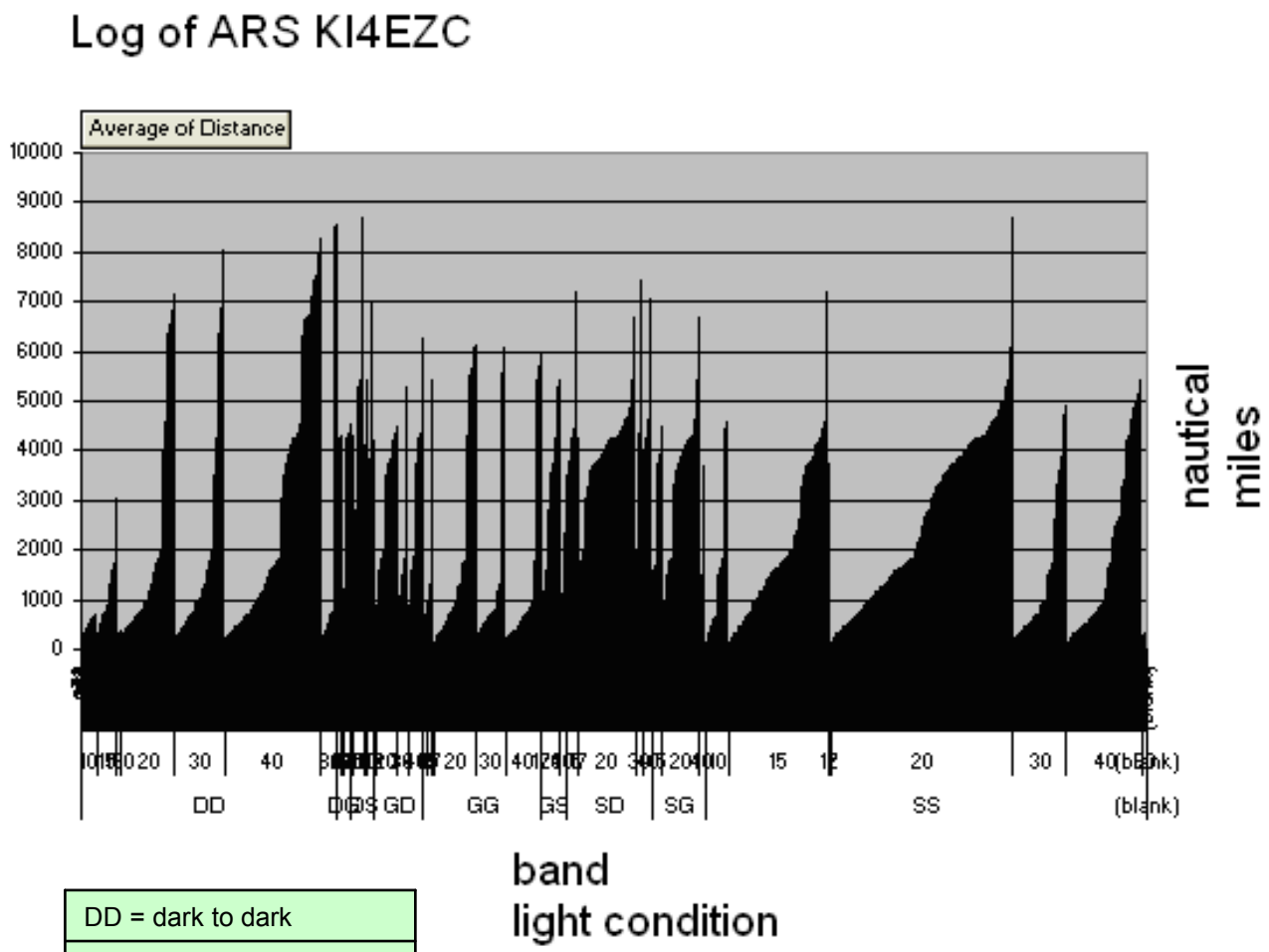
Gray Line = What bands

- ARRL = 160 and 80m
- NA5N and N4KG = 15 and 10m
- K9LA = “Anatomy of a 20m Gray line QSO”
- G0KYA = “The Twilight Zone” – ”My own studies show that enhancements on 10m do occur”

Theory Tested…

using my Log Data



DD = dark to dark
DG = dark to gray
DS = dark to sun
GD = gray to dark
GG = gray to gray
GS = gray to sun
SD = sun to dark
SG = sun to gray
SS = sun to sun

My greatest distance is Actually Sun to Sun!

(and not gray to gray) *

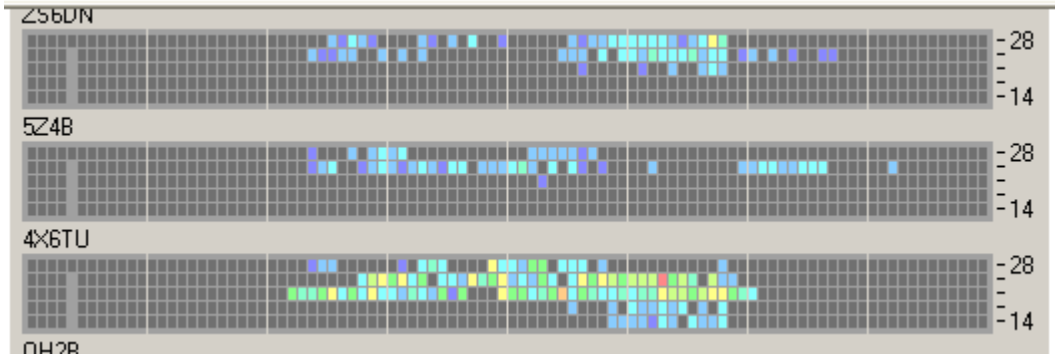
NCDXF Beacon Test Case

- My analysis of NCDXF monitor station CT1JTQ * 20th month actual data for 12 months (mostly 2011 data) shows no instance of GL improvement for 20 through 10m (attached)
- This does not mean that GL is a myth just that it is rare on 20 -10m
- CT1JTQ Radio: Yaesu FT-897 - Antenna: delta loop
- During most of the 12 months of analyzed data- these beacons were off-air
  - 4U1UN roof reconstruction
  - VK6RBP failure
  - CS3B antenna failure

