7/16∼18/05: Drill

12 SVP realizations in FAF05 area were generated. Yoyo control was implemented in the last two (file sound_faf05_jul14_run04_day6_6.5.mat). The first one is associated with morning scenario; the second one is associated with afternoon scenario. For each scenario, yoyo control was implemented 10 times with adding white CTD measurement noise. With using a priori error field (see Figure 9, 11), ObjectiveAnalysis was used to generate SVP estimate and error field. The estimates of the error reduction due to the assimilation of the predicted adaptive sampling path in the HOPS vertical sections are shown in "Err from OA" plots. Parameter values in the table below were used throughout the whole experiment.

sound frequency=100Hz
sound source r=1950m
sound source z=35m
receivers z=5m
horizontal correlation length=2000m
vertical correlation length=5m
AUV maximum range=2000m

SVP error and TL error were used as cost function respectively. Yoyo control parameters pairs:

	points	threshold
1	20	0.1
2	20	0.5
3	20	1
4	30	0.1
5	30	0.5
6	30	1
7	30	1000

were used one by one for optimization purpose.

From optimization results, (points=30, threshold=1000) was found the optimal parameters pair for both SVP error and TL error cost function. Since now the horizontal correlation length is 2000m, just one in-situ measurement will dramatically reduce SVP error in the horizontal direction. From Figure 9 we can see that in error field, almost only errors in the most right lower place are greater than 0.5. So, if a yoyo pattern can reach deepest place and scan most area, it would be very possibly the optimal one for SVP error cost function. Since (points=30, threshold=1000) means that AUV will just go most up and down between upper bound and lower bound, SVP error got minimized. Because of this reason, in the next few days SVP error cost function will not be used.

Optimal: points=30, threshold=1000 for morning 7/20/05
Optimal: points=30, threshold=1000 for afternoon 7/20/05

