frontiers

Supplementary Material

Automated assessment of bidirectional early-life interaction in mouse dam-pup dyads

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1 Supplementary Data

Supplementary File 1. Structural parameters used to train the DAS automated detection network.

```
das.train.train(model_name='tcn_stft',
    data_dir=path_to_data,
    save_dir=path_to_data,
    pre_nb_conv=4,
    pre_nb_dft=33,
    pre_nb_filters=33,
    pre_kernel_size=64,
    nb_hist=8192,
    batch_size=32,
    batch_norm=True,
    kernel_size=16,
    nb_filters=32,
    ignore_boundaries=True,
    verbose=1,
    nb_conv=2,
    learning_rate=0.0005,
    use_separable=[True, True, False, False],
    nb_epoch=100)
```

2 Supplementary Figures and Tables

2.1 Supplementary Tables

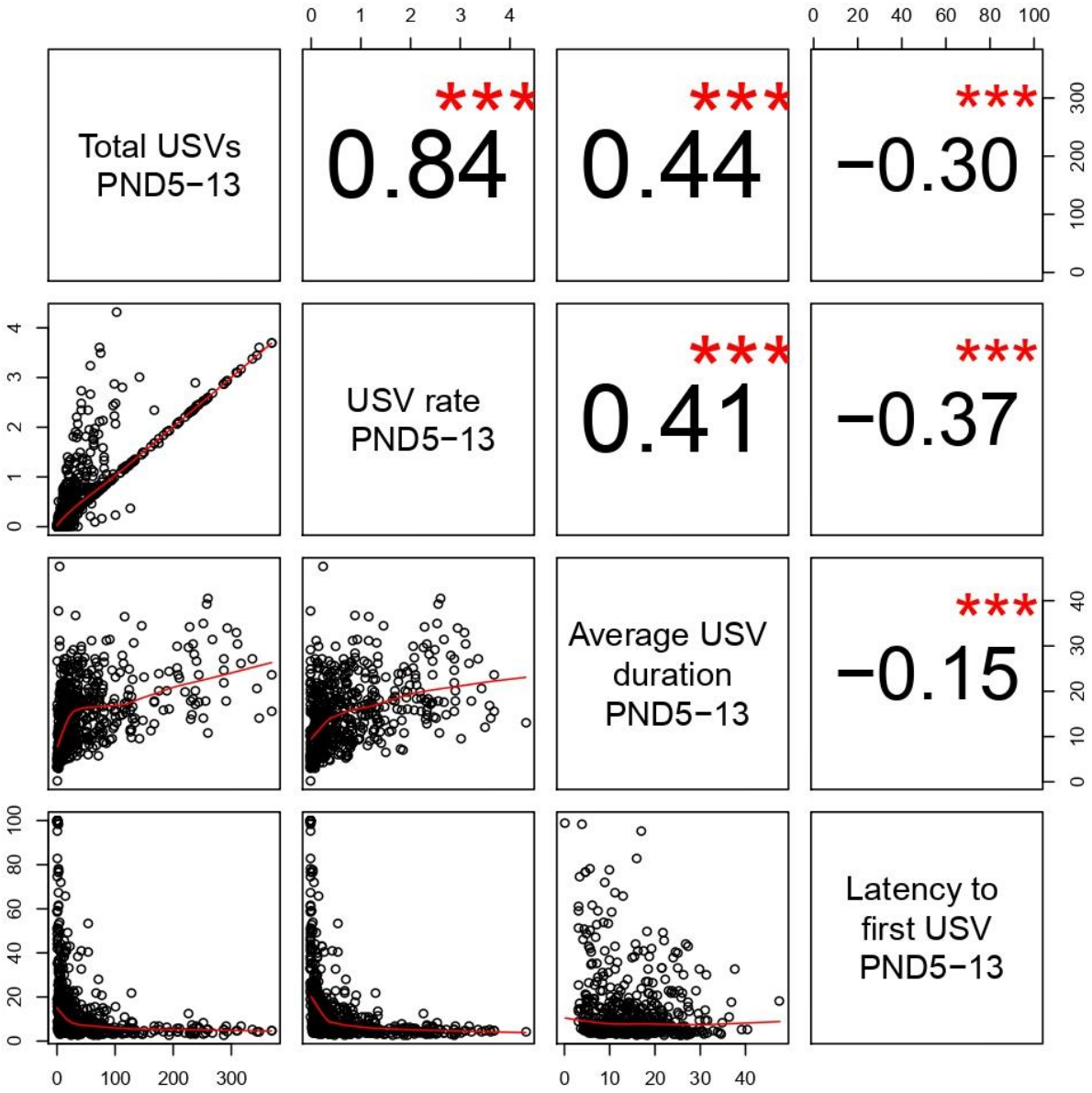
Supplementary Table 1. Table including pups that did not vocalize.

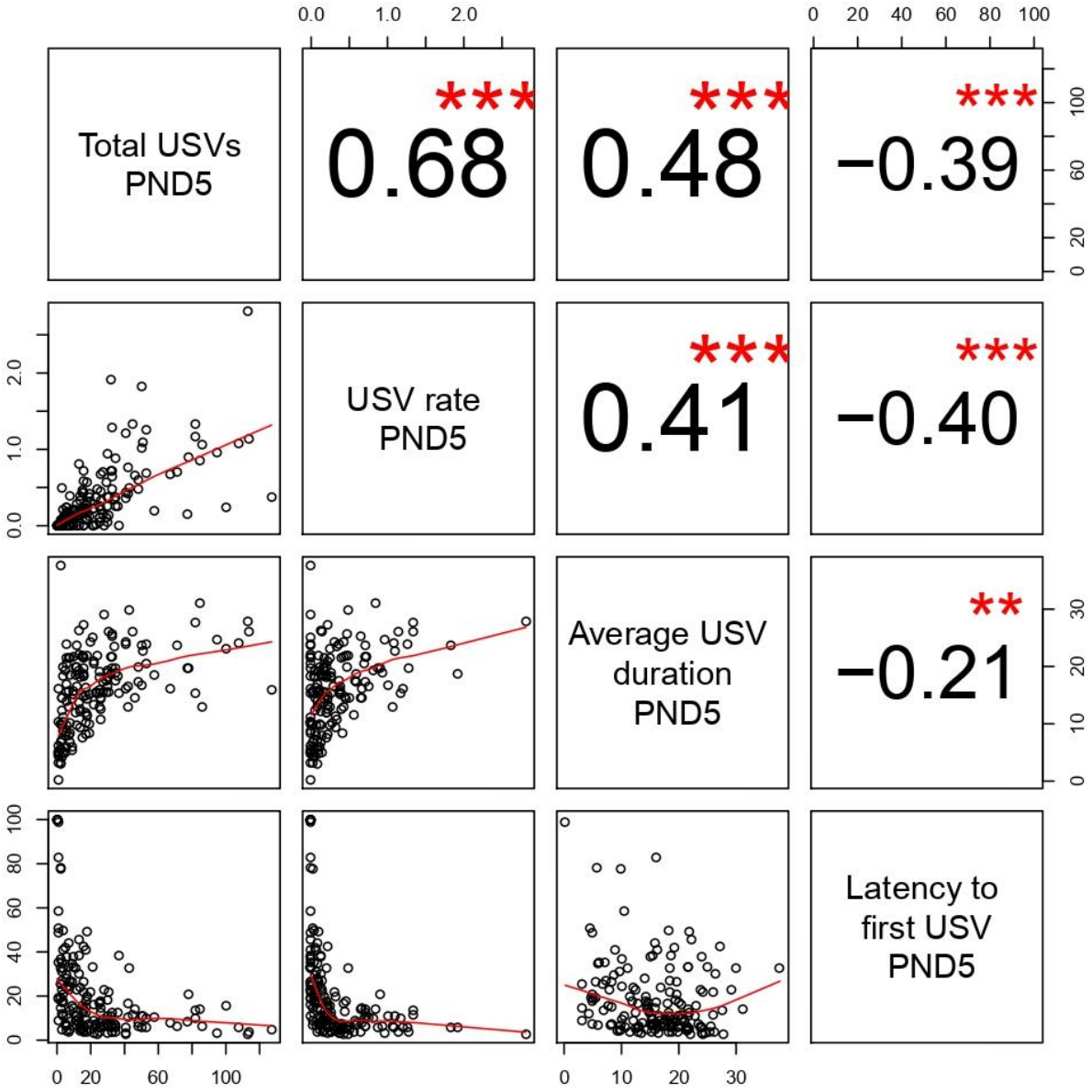
	SEQUENCE	RETRIEVED	NOT RETRIEVED
PND5		31	2
	Pup 1	*1*	*1*
	Pup 2	*4*	*0*
	Pup 3	*6*	*0*
	Pup 4	*2*	*1*
	Pup 5	*8*	*0*
	Pup 6	*10*	*0*
PND7		4	0
	Pup 1	*1*	*0*
	Pup 2	*1*	*0*
	Pup 3	*1*	*0*
	Pup 4	*1*	*0*
PND9		4	0
	Pup 1	*0*	*0*
	Pup 2	*1*	*0*
	Pup 3	*1*	*0*
	Pup 4	2	*0*
PND11		13	1
	Pup 1	*5*	*0*

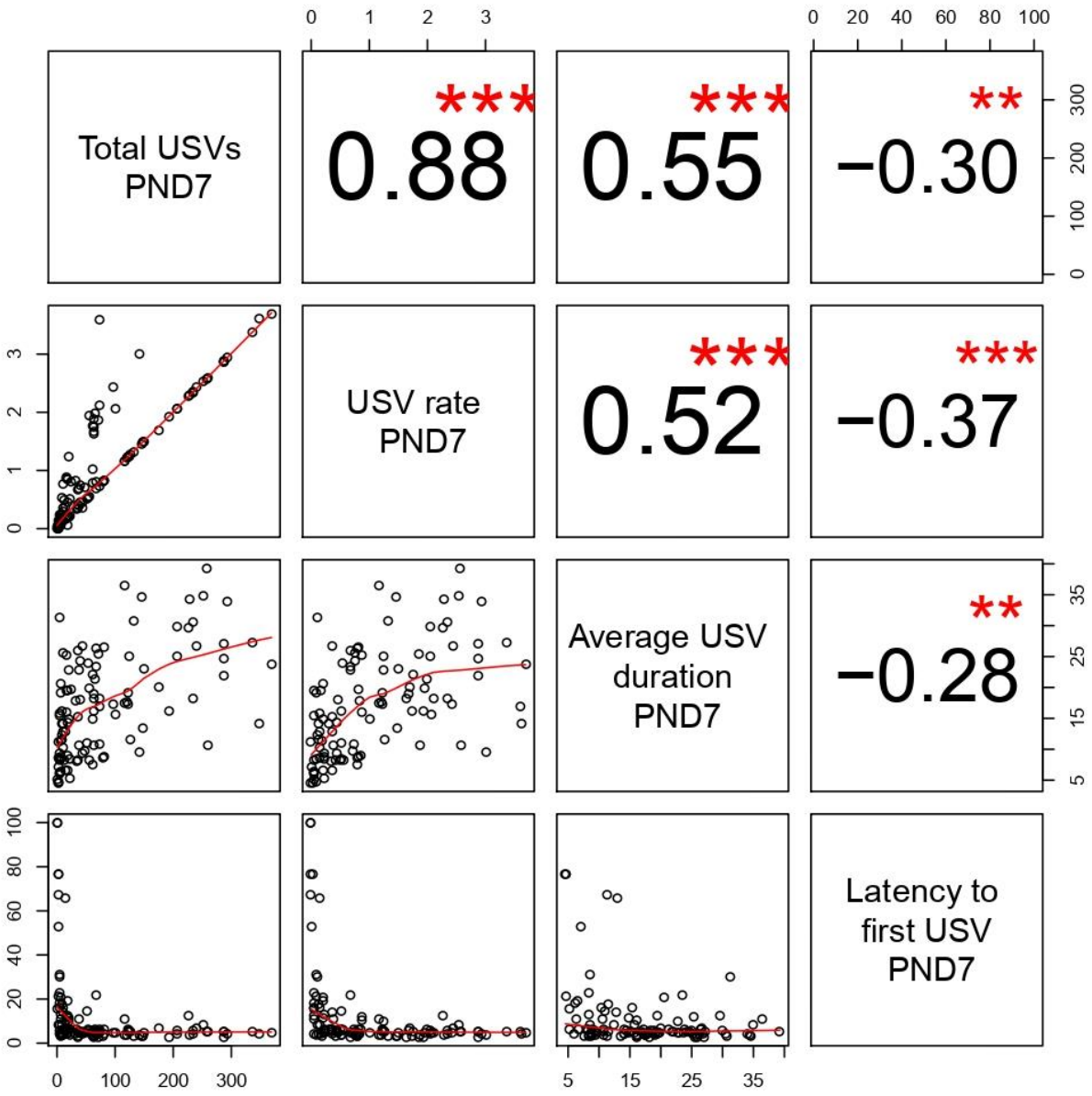
	Pup 2	*2*	*1*
	Pup 3	*4*	*0*
	Pup 4	2	*0*
PND13	12	0	
	Pup 1	*2*	*0*
	Pup 2	*3*	*1*
	Pup 3	*2*	*0*
	Pup 4	5	*0*

