

# New Features in SYNGRAM

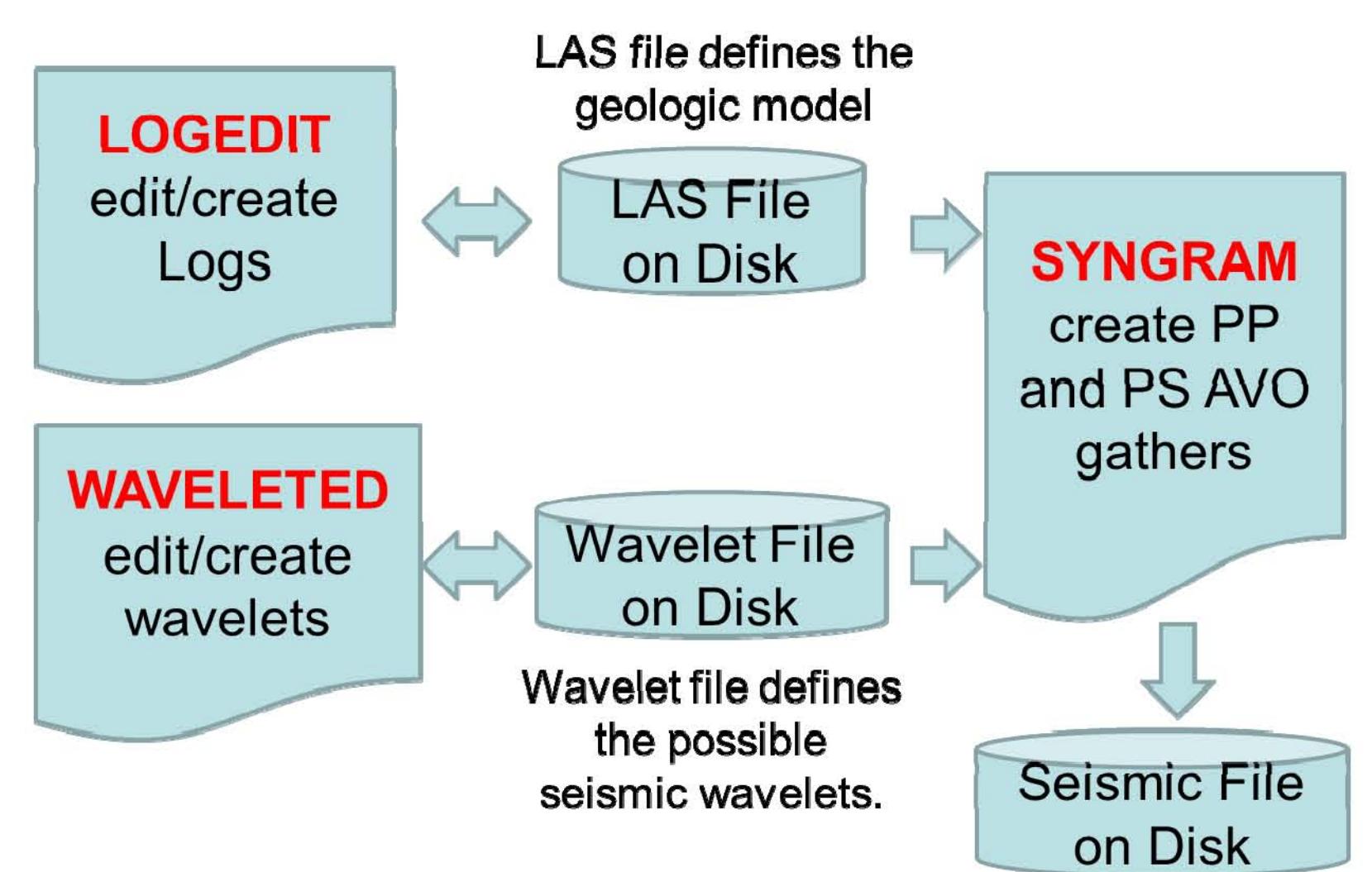
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## Summary

The CREWES AVO synthetic seismogram facility, SYNGRAM, has been upgraded to include several new features. These are (1) An interactive AVO analysis tool, (2) The option to create angle gathers as well as the traditional offset gathers, and (3) a wavelet display axe. The AVO analysis panel allows the interactive selection of an analysis level and then compares the AVO in the gather with that from a simple Zoeppritz calculation. These tend to agree on strong reflectors but not on subtle ones. The angle gathers are created by tracing rays from each reflector to the source and receiver at constant incidence angle regardless of the ultimate offset. Angle gathers are contoured with offset values while offset gathers are contoured with angle values. Finally the wavelet display panel provides a visual reminder of the selected wavelet and is plotted at the same scale as the seismogram and logs. This provides a direct assessment of resolution in either time or depth.

