Monitoring of movements

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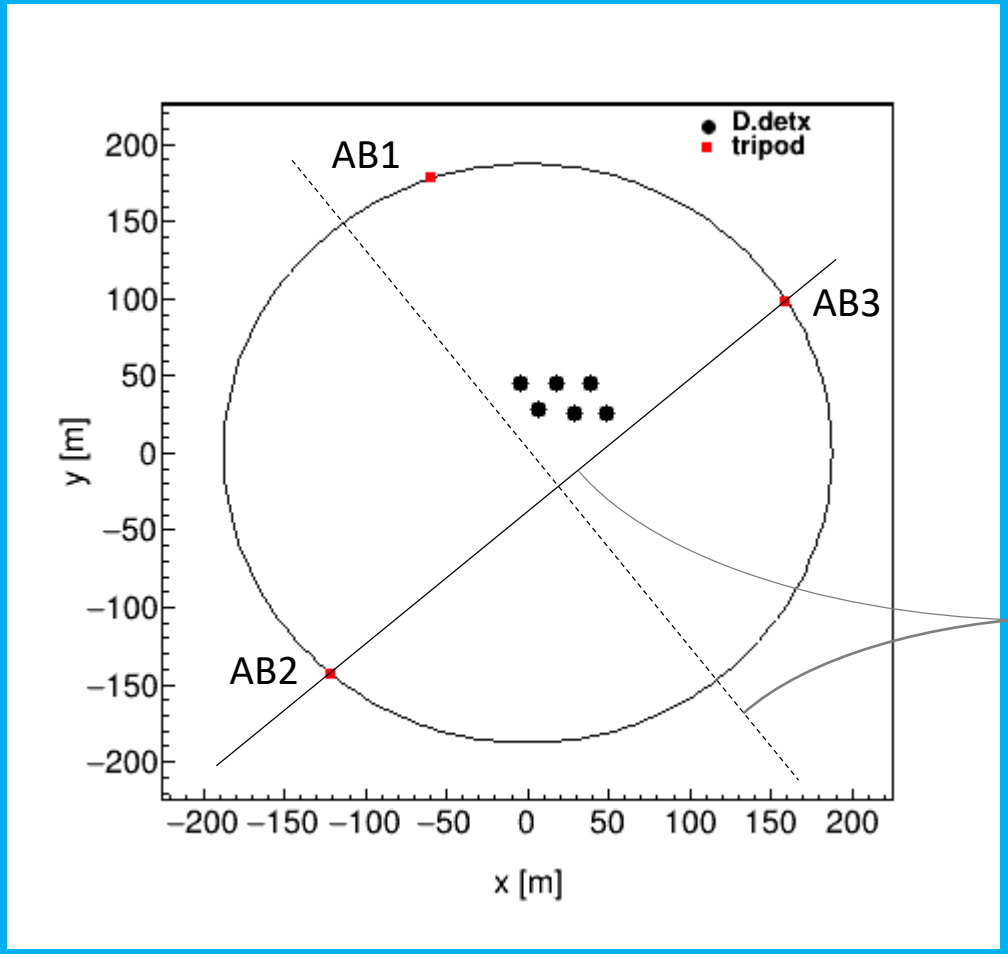
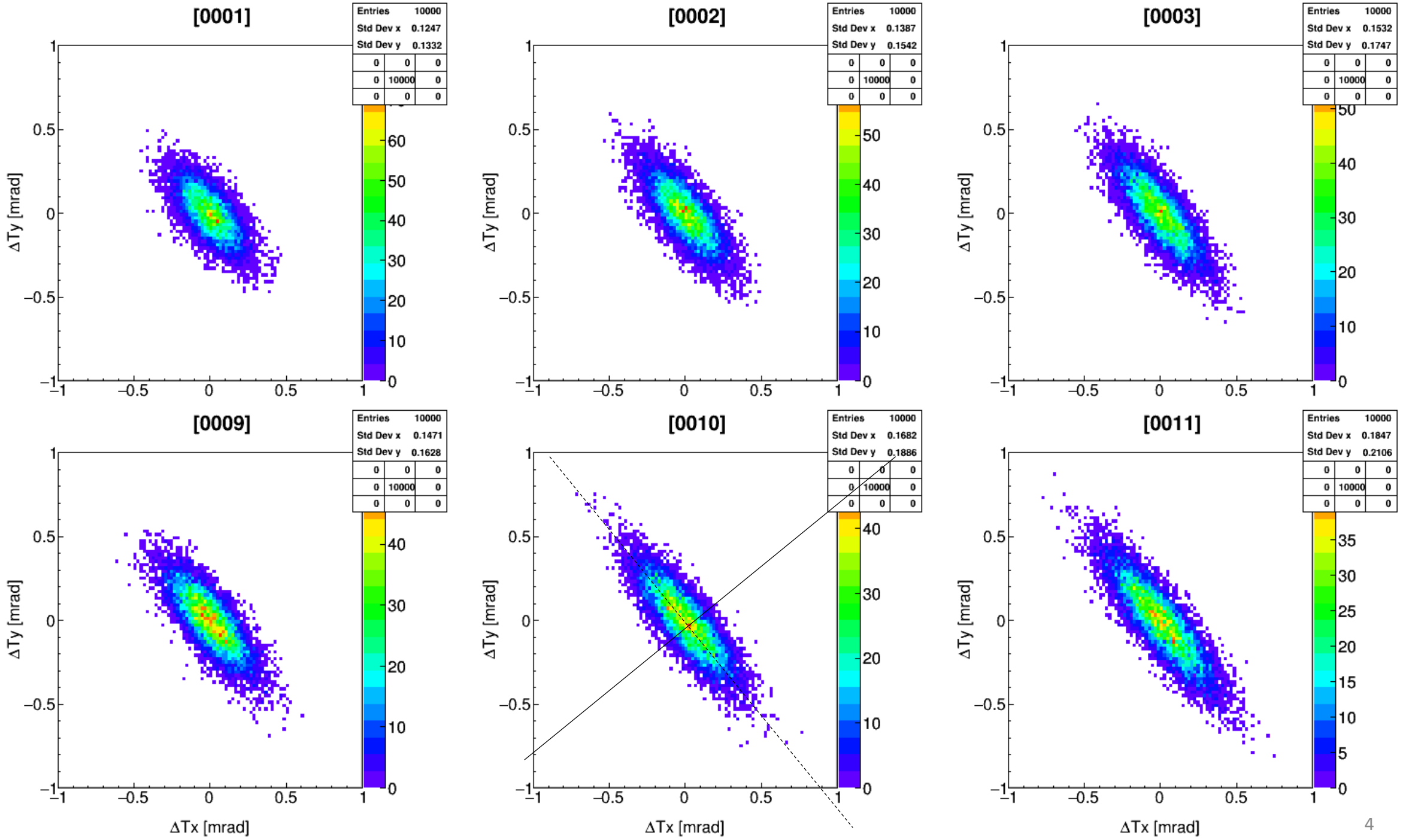
Simulation (I)