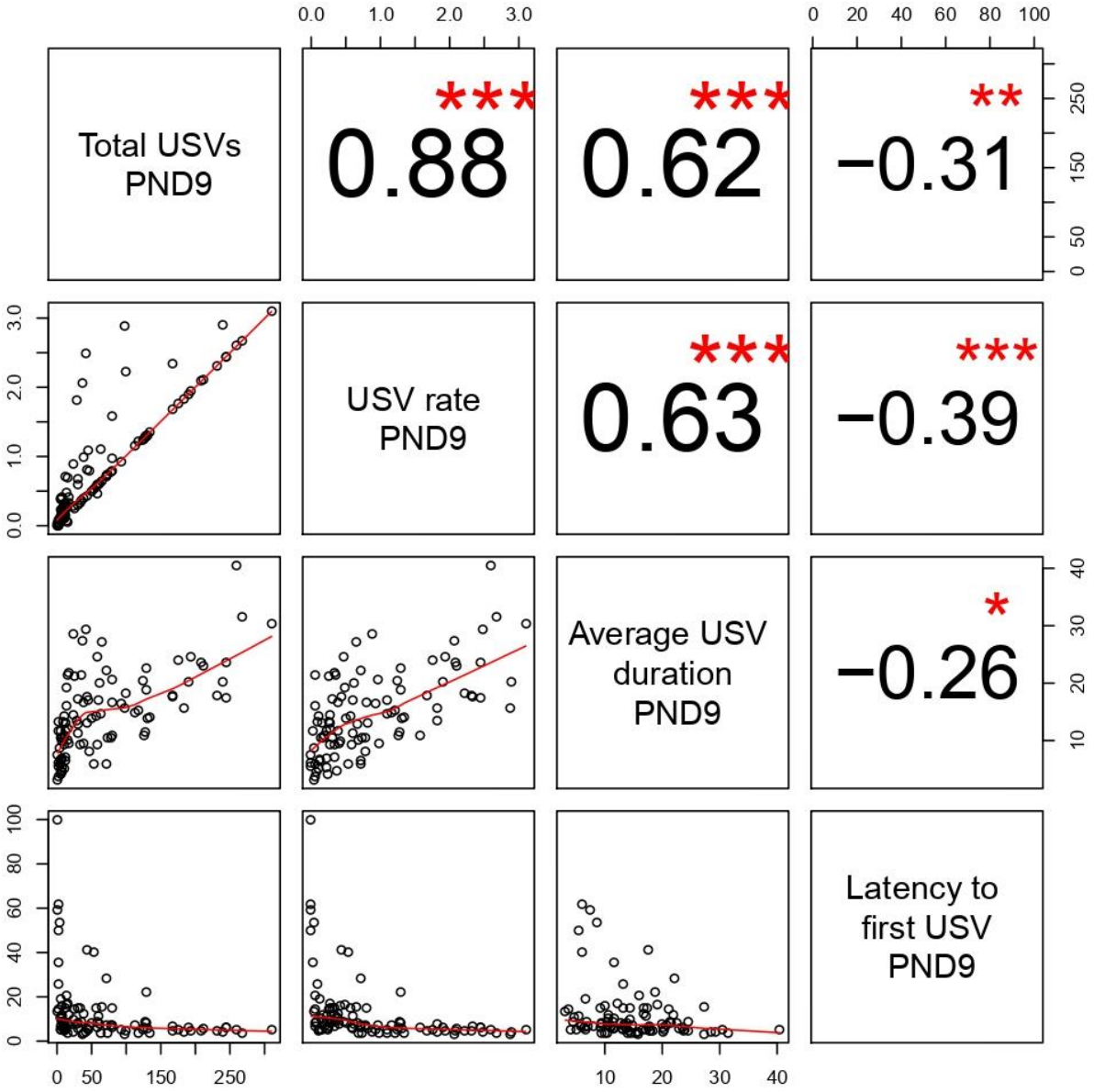
2.2 Supplementary Figures

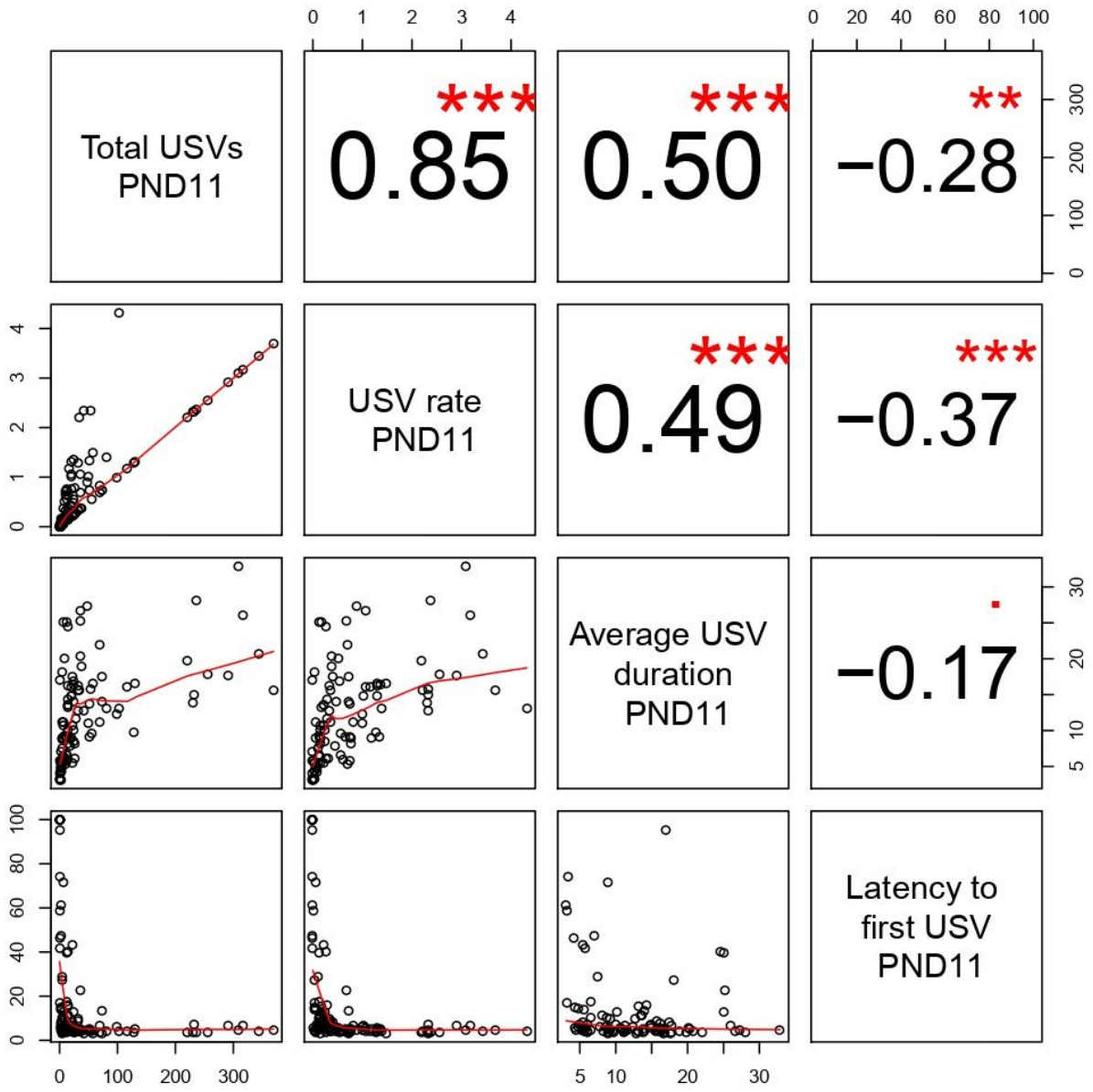
Supplementary Figure 1. Pairwise correlational plots of total amount of emitted USVs (number USVs), USV rate (USVs/s), average USV duration (s) and latency to first USV (s). Pairwise correlation plots are first given for all test days combined (PND5-13) and then separately for PND5, 7, 9, 11 and 13. Below diagonal the pairwise correlation plot is shown. Above the diagonal the estimated Pearson correlation coefficient is given with significance value. (°p<0.10; *p<0.05; **p<0.01; ***p<0.001)