## SYNGRAM Modelling Paradigm



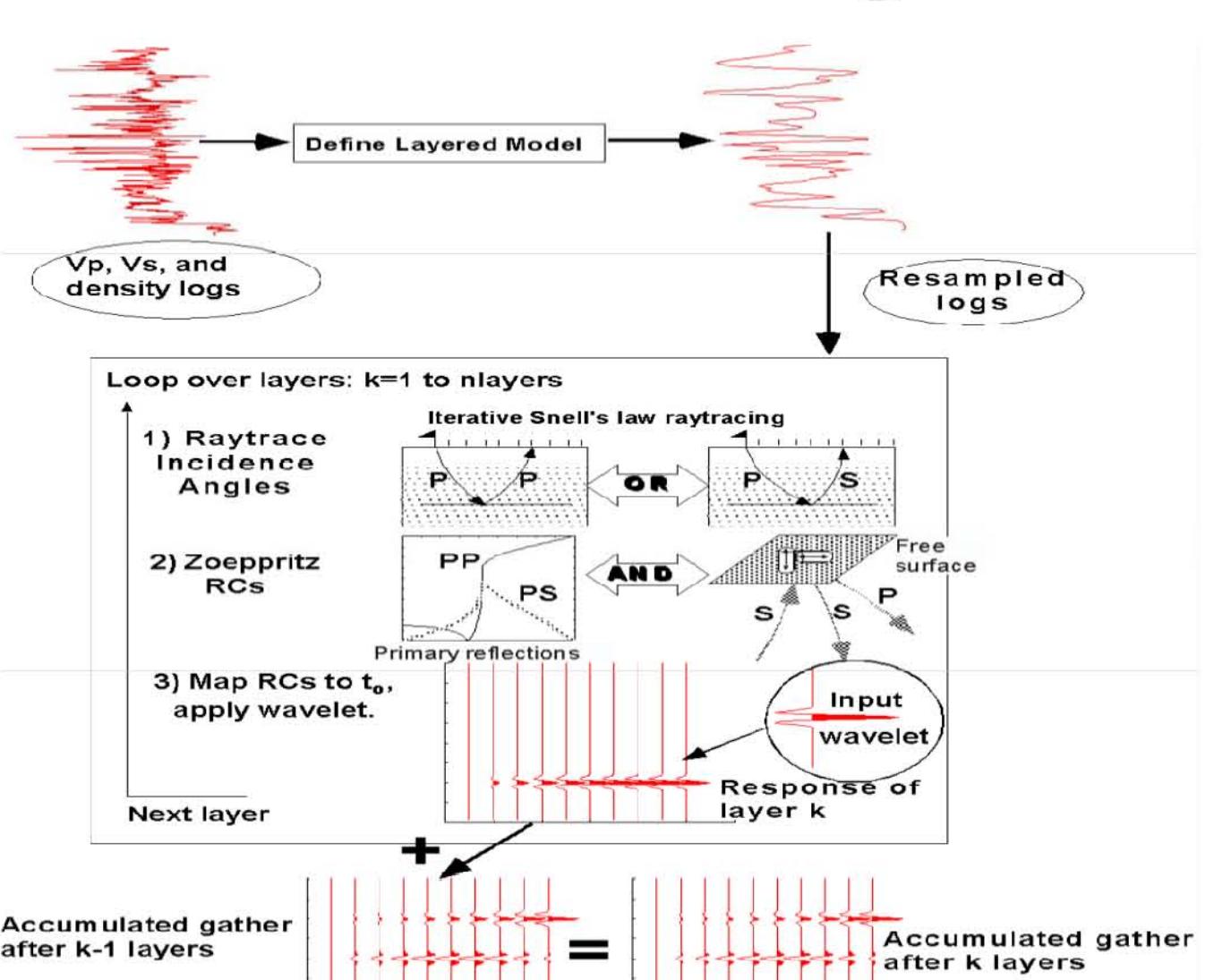
## Assumptions

- Well logs provide ground-truth parameters
- Raytracing for traveltimes and incidence angles
- Zoeppritz equations for reflection amplitudes
- Primaries only