- Position resolution can be estimated using existing example
  - <Jpp>/examples/JAcoustics/JKatoomba[.sh] <detector file> <tripod file>
- Input data
  - time-of-arrival resolution $\sigma \equiv 50\ \mu s$
    - conform measured value, see presentation at Calibration meeting d.d. 30 July 2020
  - calibrated ORCA detector D_ORCA006 (serial number 49)
- Set-up
  - tripods AB1, AB2 and AB3 ping 1, 11 and 11 times per sequence, respectively

Set-up



next slide

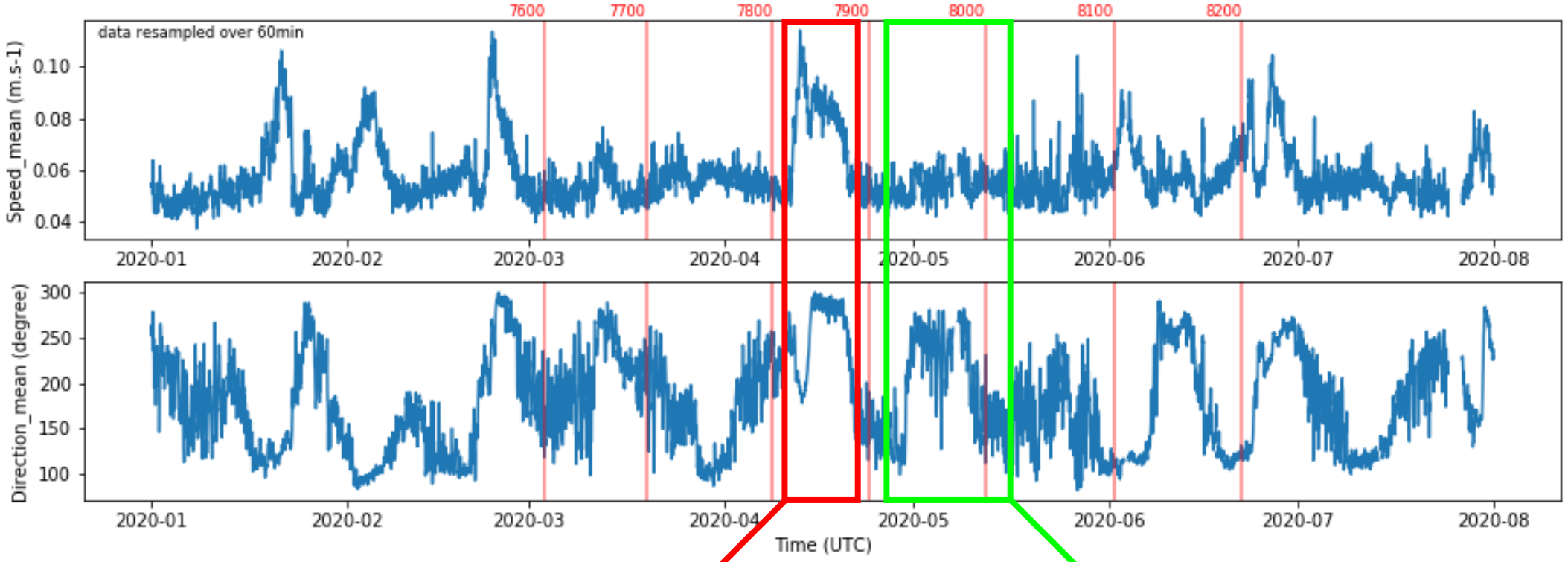

[0001]
Entries 10000
Std Dev x 0.1247
Std Dev y 0.1332
[0002]
Entries 10000
Std Dev x 0.1387
Std Dev y 0.1542
[0003]
Entries 10000
Std Dev x 0.1532
Std Dev y 0.1747
[0009]
Entries 10000
Std Dev x 0.1471
Std Dev y 0.1628
[0010]
Entries 10000
Std Dev x 0.1682
Std Dev y 0.1886
[0011]
Entries 10000
Std Dev x 0.1847
Std Dev y 0.2106
ΔTy [mrad]
ΔTx [mrad]

Measurements (I)

- Tilts of the strings are measured using standard procedure
  - JAcousticEventBuilder.sh
  - JKatoomba.sh
- Input data
  - detector file and tripod positions as obtained from scans
    - see presentation at Calibration meeting d.d. 30 July 2020
- Results can be monitored using example
  - <Jpp>/examples/JAcoustics/JNarrabri[.sh]
    - tilt speed $\equiv \frac{\text{difference between two tilts}}{\text{elapsed time}}$

Measurements (II)