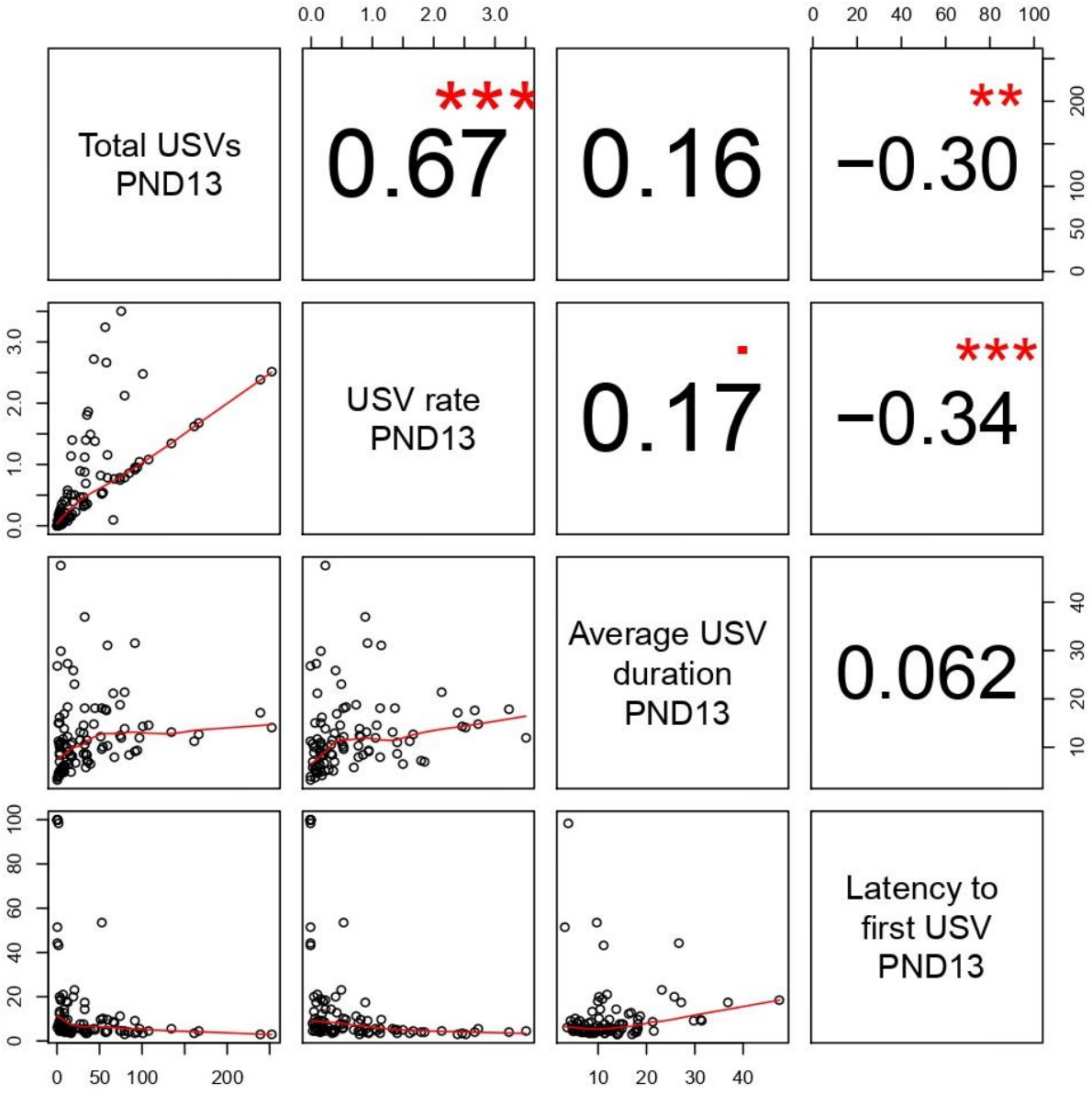



Total USVs PND5
0.68
***
0.48
***
−0.39
***
USV rate PND5
0.41
***
−0.40
***
Average USV duration PND5
−0.21
**
Latency to first USV PND5
0.0
1.0
2.0
0
20
40
60
80
100
0
10
20
30

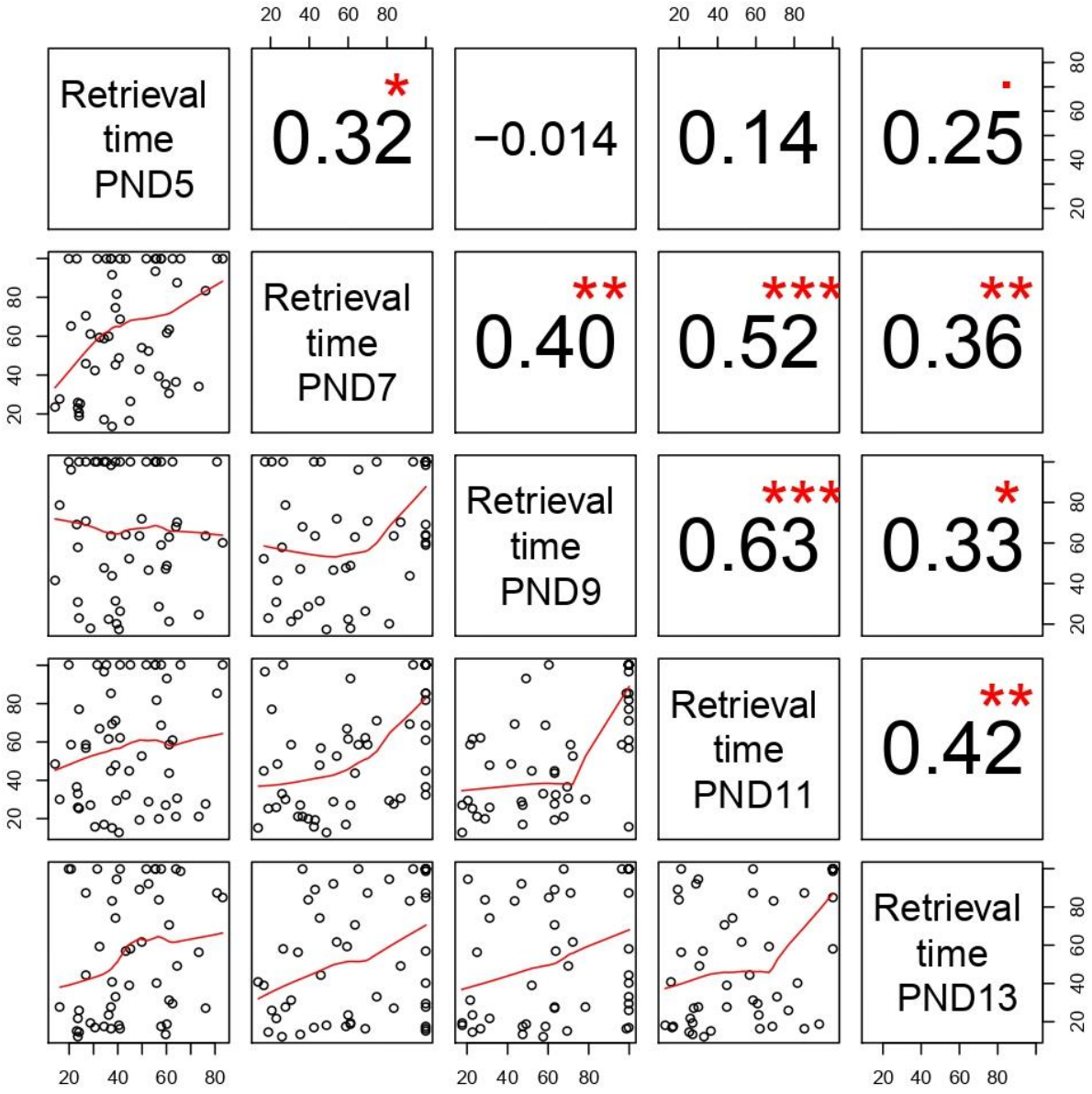

Total USVs PND7
0.88
***
0.55
***
−0.30
**
USV rate PND7
0.52
***
−0.37
***
Average USV duration PND7
−0.28
**
Latency to first USV PND7
0
1
2
3
0
20
40
60
80
100
0
100
200
300
5
15
25
35


Total USVs PND9
0.88
***
0.62
***
−0.31
**
USV rate PND9
0.63
***
−0.39
***
Average USV duration PND9
−0.26
*
Latency to first USV PND9
0.0
1.0
2.0
3.0
0
20
40
60
80
100
0
50
150
250
10
20
30
40

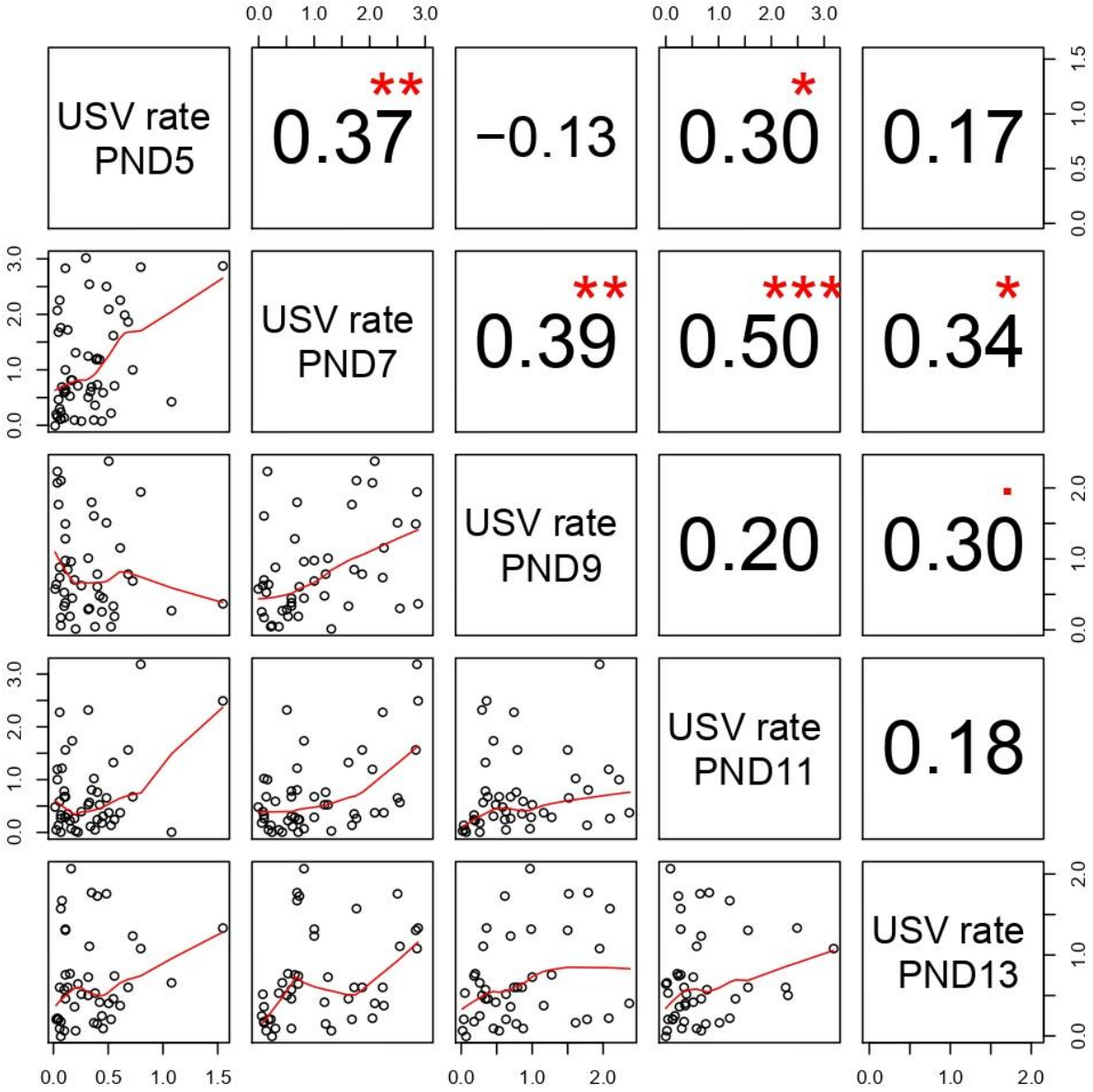

Total USVs PND11
0.85
***
0.50
***
−0.28
**
USV rate PND11
0.49
***
−0.37
***
Average USV duration PND11
−0.17
.
Latency to first USV PND11
0 1 2 3 4
0 20 40 60 80 100
0 100 200 300
0 1 2 3 4
0 20 40 60 80 100
0 100 200 300
5 10 20 30
5 10 20 30


Total USVs PND13
0.67
***
0.16
−0.30
**
USV rate PND13
0.17
.
−0.34
***
Average USV duration PND13
0.062
Latency to first USV PND13
0.0
1.0
2.0
3.0
0
20
40
60
80
100
0
50
100
200
10
20
30
40

