!!
The analysis performed using mostly only 2mm, as a large part of the 1mm data we got is incorrect !
!!

1. the major (if not the only) difference compared to other cont. receivers is the calculation of the signal:

(I,Q) -> R [mHz] R should be proportional to the total power/source signal

example of a "frequency sweep", i.e tuning of NIKA

fig.1a 3 freq. sweeps as function of time
clear gradient as function of the KID number visible, similar to the gradient of the flat field in fig.12a; the signal is smaller in the 2nd & the 3rd sweeps;
the 2nd & the 3rd sweeps are nearly identical, i.e. this decrease is not a random effect

fig.1b same data in the (I,Q) plane; better visible that the second (in green) and the third (in blue) sweeps gives smaller circles in (I,Q);
green is hardly visible as overplotted with blue, i.e. the two are almost identical

2. immediately visible problems in the linearised signal R

- instabilities

fig.2
- jumps, >11 during ~1300sec, marked with vertical grey lines
- jumps are not equal - KID dependent
- atmospherical signal is not well correlated (comp. red, blue ... black)

- negative signal

fig.3
KID87 shows negative signal

- cross talk

fig.4 in KIDs 4, 15, 18, 19, 20, 26, 53?
also important: KID71 does not show the signal of Uranus
clear distortion of most beams =>

- beam distortion (as no focussing), i.e. beam efficiency might be changed even by 50% => calib. factor by 2

fig.5

- pointing not corrected during the whole run =>
statistics on pointing corrections for NIKA not possible
the beam maps show offsets of up to 10asec
(these offsets affect even the calculation of the FoV geometry)
statistics of pointing corrections for EMIR, period of NIKA run #2
(NIKA used the pointing model of EMIR)

fig.6

3. further instabilities

- correlation (flat field) plots show many different problems, also in groups of KIDs =>
the "noise" in the final image is dominated by these instabilities

fig.7

- "50sec steps" (not shown)

- oscillations visible after removing of the correlated signals (~ sky noise)
with different zoomming factors different oscillation frequencies visible (as aliasing appears)

fig.8a e.g. KIDs 1, 11, 23, 32, 69, 70

fig.8b

fig.8c e.g. KIDs 1, 11, ... 69, 70, ... 99

4. relative calibration

- FoV geometry: distortion, position of KIDs 21 & 22 @2mm changed due to a cross talk
fig.9
fig.10
fig.11

- flat field: change >10 for 2mm, > 3 for 1mm
fig.12a clear gradient, similar to the gradient seen in fig.1a
fig.12b KID35 <<, KID42 >>
fig.12c very flat

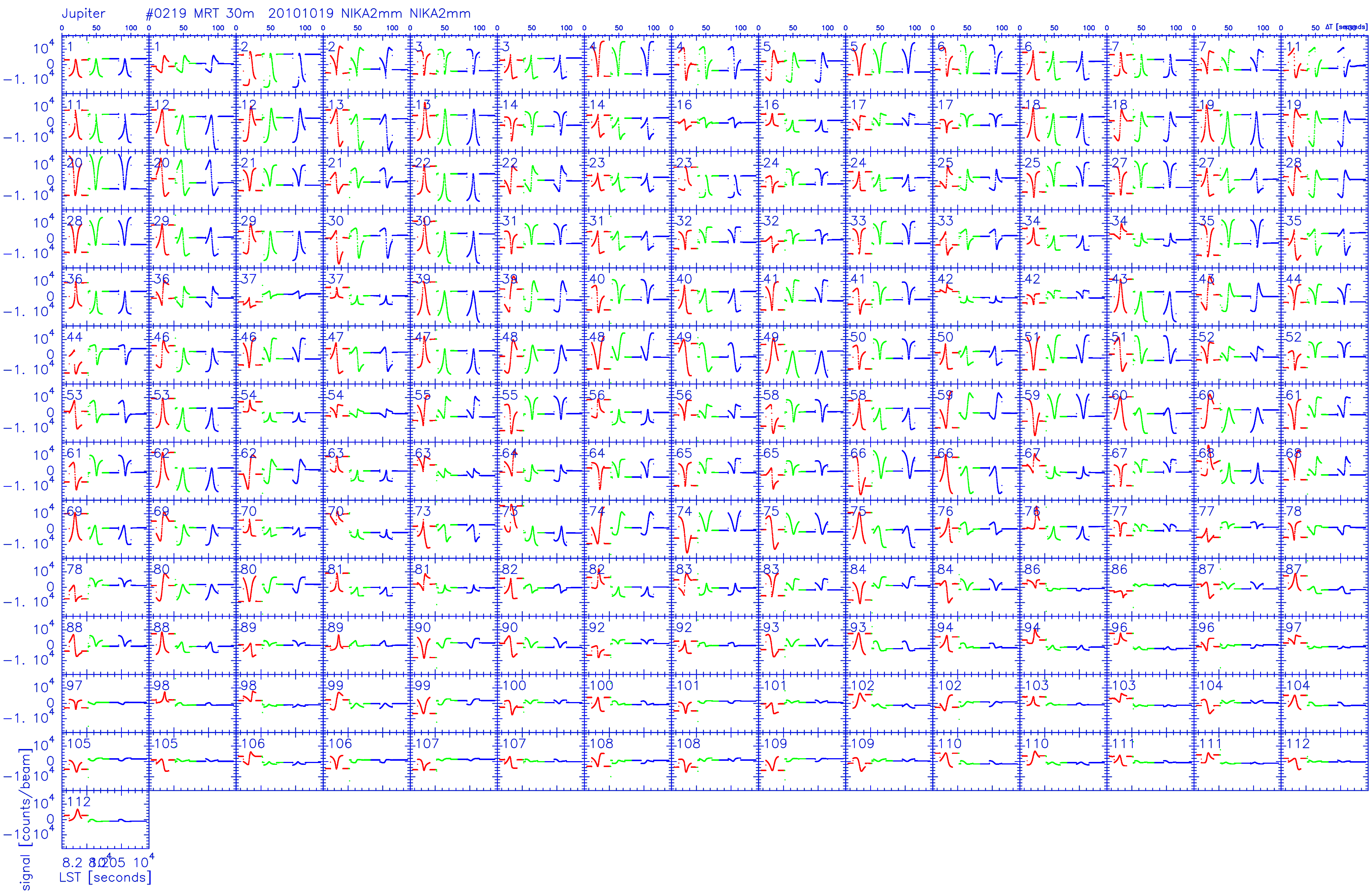
- statistics of the flat field
fig.13
fig.14