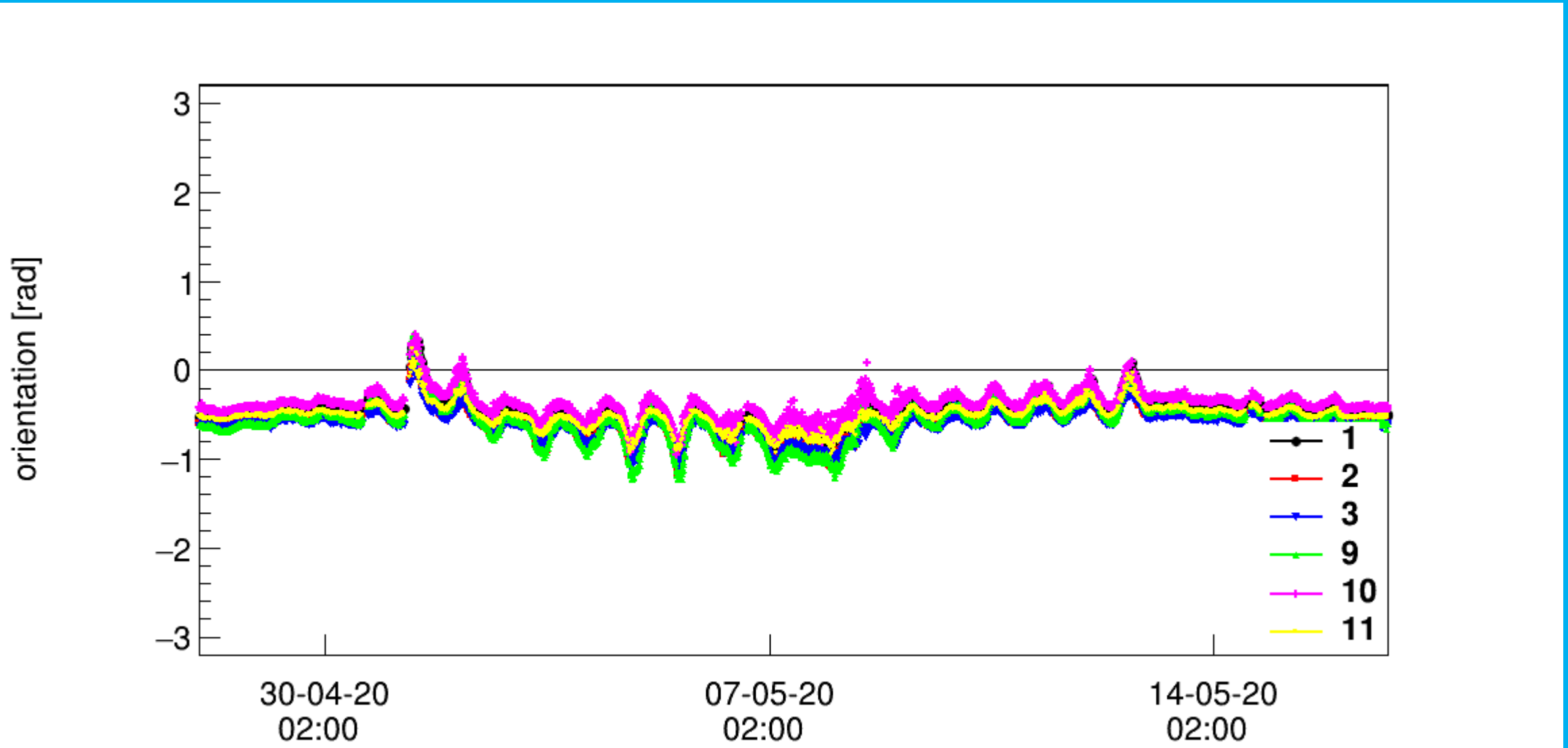
picture by Lilian

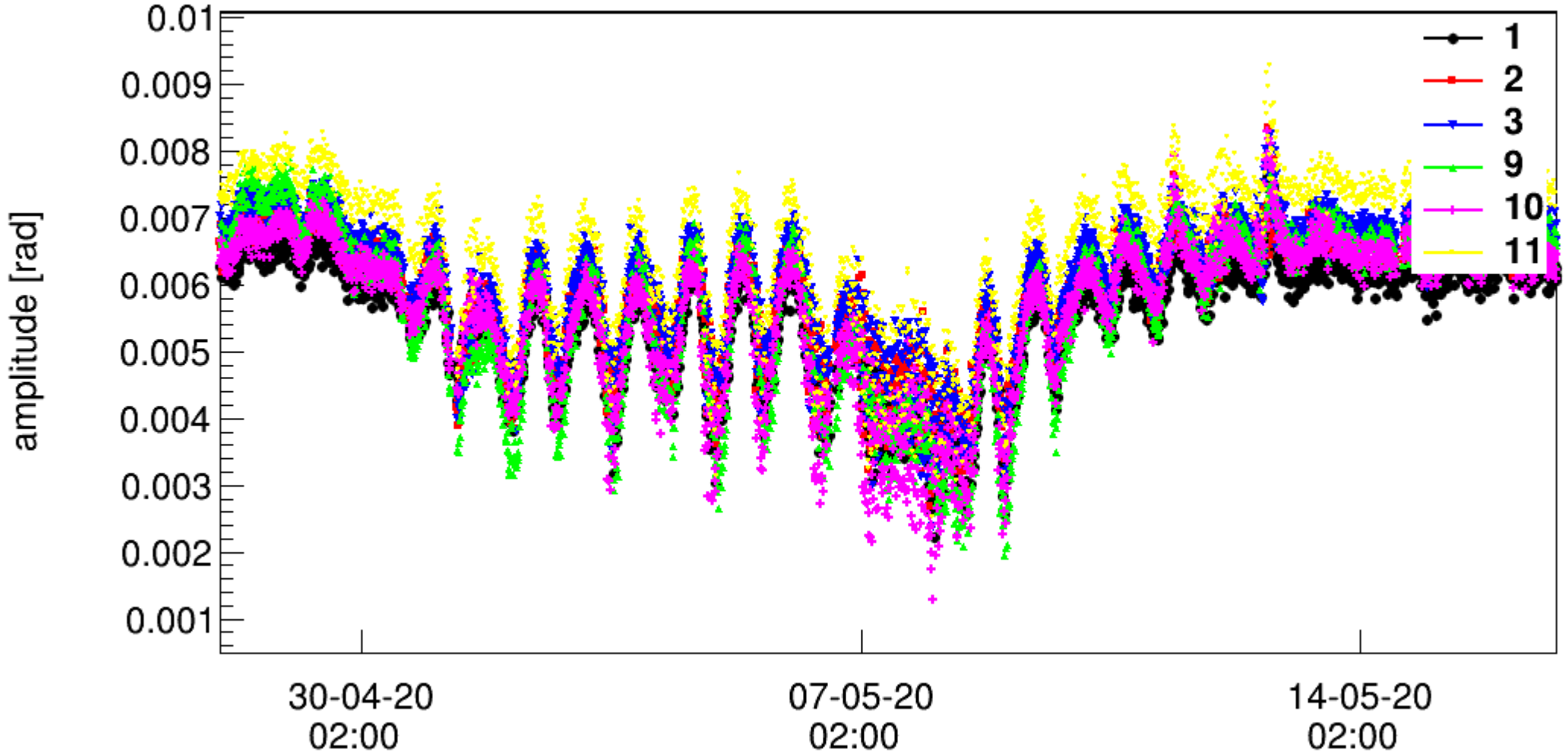