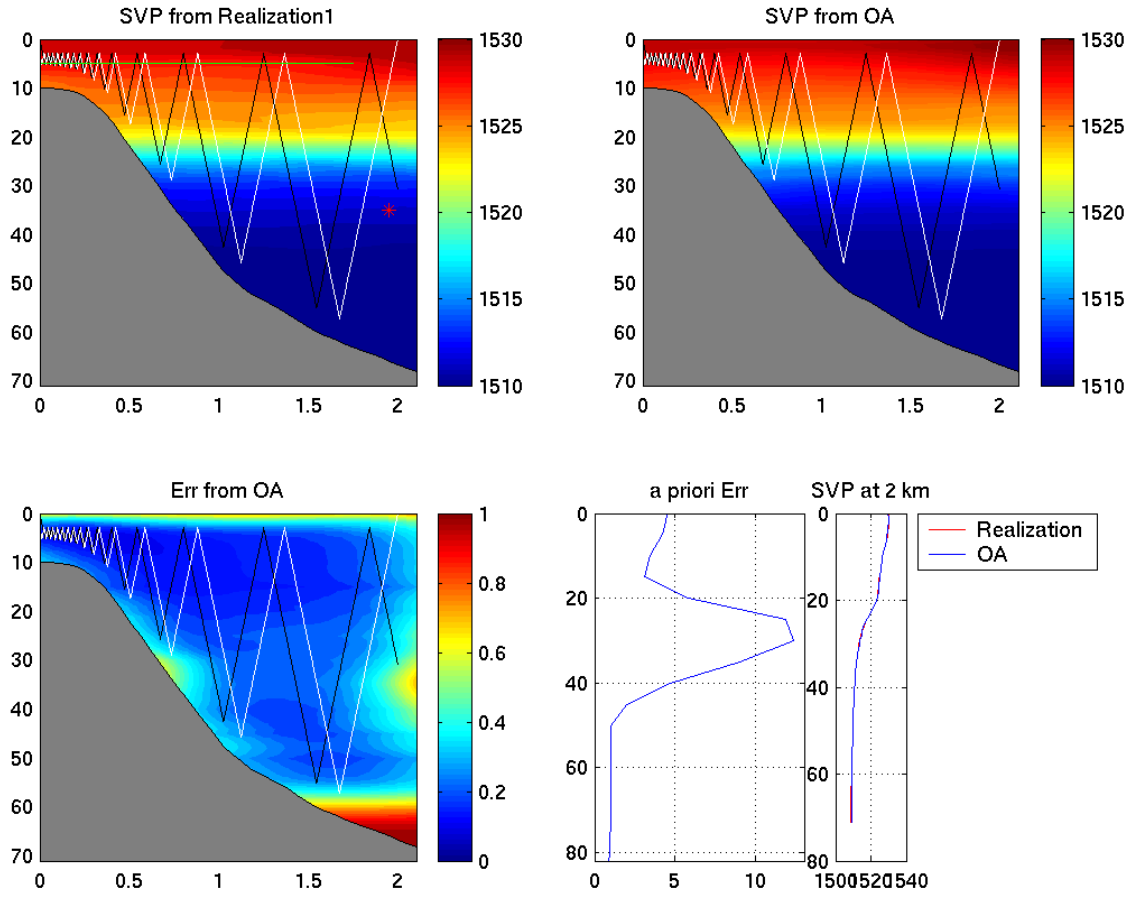

Figure 9: Yoyo control implementation. Morning 7/20/05. sound_faf05_jul14_run04_day6_6.5.mat. Black line is the forward path; White line is the backward path; Red star is the sound source location; Green line is receivers' location. Note that to avoid bottom AUV turns around at 5 m above bottom.