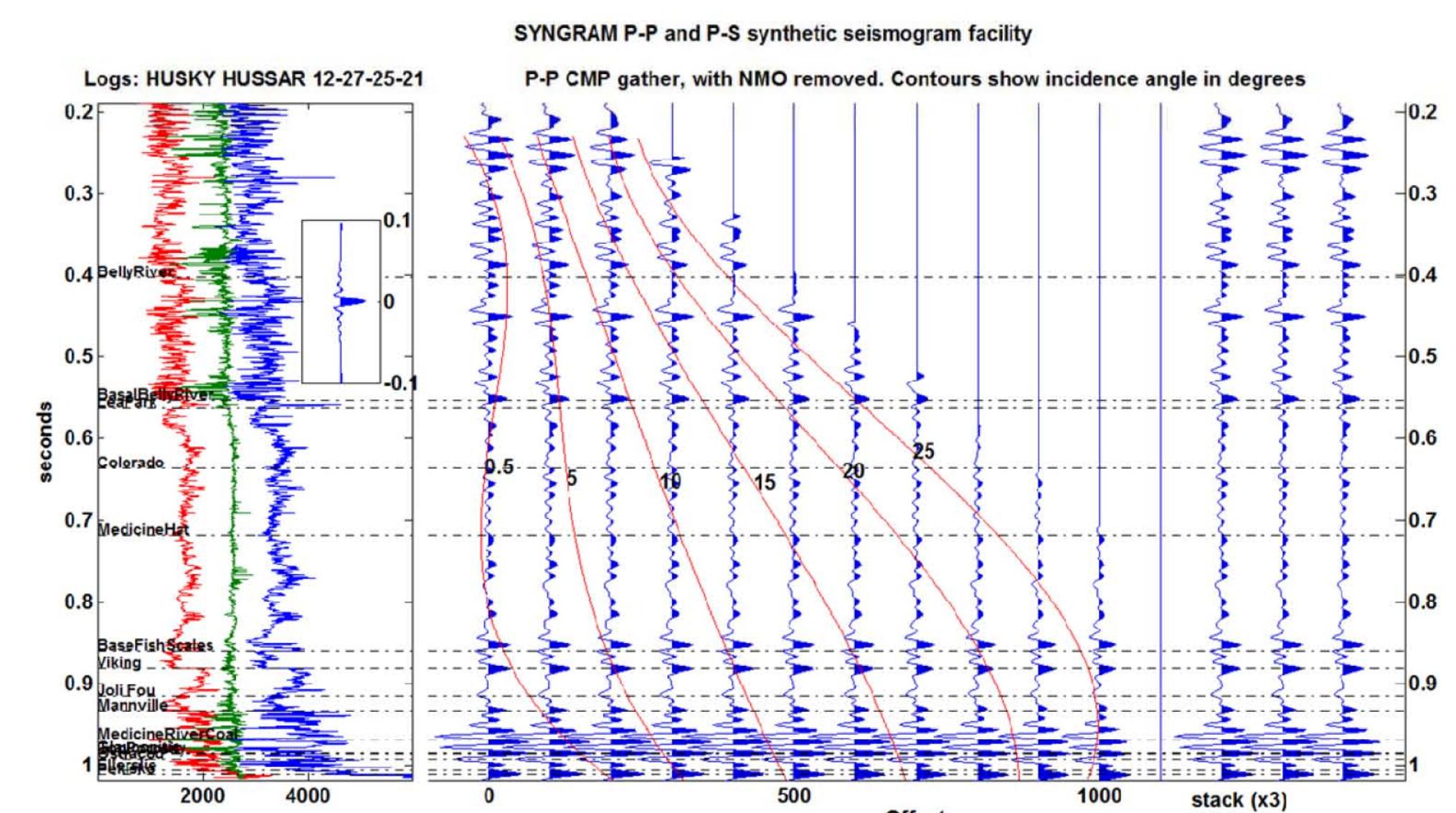
## SYNGRAM Limitations

- No multiples
- No Array effect
- Surface geometry only (no VSP)
- No Q effect
- P-P and P-S reflections only
- Plane-wave reflection coefficients
- Not valid near or beyond critical angle