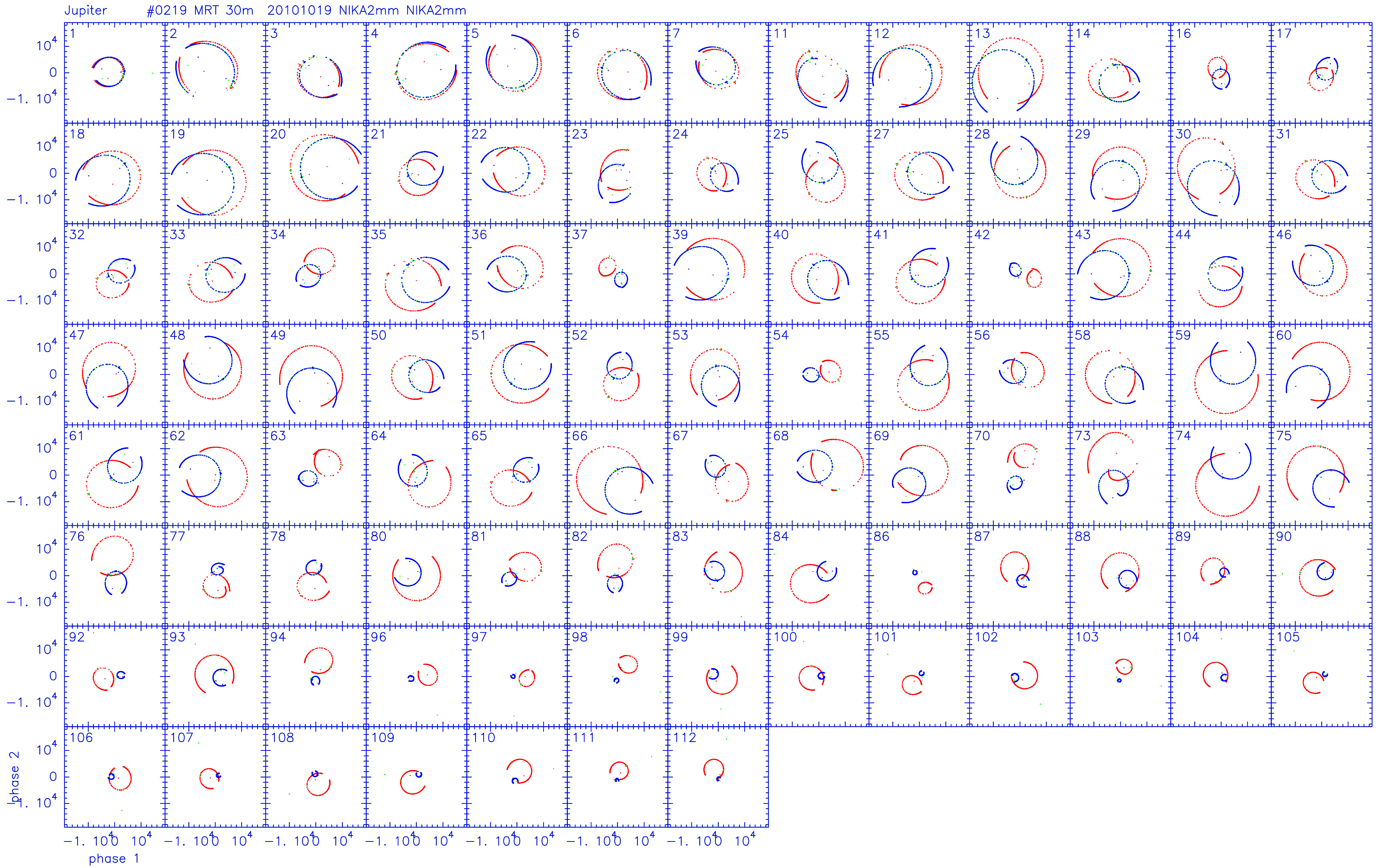
5. comments on mapping

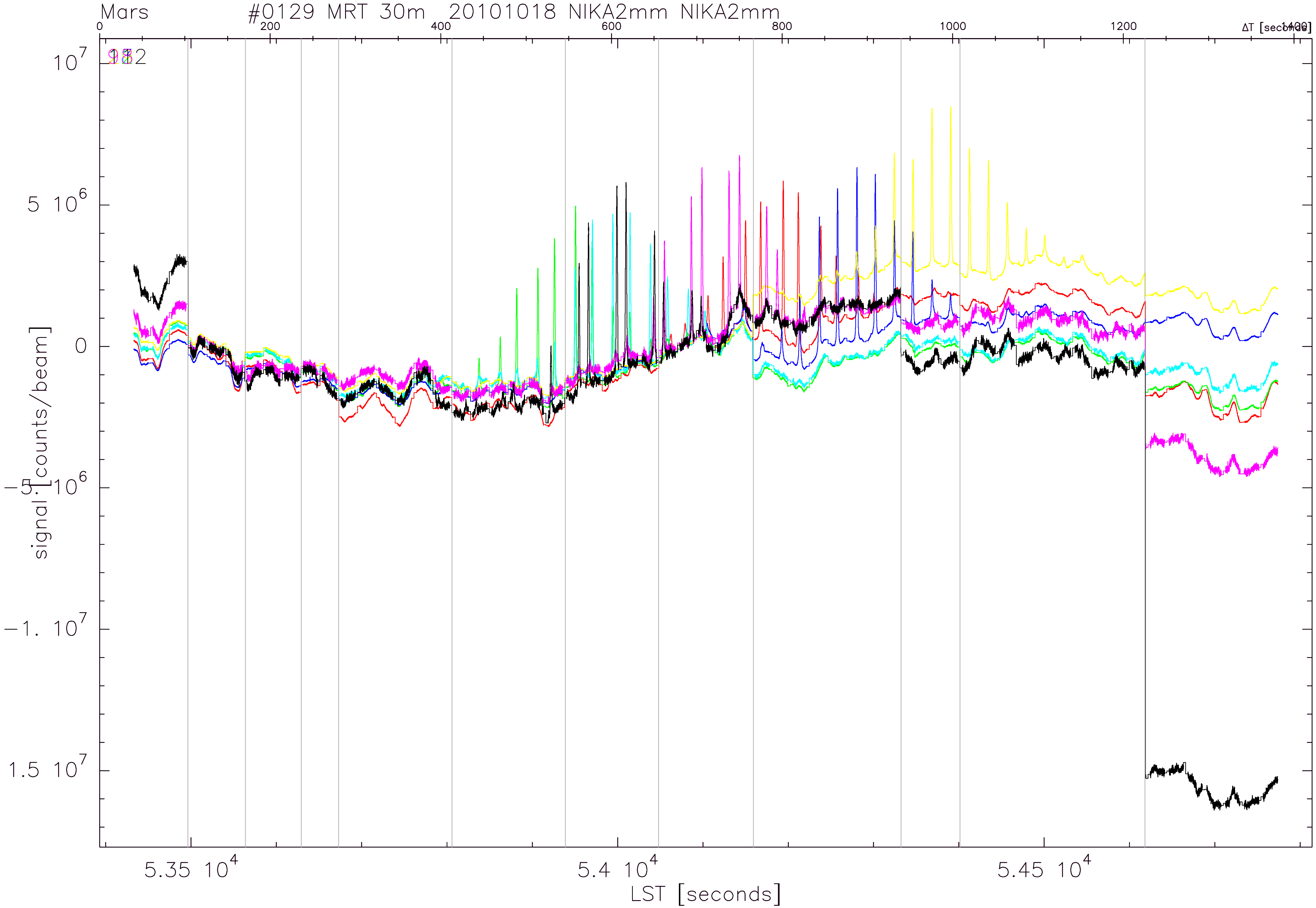
- efficiency
  eff ~ (time of a subscan) / [(time of a subscan) + (time for an U-turn)]
  time for an U-turn >~5sec
  time of a subscan deltaAz/vAz
  vAz = 10 to 20asec/sec, i.e. even 4*Nyquist samplig of the coords @1mm (slow loop with 1Hz !)
  => time of a subscan even just 6sec
  => efficiency down to ~50% !

- map sizes
  the smallest map size in the scanning dir. is given by:
    source size + array diameter + HPBW + "base range"
  => all maps too small

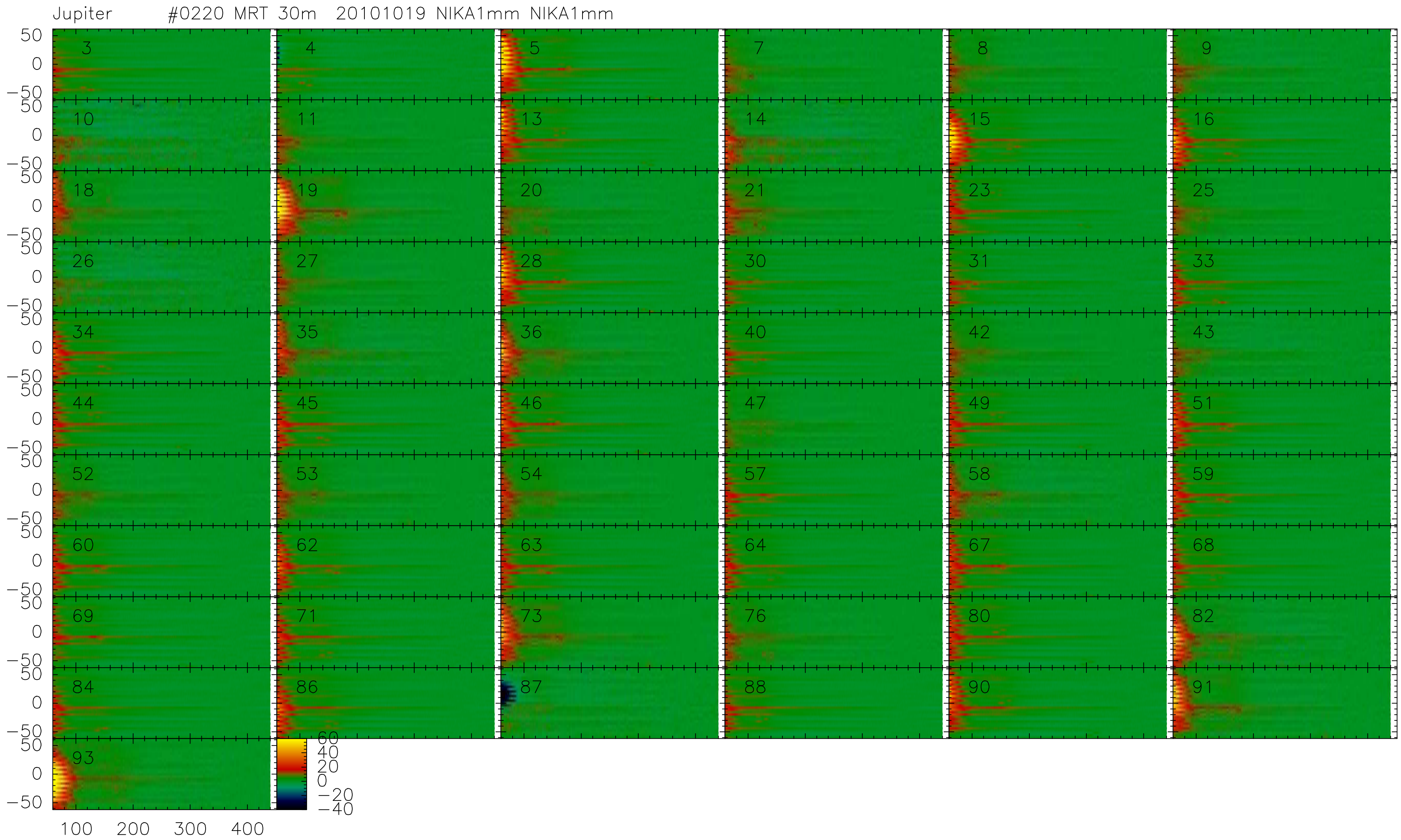
  additional NCS problem: the subscan length (= map length in the scanning dir.) is always shorter
  than commanded by vAz/freqSlowLoop, i.e. 10 to 20asec for maps with NIKA, run #2
fig.15 circles: the commanded coords, dots: coords interpolated to the time stamps of NIKA


Jupiter
#0219 MRT 30m 20101019 NIKA2mm NIKA2mm
ΔT [seconds]
signal [counts/beam]
LST [seconds]


Jupiter #0219 MRT 30m 20101019 NIKA2mm NIKA2mm
phase 1
phase 2



Mars
#0129 MRT 30m 20101018 NIKA2mm NIKA2mm
ΔT [seconds]
signal [counts/beam]
LST [seconds]
5.35 10^4
5.4 10^4
5.45 10^4


