Modeling of quasi-anisotropy effects in thin-layered non-monotonous media

Model Parameters

α_1 =4000m/s;
β_1 = 2310m/s;
ρ_1 =2.35g/cm^3; ΔZ=10m
α_2 =2000m/s;
β_2 = 1150m/s;
ρ_2 =2.01g/cm^3 ; ΔZ=10m

Elastic Parameters

P-wave
$\alpha_{\perp}$= 2470 m/s., α3150 =$_{II}$ m/s,
α_{av} = 2667 m/s, α_{avk} = 2828 м/с, α_{eff} = 2500 м/с
SV-wave
$\beta_{\perp}$ = β1420 = $_{II}$ m/s, β_{cp} = 1535 m/s.

Thomsen Parameters

ε= 0.32, δ=0.03

Acoustic Parameters

$\alpha_{\perp}$= α2470 =$_{II}$ m/s, α_{av} = 2667 m/s
This presentation shows that measured modeling data practically coincide with the theoretical values. It shows that the Tesseral package produces sufficiently exact results in conditions of thin-layered non-monotonous media

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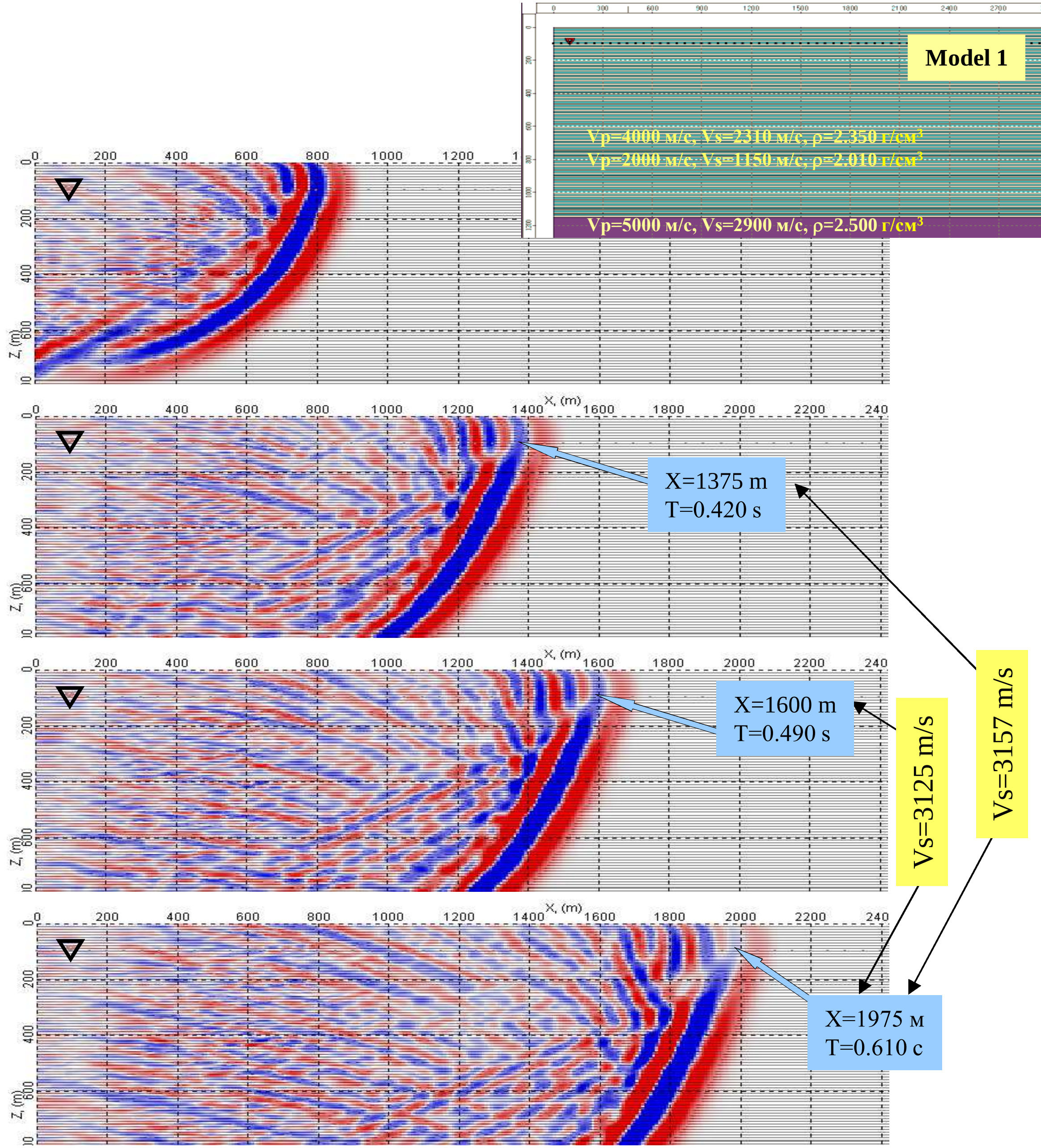
P-wave propagation fronts (snapshots) for elastic medium in time moments:

t_1=0.250 s;

t_2=0.420 s;