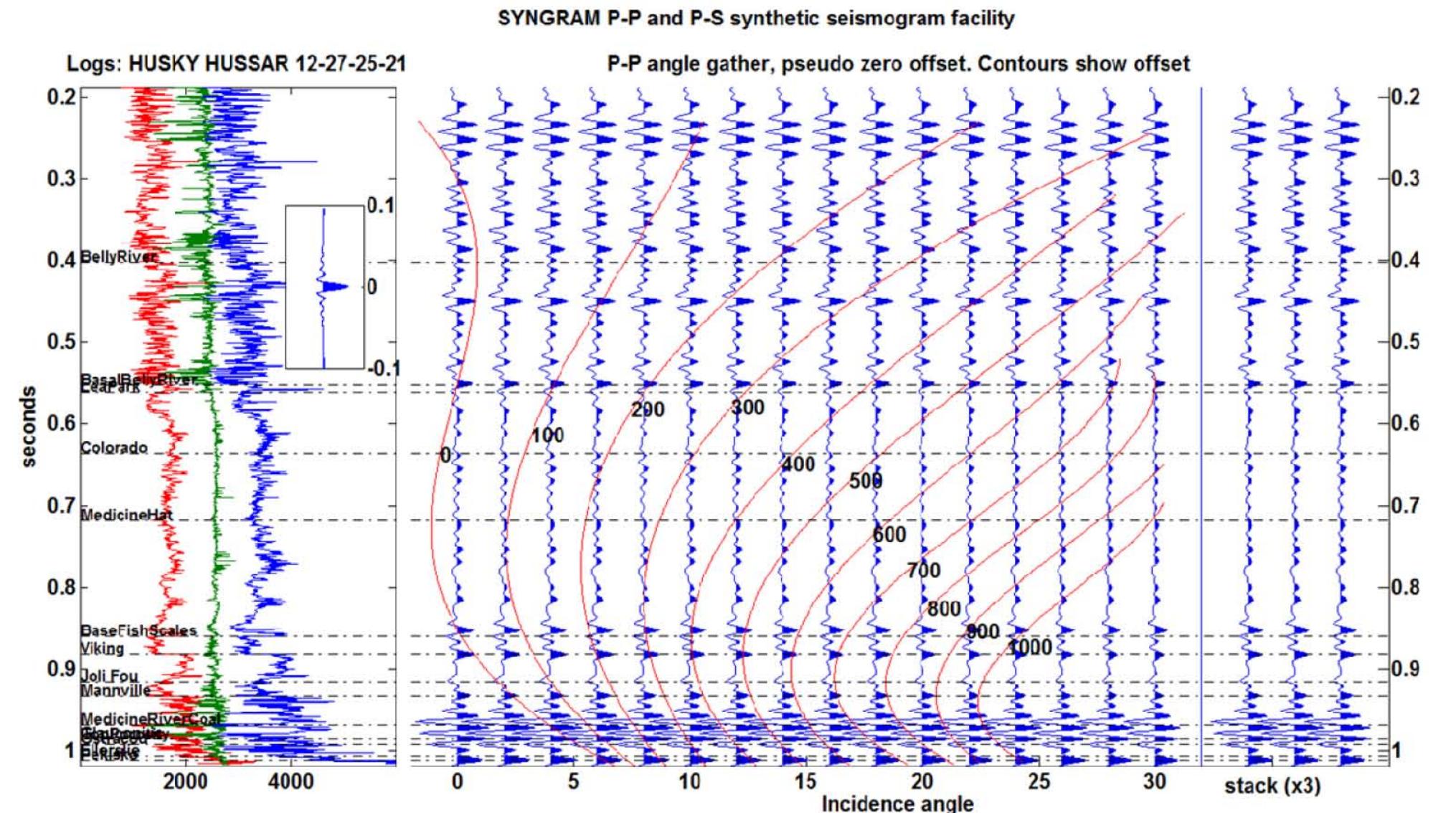
## The SYNGRAM Algorithm



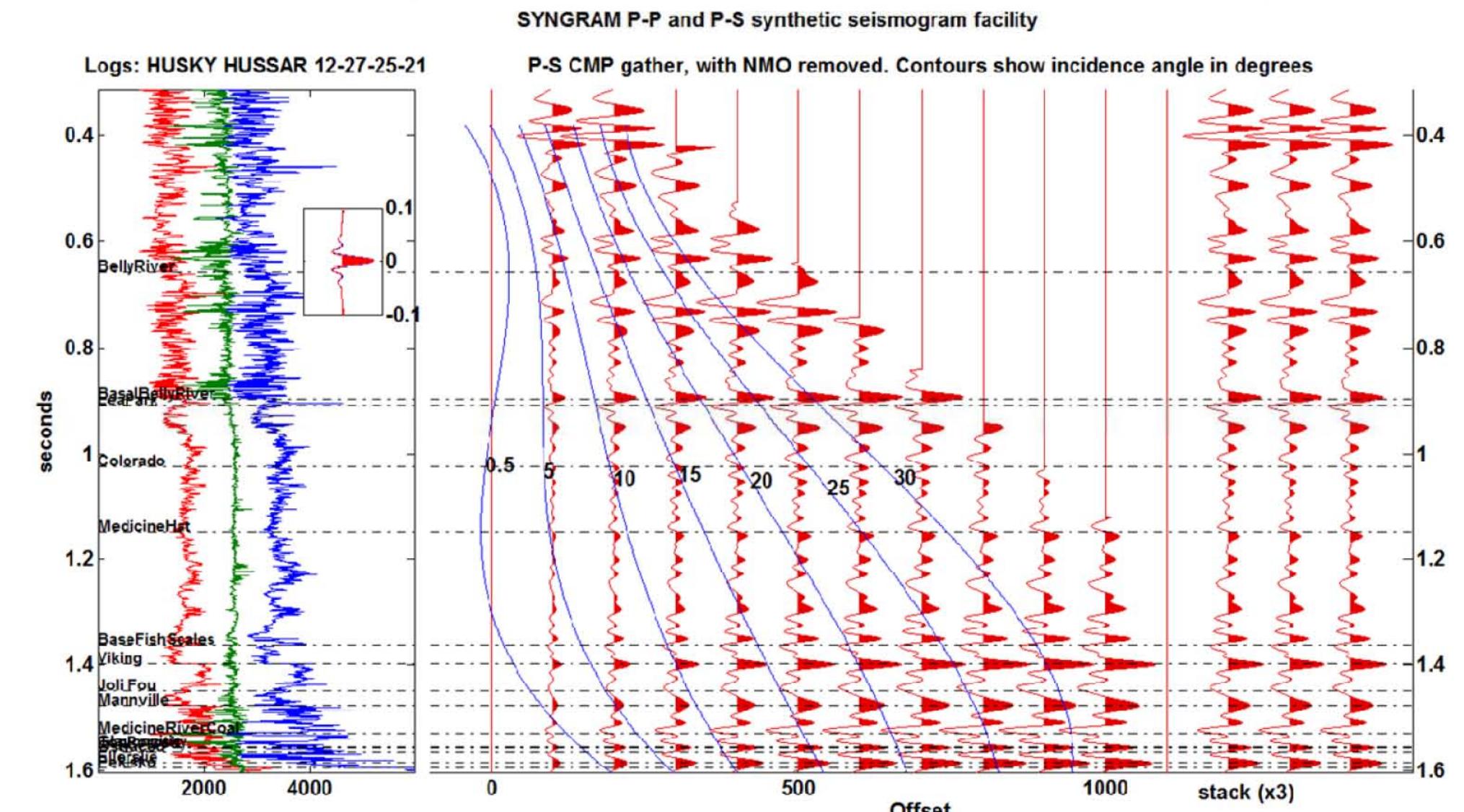
## PP offset gather with wavelet display