* <http://www.iz1err.net/iz1fgu/prop/>

Monitor Station database

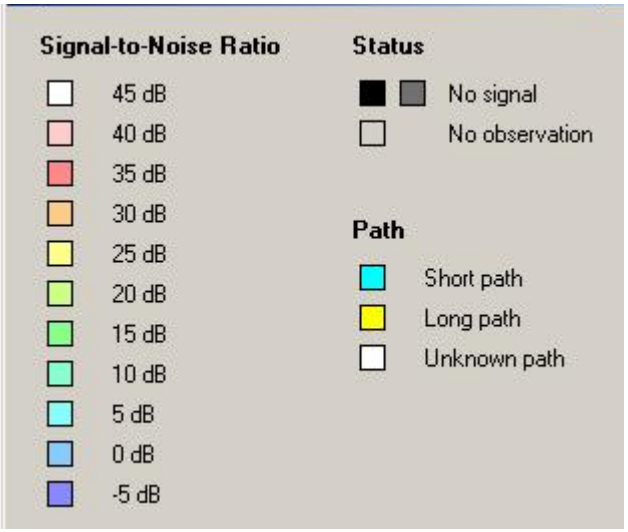
- Amount of saved data varies by monitor station (CT1JTQ has very complete data availability)
- They all use Faros



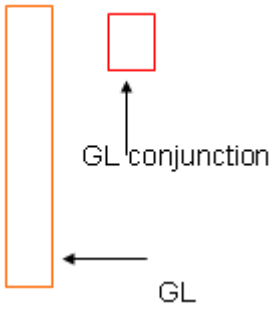
Z time from 0-24 across

Beacon call on left

Frequency 14 – 28 on right



My GL notation added:



Conjunction means beacon and monitor station were in GL at same time monitor station recorded reading

T – ground level sun terminator

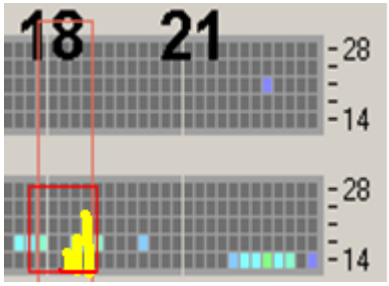
Expected vrs. Actual

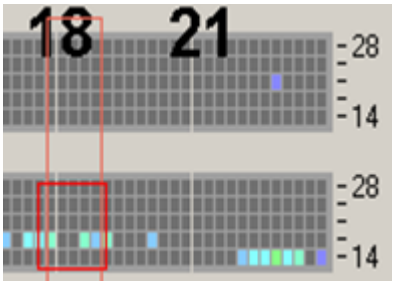
Expected : see an

Upturn in strength

At the several GL conjunctions:

Actual : GL conjunction
Is neutral to the expectation in all test Observations:





Exclamation of the left side bar report

Produced by the EZC gray line macro
the Lat and Long with location are the coordinates used for monitor station report
the Lat and Long associated with month and sunrise and sunset is the coordinate of the sun point/ sun point is earth position where sun is directly overhead
Location entities are NCDXF beacon stations
Bear - short path bearing to beacon in degrees from monitor station
dist – monitor station to beacon is in nautical miles as is sun D below
sun D - is the distance from beacon to the sun point (determines gray line advent)
MTGS - is minutes to start or end of gray line for this beacon advent/ also if beacon is
Proceeding to same or opposite advent as monitor station (sunrise vrs sunset or opposite)
> Proceeding towards
~ very long gray line twilights are indicated

SFI – solar flux index

12 months of CT1JTQ observations follow:

Confirmed Expectations

- Illuminated receiver- most receipts
- 20m more often received than 10m
- Tapering off after sunset sometime lasted approx 3- 6 hrs
- Daily signal profile often included the GL (just extended illumination?)

Oddities

- Signals tapering off after sunset many times maintained receipt of 10m
- So many available beacons were never received (blocked polar hops?)
- Poor night beacon reception in Europe (located in beacon dense area)