Jupiter #0220 MRT 30m 20101019 NIKA1mm NIKA1mm
3
4
5
7
8
9
10
11
13
14
15
16
18
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21
23
25
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30
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42
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47
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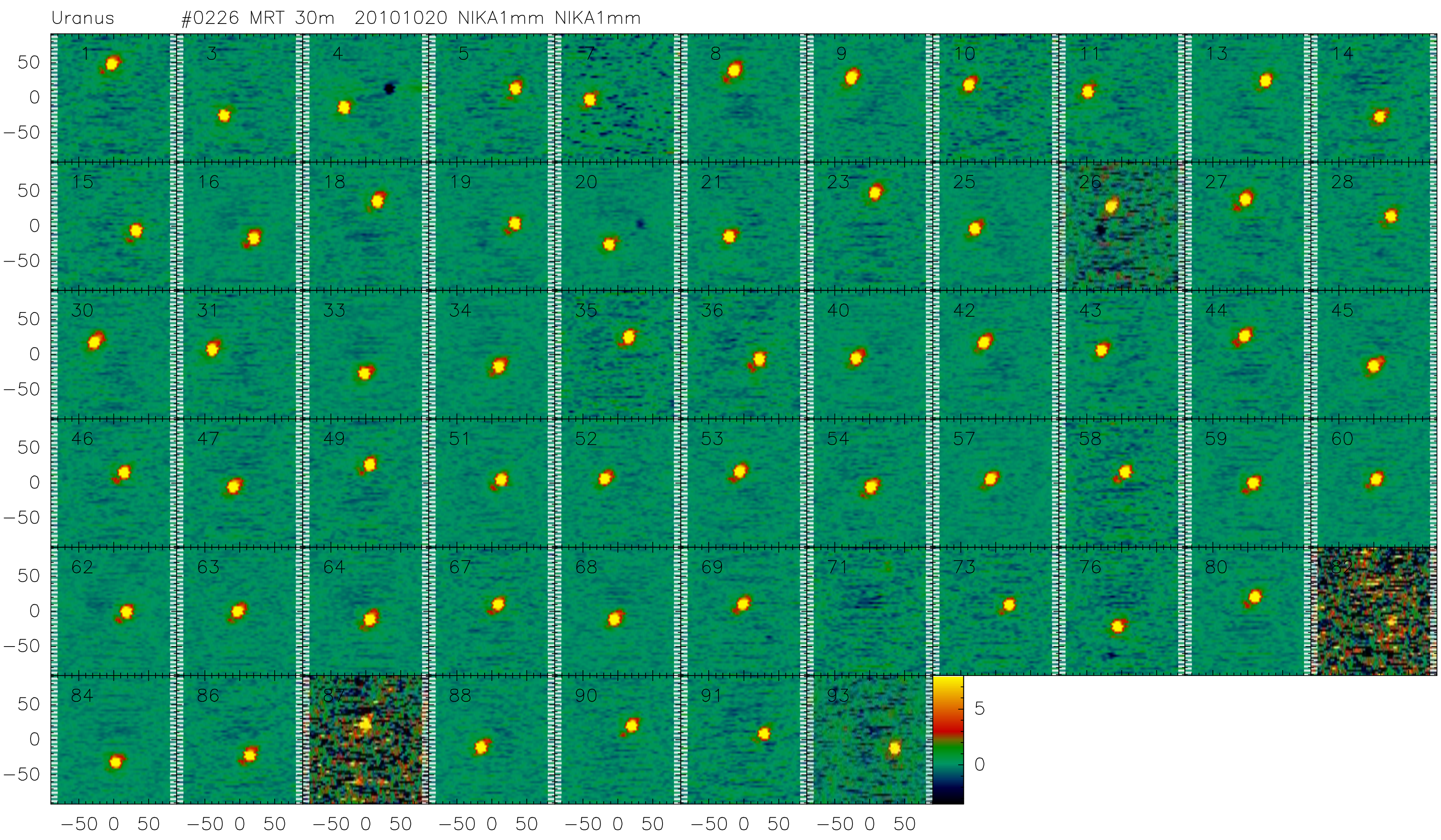
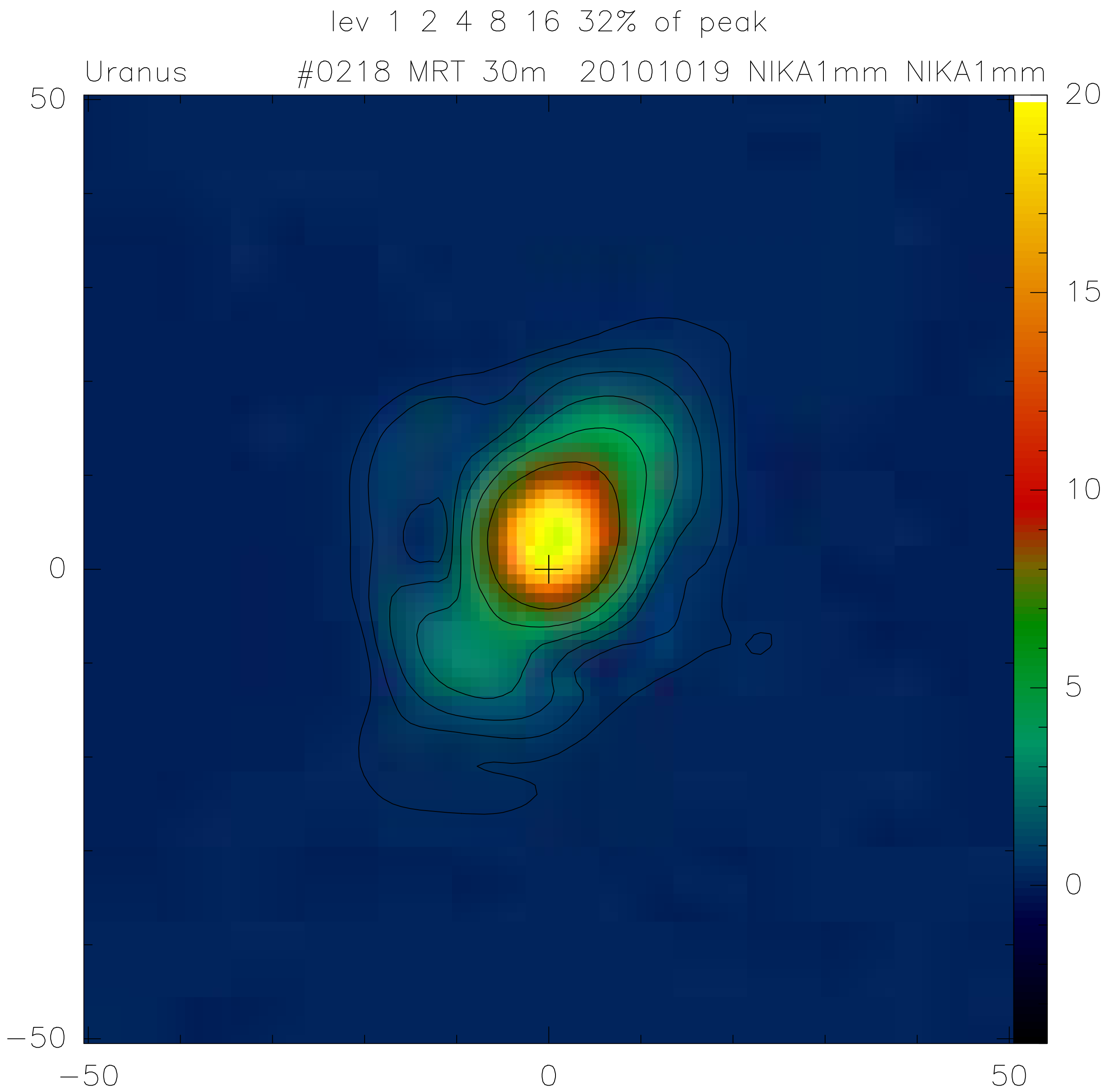
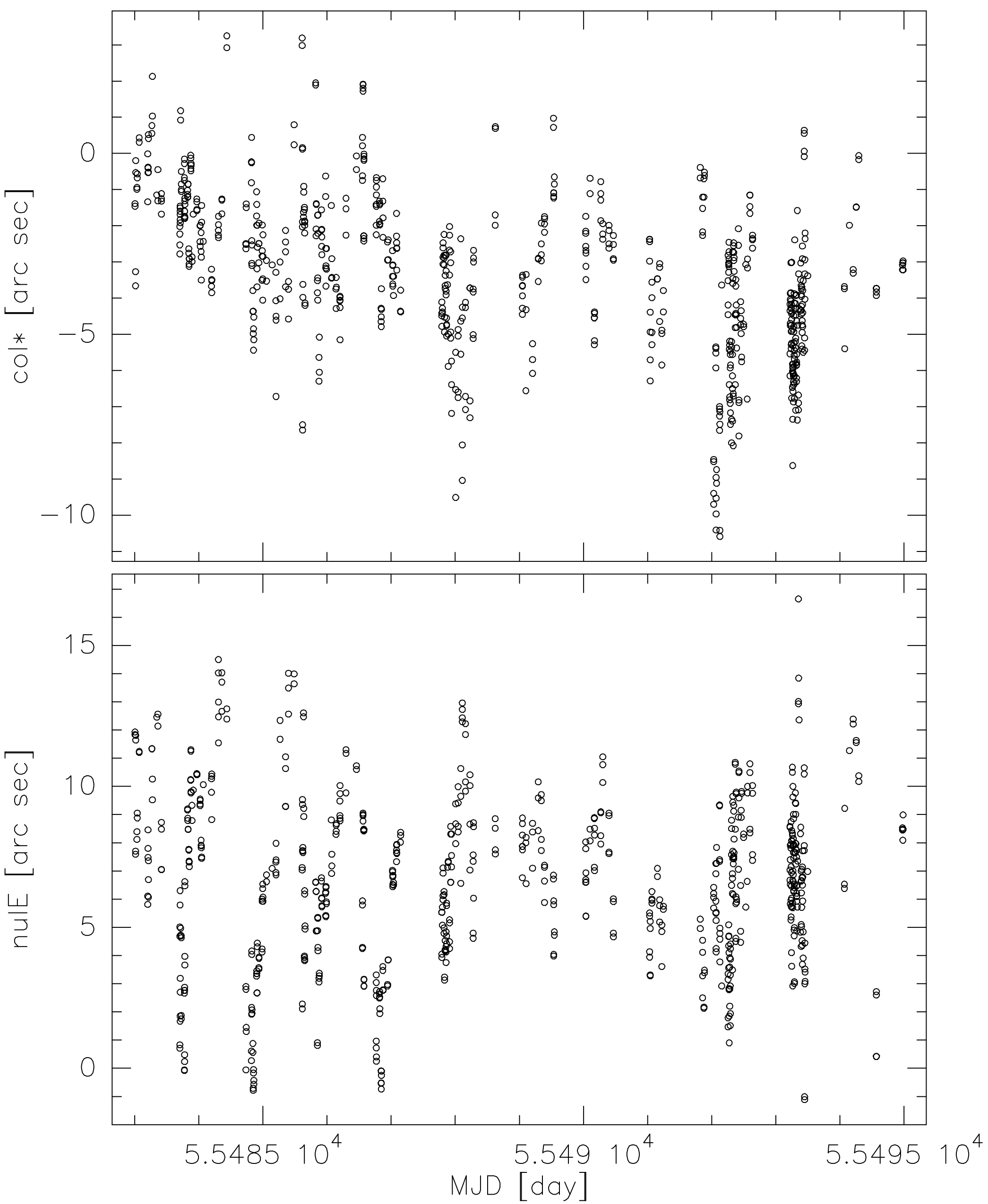
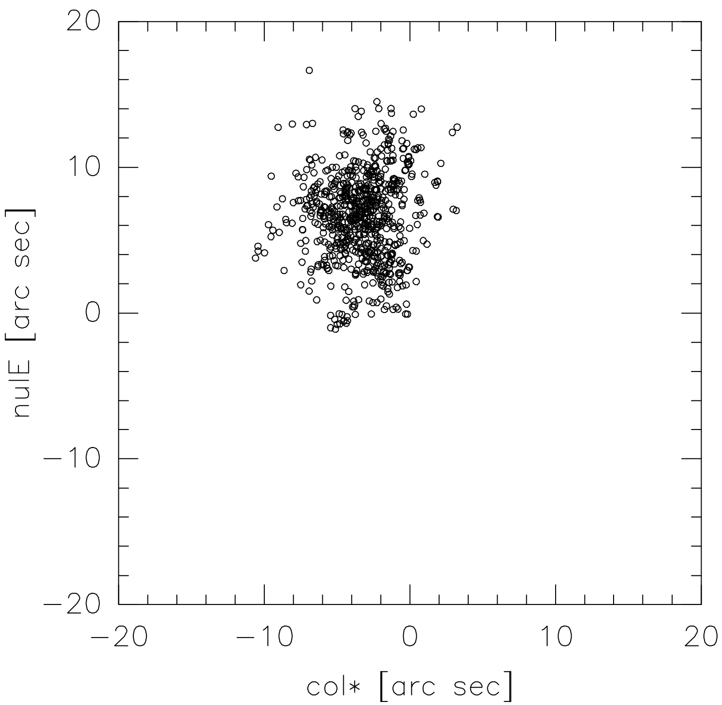
51
52
53
54
57
58
59
60
62
63
64
67
68
69
71
73
76
80
82
84
86
87
88
90
91
93
50
0
−50
100
200
300
400
60
40
20
0
−20
−40