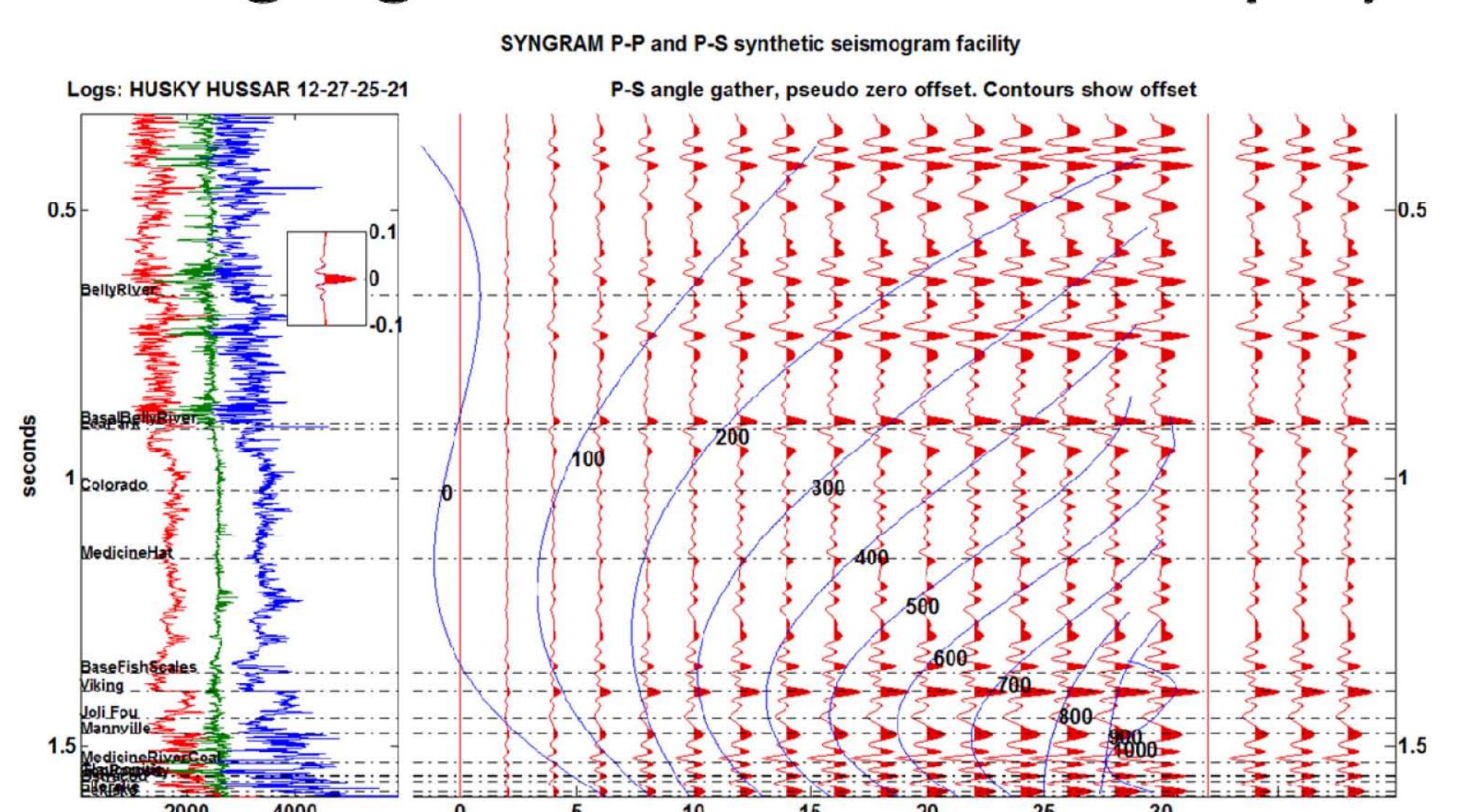
## PP angle gather with wavelet display