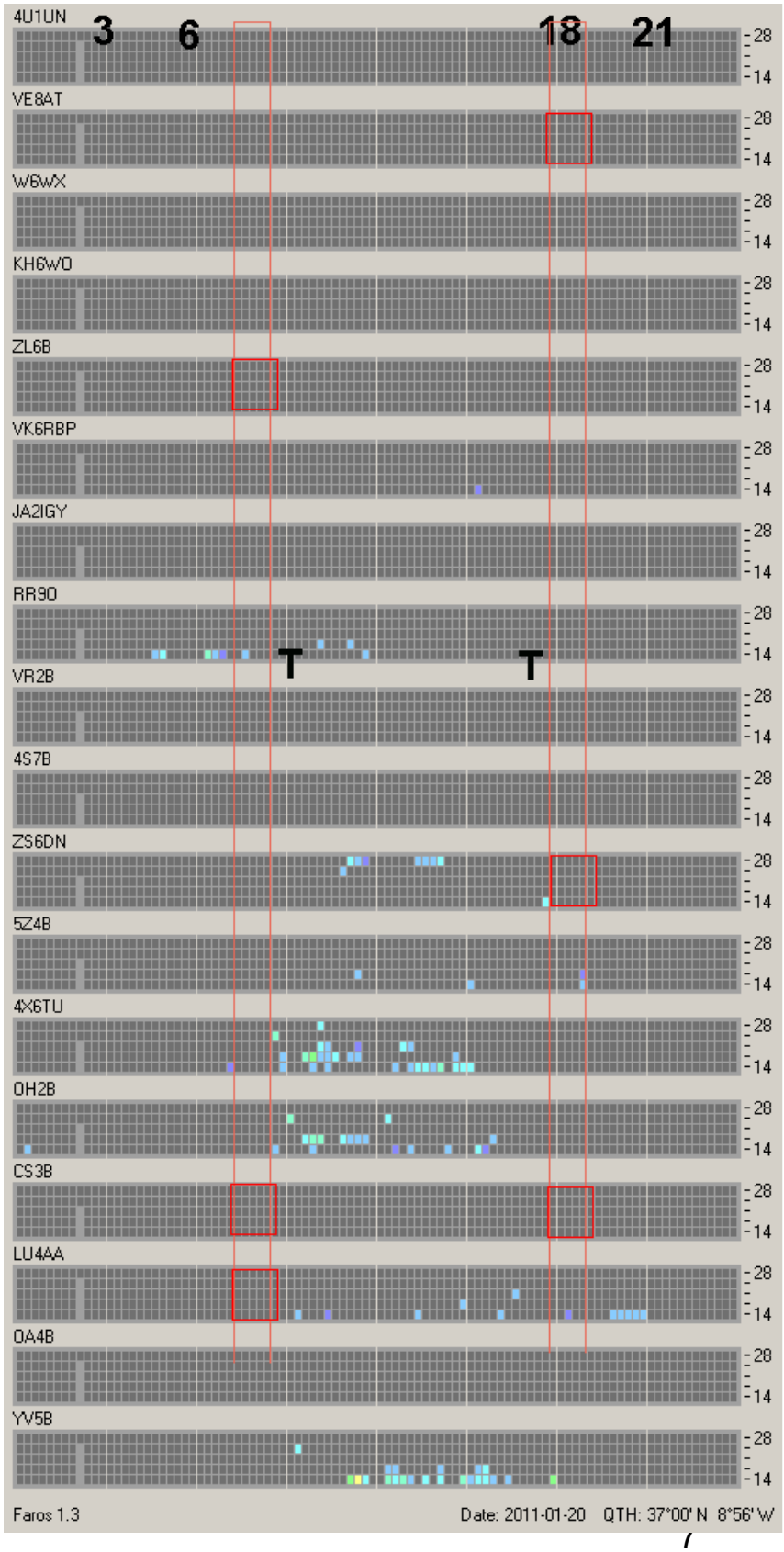
Relevant

- Only 9 (1/2 of the) beacons have an illuminated sun path to CT1JTQ for at least 10 out of 12 months while simultaneously giving at least 6 hours of illumination (consideration for 10 – 15 m)

20 Jan 2011 sfi: 81.8

```
Portugal (37.0208N,8.9583W)
21.5S,  64.04E            01-january

sunrise -45 mins @- 7:44UTC

DXCC Entity                          Bearg Dist  prefix      sun D MTGS
OC-New Zealand                       220   10479 5           5460  44>SS
EU-Madeira Is                        237   471   15          5649  17
SA-Argentine Republic                219   5106  16          6100  47

Portugal (37.0208N,8.9583W)
21.5S,  81.96W            01-january

sunset @- 17:50UTC

DXCC Entity                          Bearg Dist  prefix      sun D MTGS
NA-Canada                            336   3709  2           5559  11>SR
AF-South Africa (Republic of)        145   4321  11          5846  30>SR
EU-Madeira Is                        237   471   15          4944  >gray-30
```

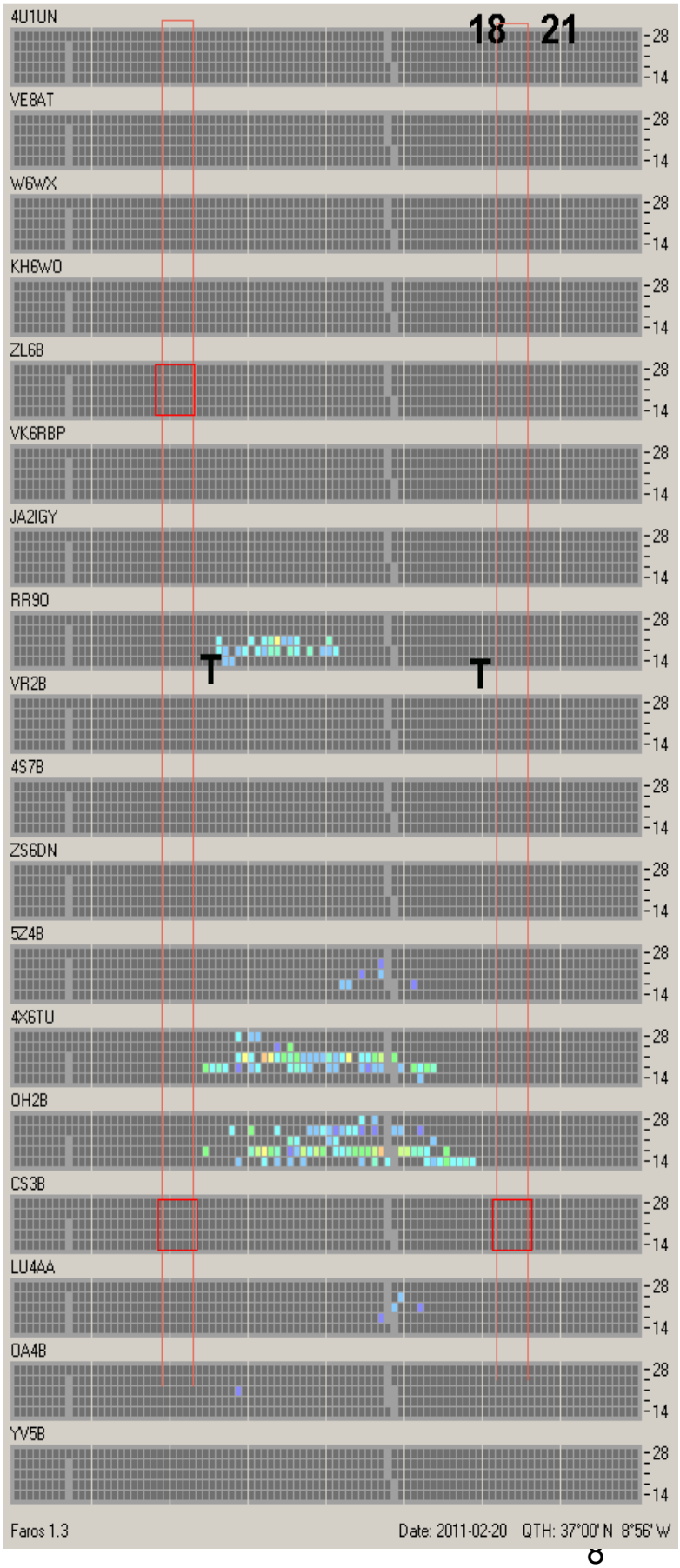
Zoom to 200% for view



20 Feb
sfi: 100.2

```
Portugal (37.0208N,8.9583W)
14.8S,  70.04E          02-february

sunrise -45 mins @~ 7:16UTC

DXCC Entity                          Beard Dist  prefix       sun D MTGS
OC-New Zealand                       220   10479 5            5496  42>SS
EU-Madeira Is                        237   471   15           5719  21

Portugal (37.0208N,8.9583W)
14.8S,  87.96W          02-february

sunset @~ 18:23UTC

DXCC Entity                          Beard Dist  prefix       sun D MTGS
EU-Madeira Is                        237   471   15           4967  >gray-29
```