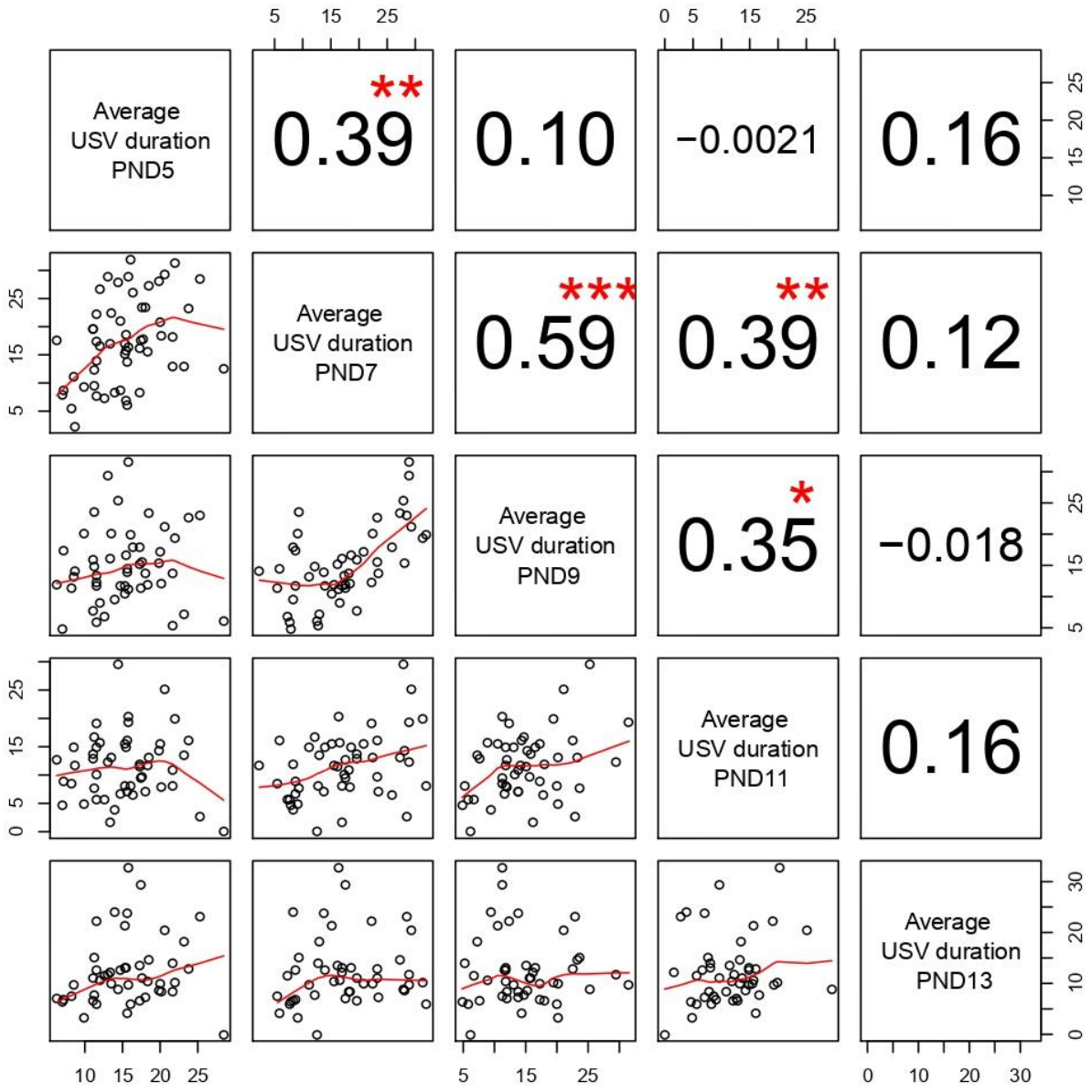
Supplementary Figure 2. Repeatability of maternal retrieval time represented as a pairwise correlational plot of retrieval time (s) over PND5, 7, 9, 11 and 13. Below diagonal the pairwise correlation plot is shown. Above the diagonal the estimated Pearson correlation coefficient is given with significance value. (°p<0.10; *p<0.05; **p<0.01; ***p<0.001)



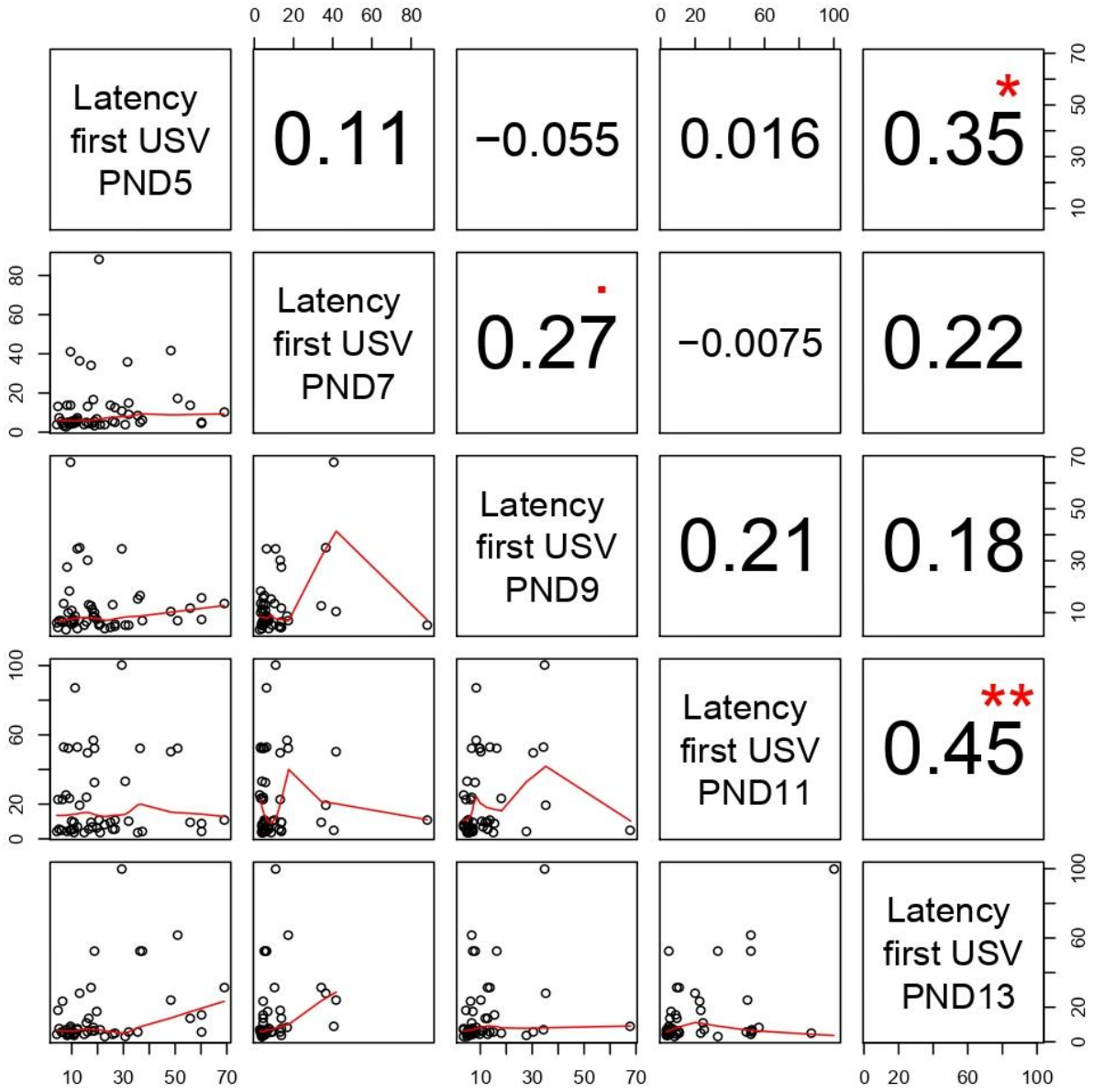
Supplementary Figure 3. Repeatability of USV rate represented as a pairwise correlational plot of USV rate (USVs/s) over PND5, 7, 9, 11 and 13. Below diagonal the pairwise correlation plot is shown. Above the diagonal the estimated Pearson correlation coefficient is given with significance value. (°p<0.10; *p<0.05; **p<0.01; ***p<0.001)



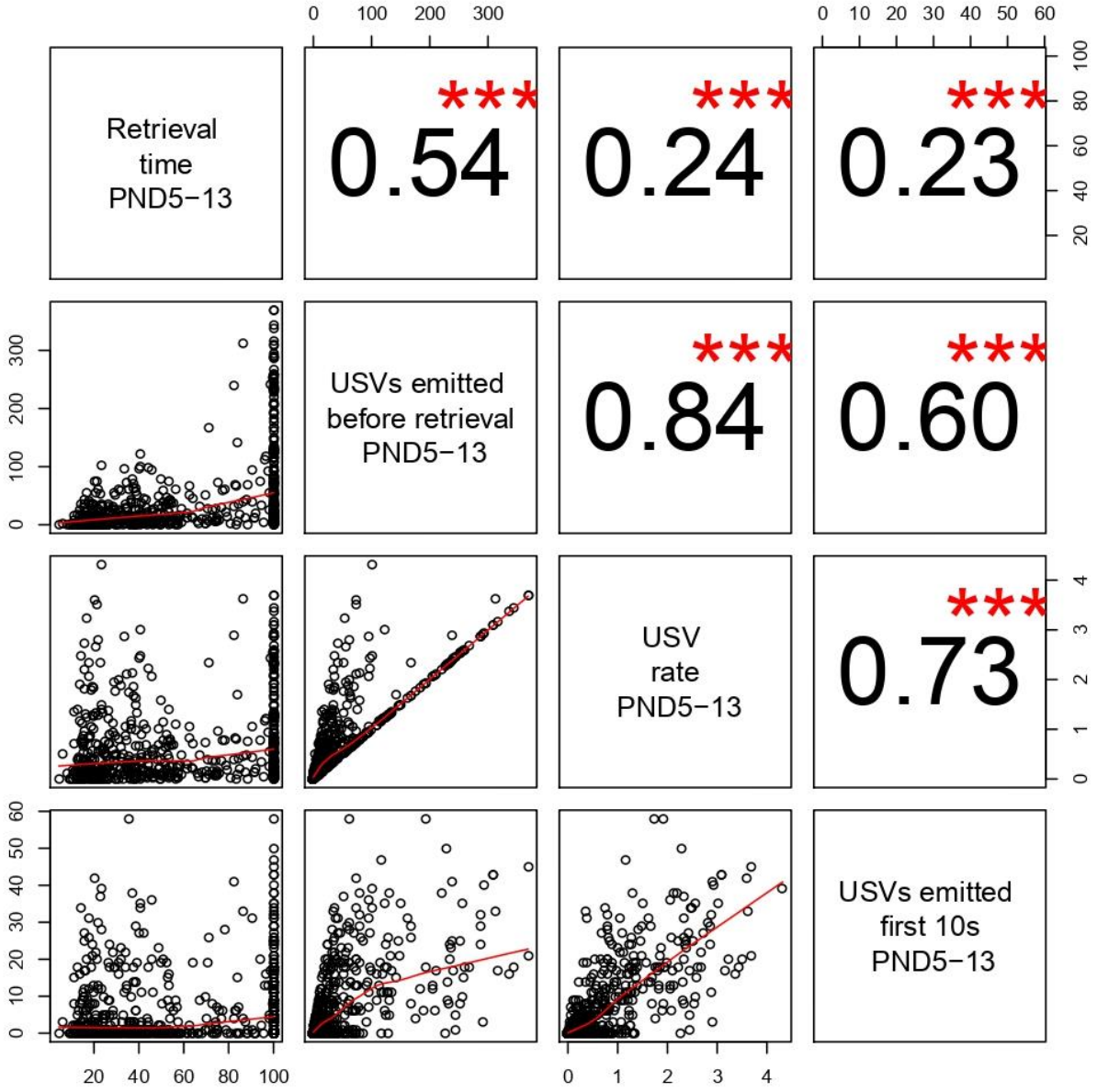
Supplementary Figure 4. Repeatability of average USV duration represented as a pairwise correlational plot of average USV duration (s) over PND5, 7, 9, 11 and 13. Below diagonal the pairwise correlation plot is shown. Above the diagonal the estimated Pearson correlation coefficient is given with significance value. (°p<0.10; *p<0.05; **p<0.01; ***p<0.001)