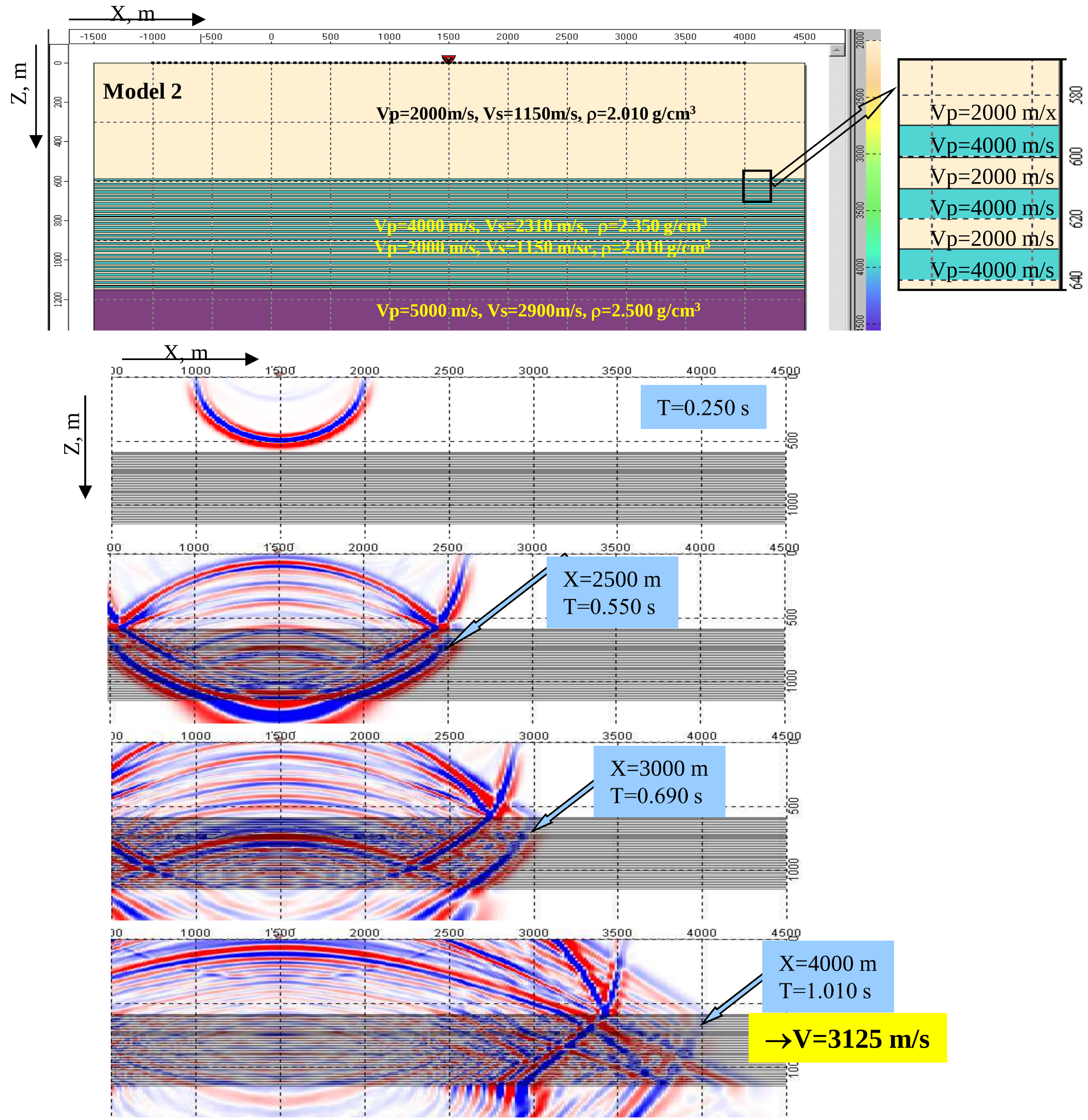
t_3=0.490 s;

t_4=0.610 s.