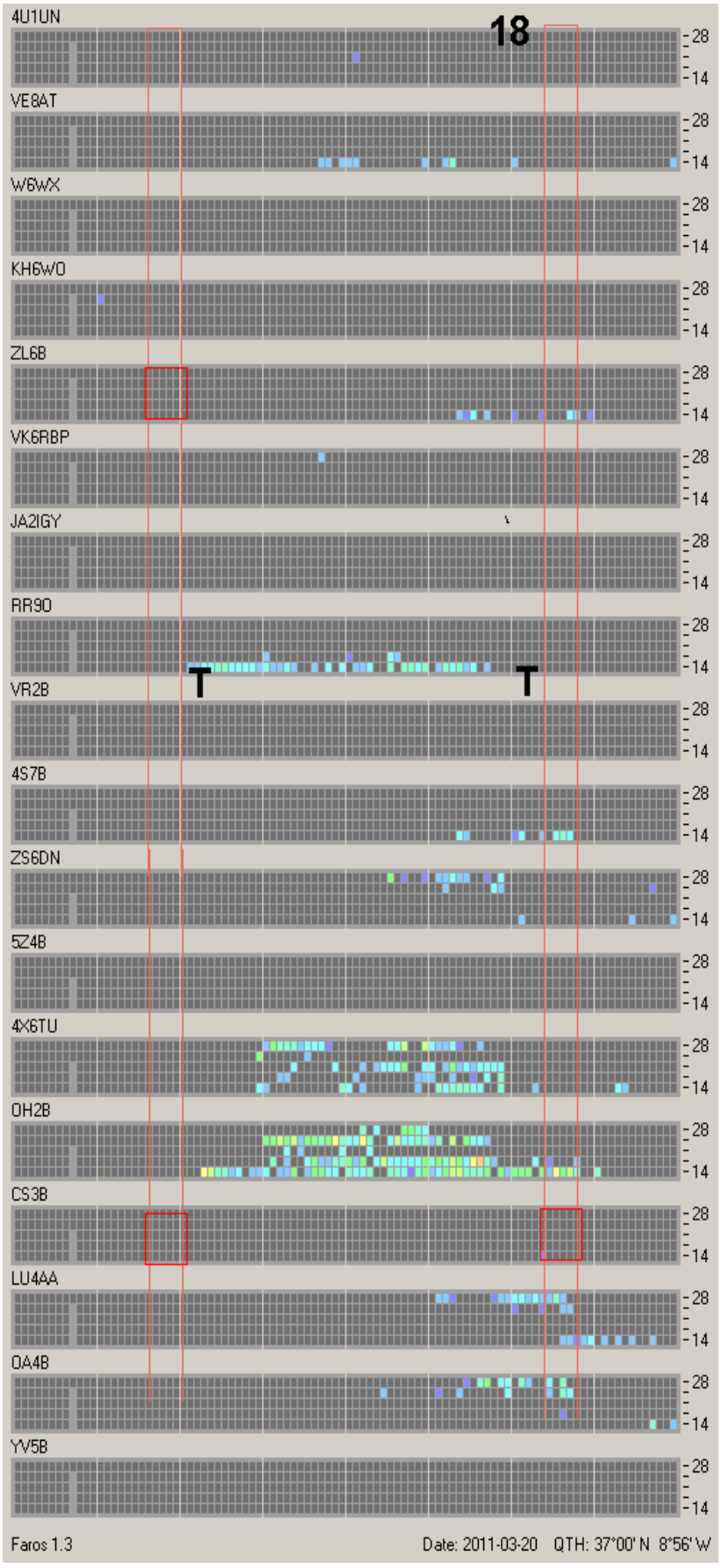
Zoom to 200% for view



20 Mar
sfi: 92.1

```
Portugal (37.0208N,8.9583W)
ON,  80.54E              03-march

sunrise -45 mins @- 6:38UTC

DXCC Entity                                Bearg Dist  prefix       sun D MTGS
OC-New Zealand                             220   10479 5            5629  33>SS
EU-Madeira Is                              237   471   15           5772  25

Portugal (37.0208N,8.9583W)
ON,  98.46W              03-march

sunset @- 18:46UTC

DXCC Entity                                Bearg Dist  prefix       sun D MTGS
EU-Madeira Is                              237   471   15           4979  >gray-28
```