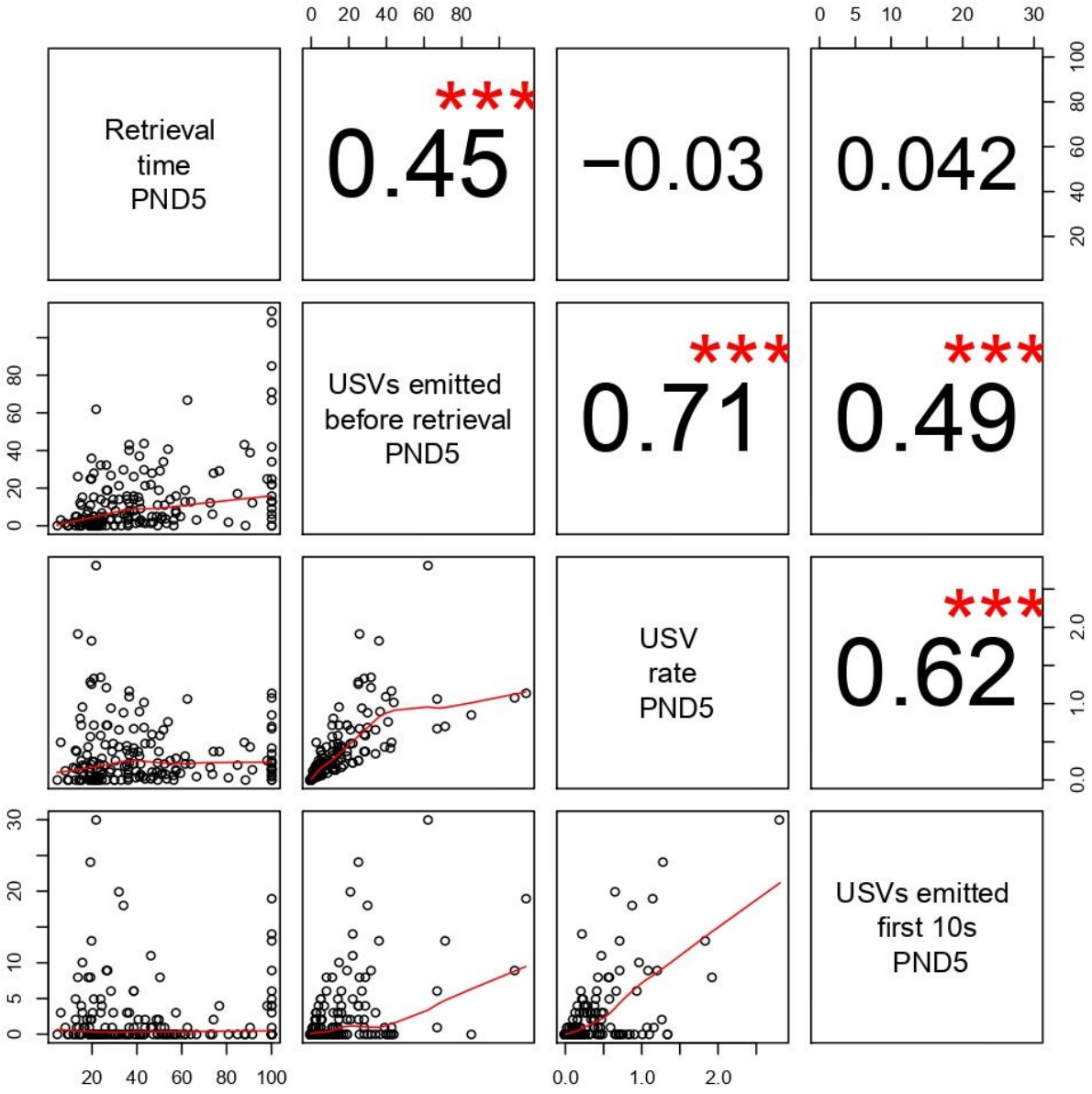


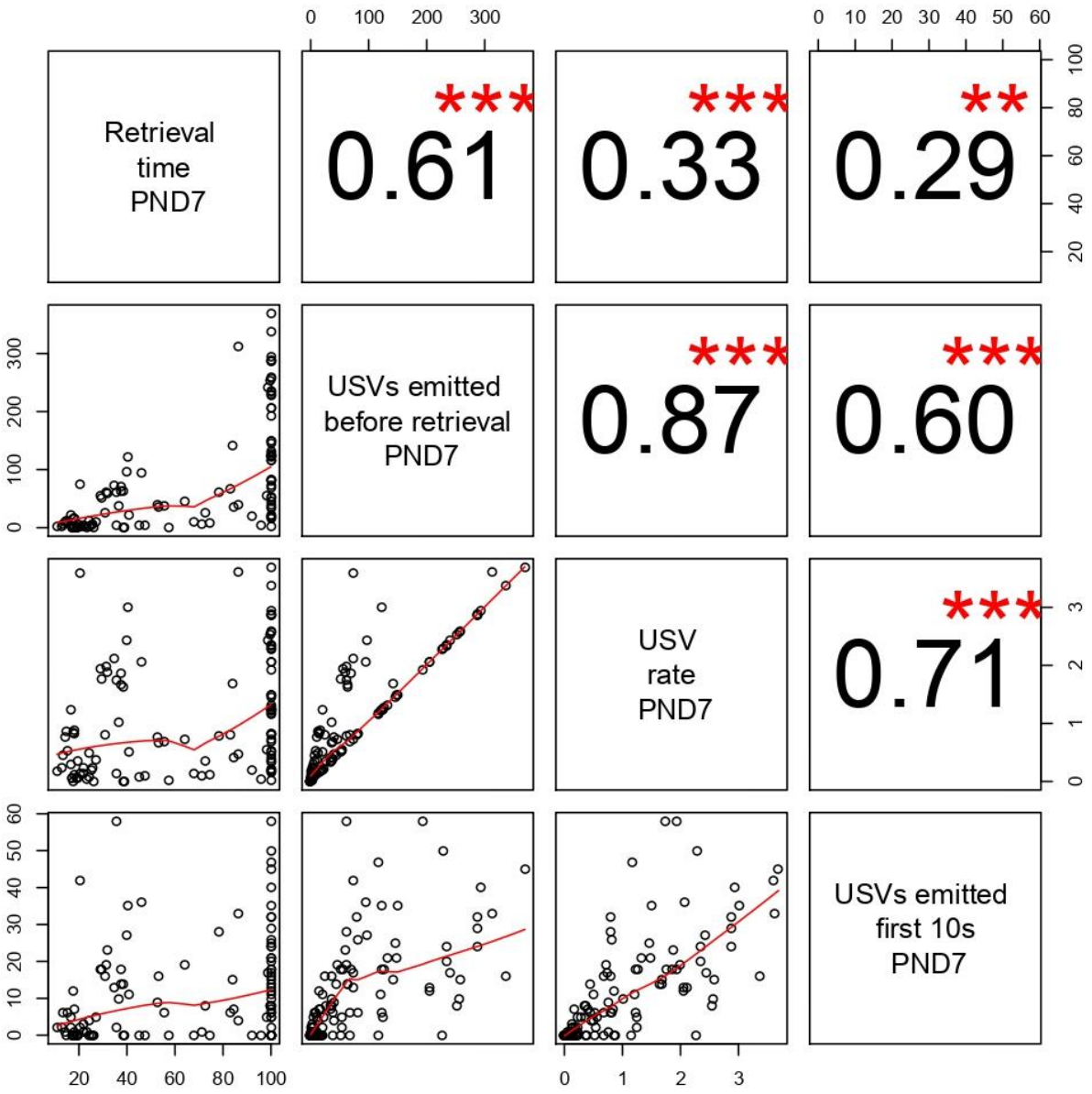
Supplementary Figure 5. Repeatability of latency to first USV represented as a pairwise correlational plot of latency to first USV (s) over PND5, 7, 9, 11 and 13. Below diagonal the pairwise correlation plot is shown. Above the diagonal the estimated Pearson correlation coefficient is given with significance value. (°p<0.10; *p<0.05; **p<0.01; ***p<0.001)