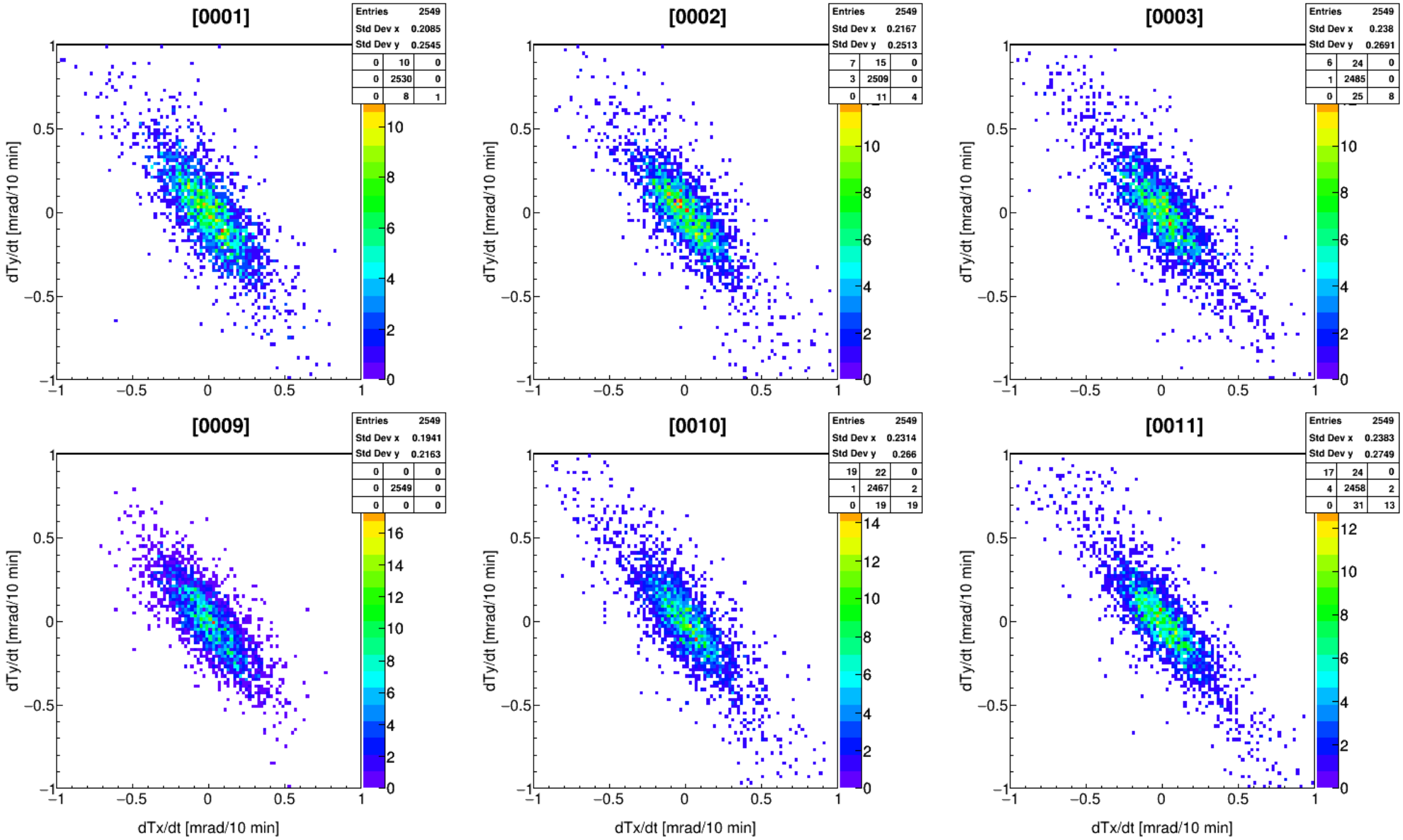
high sea current

low sea current