Zoom to 200% for view

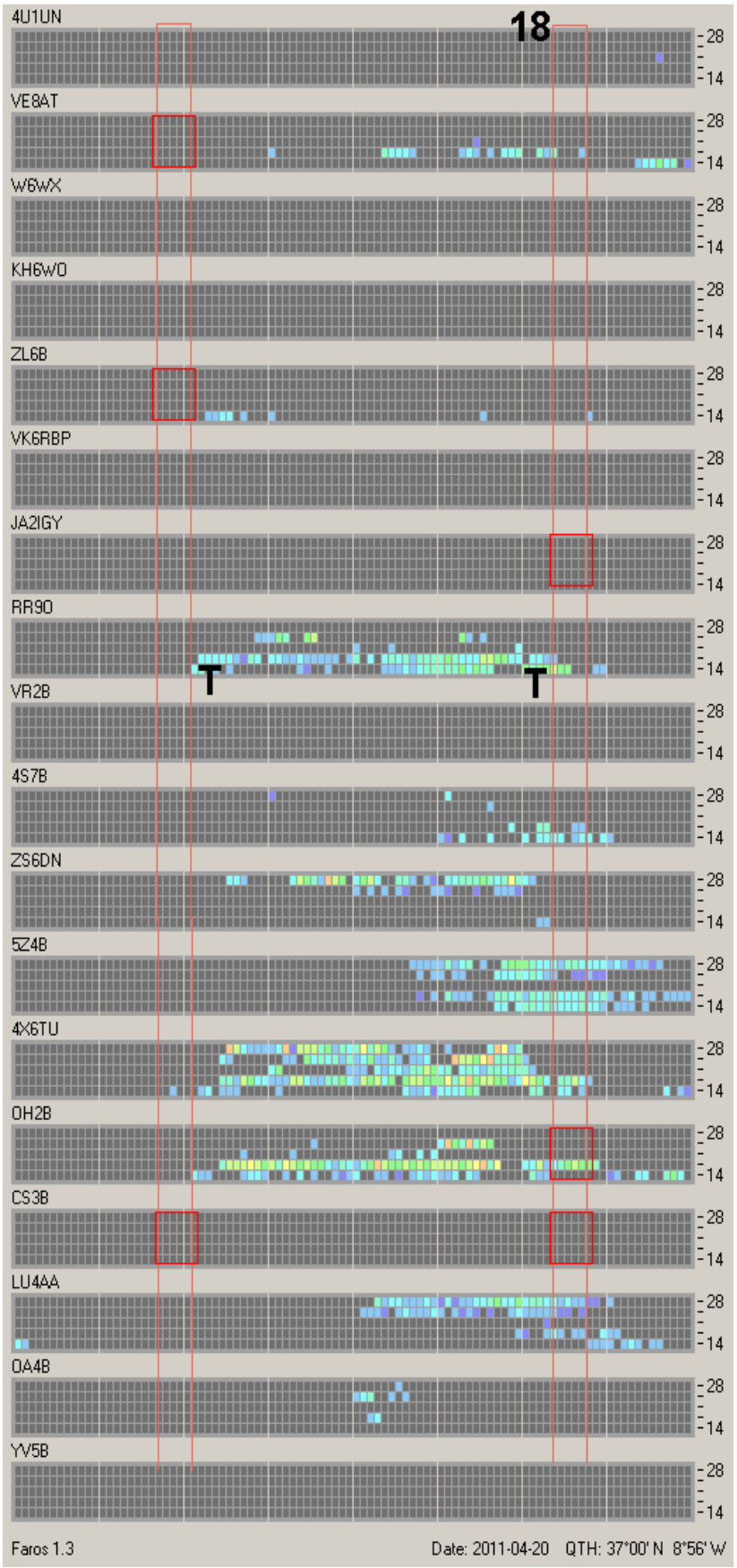


Ki4ezc oct 2011

20 Apr
sfi: 113.5

```
Portugal (37.0208N,8.9583W)
13.3N,  91.04E              04-april

sunrise -45 mins @- 5:56UTC

DXCC Entity                          Bearg Dist  prefix       sun D MTGS
NA-Canada                            336   3709  2            5801  21>SS
OC-New Zealand                       220   10479 5            5681  29>SS
EU-Madeira Is                        237   471   15           5841  29

Portugal (37.0208N,8.9583W)
13.3N,  108.96W             04-april

sunset @- 19:13UTC

DXCC Entity                          Bearg Dist  prefix       sun D MTGS
AS-Japan                             28    6105  7            6091  46>SR
EU-Finland                           31    1885  14           5837  29>SR
EU-Madeira Is                        237   471   15           5081  >gray-21
```