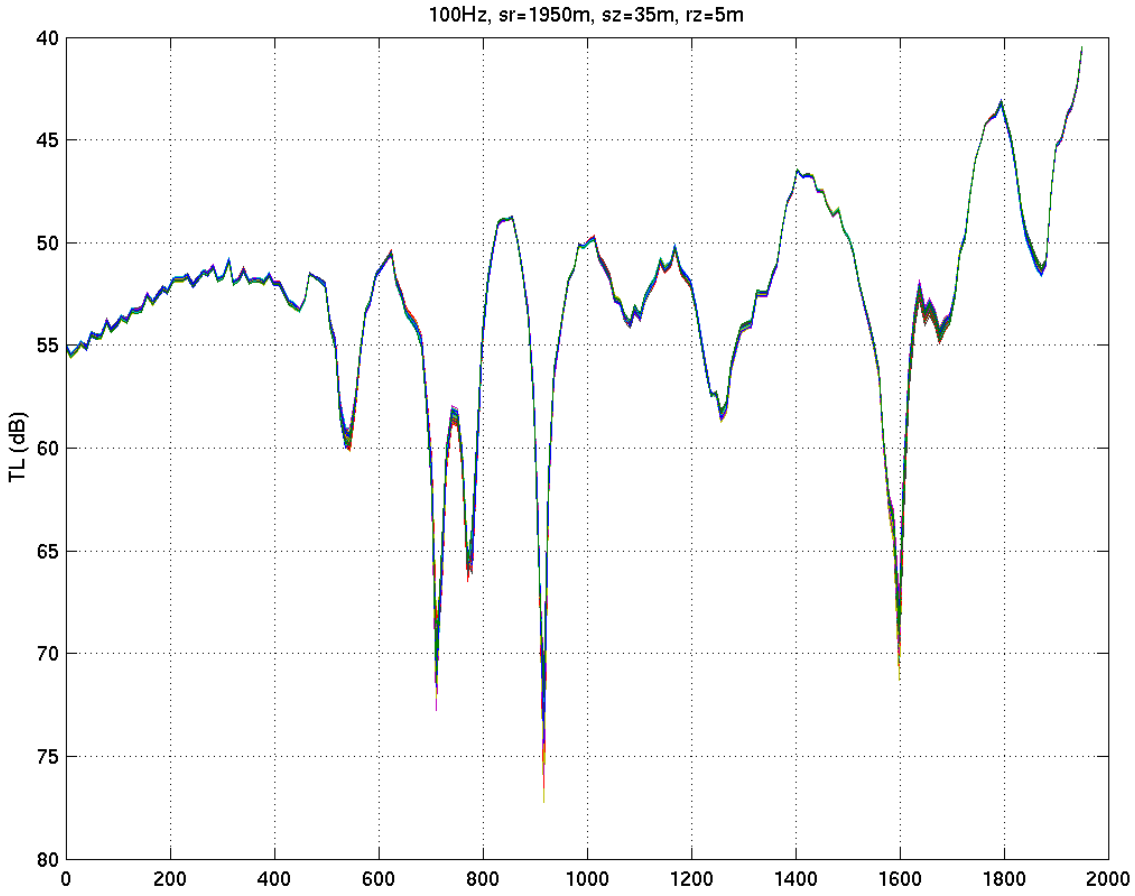

Figure 10: Morning 7/20/05. sound_faf05_jul14_run04_day6_6.5.mat.

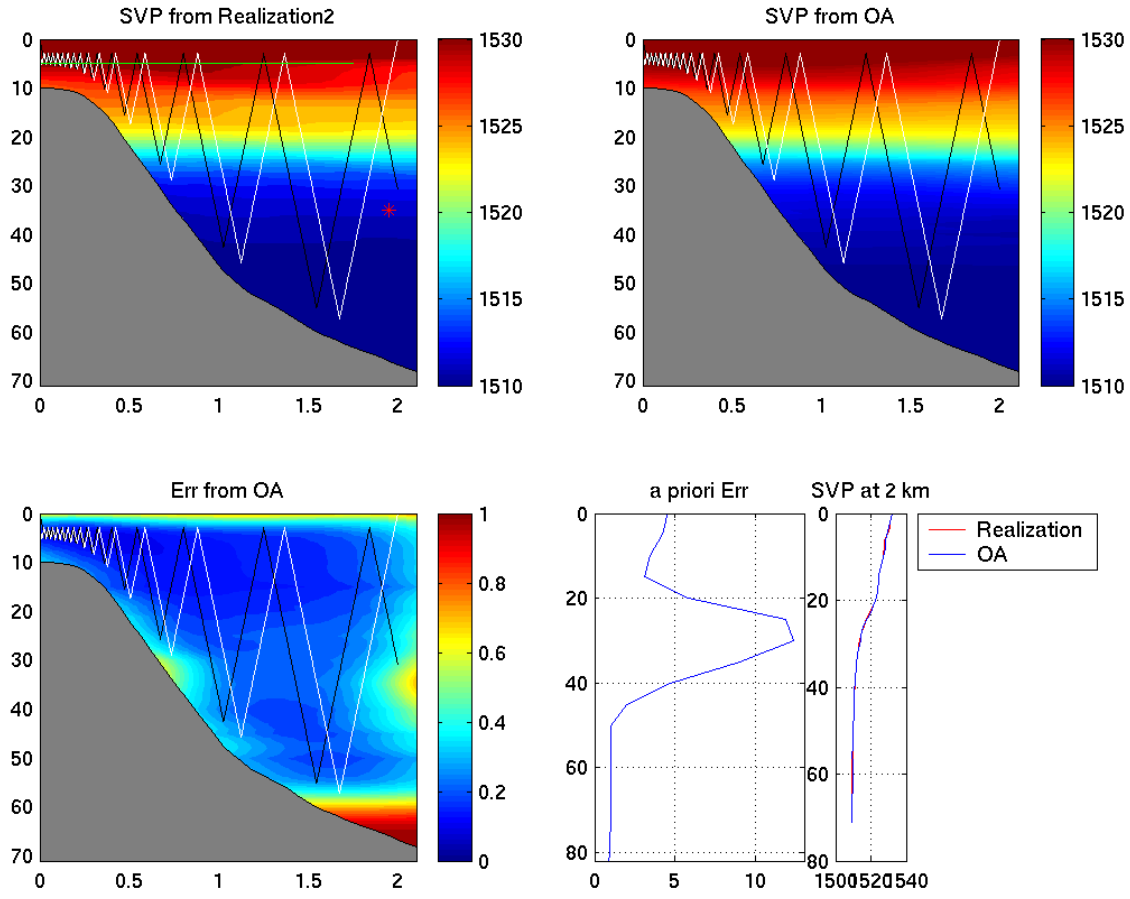

Figure 11: Yoyo control implementation. Afternoon 7/20/05. sound_faf05_jul14_run04_day6_6.5.mat. Black line is the forward path; White line is the backward path; Red star is the sound source location; Green line is receivers' location. Note that to avoid bottom AUV turns around at 5 m above bottom.