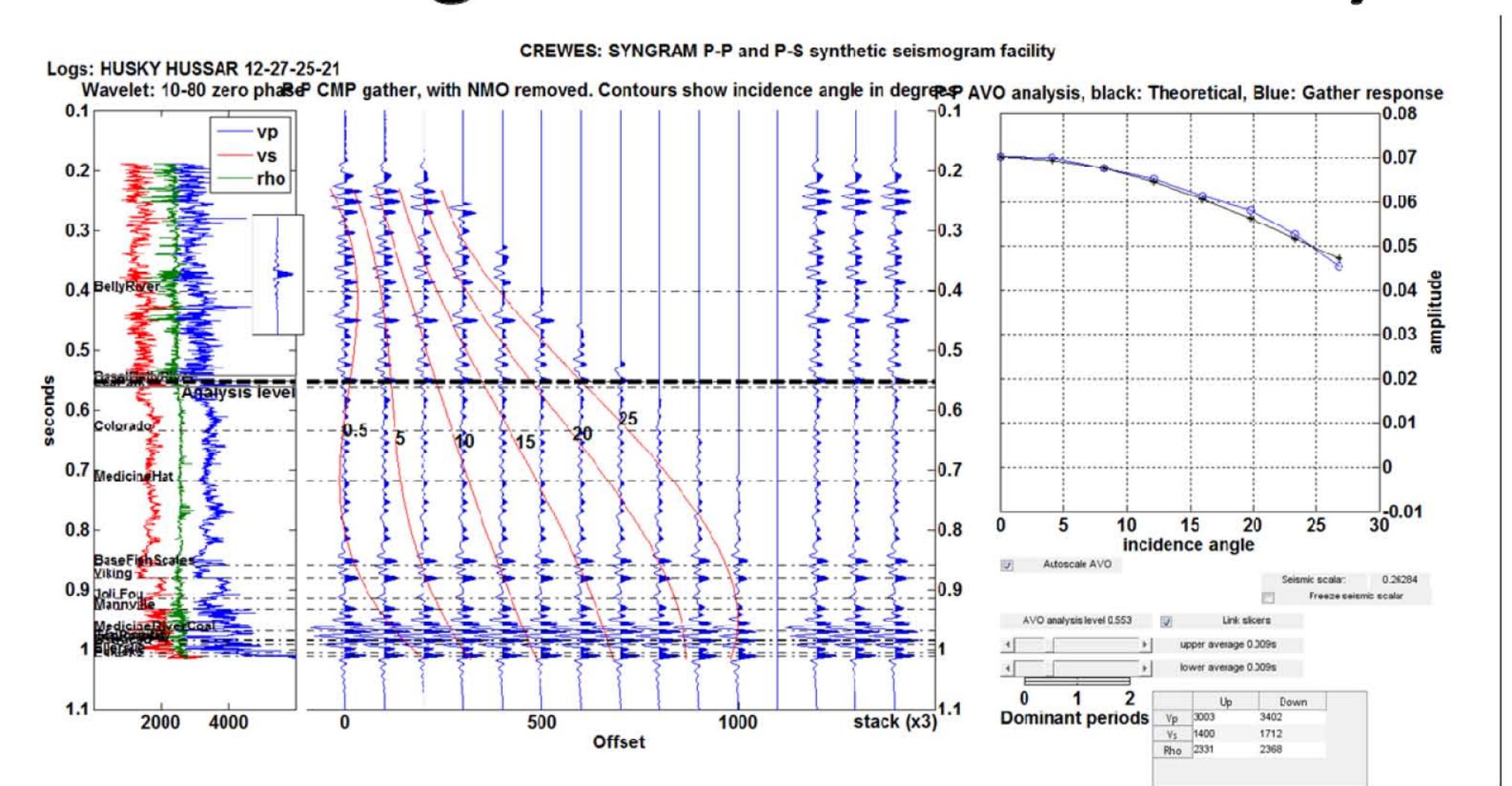
## PS offset gather with wavelet display