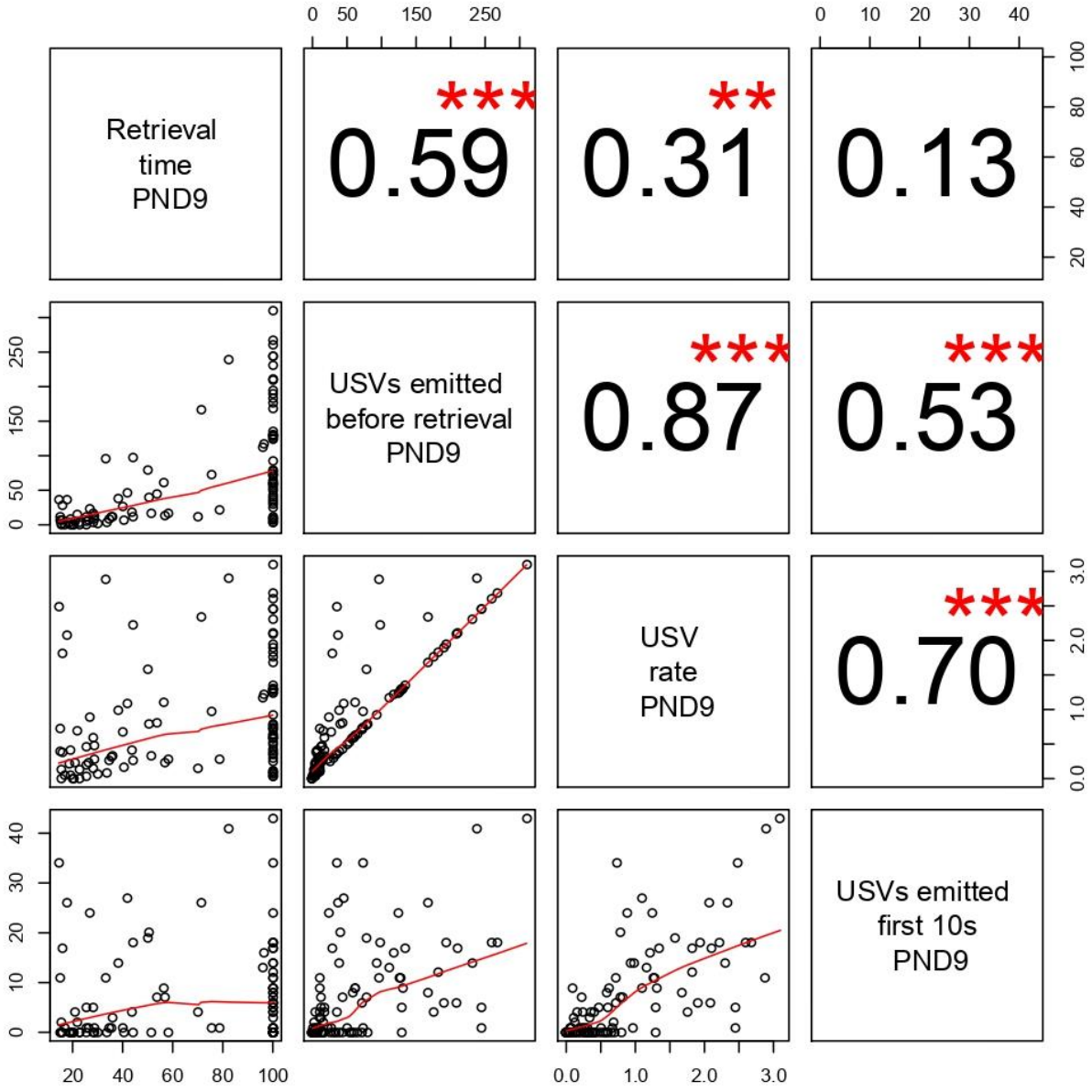


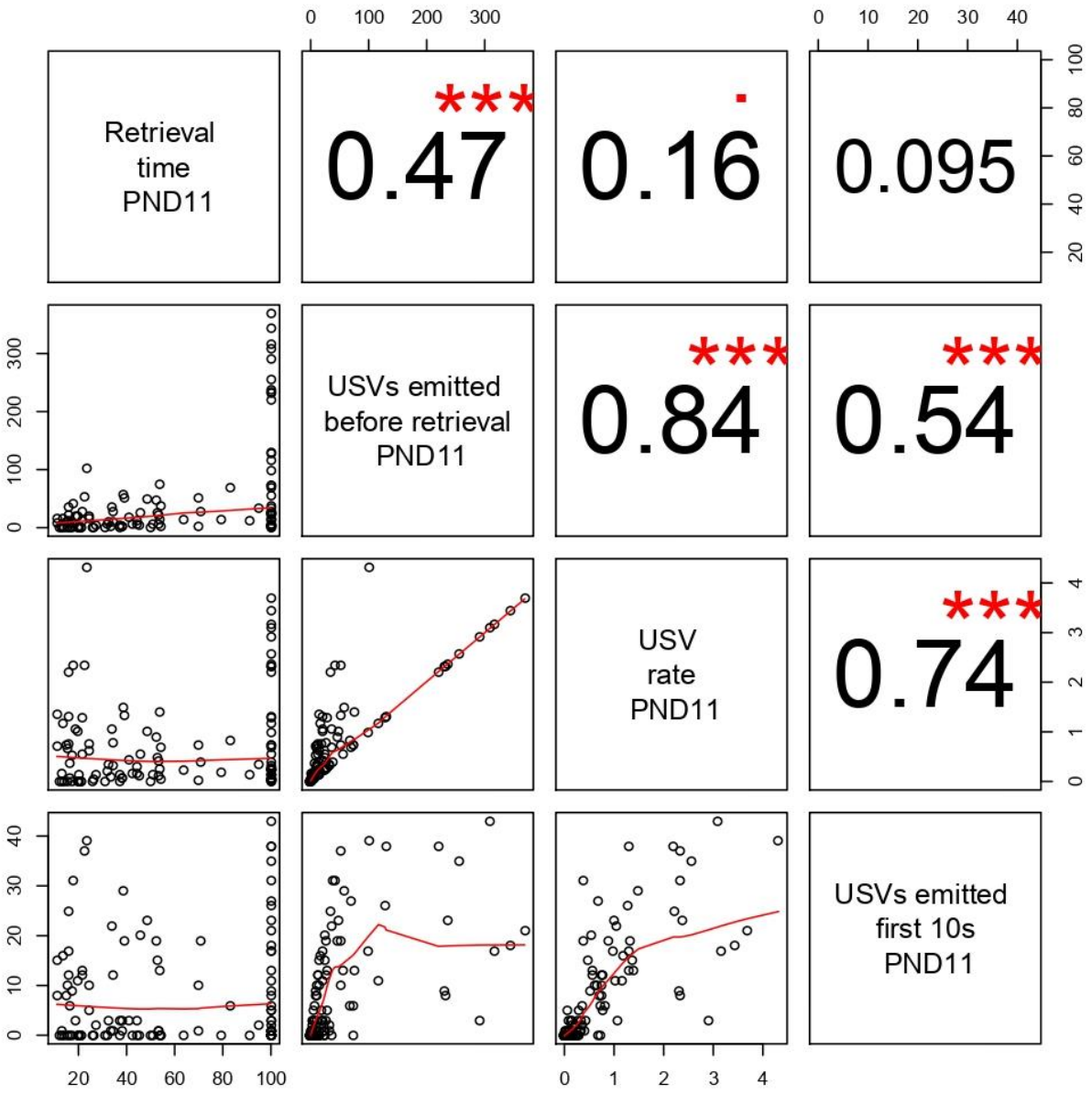
Supplementary Figure 6. Pairwise correlational plots of retrieval time (s), USVs emitted before retrieval (number USVs), USV rate (USVs/s) and USVs emitted in the first 10 seconds of PRT trial (number USVs). Pairwise correlation plots are first given for all test days combined (PND5-13) and then separately for PND5, 7, 9, 11 and 13. Below diagonal the pairwise correlation plot is shown. Above the diagonal the estimated Pearson correlation coefficient is given with significance value. (°p<0.10; *p<0.05; **p<0.01; ***p<0.001)

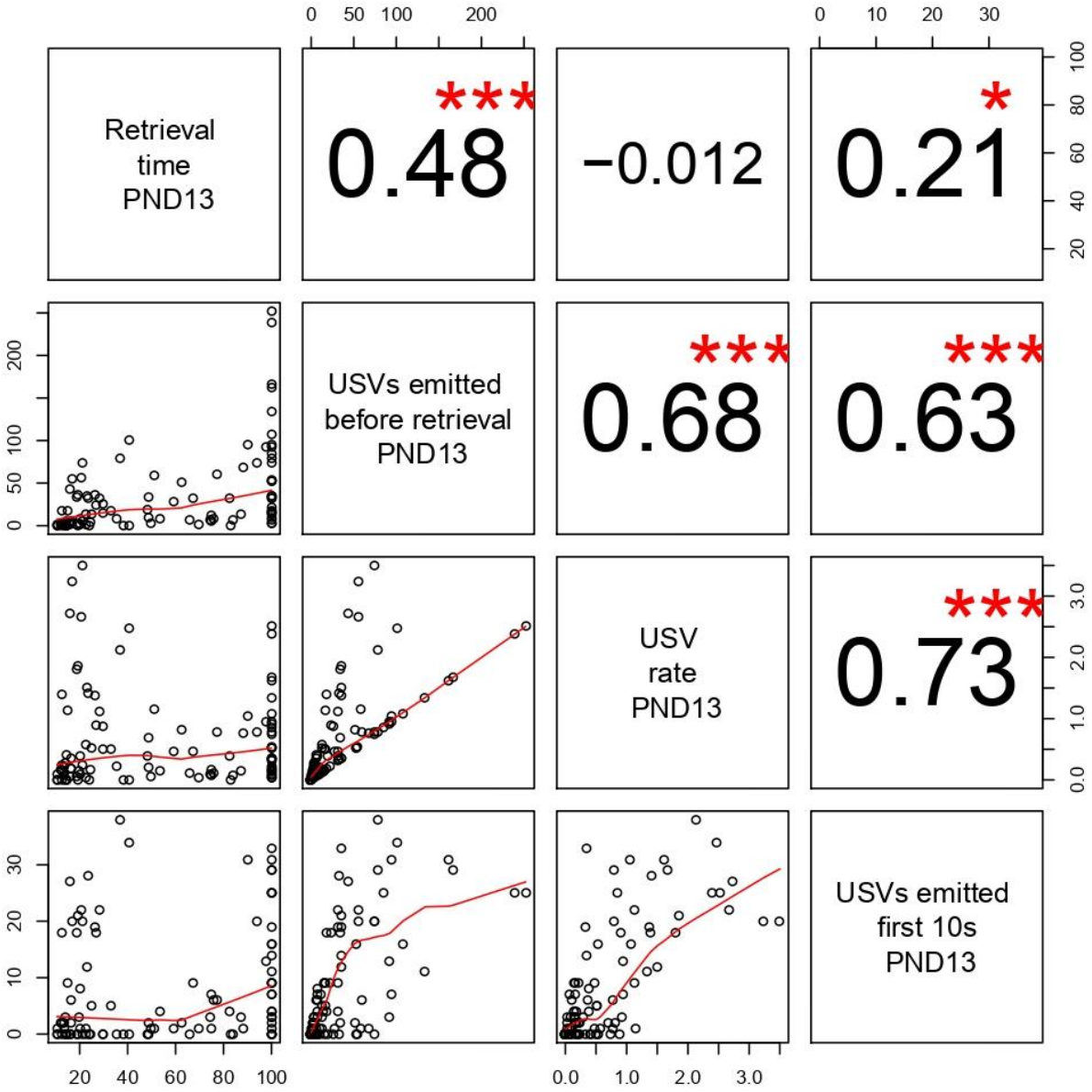



Retrieval time PND5
0.45
***
−0.03
0.042
USVs emitted before retrieval PND5
0.71
***
0.49
***
USV rate PND5
0.62
***
USVs emitted first 10s PND5
0 20 40 60 80
0 5 10 20 30
0 20 40 60 80 100
0.0 1.0 2.0

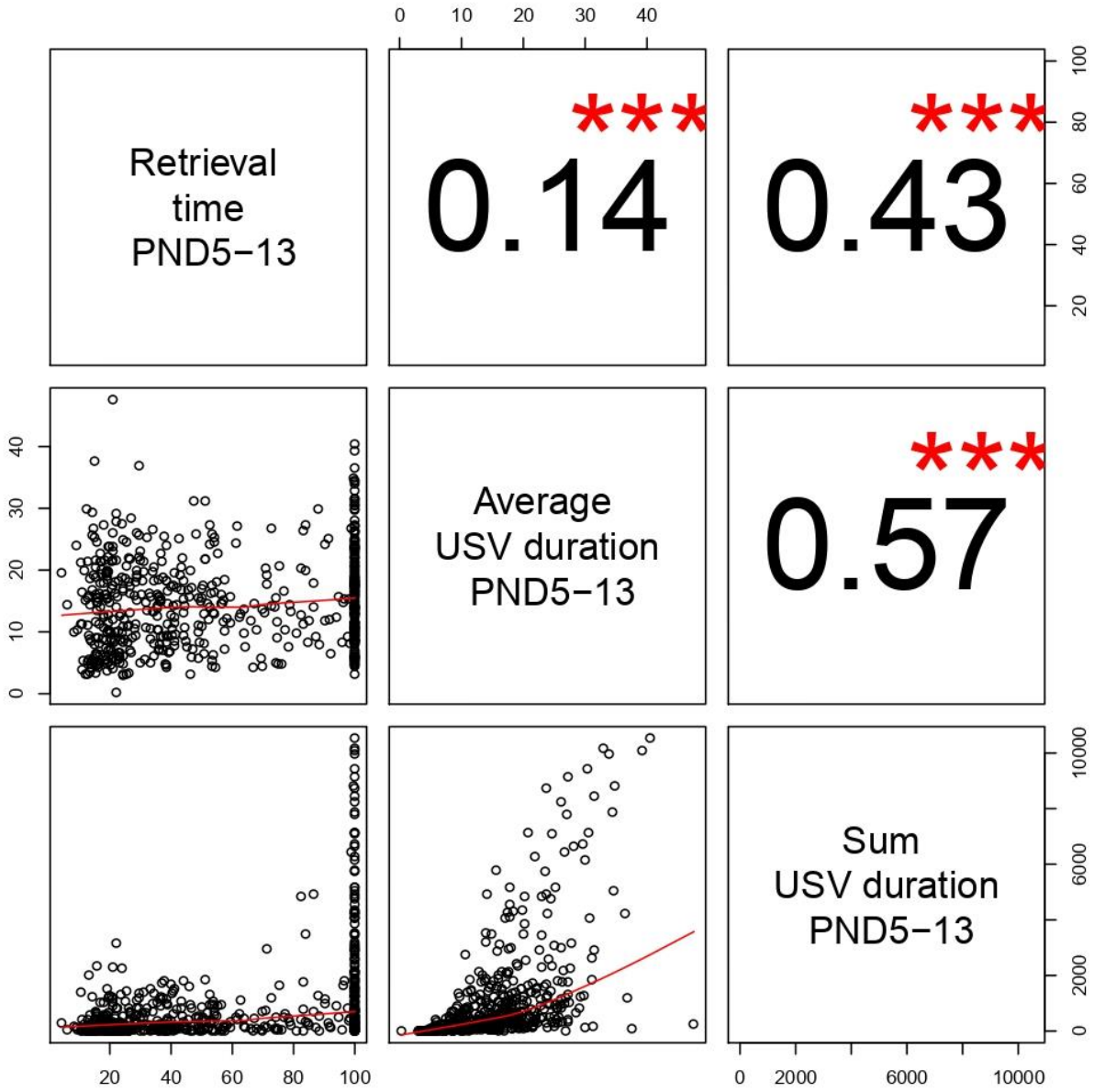

Retrieval time PND7
0.61
***
0.33
***
0.29
**
USVs emitted before retrieval PND7
0.87
***
0.60
***
USV rate PND7
0.71
***
USVs emitted first 10s PND7
0
100
200
300
0
10
20
30
40
50
60
20
40
60
80
100
0
1
2
3