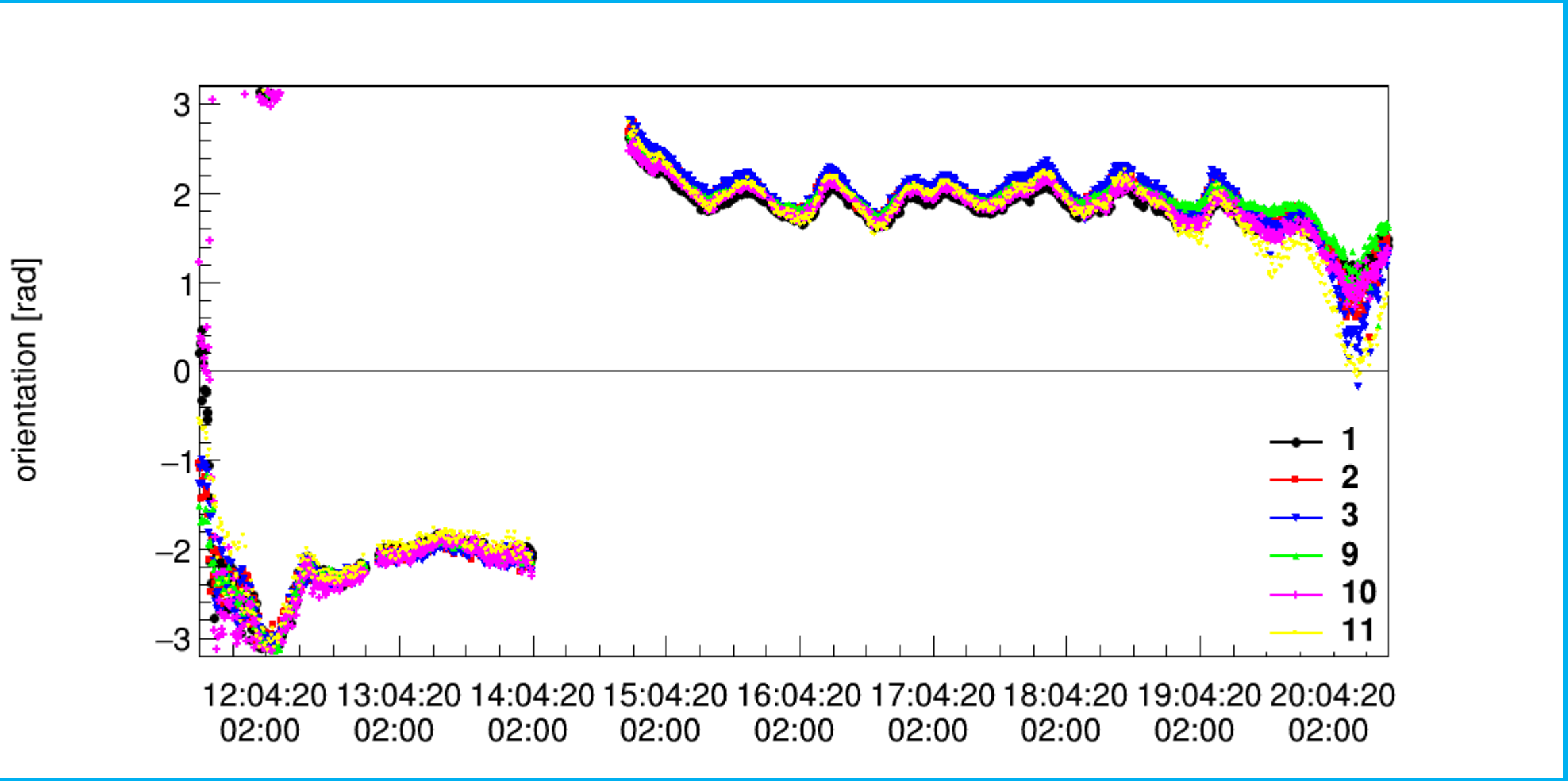
low sea current
ORCA detector 49
runs 7920—7820