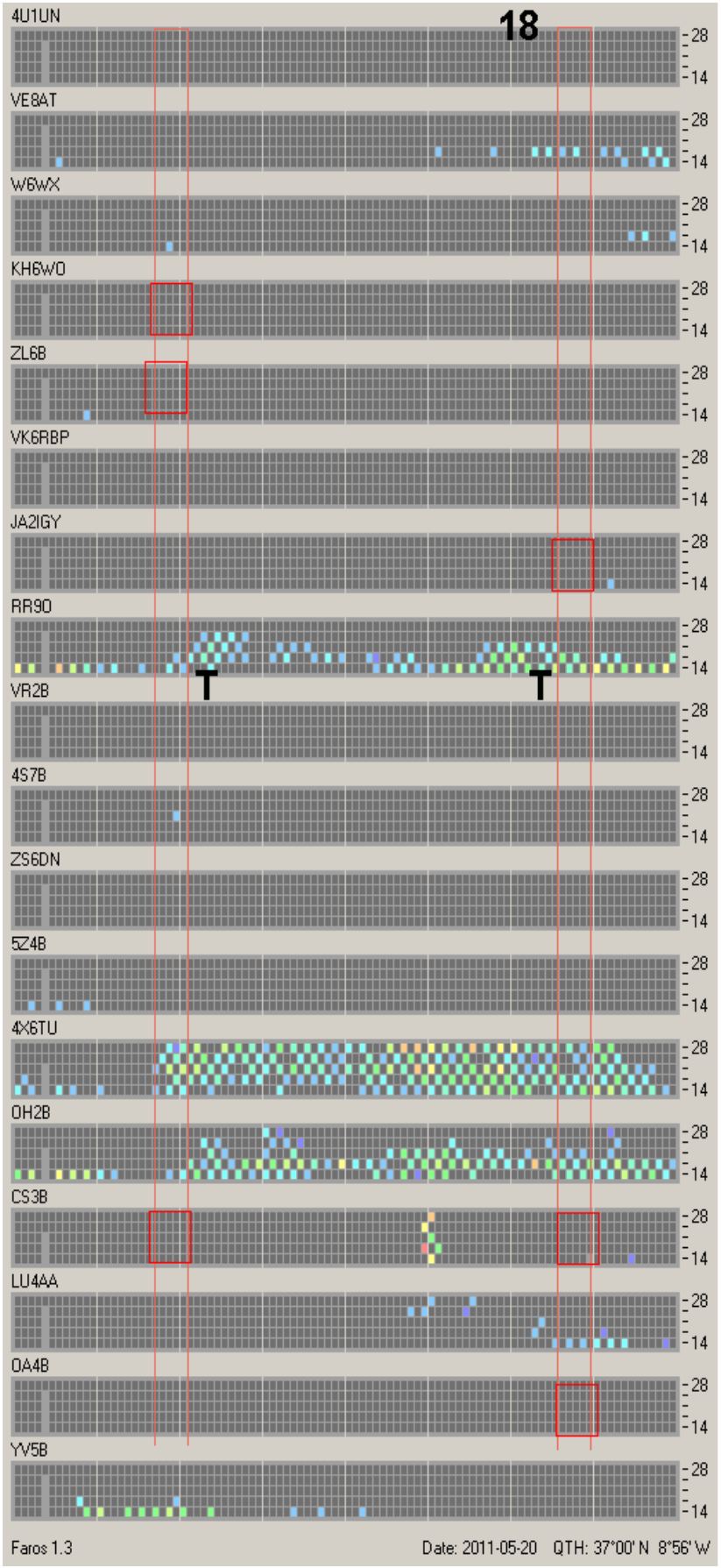
Zoom to 200% for view



20 May
sfi: 83.1

```
Portugal (37.0208N,8.9583W)
21N,  97.54E              05-may

sunrise -45 mins @~ 5:29UTC

DXCC Entity                                Bearg Dist  prefix      sun D MTGS
NA-Hawaii_United States of America         328   6868  4           5696  28>SS
OC-New Zealand                             220   10479 5           5709  27>SS
EU-Madeira Is                              237   471   15          5855  30

Portugal (37.0208N,8.9583W)
21N,  115.46W             05-may

sunset @~ 19:37UTC

DXCC Entity                                Bearg Dist  prefix      sun D MTGS
AS-Japan                                   28    6105  7           5511  7>SR
EU-Finland                                 31    1885  14          5530  9 to ~ >SR
EU-Madeira Is                              237   471   15          5145  >gray-17
```

Zoom to 200% for view

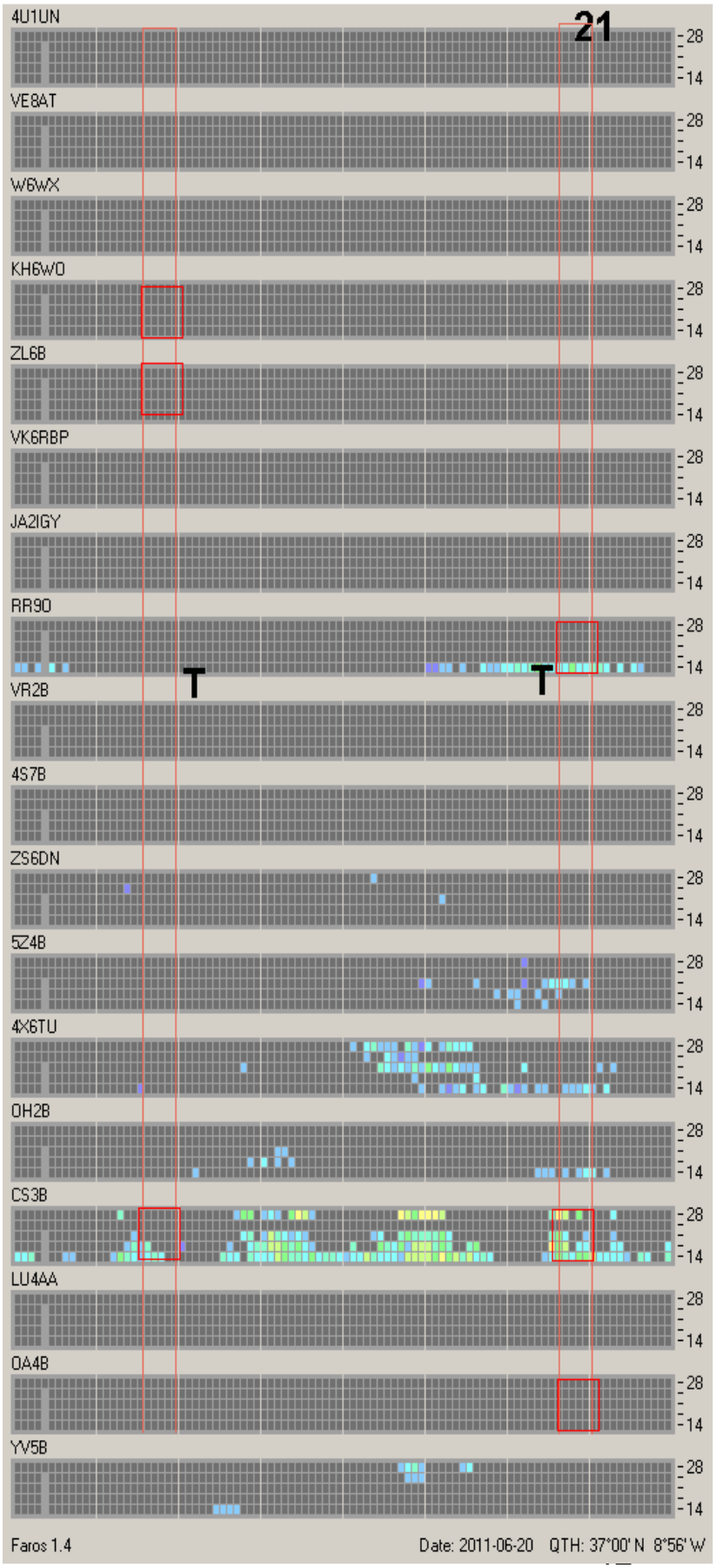


Ki4ezc oct 2011

20 Jun
sfi: 94.9

```
Portugal (37.0208N,8.9583W)
23.5N,  100.04E            06-june

sunrise -45 mins @~ 5:20UTC

DXCC Entity                                Bearg Dist  prefix       sun D MTGS
NA-Hawaii_United States of America         328   6868  4            5507  41>SS
OC-New Zealand                             220   10479 5            5708  27>SS
EU-Madeira Is                              237   471   15           5865  31

Portugal (37.0208N,8.9583W)
23.5N,  117.96W            06-june

sunset @~ 19:52UTC

DXCC Entity                                Bearg Dist  prefix       sun D MTGS
EU-Russian Federation                      41    3686  8            5971  38 to ~ >SR
EU-Finland                                 31    1885  14           5430  2 to ~ >SR
EU-Madeira Is                              237   471   15           5178  >gray-15
```