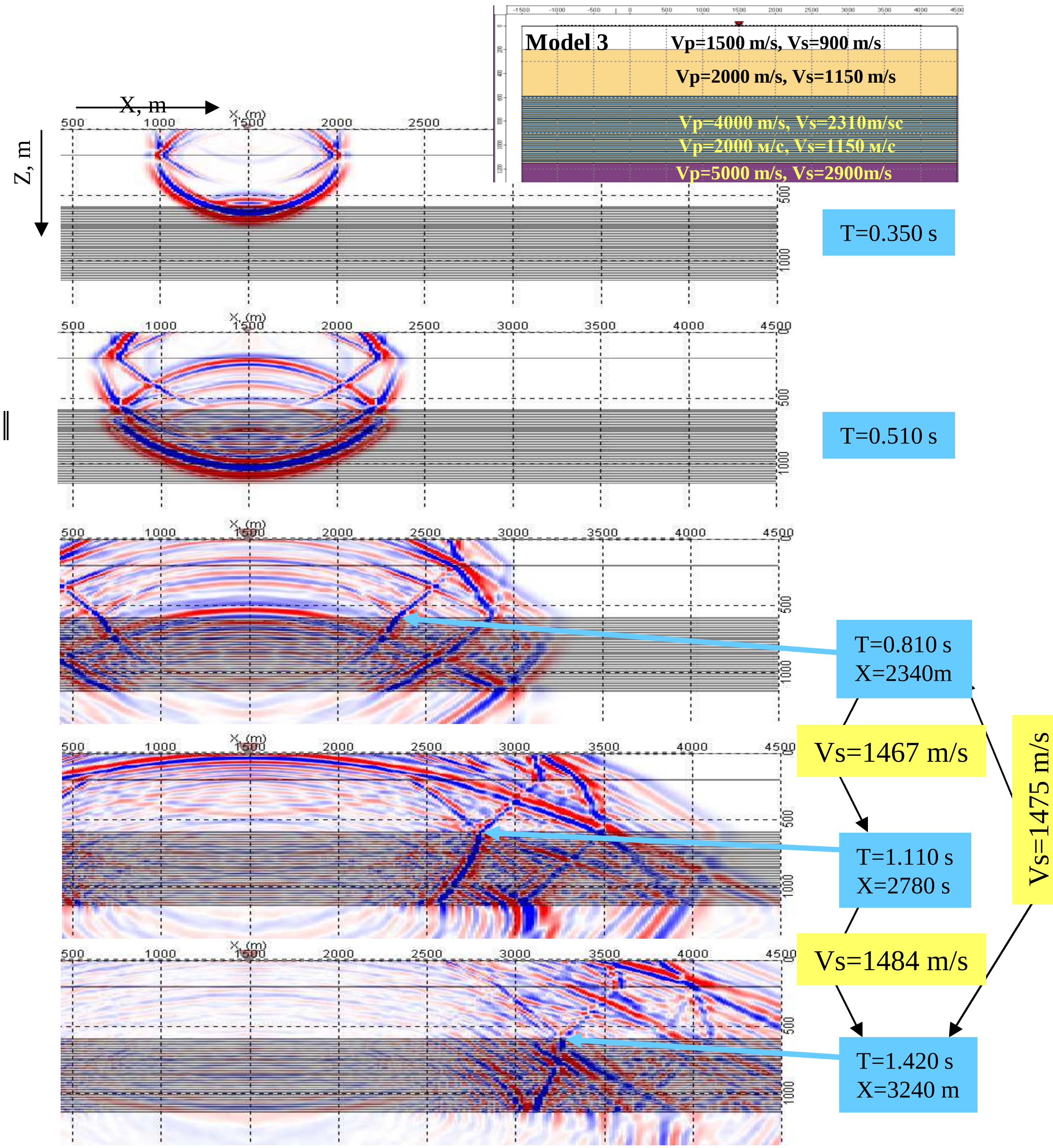
Determining of velocity $\alpha_{\parallel}$ for elastic model 2 by front of the head wave propagation fixed in time moments:

t_1=0.250 s;
t_2=0.550 s;
t_3=0.690 s;
t_4=1.010 s.



Determining of velocity $\beta_{\parallel}$ for acoustic model 3 by the head wave propagation front, fixed in time moments:

t_1=0.350 s;
t_2=0.510 s;
t_3=0.810 s;
t_4=1.110 s;
t_5=1.420 s.