Uranus
#0226 MRT 30m 20101020 NIKA1mm NIKA1mm
1 3 4 5 7 8 9 10 11 13 14
15 16 18 19 20 21 23 25 26 27 28
30 31 33 34 35 36 40 42 43 44 45
46 47 49 51 52 53 54 57 58 59 60
62 63 64 67 68 69 71 73 76 80 82
84 86 87 88 90 91 93
50 0 −50
−50 0 50
5
0


lev 1 2 4 8 16 32% of peak
Uranus
#0218 MRT 30m 20101019 NIKA1mm NIKA1mm
50
0
−50
−50
0
50
20
15
10
5
0





E090E150E230

<col*> −3.335 rms 2.203

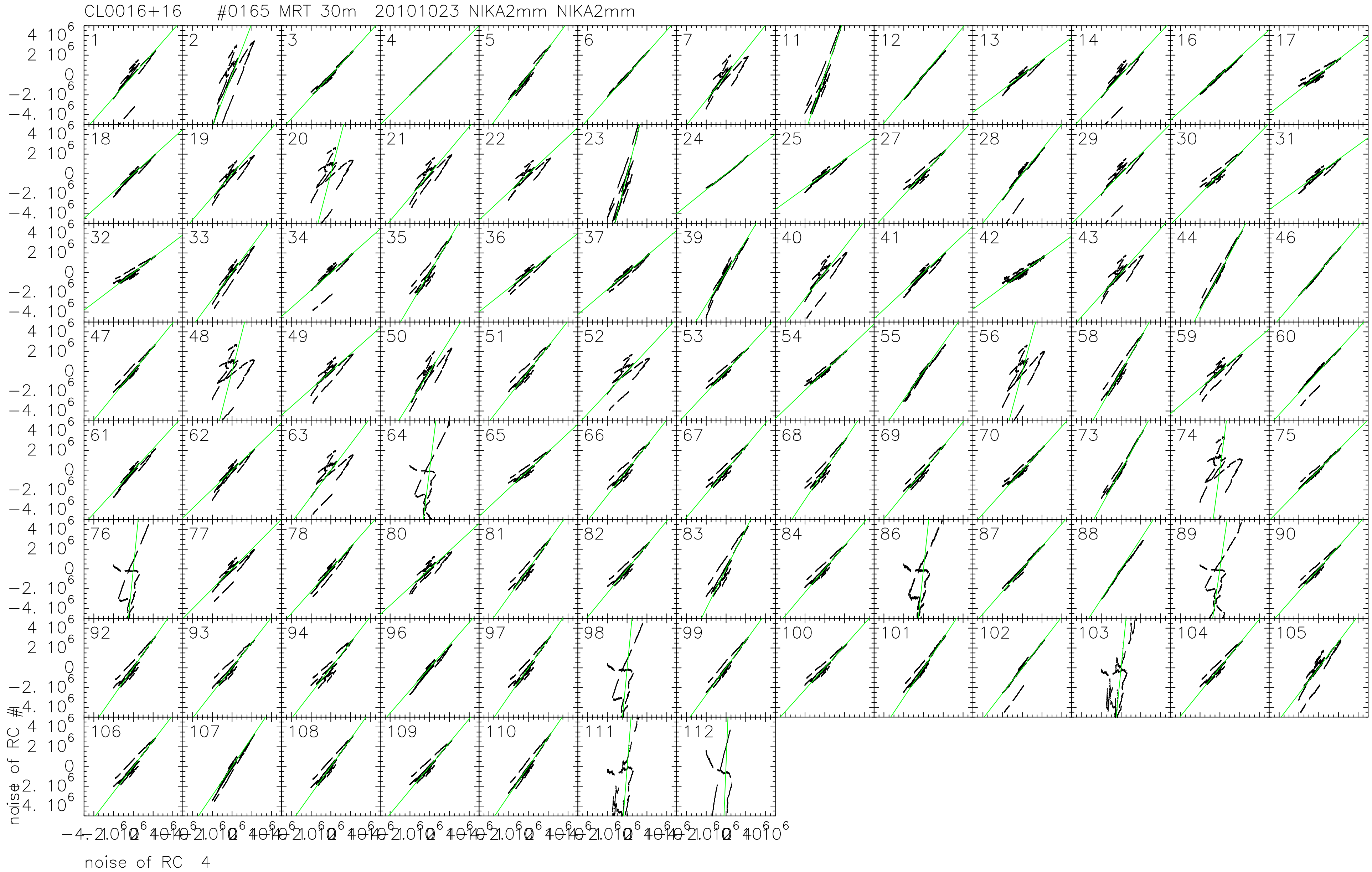
<nulE> 6.634 rms 3.029

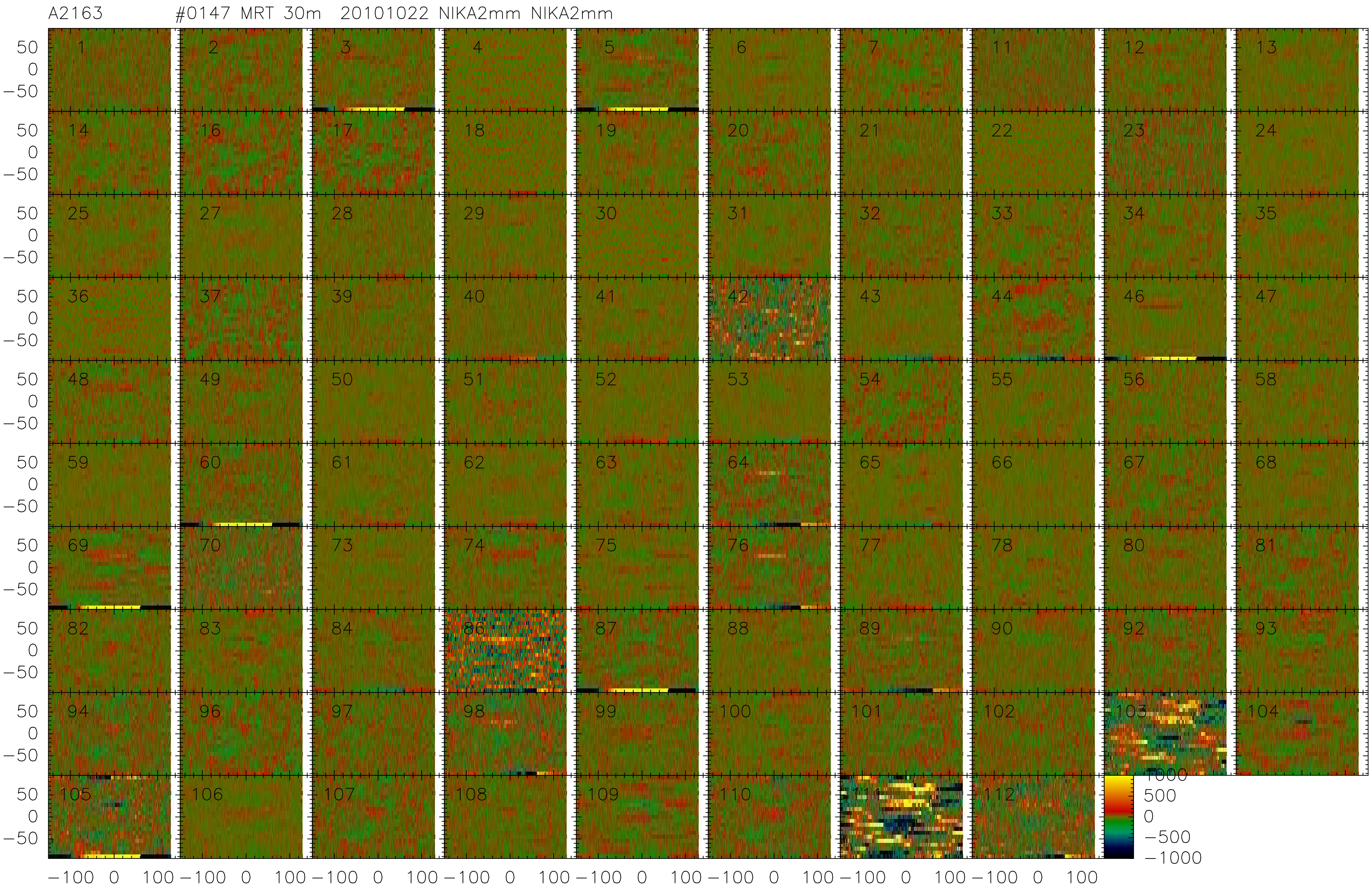
date.scanNr 20101014.0003−20101025.0165

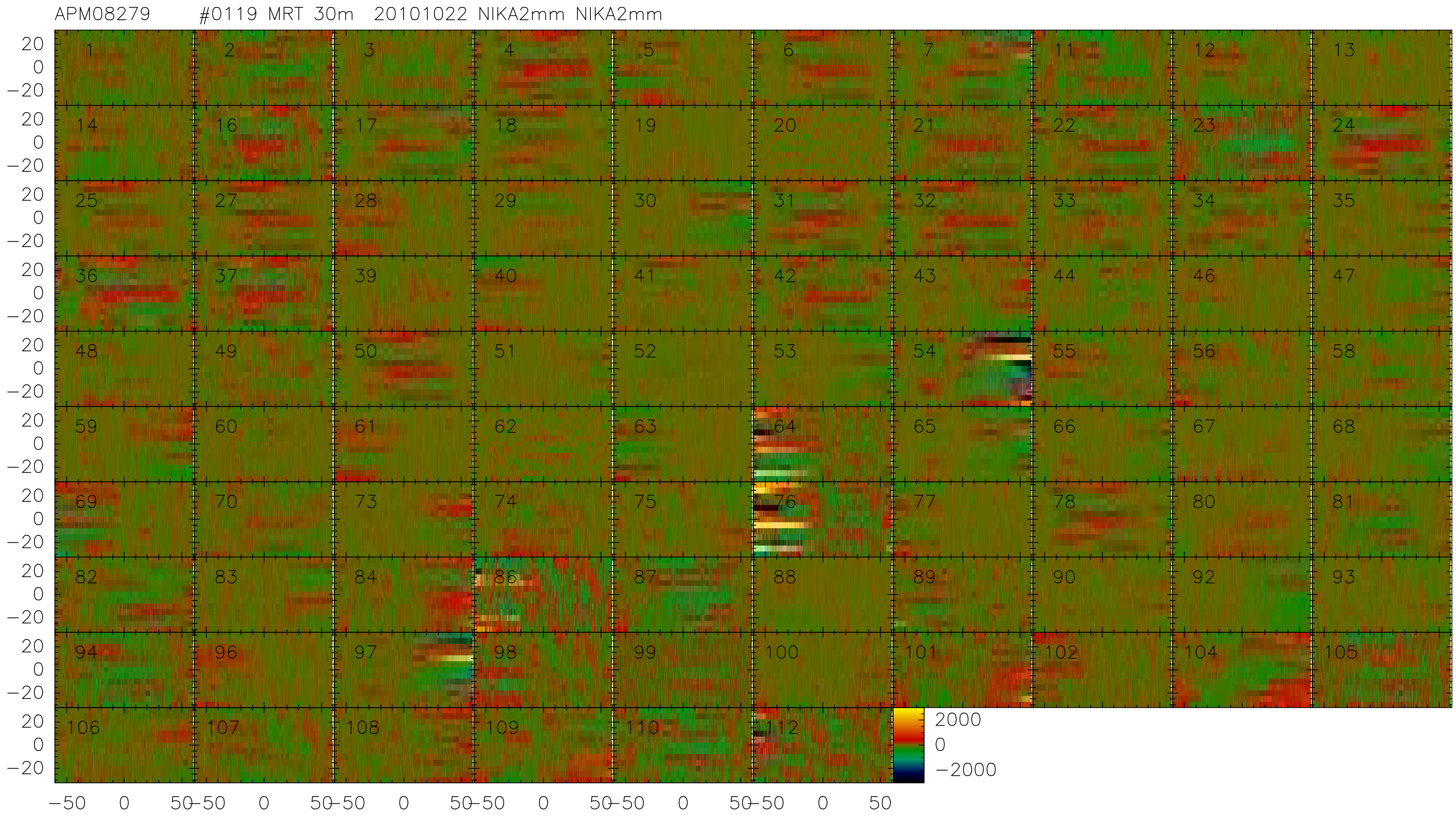
quality

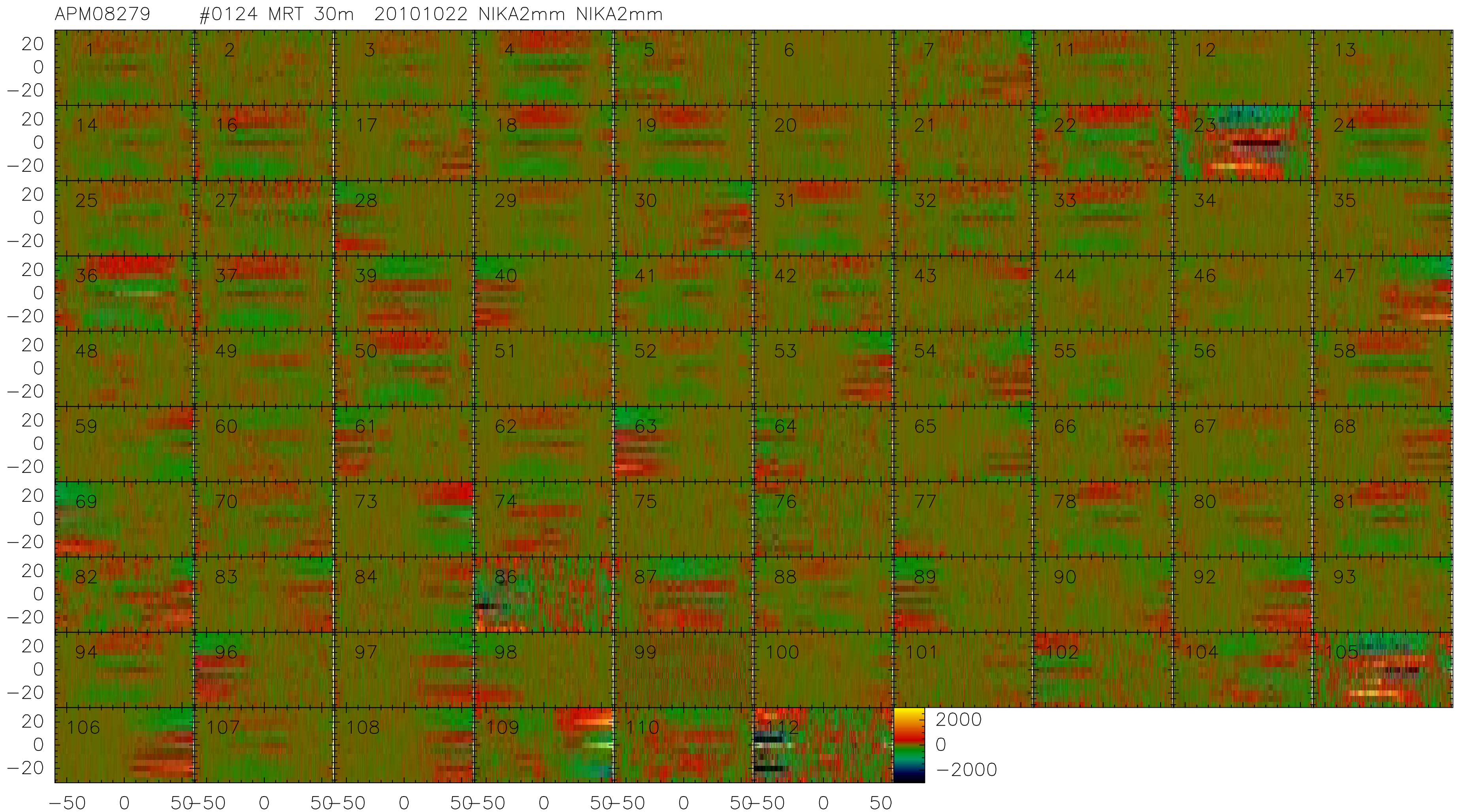