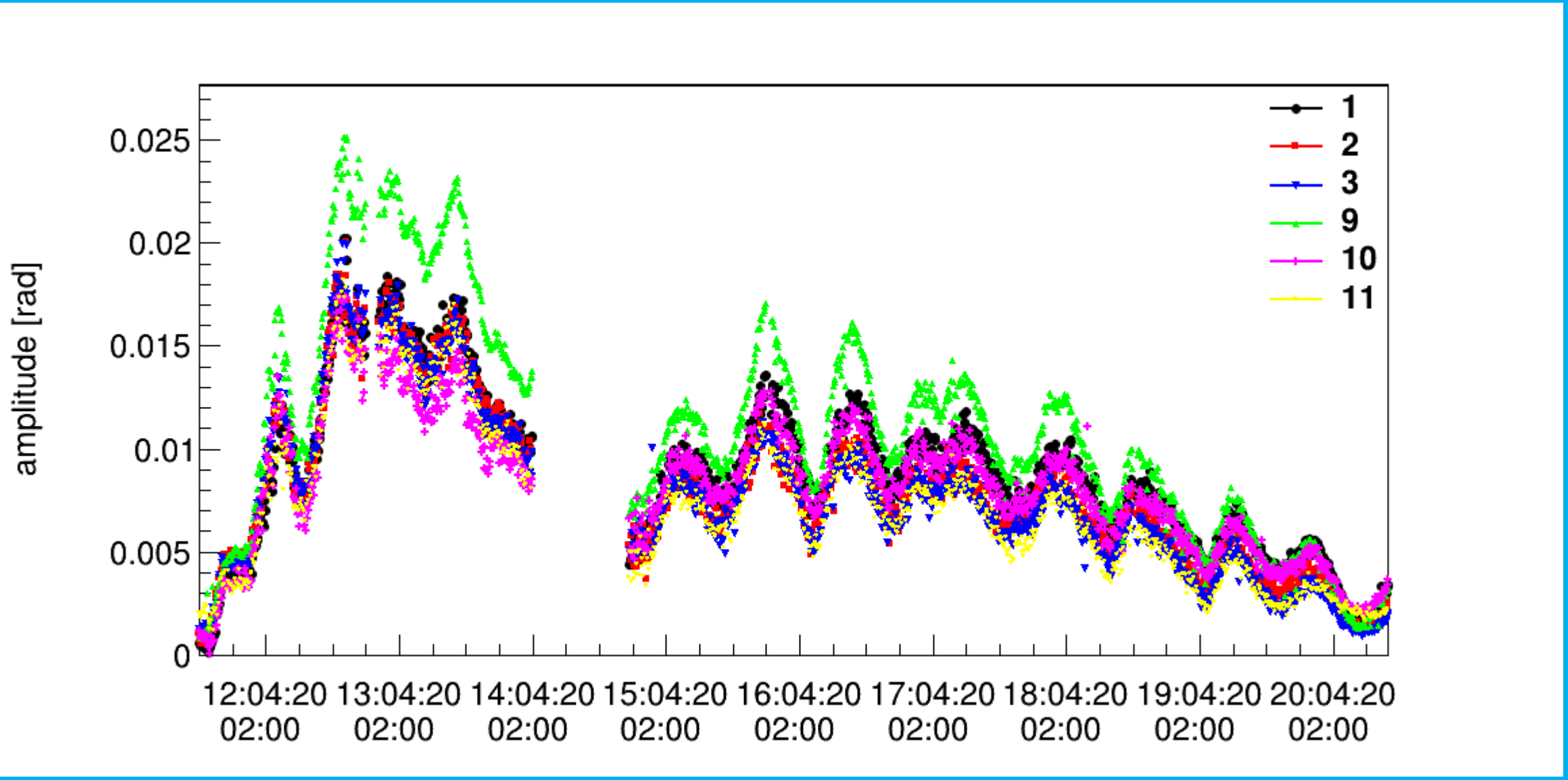

orientation [rad]
3
2
1
0
−1
−2
−3
30-04-20
02:00
07-05-20
02:00
14-05-20
02:00
1
2
3
9
10
11