Determining of velocity $\alpha_{\parallel}$ for acoustic model 2 by the head wave propagation

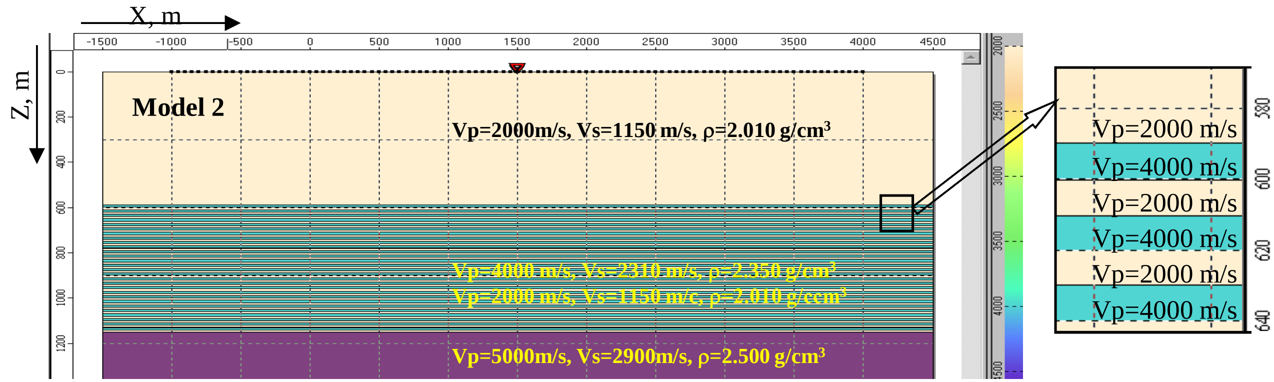
Front fixed in time moments:

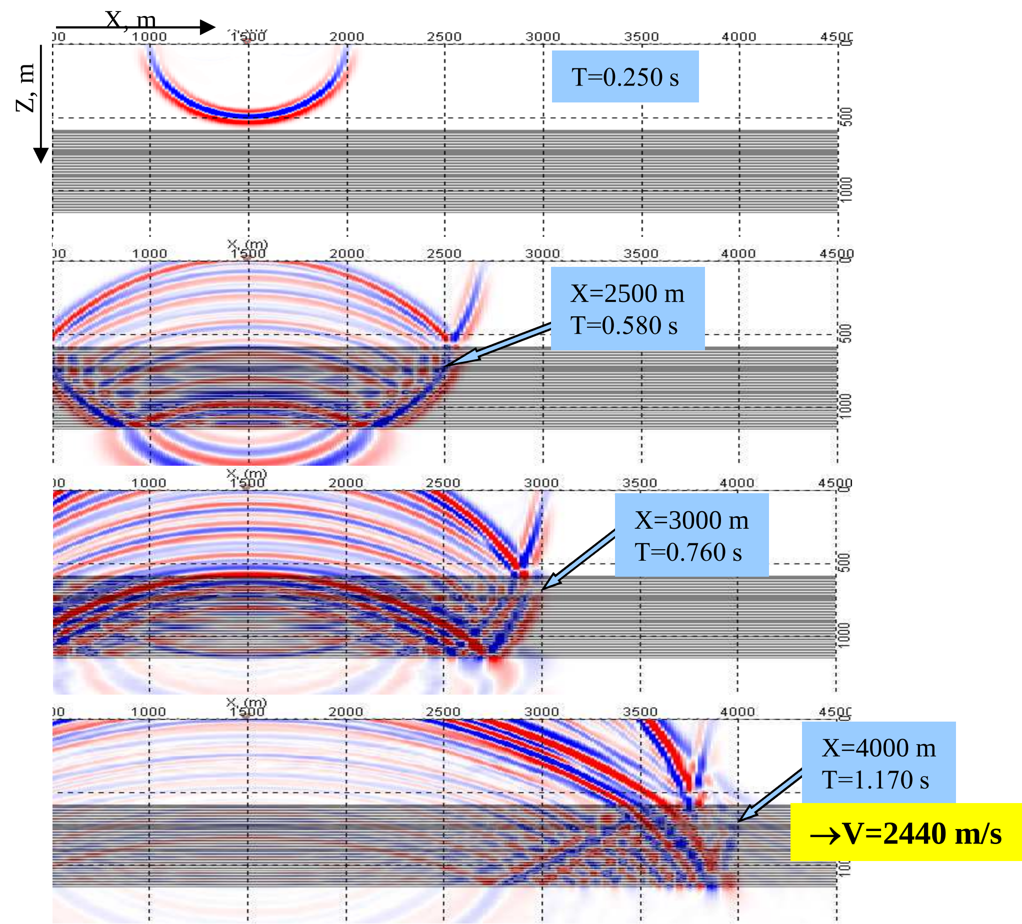
t_1=0.250 s;

t_2=0.580 s;

t_3=0.760 s;

t_4=1.170 s.