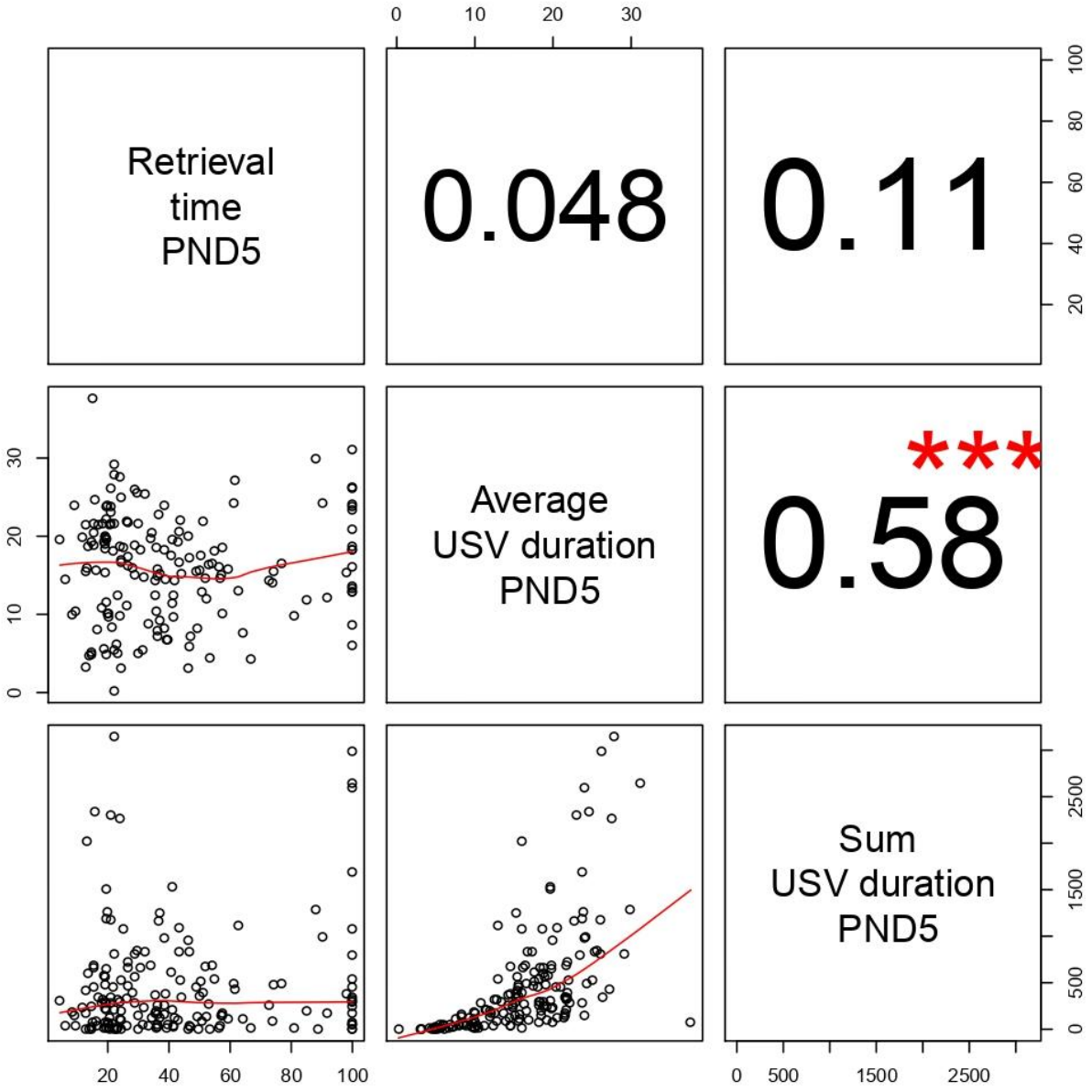

Retrieval time PND9
0.59
***
0.31
**
0.13
USVs emitted before retrieval PND9
0.87
***
0.53
***
USV rate PND9
0.70
***
USVs emitted first 10s PND9
0 50 150 250
0 10 20 30 40
20 40 60 80 100
0 50 150 250
0 10 20 30 40
0.0 1.0 2.0 3.0

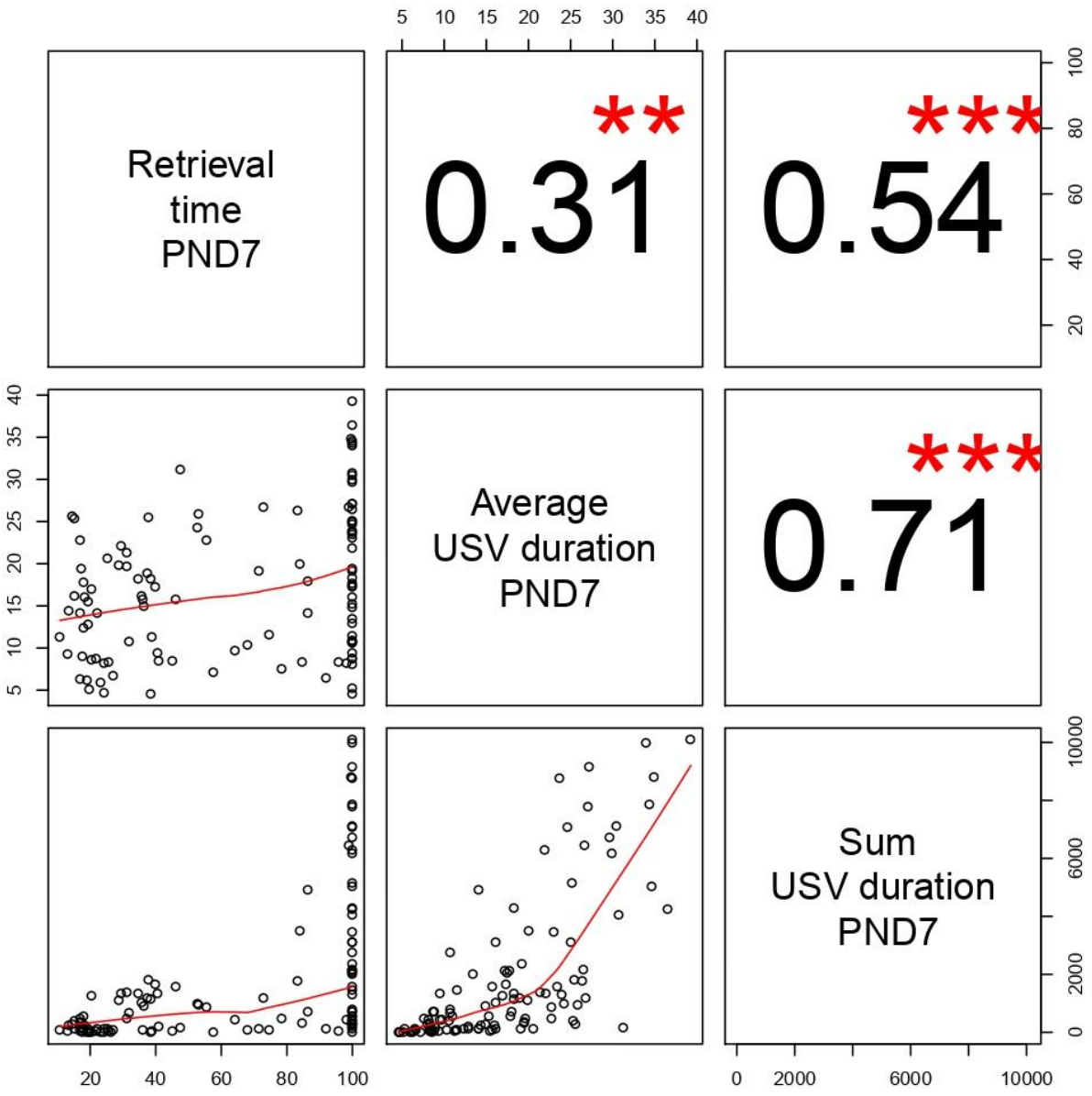

Retrieval time PND11
0.47
***
0.16
.
0.095
USVs emitted before retrieval PND11
0.84
***
0.54
***
USV rate PND11
0.74
***
USVs emitted first 10s PND11
0
100
200
300
0
10
20
30
40
0
100
200
300
0
20
40
60
80
100
0
1
2
3
4
0
10
20
30
40
20
40
60
80
100
0
1
2
3
4

