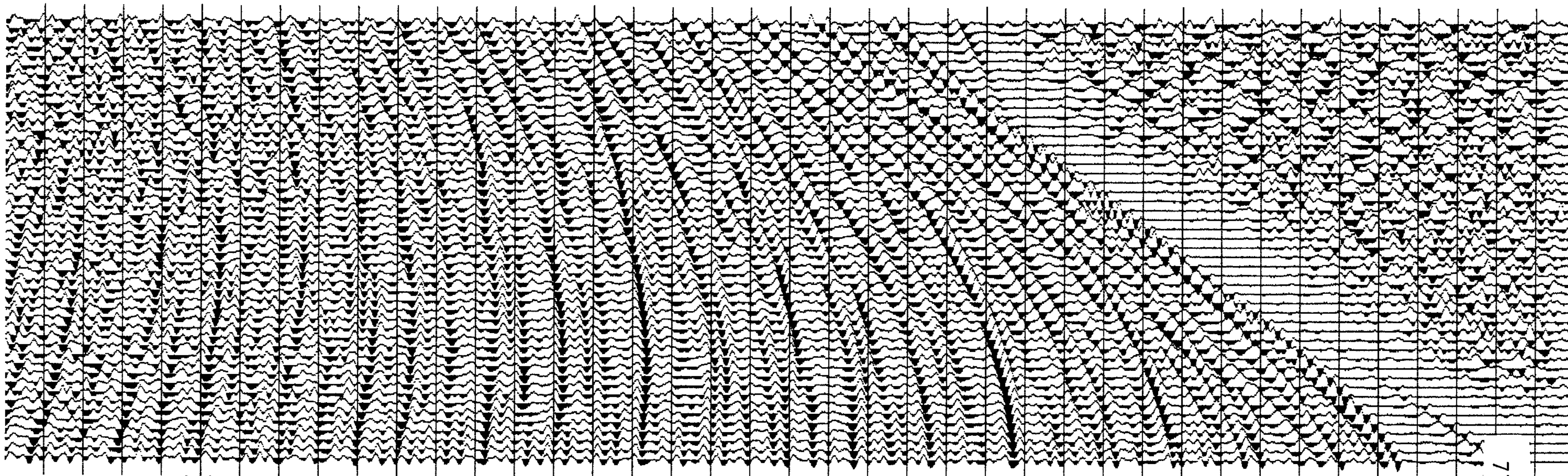
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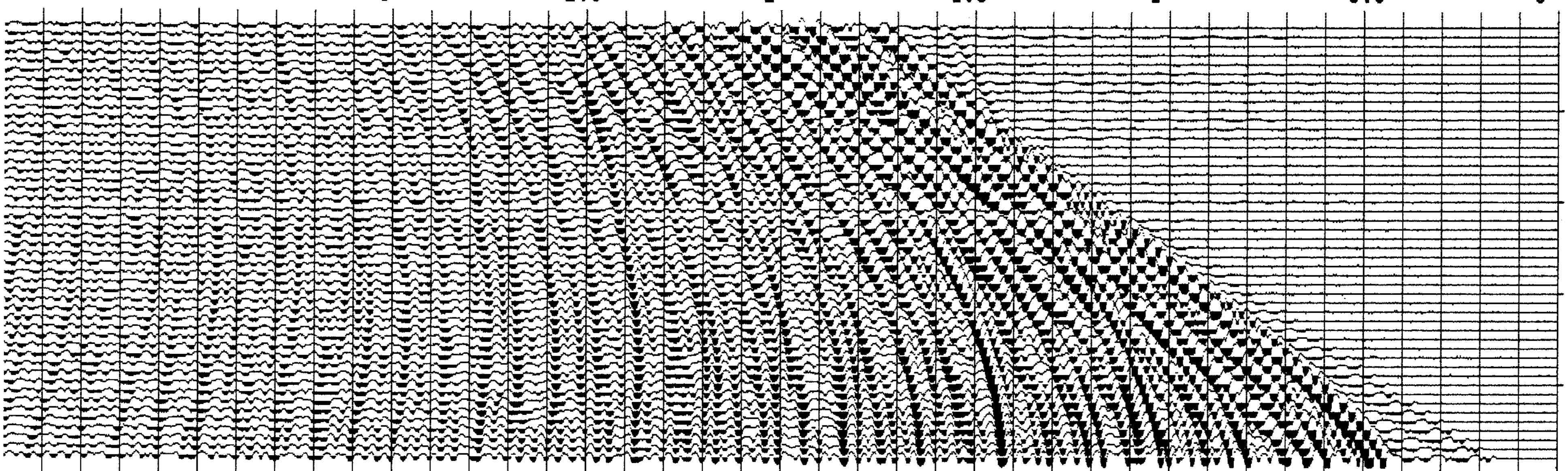
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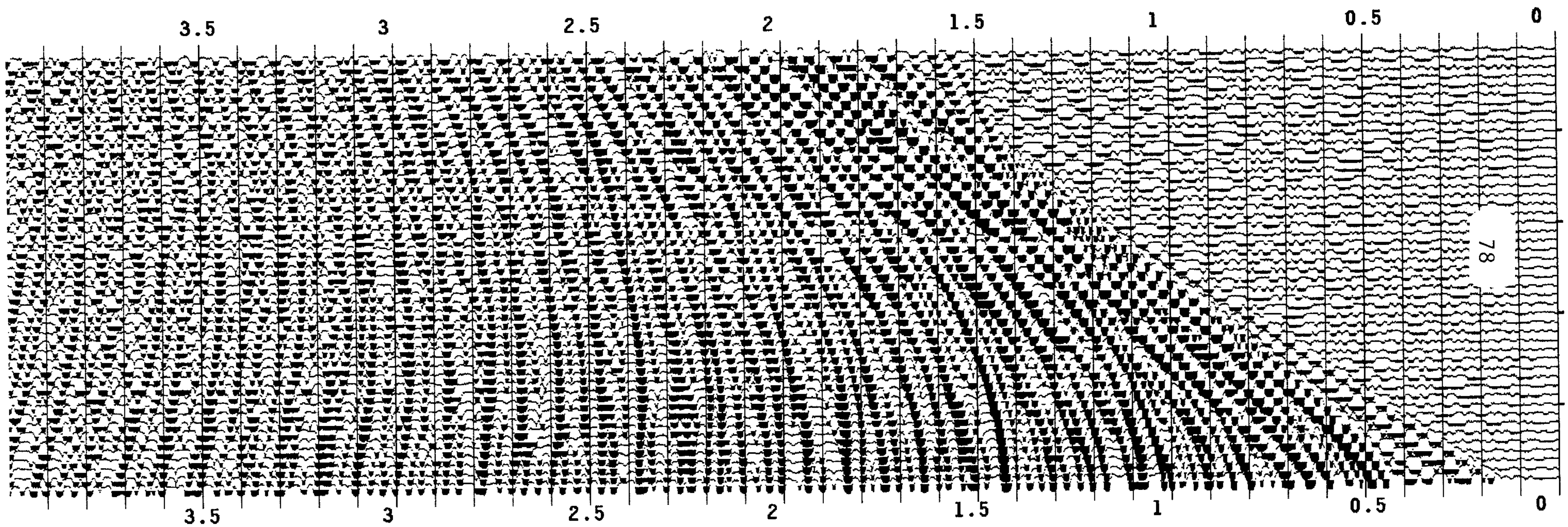

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