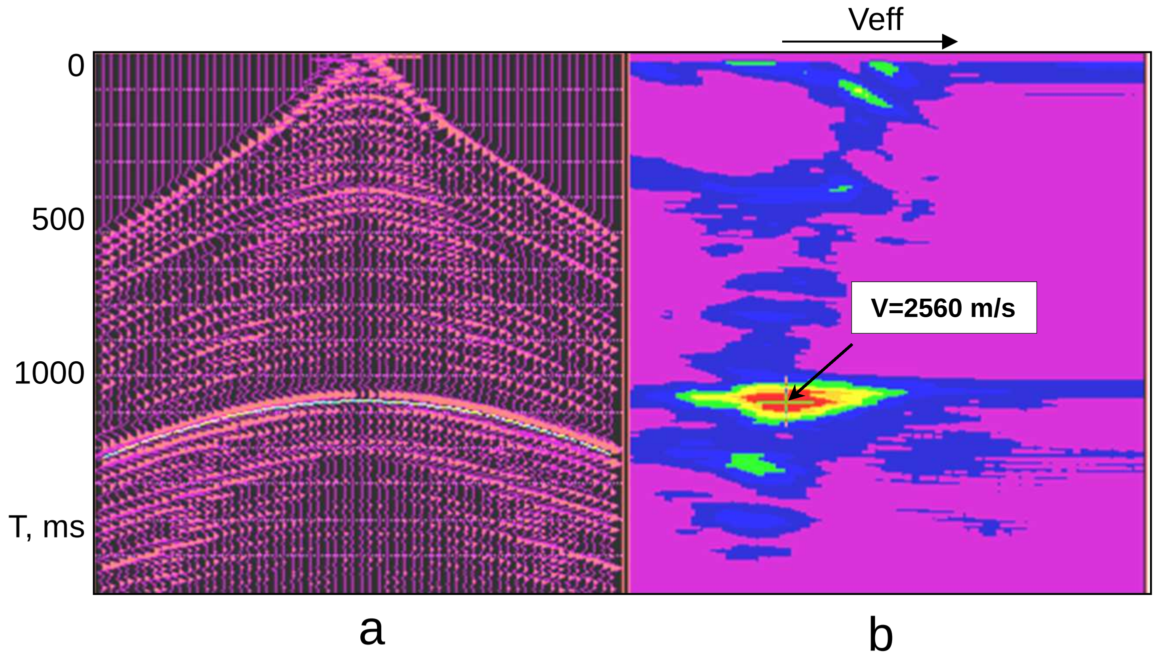




Determining of effective velocity by synthetic shotgather, based on the thin-layered model

a - synthetic seismogram;