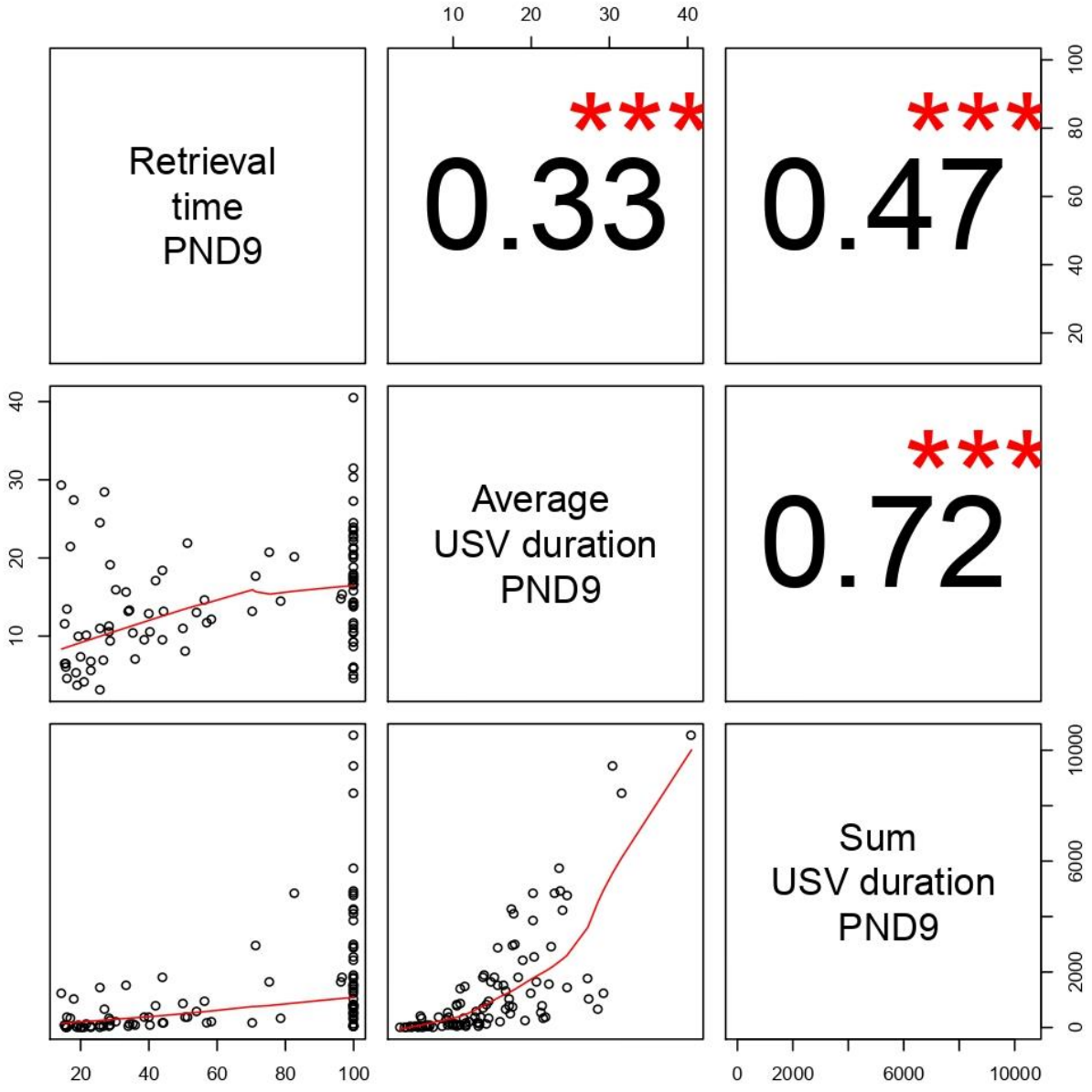

Retrieval time PND13
0.48
***
−0.012
0.21
*
USVs emitted before retrieval PND13
0.68
***
0.63
***
USV rate PND13
0.73
***
USVs emitted first 10s PND13
0 50 100 200
0 10 20 30
0 50 100 200
20 40 60 80 100
0.0 1.0 2.0 3.0
0 10 20 30
20 40 60 80 100
0.0 1.0 2.0 3.0

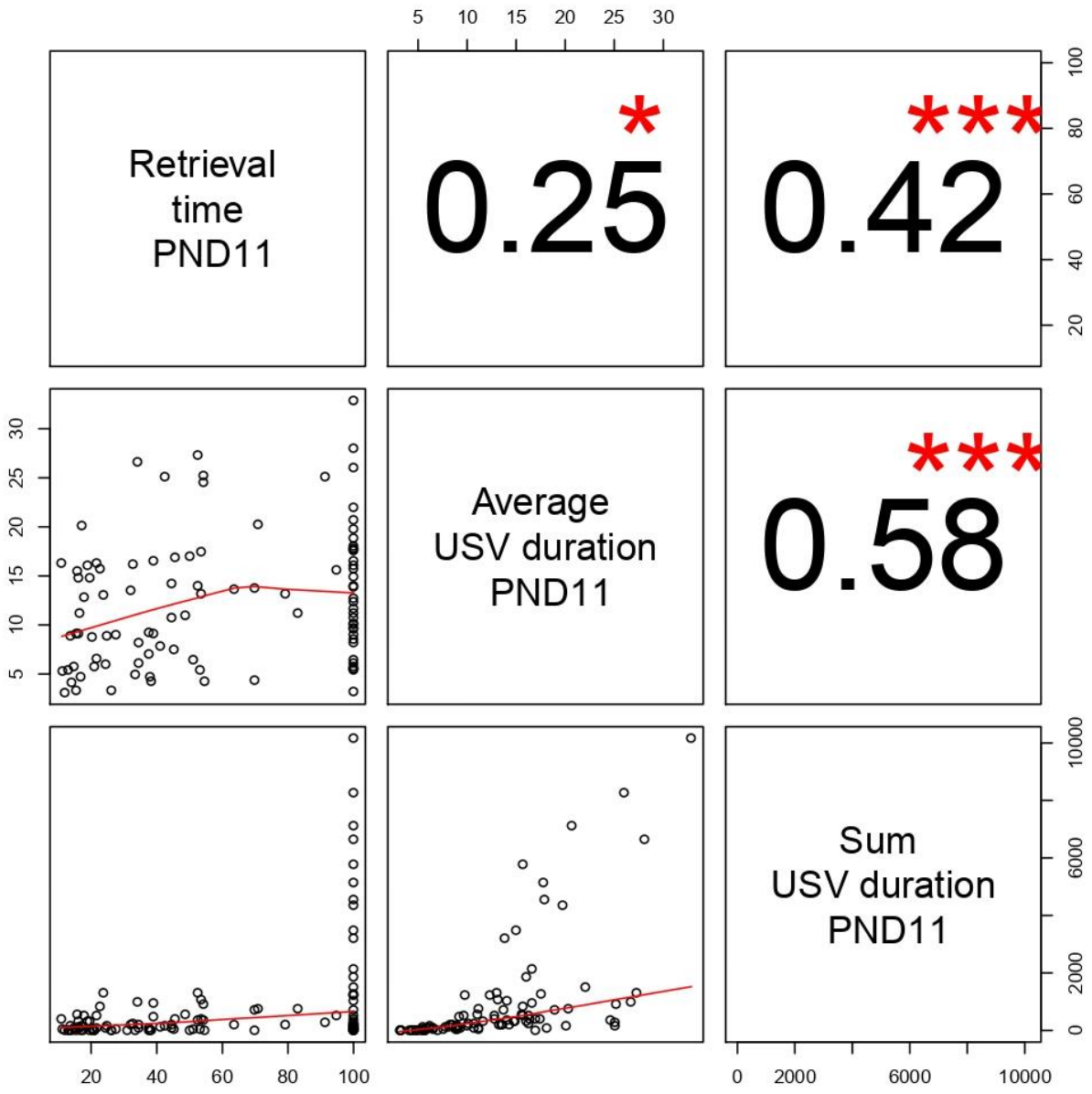
Supplementary Figure 7. Pairwise correlational plots of retrieval time (s), average USV duration (s) and sum of USV duration (s). Pairwise correlation plots are first given for all test days combined (PND5-13) and then separately for PND5, 7, 9, 11 and 13. Below diagonal the pairwise correlation plot is shown. Above the diagonal the estimated Pearson correlation coefficient is given with significance value. (°p<0.10; *p<0.05; **p<0.01; ***p<0.001)

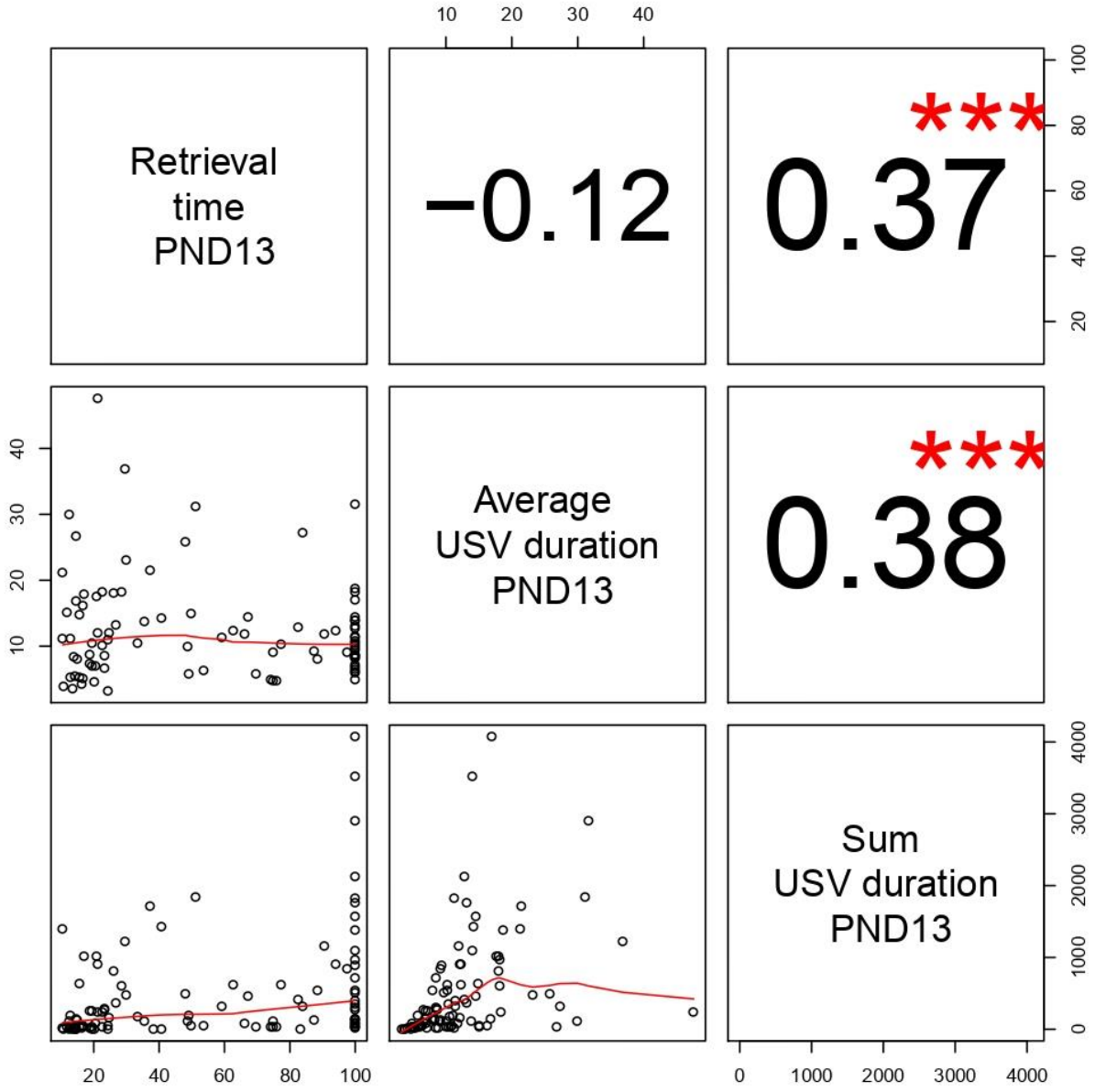



Retrieval time PND5
0.048
0.11
Average USV duration PND5
***
0.58
Sum USV duration PND5
0
10
20
30
20
40
60
80
100
0
500
1500
2500


Retrieval time PND7
0.31
**
0.54
***
Average USV duration PND7
0.71
***
Sum USV duration PND7
5 10 15 20 25 30 35 40
20 40 60 80 100
0 2000 6000 10000


Retrieval time PND9
0.33
***
0.47
***
Average USV duration PND9
0.72
***
Sum USV duration PND9
10
20
30
40
20
40
60
80
100
0
2000
6000
10000


Retrieval time PND11
0.25
*
0.42
***
Average USV duration PND11
0.58
***
Sum USV duration PND11
5 10 15 20 25 30
20 40 60 80 100
0 2000 6000 10000


Retrieval time PND13
−0.12
0.37
***
Average USV duration PND13
0.38
***
Sum USV duration PND13
10
20
30
40
20
40
60
80
100
0
1000
2000
3000
4000