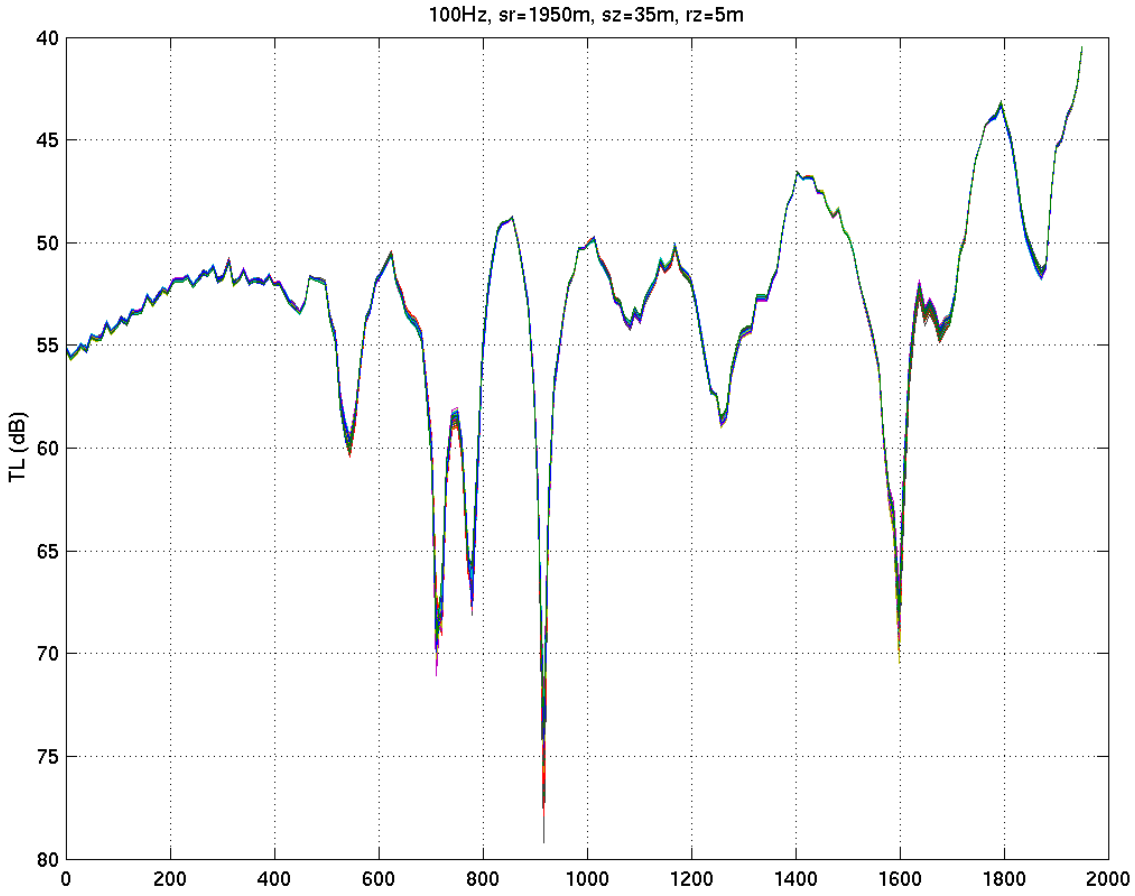

Figure 12: Afternoon 7/20/05. sound_faf05_jul14_run04_day6_6.5.mat.