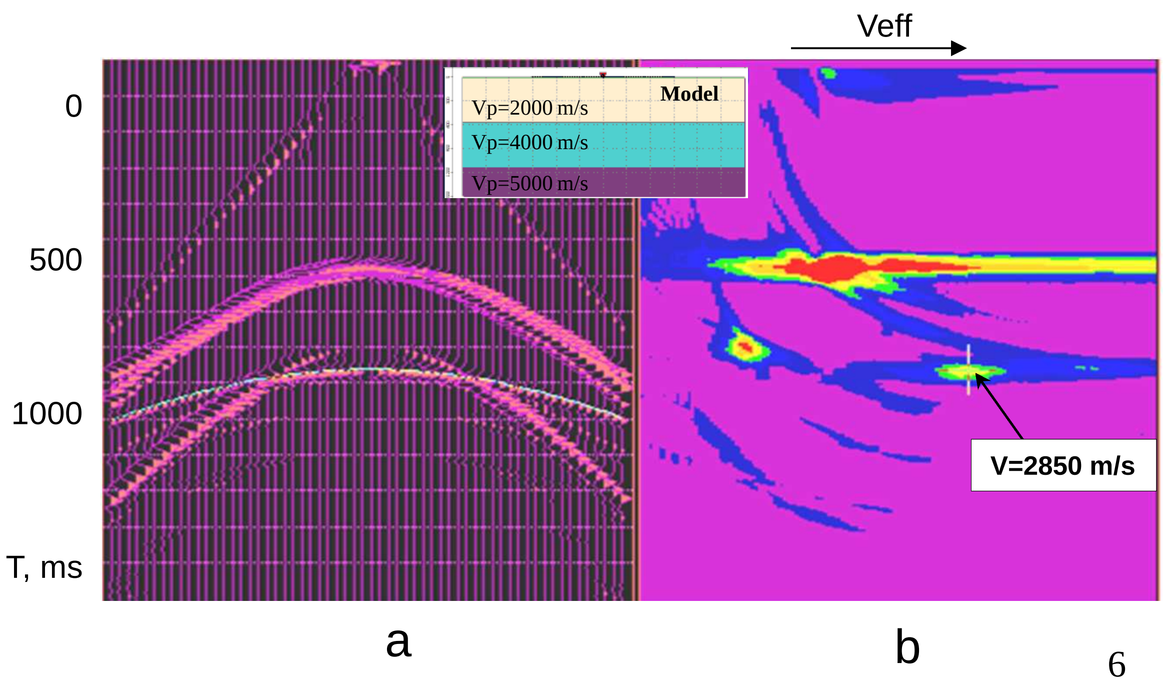
b - vertical velocity spectrum

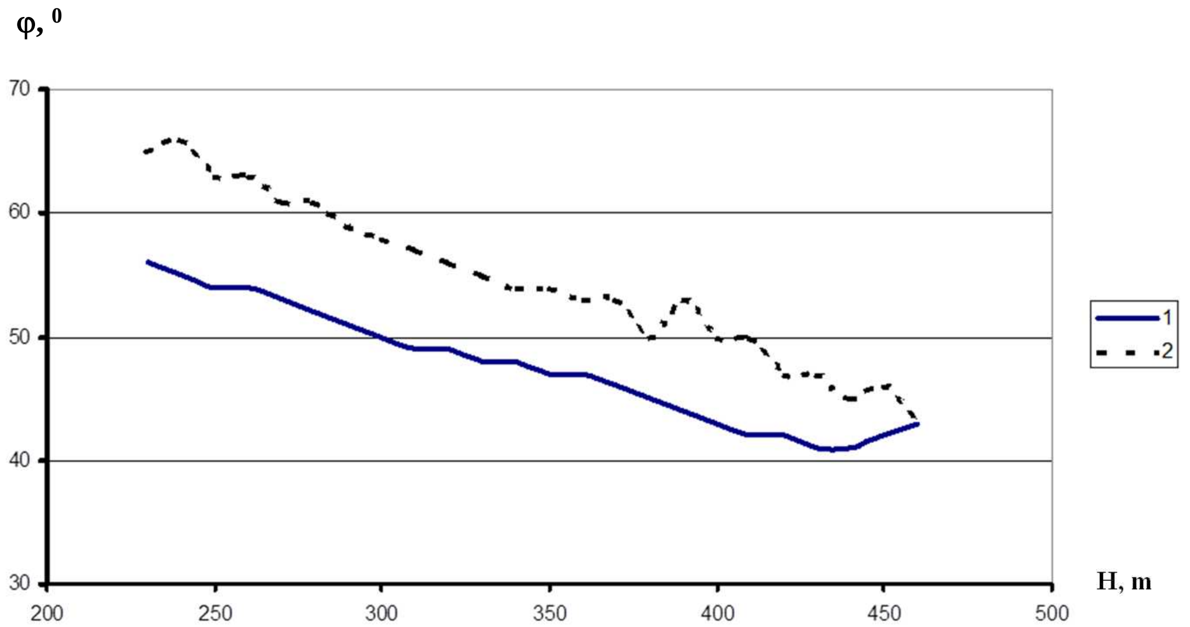


Determining of effective velocity by synthetic shotgather, based on the thick-layered model

