



AGT's Imaging of Multiples

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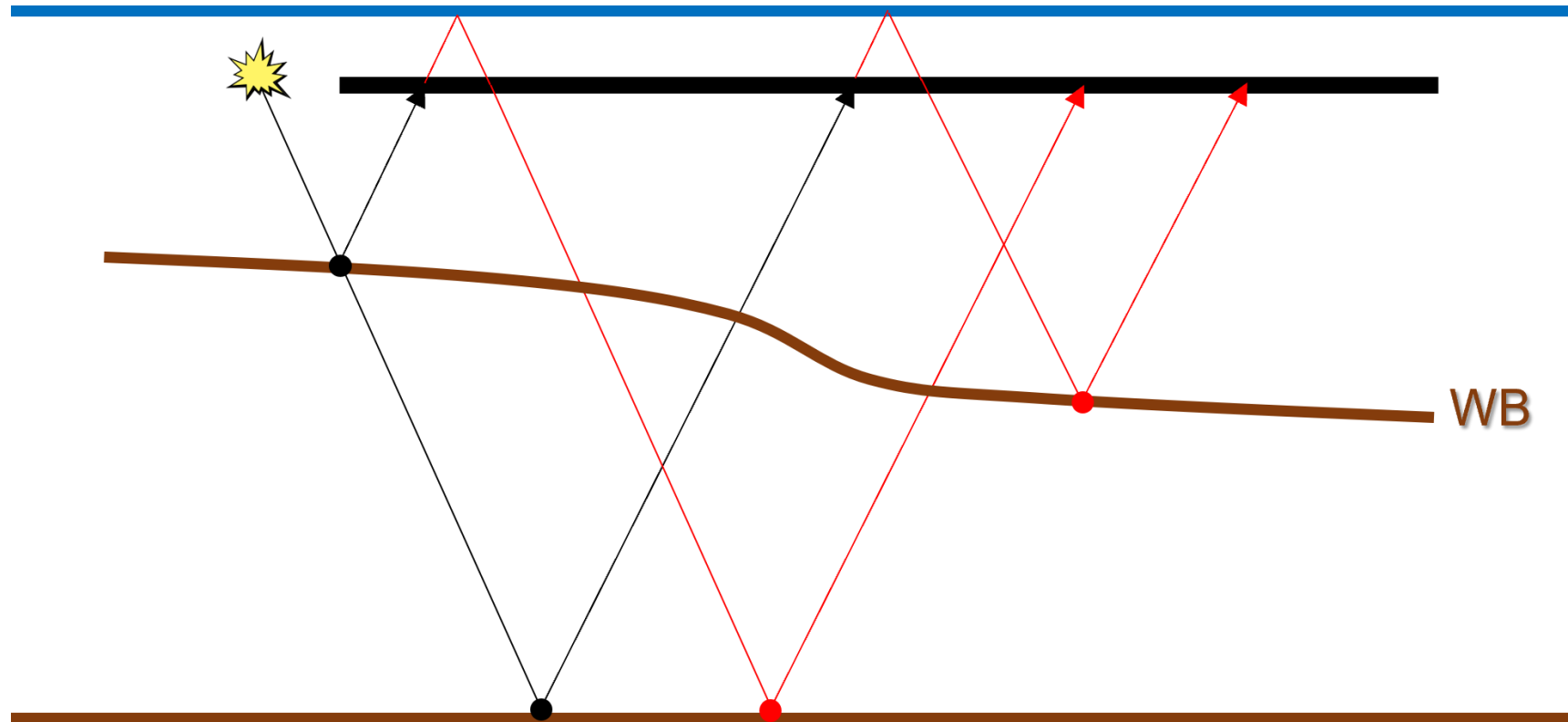


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Surface-related multiple reflected energy usually propagates into the subsurface containing rich information on small reflection angles, providing complementary illumination and a higher vertical resolution. Conventional seismic processing and imaging regularly treat these high-order reflected events (multiples) as noise and enormous efforts have been spent over many years in their removal.

Depth imaging of the full reflected wavefield, including not only the primary (black, in Fig.01) but also the surface-related multiple (red, in Fig. 01) reflected energy, can significantly mitigate some of the illumination and resolution issues mostly caused by limitations in acquisition configuration. Crosstalk and balancing of each contribution are still concerns that require certain attention*.

Schematics of Primary and Multiple Energy (Fig. 01)



Primary, black, and surface-related multiple, red, energy used in full reflected wavefield imaging.

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Basically, for streamer data, it is key to separate the data into primary, first WB-related multiple, second WB-related multiple, etc. so that they can be imaged independently with Kirchhoff migrations.

For OBN/OBC data, it is necessary to first separate the up-going wave and use it as primary. For the down-going wave, we need to execute SRME to separate various levels of multiple. For the first level of the down-going wave (aka receiver ghost, by some), we perform a mirror imaging. For higher levels, we utilize the same scheme as for streamer data above.

Broadly speaking, multiple data will have a similar effect as adding near offset data in the imaging process. This is helpful when near offset data is lacking, but it is generally limited to the shallow portion.

AGT workflow is shown in Fig. 02.

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Multiple Imaging Workflow (Fig. 02)

(Fig. 01)