040404041111133111−999999999999999999

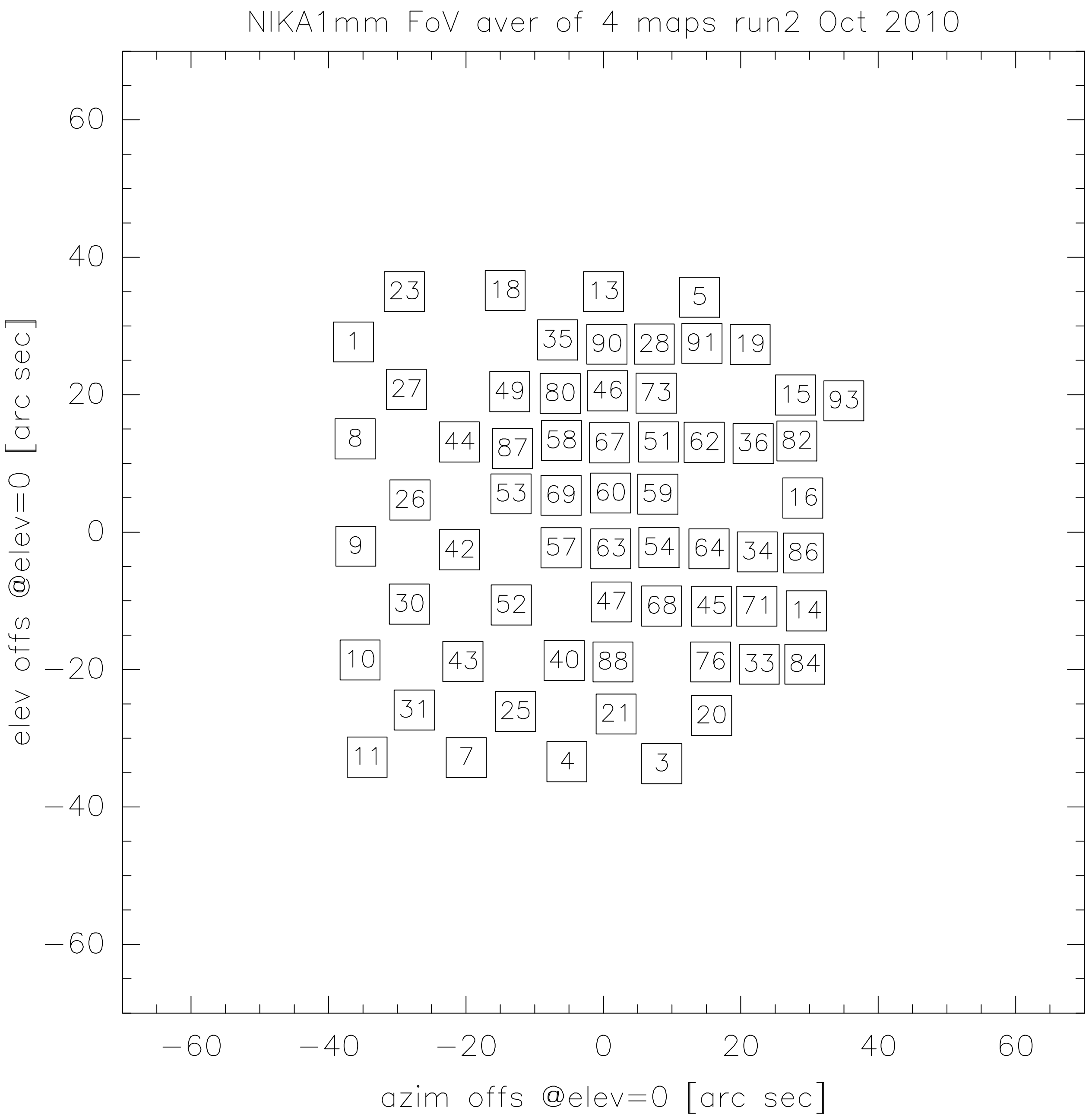
usable pointings 718 from 1273


CL0016+16 #0165 MRT 30m 20101023 NIKA2mm NIKA2mm
noise of RC #I
noise of RC 4


A2163
#0147 MRT 30m 20101022 NIKA2mm NIKA2mm


APM08279
#0119 MRT 30m 20101022 NIKA2mm NIKA2mm
2000
0
−2000


APM08279
#0124 MRT 30m 20101022 NIKA2mm NIKA2mm
2000
0
−2000


NIKA1mm FoV aver of 4 maps run2 Oct 2010
elev offs @elev=0 [arc sec]
azim offs @elev=0 [arc sec]
-60
-40
-20
0
20
40
60
1
8
9
10
11
23
27
26
30
31
44
42
43
7
18
49
87
53
52
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35
80
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57