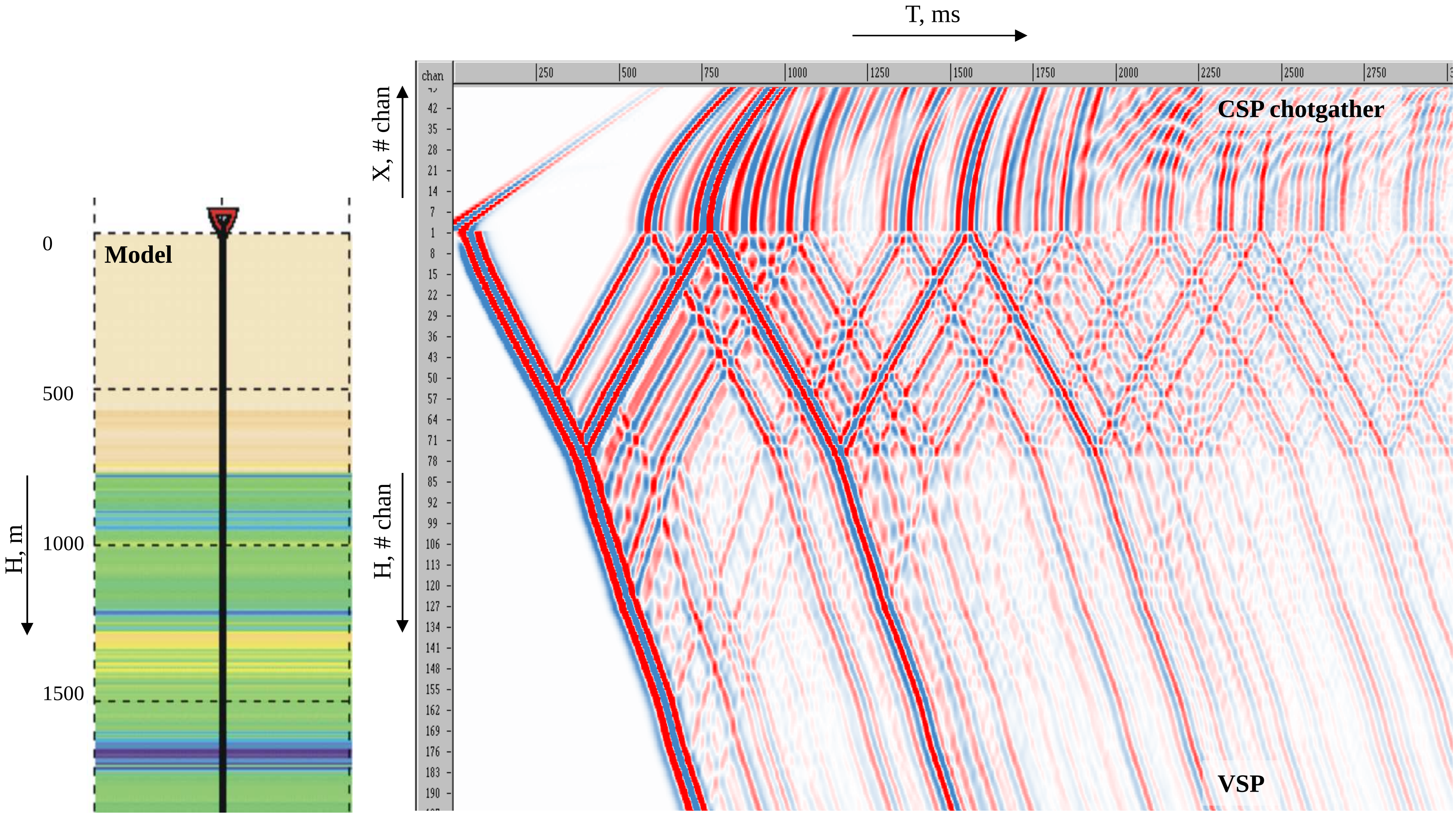
a - synthetic seismogram;