Zoom to 200% for view

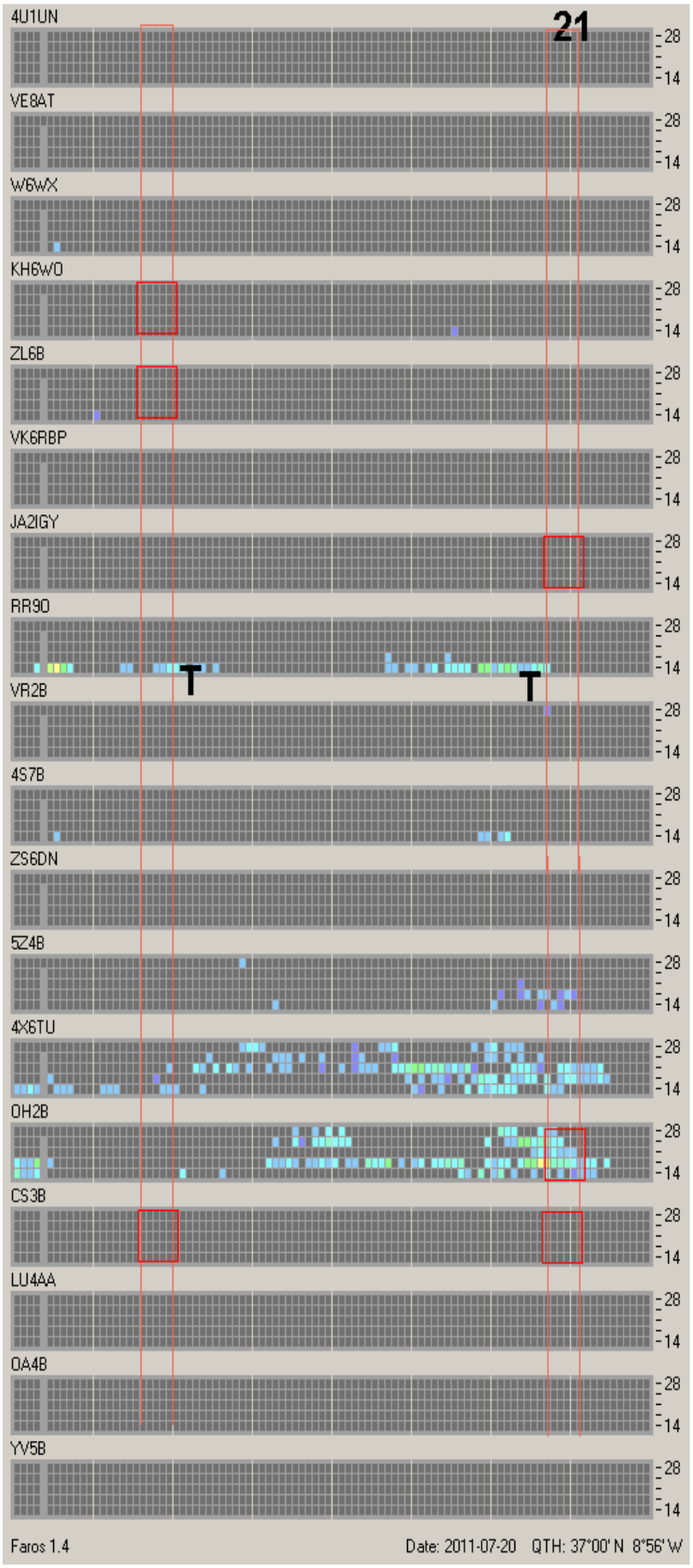


Ki4ezc oct 2011

20 Jul
sfi: 99.4

```
Portugal (37.0208N,8.9583W)
21N,  97.54E              07-july

sunrise -45 mins @- 5:37UTC

DXCC Entity                          Beard Dist  prefix      sun D MTGS
NA-Hawaii_United States of America   328   6868  4           5696  28>SS
OC-New Zealand                       220   10479 5           5709  27>SS
EU-Madeira Is                        237   471   15          5855  30

Portugal (37.0208N,8.9583W)
21N,  115.46W             07-july

sunset @- 19:41UTC

DXCC Entity                          Beard Dist  prefix      sun D MTGS
AS-Japan                             28    6105  7           5511  7>SR
EU-Finland                           31    1885  14          5530  9 to - >SR
EU-Madeira Is                        237   471   15          5145  >gray-17
```