40
4
13
90
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67
60
63
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21
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73
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59
54
68
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91
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64
45
76
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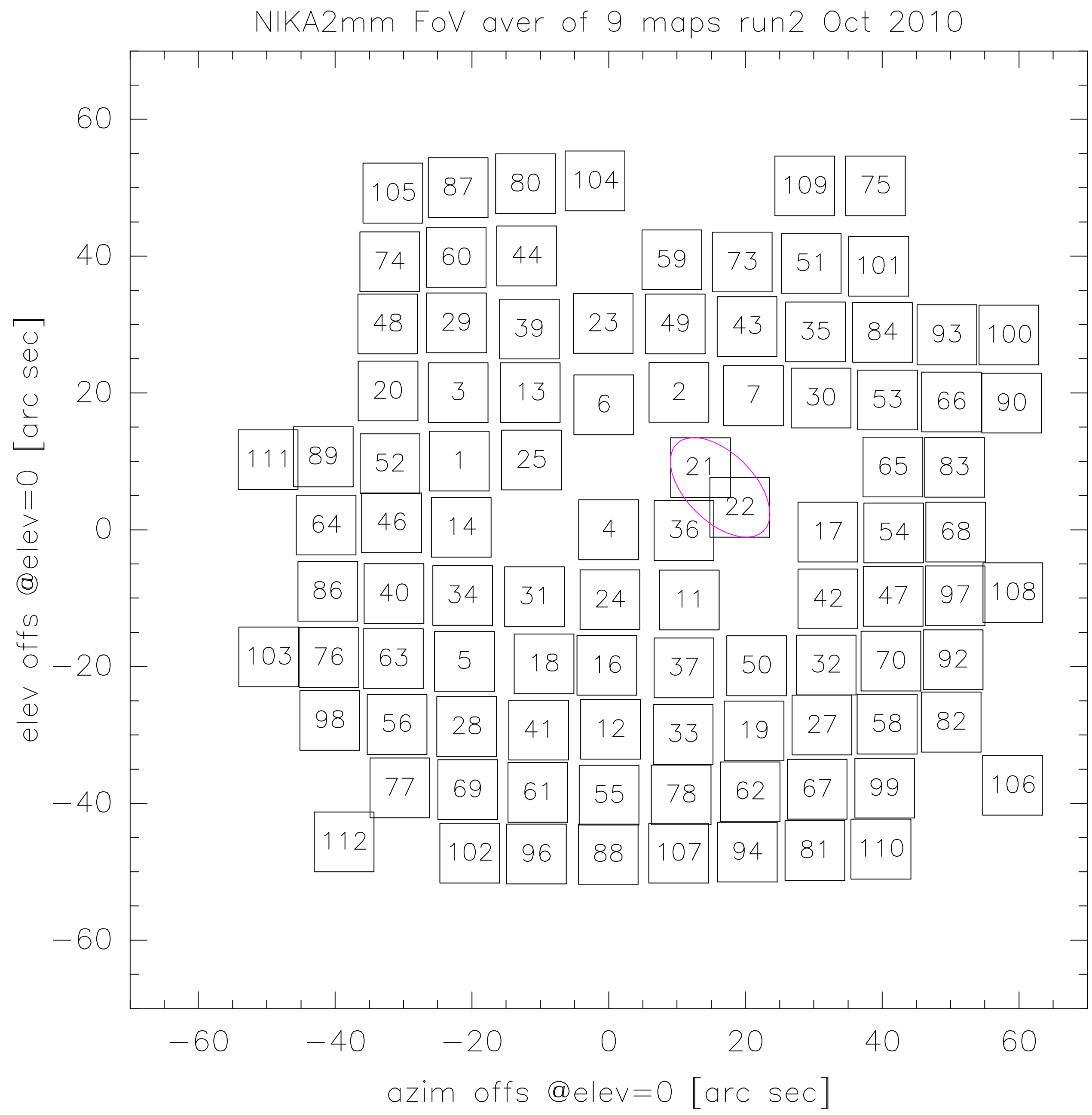
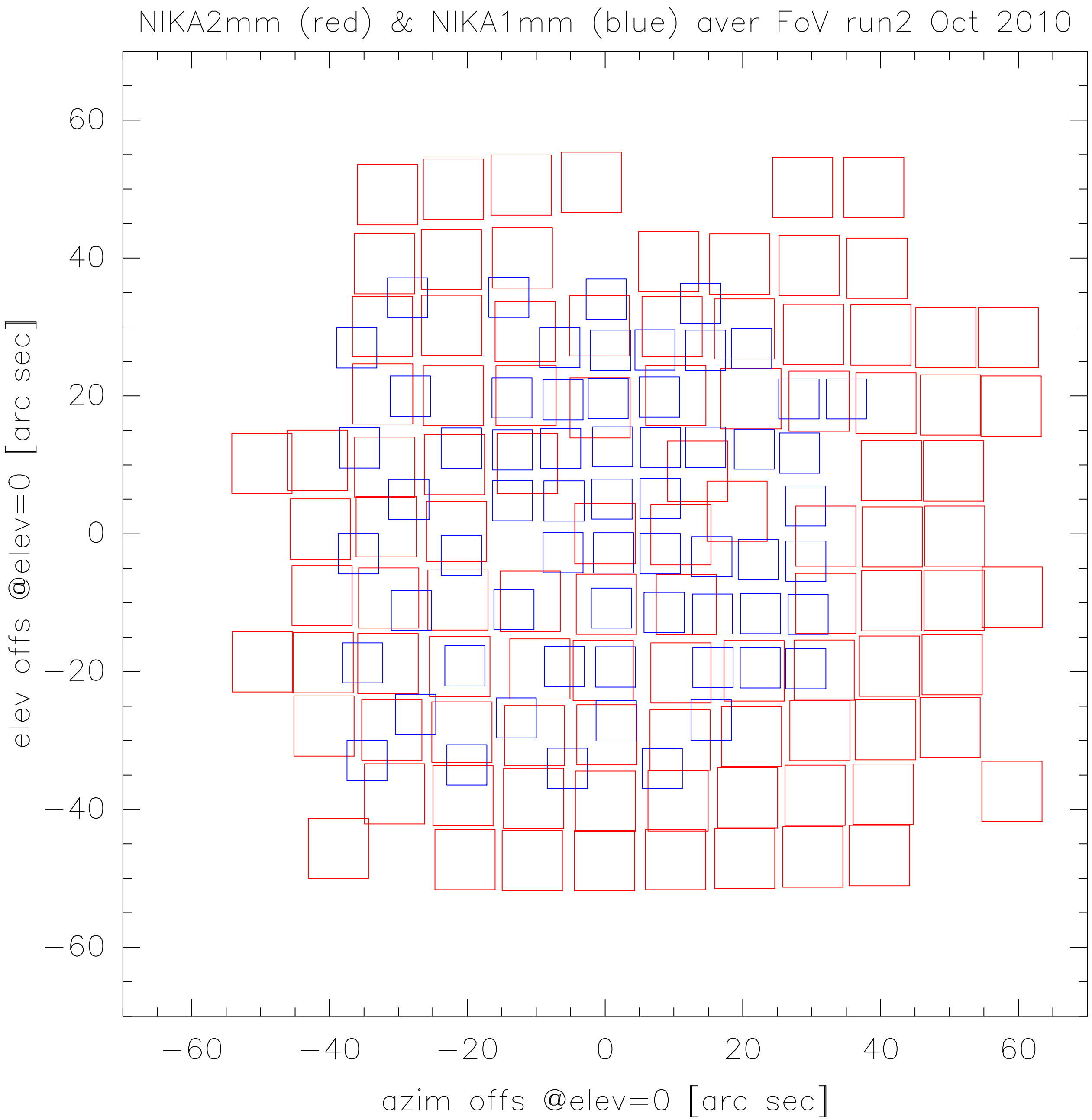
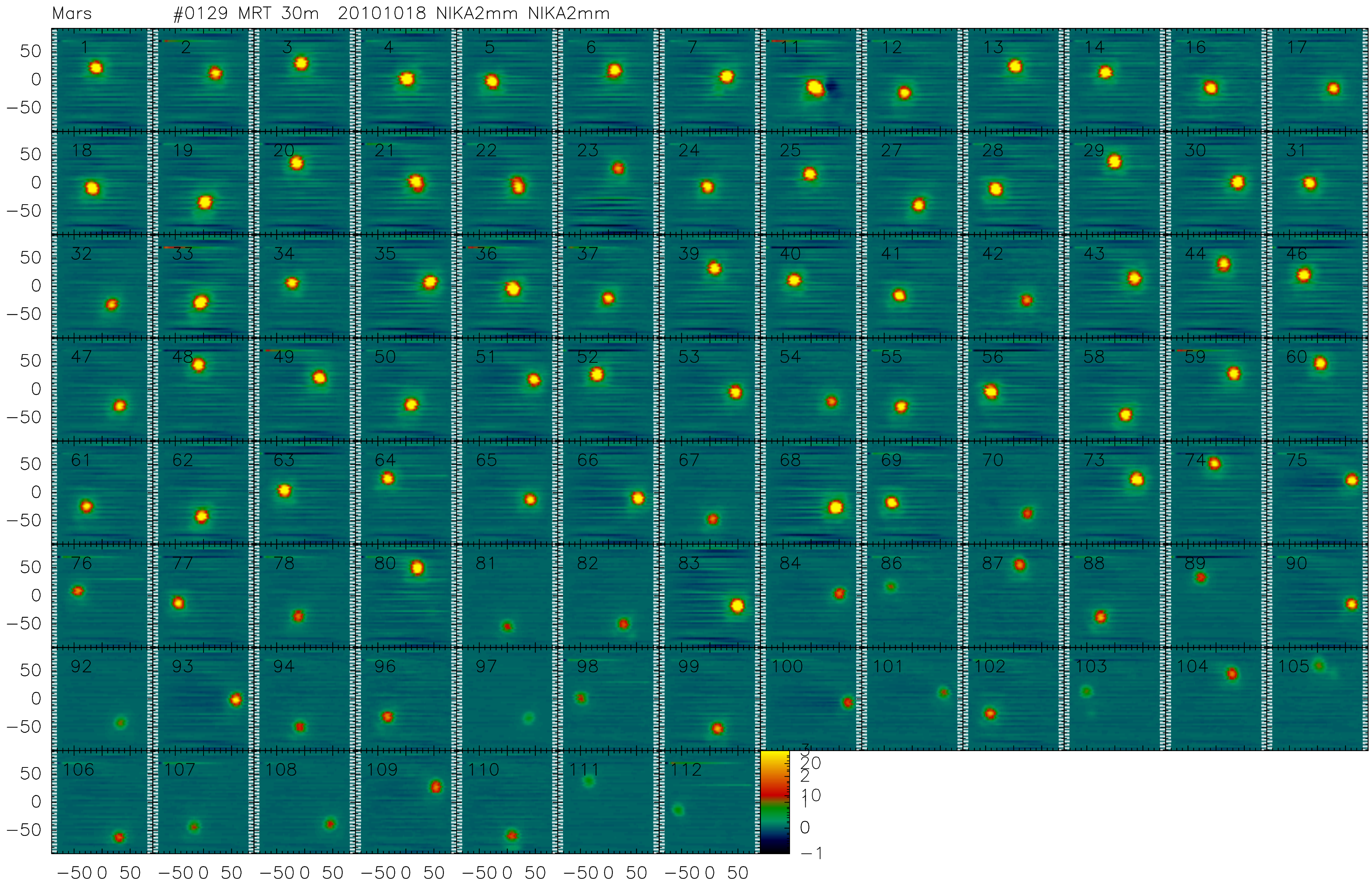
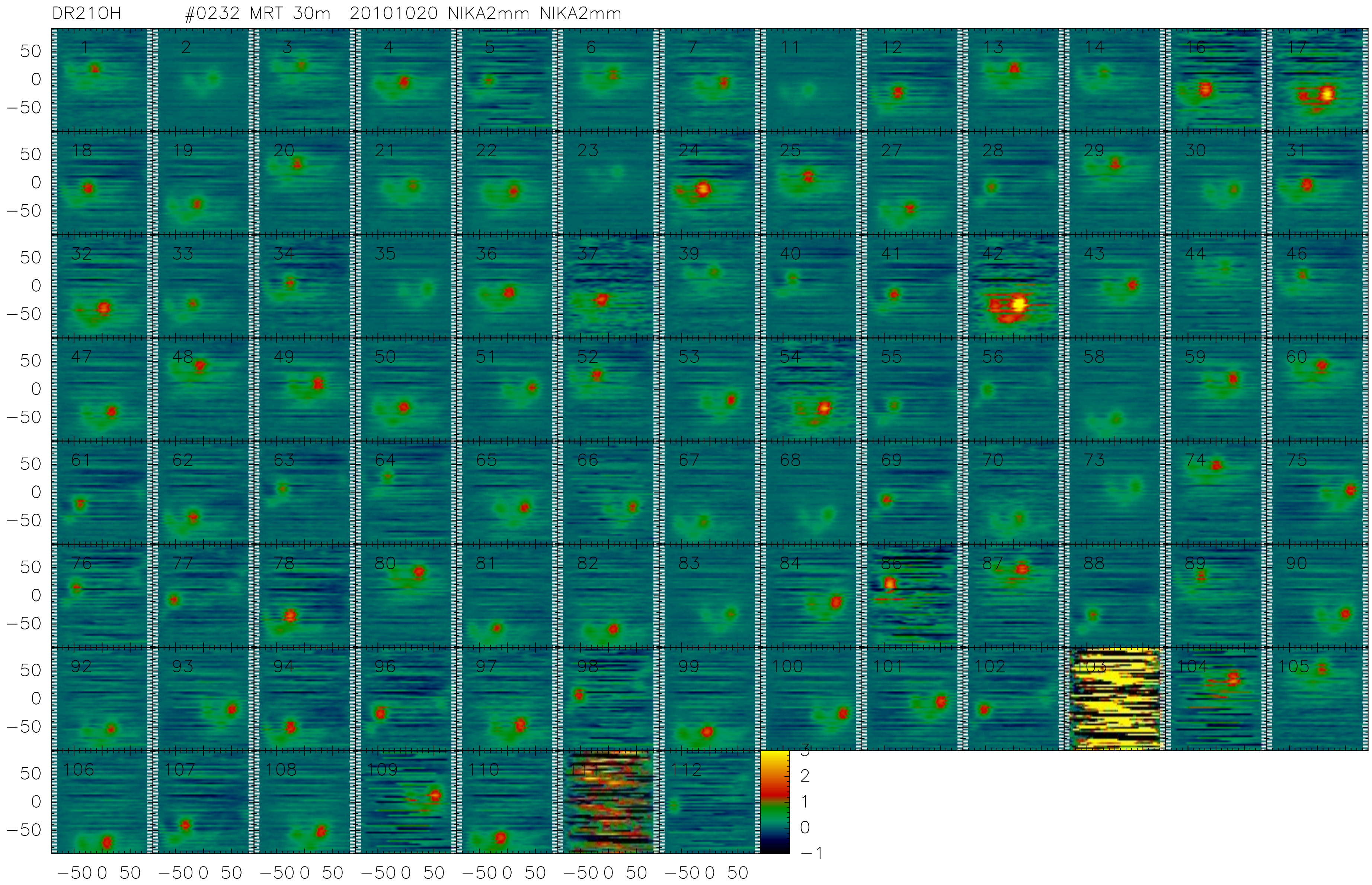
36
34
71
33
15
82
16
86
14
84
93