b - vertical velocity spectrum

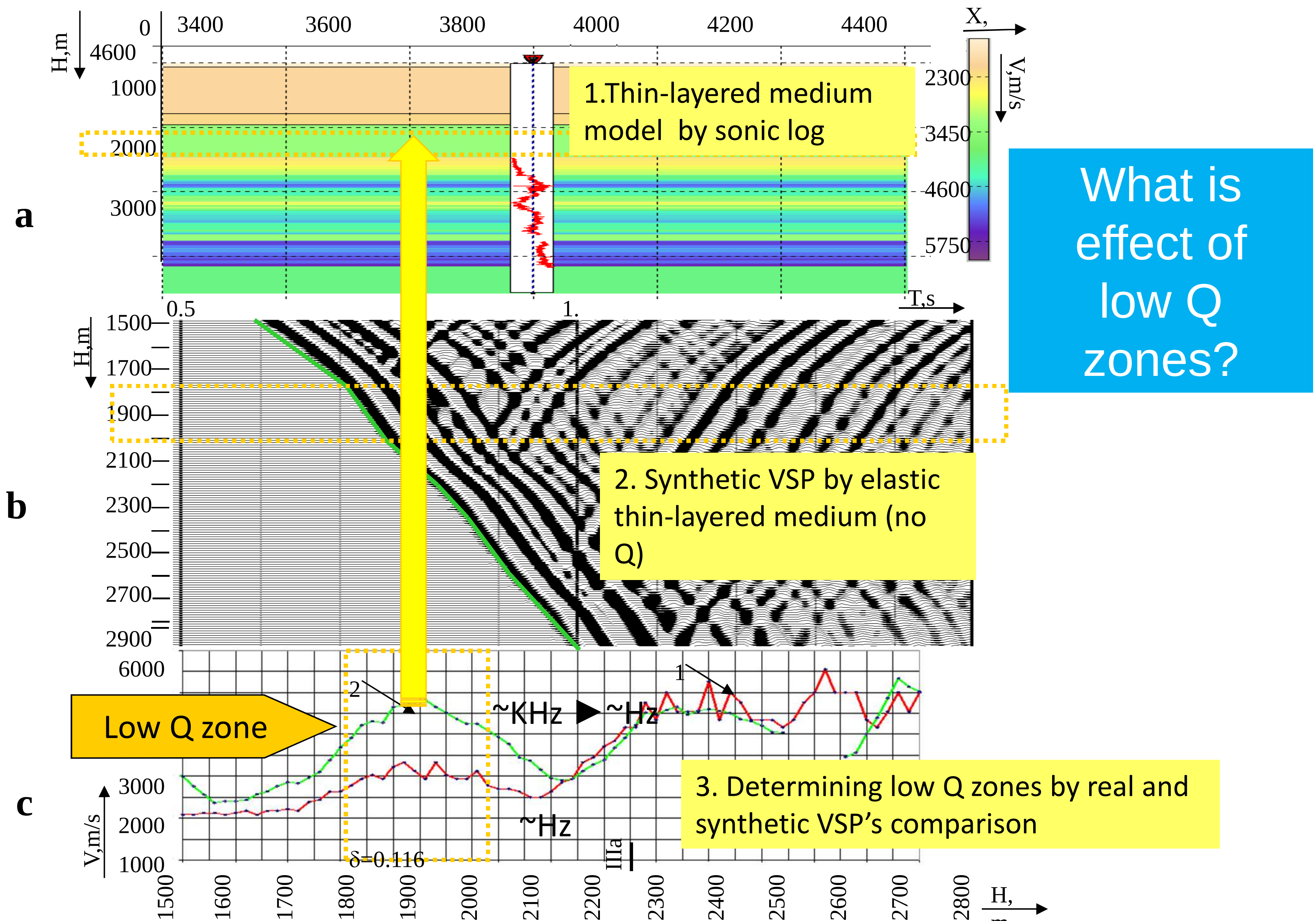




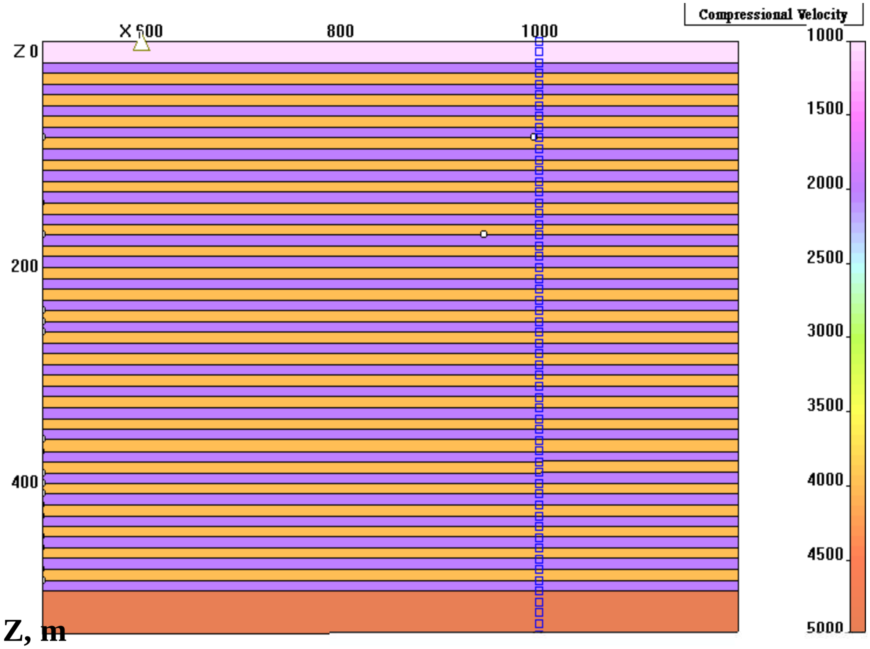
Charts of dependency of the slowness vector (1) and Polarization vector (2) of incident wave from depth.



CSP and VSP shotgathers coincided by the interface line.
Model is obtained with using sonic log data for compression and shear waves and density logging



Velocity analysis of the wave propagation for real VSP in comparison with SL → synthetic VSP velocities determined in the well S-2 on the Black Sea shelf : a – thin-layered velocity model by the well SL; b – model shotgather; c – graphics of interval velocities, determined on the base 100 m,
V_{VSP}(1-) and $V_{SL \to VSP}$ (2-).



Quasi-anisotropy effect in condition of the thin-layered model can be demonstrated for VSP data at studying of polarized properties of the downgoing compressional wave by its Z- and X- components