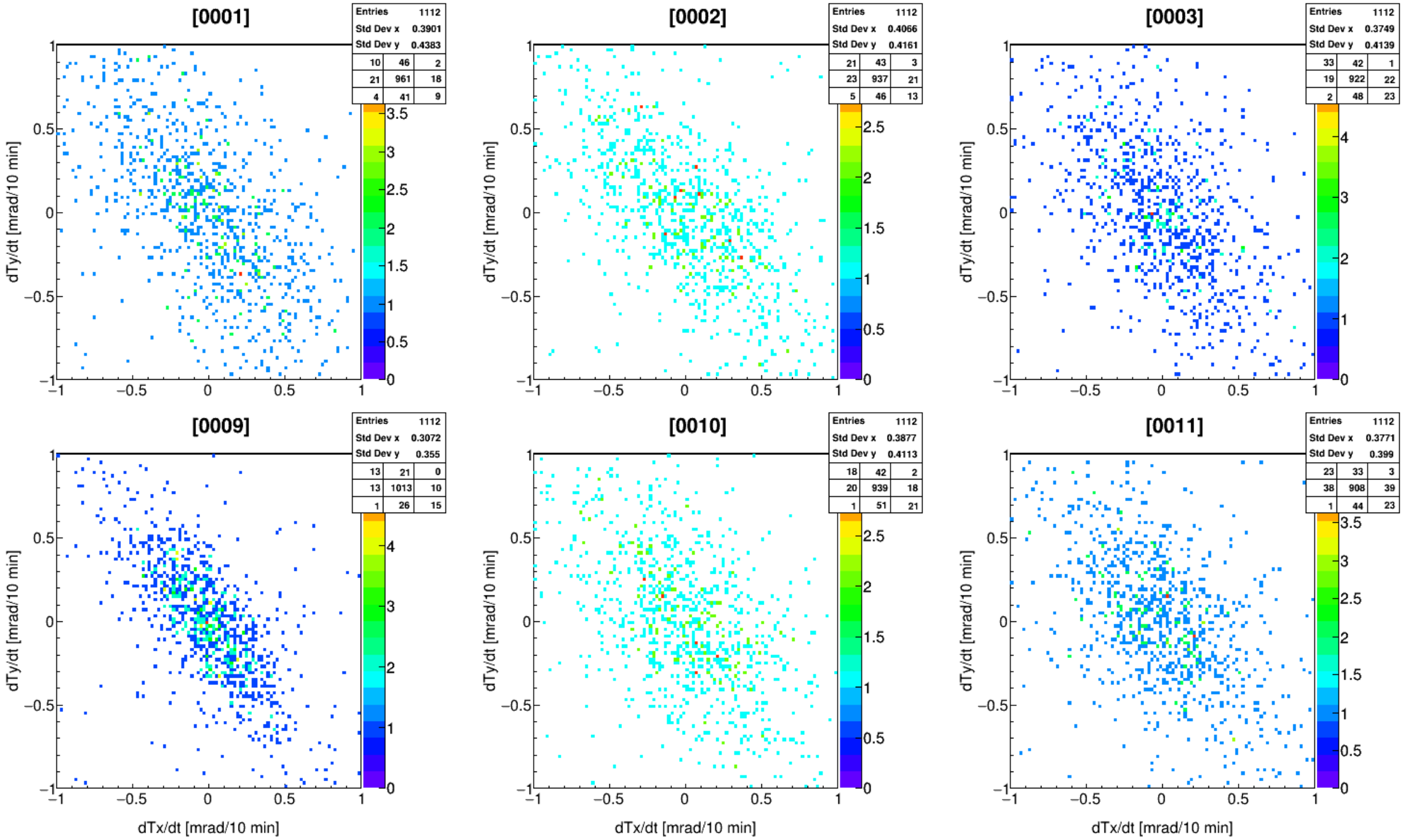

amplitude [rad]
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
30-04-20
02:00
07-05-20
02:00
14-05-20
02:00
1
2
3
9
10
11


[0001]
Entries 2549
Std Dev x 0.2085
Std Dev y 0.2545
0 10 0
0 2530 0
0 8 1
[0002]
Entries 2549
Std Dev x 0.2167
Std Dev y 0.2513
7 15 0
3 2509 0
0 11 4
[0003]
Entries 2549
Std Dev x 0.238
Std Dev y 0.2691
6 24 0
1 2485 0
0 25 8
[0009]
Entries 2549
Std Dev x 0.1941
Std Dev y 0.2163
0 0 0
0 2549 0
0 0 0
[0010]
Entries 2549
Std Dev x 0.2314
Std Dev y 0.266
19 22 0
1 2467 2
0 19 19
[0011]
Entries 2549
Std Dev x 0.2383
Std Dev y 0.2749
17 24 0
4 2458 2
0 31 13
dTy/dt [mrad/10 min]
dTx/dt [mrad/10 min]

high sea current
ORCA detector 49
runs 7830—7880


orientation [rad]
3
2
1
0
−1
−2
−3
12:04:20
02:00
13:04:20
02:00
14:04:20
02:00
15:04:20
02:00
16:04:20
02:00
17:04:20
02:00
18:04:20
02:00
19:04:20
02:00
20:04:20
02:00
1
2
3
9
10
11


amplitude [rad]
0.025
0.02
0.015
0.01
0.005
0
12:04:20
02:00
13:04:20
02:00
14:04:20
02:00
15:04:20
02:00
16:04:20
02:00
17:04:20
02:00
18:04:20
02:00
19:04:20
02:00
20:04:20
02:00
1
2
3
9
10
11


[0001]