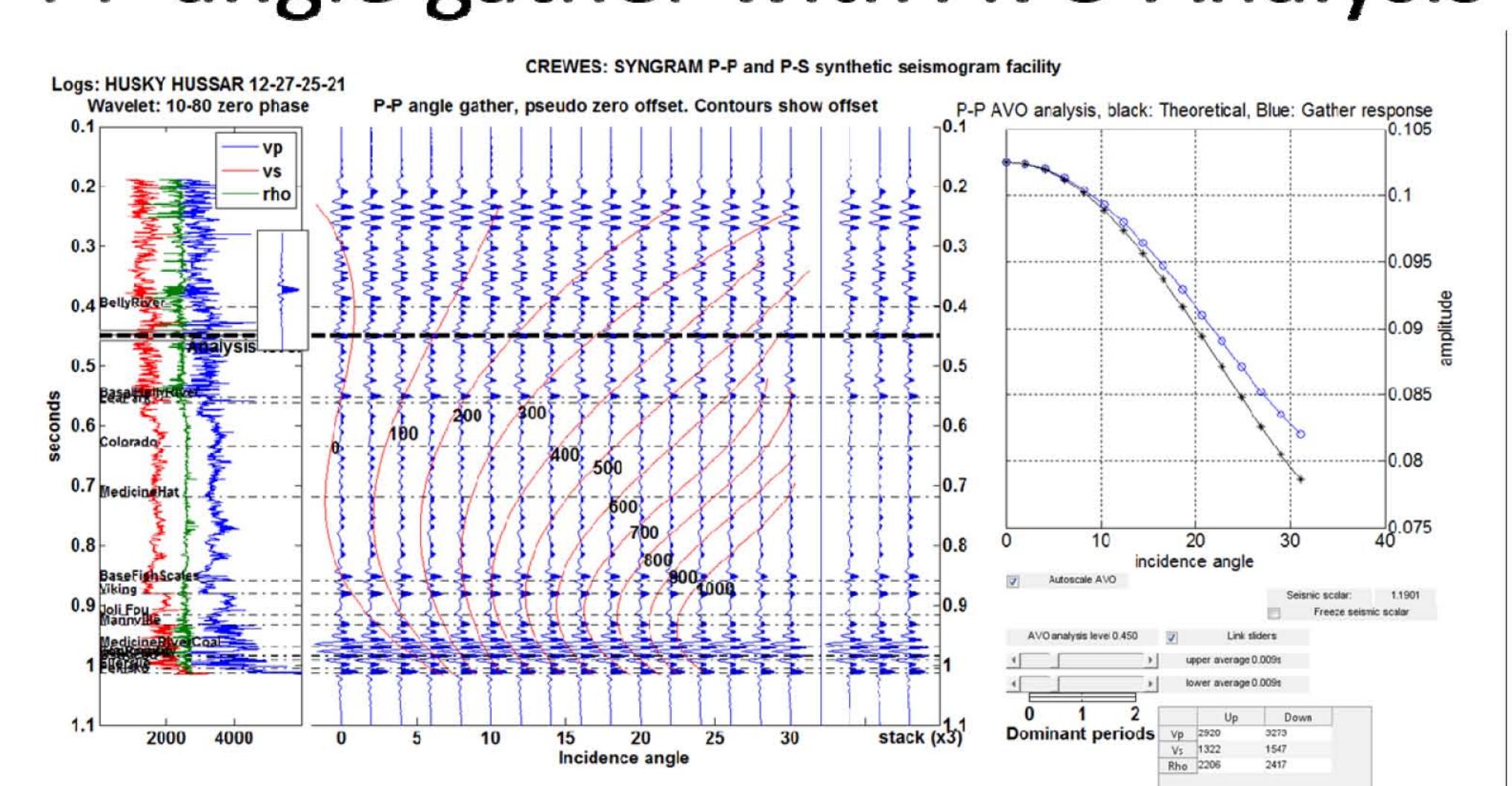
## PS angle gather with wavelet display



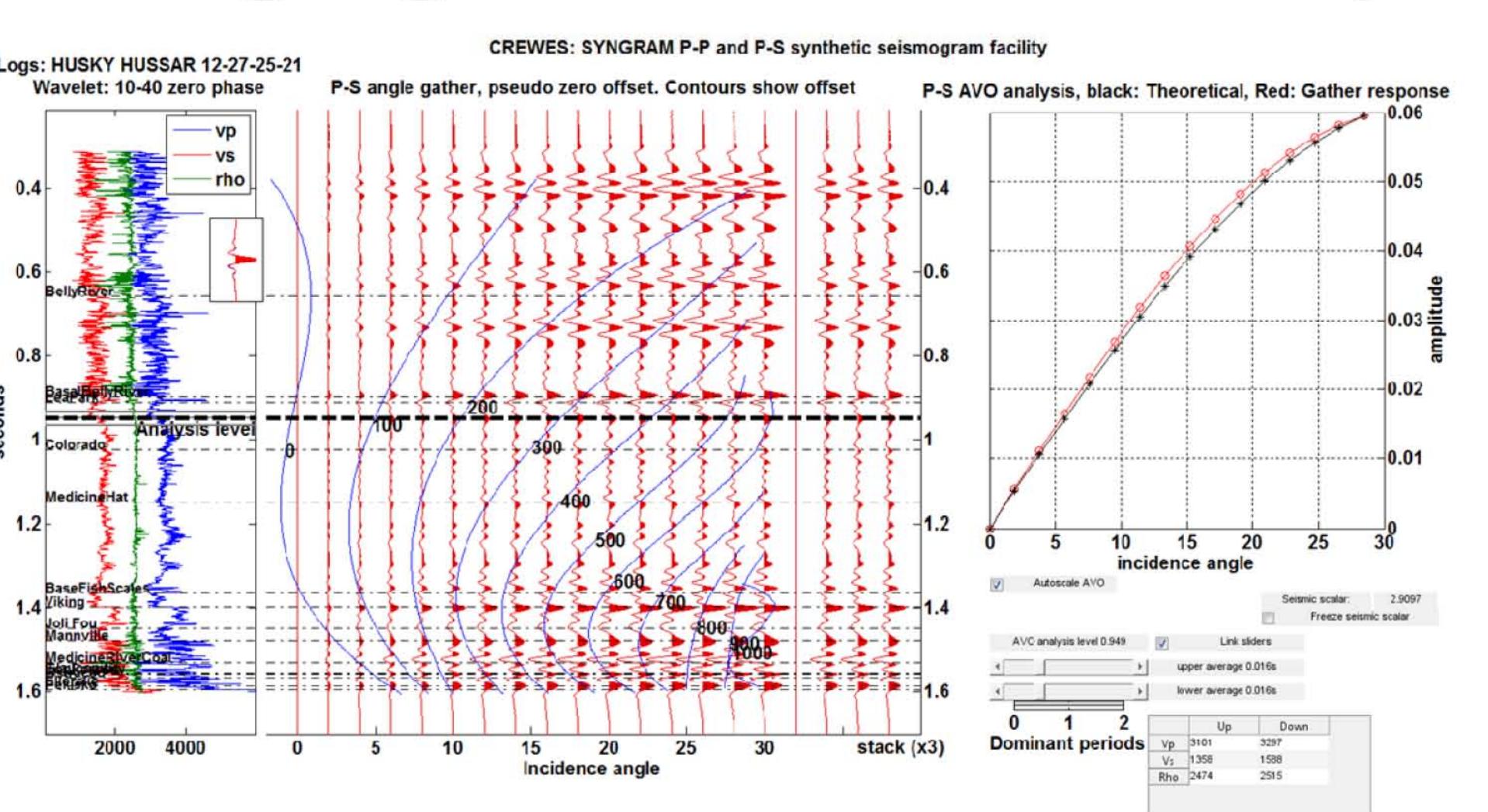
## PP offset gather with AVO Analysis



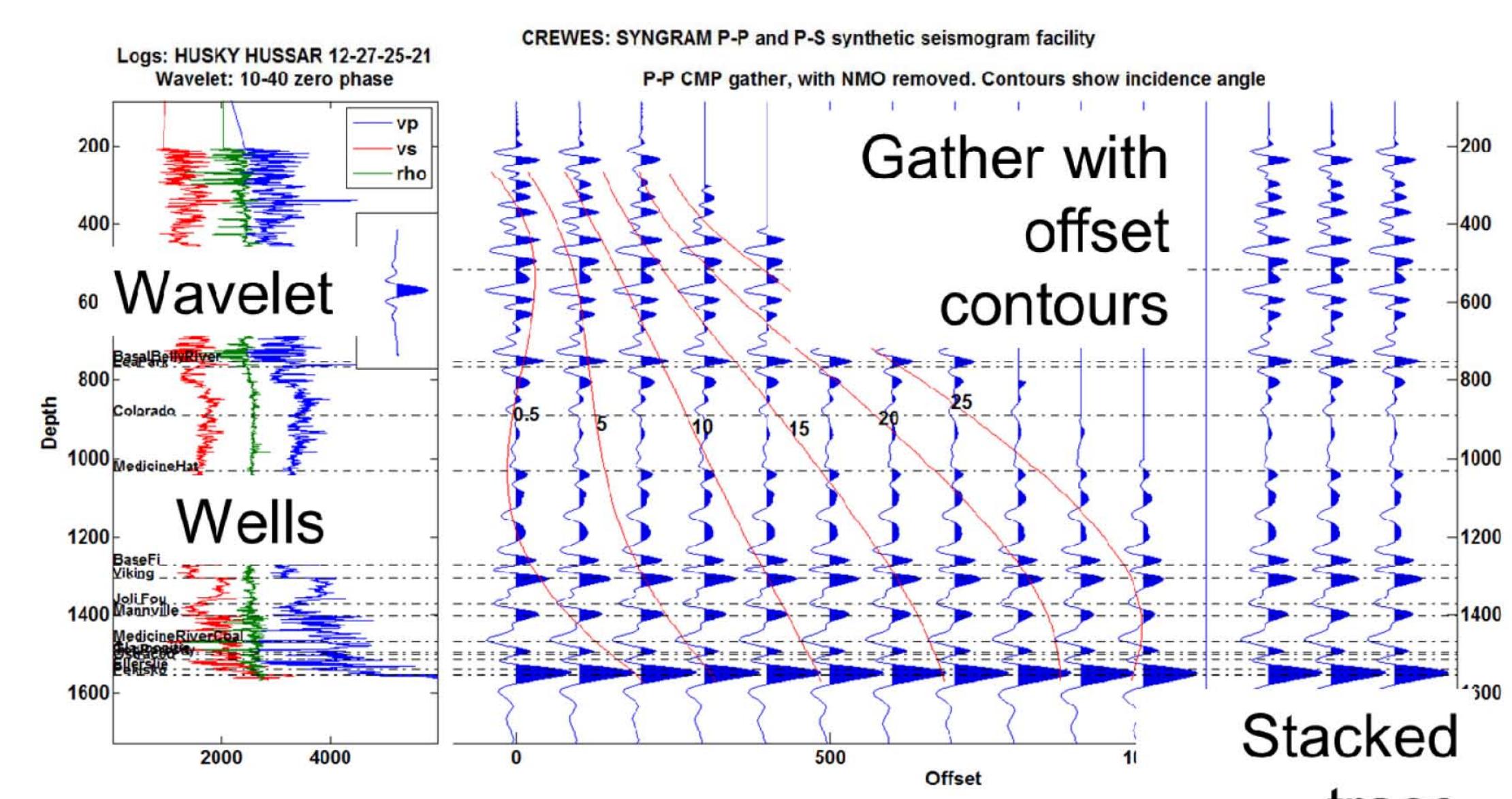
## PP angle gather with AVO Analysis



## PS angle gather with AVO Analysis



## Basic SYNGRAM Display



**Acknowledgements:** Gratitude is expressed to CREWES Sponsors and to NSERC. Kevin Hall has been very helpful in keeping SYNGRAM and associated programs in good condition.