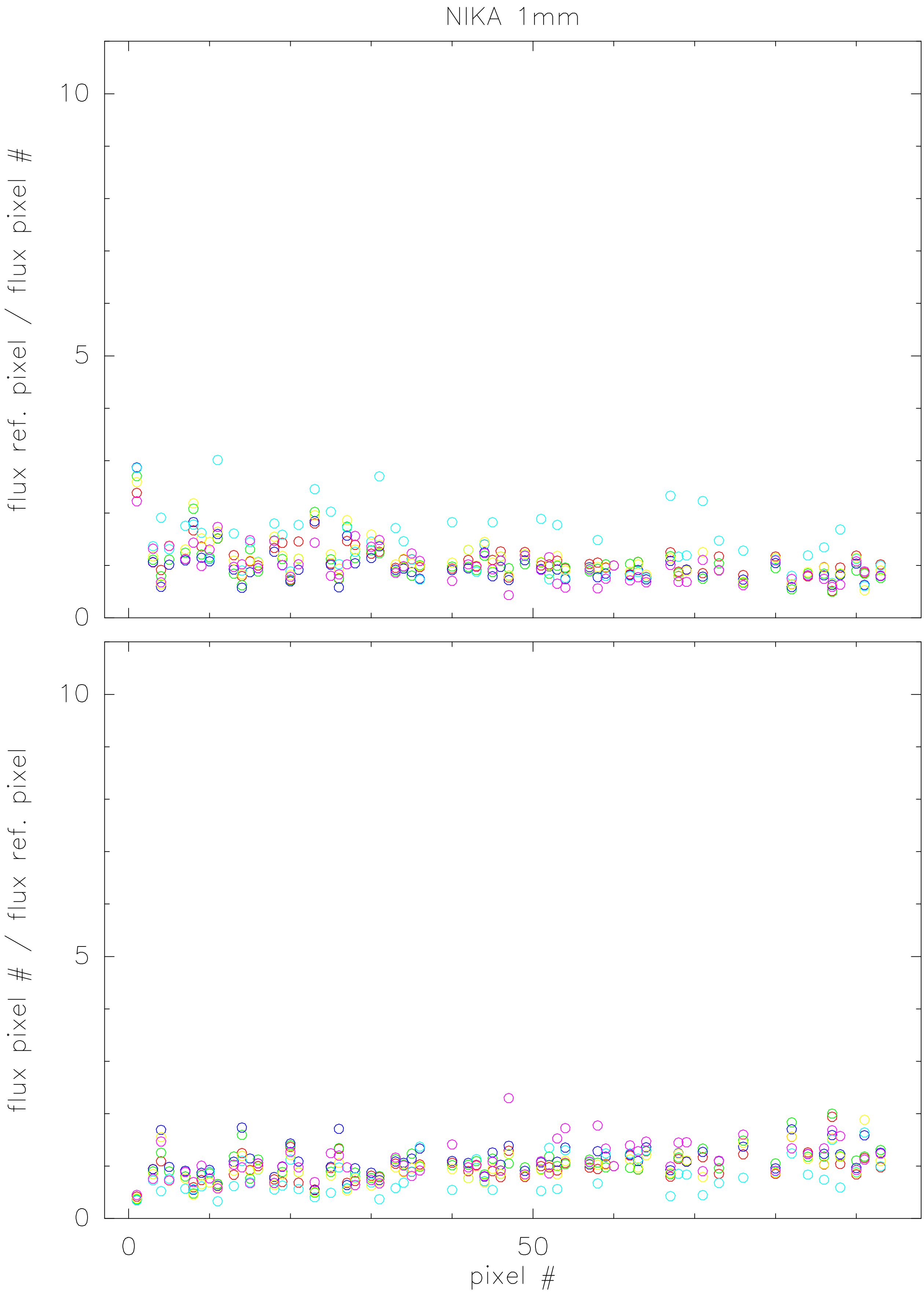

NIKA2mm FoV aver of 9 maps run2 Oct 2010
elev offs @elev=0 [arc sec]
azim offs @elev=0 [arc sec]
60
40
20
0
−20
−40
−60