Entries 1112
Std Dev x 0.3901
Std Dev y 0.4383
10 46 2
21 961 18
4 41 9
[0002]
Entries 1112
Std Dev x 0.4066
Std Dev y 0.4161
21 43 3
23 937 21
5 46 13
[0003]
Entries 1112
Std Dev x 0.3749
Std Dev y 0.4139
33 42 1
19 922 22
2 48 23
[0009]
Entries 1112
Std Dev x 0.3072
Std Dev y 0.355
13 21 0
13 1013 10
1 26 15
[0010]
Entries 1112
Std Dev x 0.3877
Std Dev y 0.4113
18 42 2
20 939 18
1 51 21
[0011]
Entries 1112
Std Dev x 0.3771
Std Dev y 0.399
23 33 3
38 908 39
1 44 23
dTy/dt [mrad/10 min]
dTx/dt [mrad/10 min]

Conclusions (I)

- Ping sequence covers a pre-set time period of 10 minutes
  - tripods AB1, AB2 and AB3 ping 1, 11 and 11 times per sequence, respectively
- Estimated resolution
  - $\langle \Delta T_{xy} \rangle \cong 0.17 \text{ mrad}$
- Observed average motion in 10 minutes
  - low sea current $\langle \Delta T_{xy} \rangle \cong 0.24 \text{ mrad}$
  - high sea current $\langle \Delta T_{xy} \rangle \cong 0.39 \text{ mrad}$

Conclusions (II)

- Caveats
  - pre-set time period of 10 mins. adversely affects accuracy of (any) fit
  - absolute orientation of detector may require further tuning