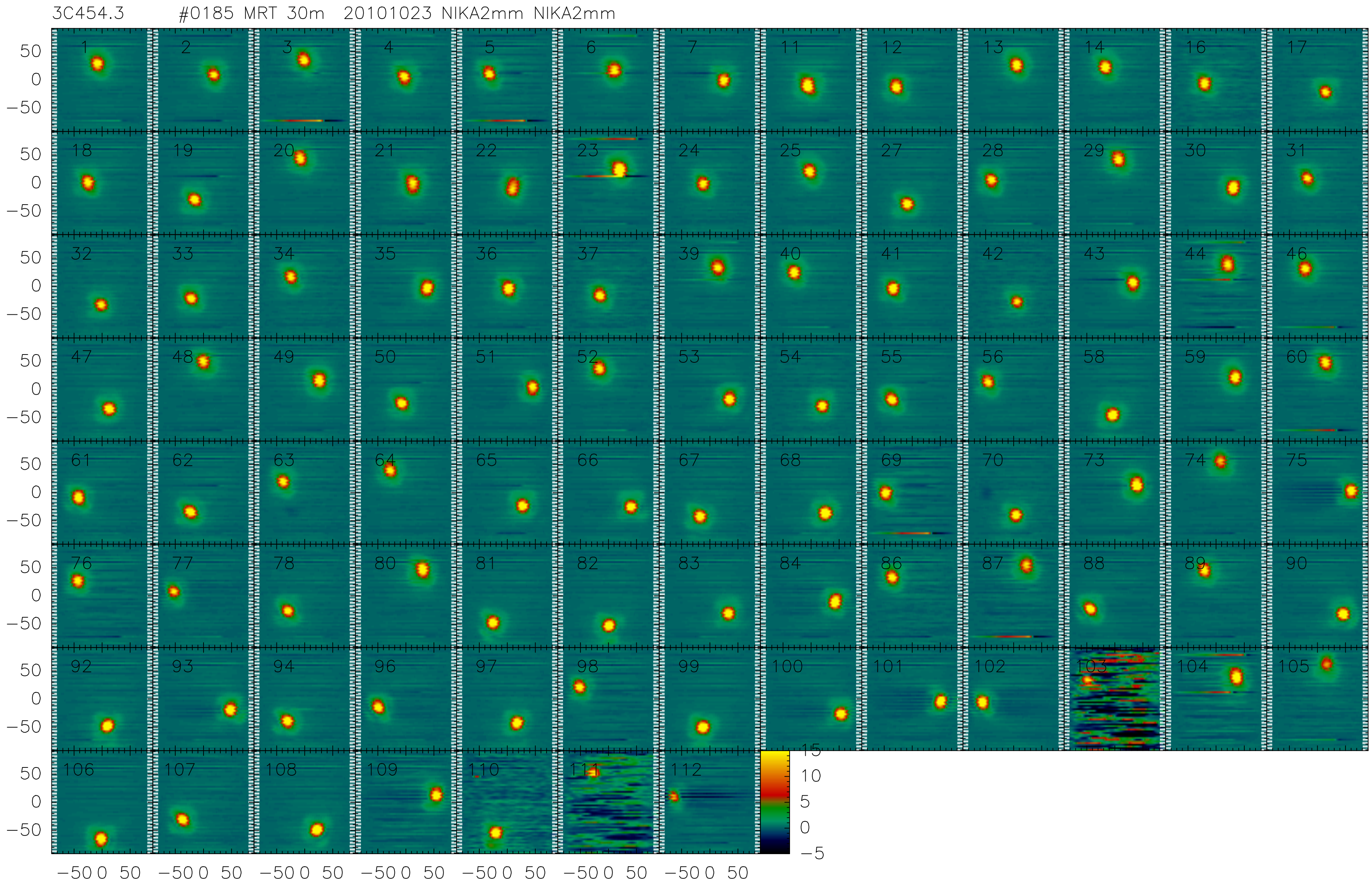

NIKA2mm (red) & NIKA1mm (blue) aver FoV run2 Oct 2010
elev offs @elev=0 [arc sec]
azim offs @elev=0 [arc sec]
60
40
20
0
−20
−40
−60
−60
−40
−20
0
20
40
60



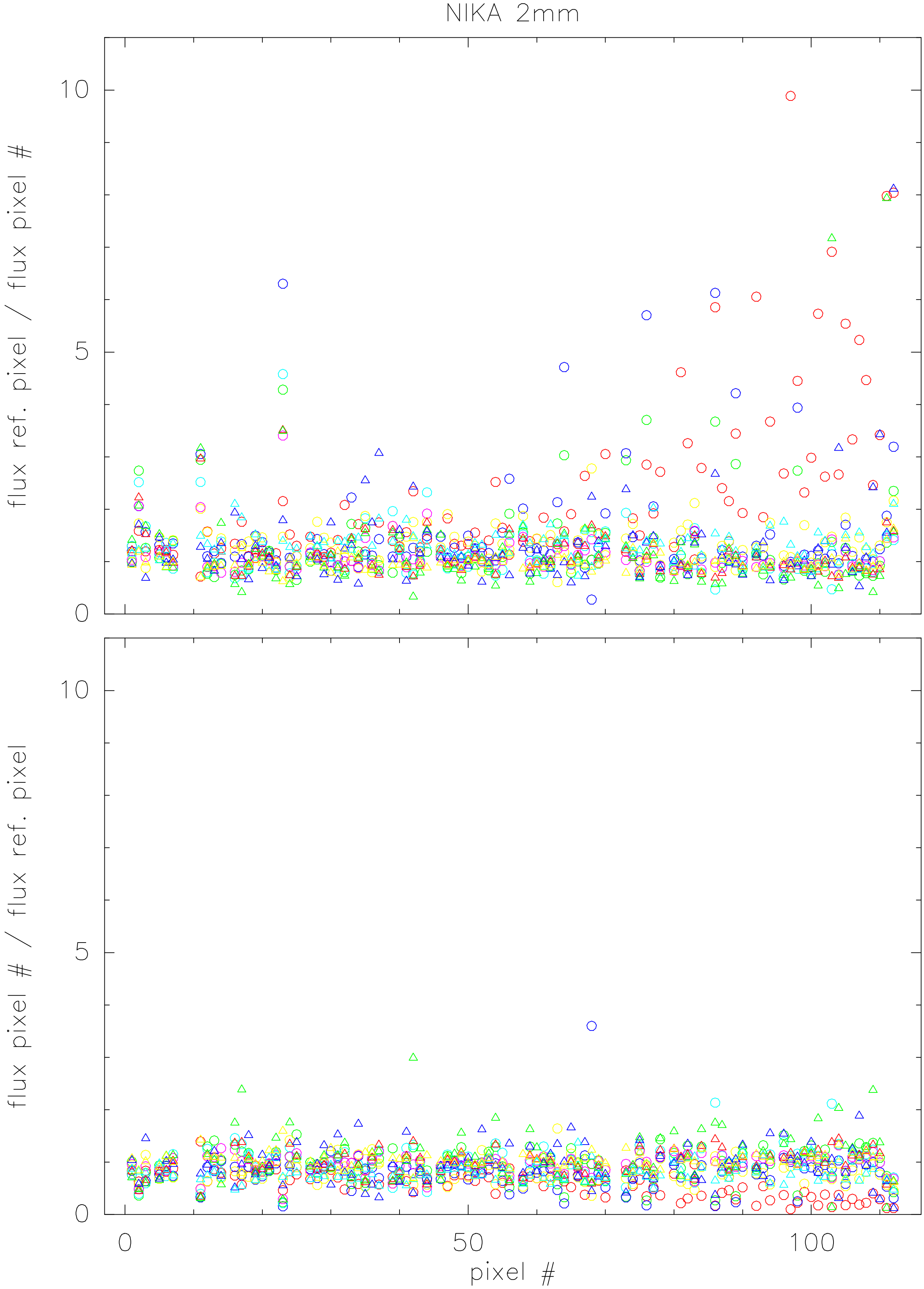
Mars
#0129 MRT 30m 20101018 NIKA2mm NIKA2mm


DR21OH #0232 MRT 30m 20101020 NIKA2mm NIKA2mm

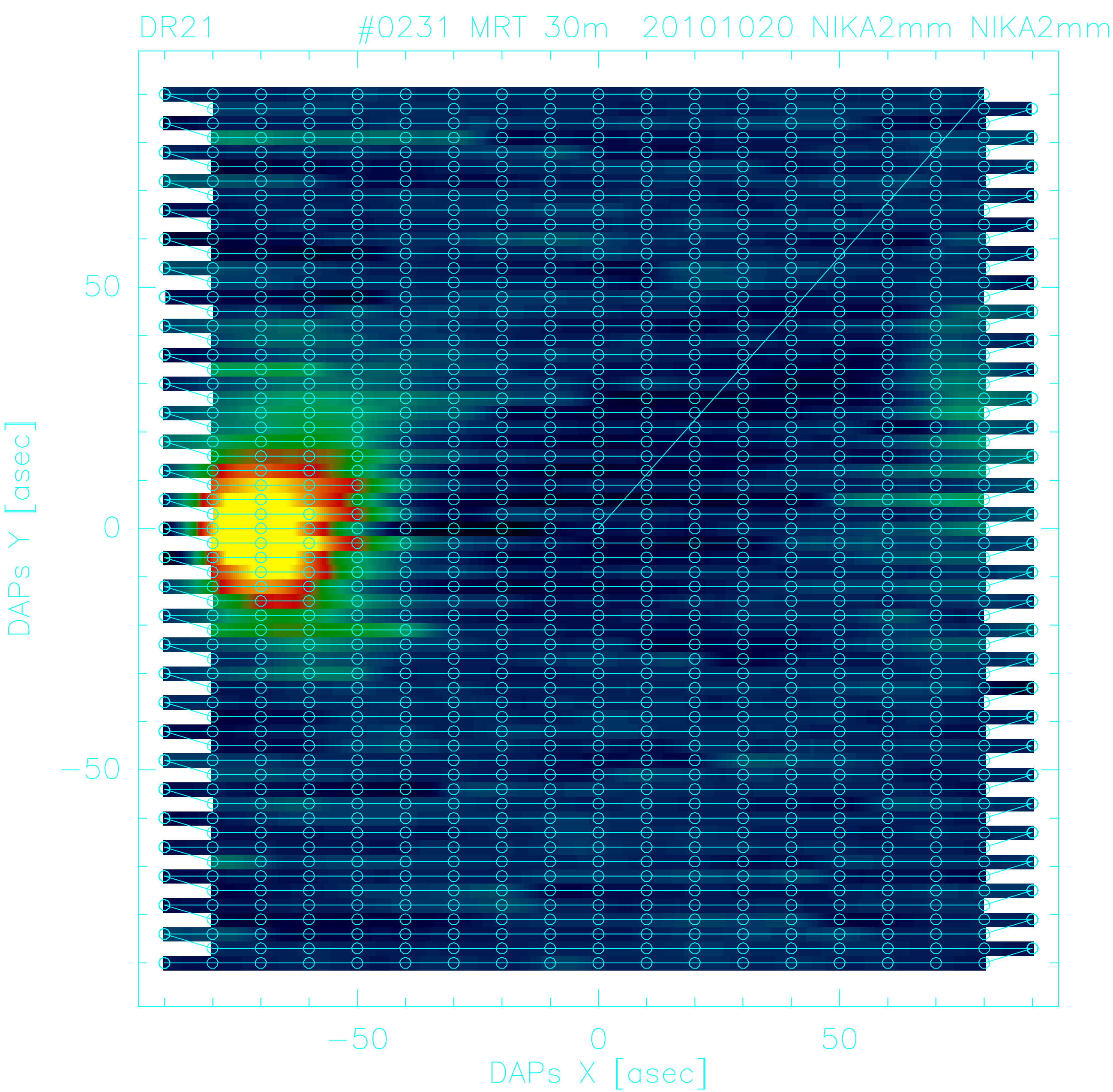

NIKA 1mm
flux ref. pixel / flux pixel #
flux pixel # / flux ref. pixel
10
5
0
10
5
0
0
50
pixel #



3C454.3 #0185 MRT 30m 20101023 NIKA2mm NIKA2mm



NIKA 2mm
flux ref. pixel / flux pixel #
flux pixel # / flux ref. pixel
pixel #
0
5
10
0
50
100


DR21
#0231 MRT 30m 20101020 NIKA2mm NIKA2mm
50
0
−50
DAPs Y [asec]
−50
0
50
DAPs X [asec]