Zoom to 200% for view



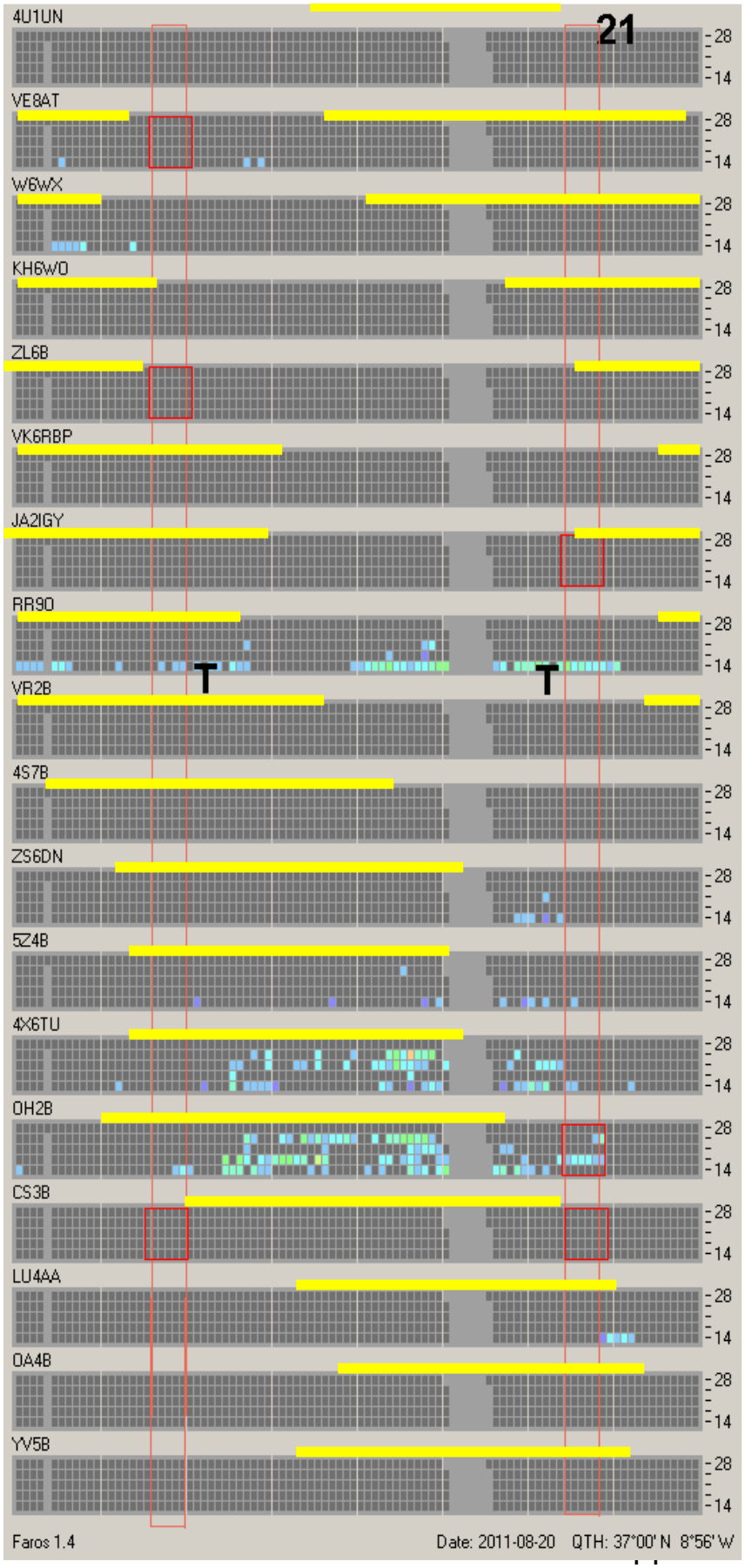
Ki4ezc oct 2011

20 Aug
sfi:102.0

```
Portugal (37.0208N,8.9583W)
13.3N,  91.04E              08-august

sunrise -45 mins @- 5:59UTC

DXCC Entity                          Bearg Dist  prefix      sun D MTGS
NA-Canada                            336   3709  2           5801  21>SS
OC-New Zealand                       220   10479 5           5681  29>SS
EU-Madeira Is                        237   471   15          5841  29

Portugal (37.0208N,8.9583W)
13.3N,  108.96W             08-august

sunset @- 19:16UTC

DXCC Entity                          Bearg Dist  prefix      sun D MTGS
AS-Japan                             28    6105  7           6091  46>SR
EU-Finland                           31    1885  14          5837  29>SR
EU-Madeira Is                        237   471   15          5081  >gray-21
```

Zoom to 200% for view

Sun light at origin

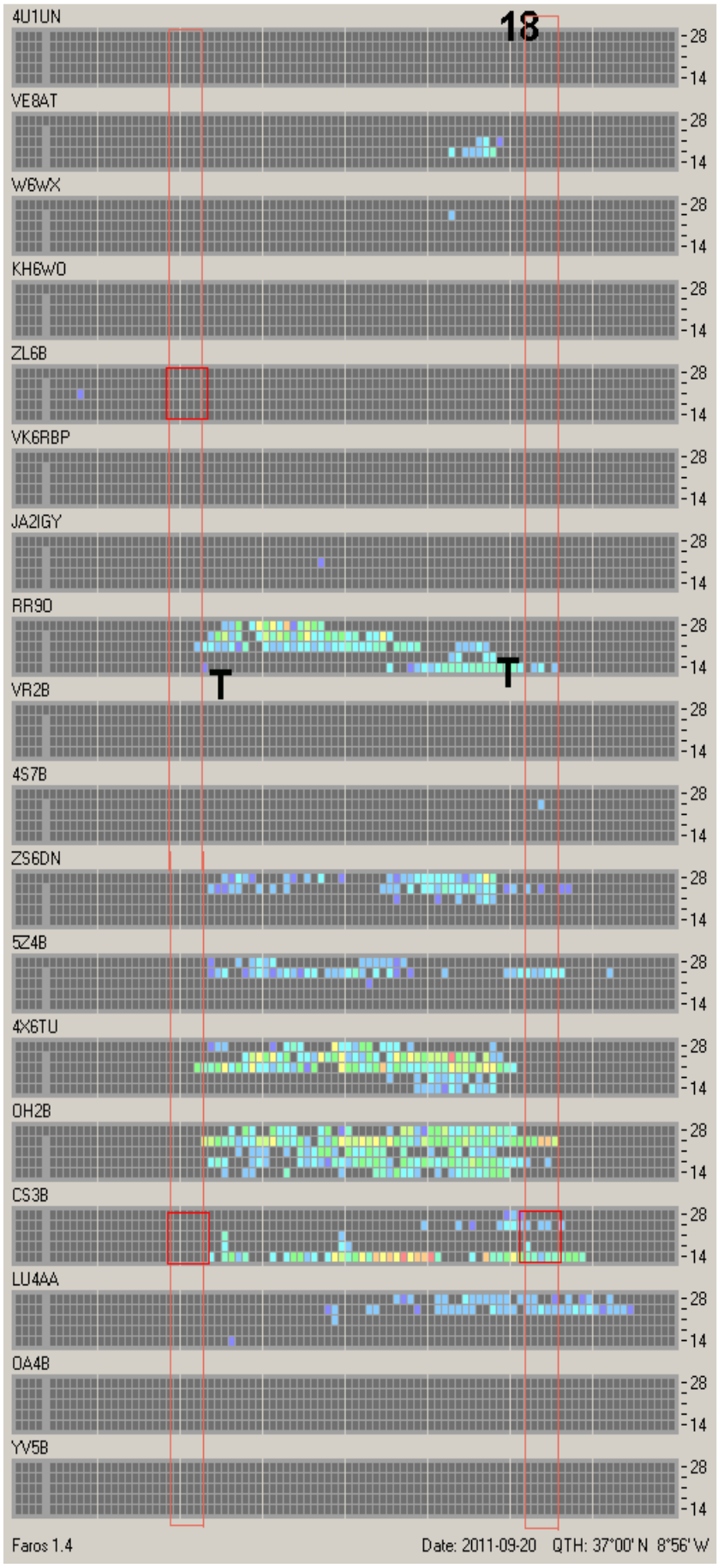


Ki4ezc oct 2011

20 Sep
sfi: 141.0

```
Portugal (37.0208N,8.9583W)
ON,  80.54E                09-september

sunrise -45 mins @- 6:25UTC

DXCC Entity                                Bearg Dist  prefix       sun D MTGS
OC-New Zealand                             220   10479 5            5629  33>SS
EU-Madeira Is                              237   471   15           5772  25

Portugal (37.0208N,8.9583W)
ON,  98.46W                09-september

sunset @- 18:34UTC

DXCC Entity                                Bearg Dist  prefix       sun D MTGS
EU-Madeira Is                              237   471   15           4979  >gray-28
```

Zoom to 200% for view

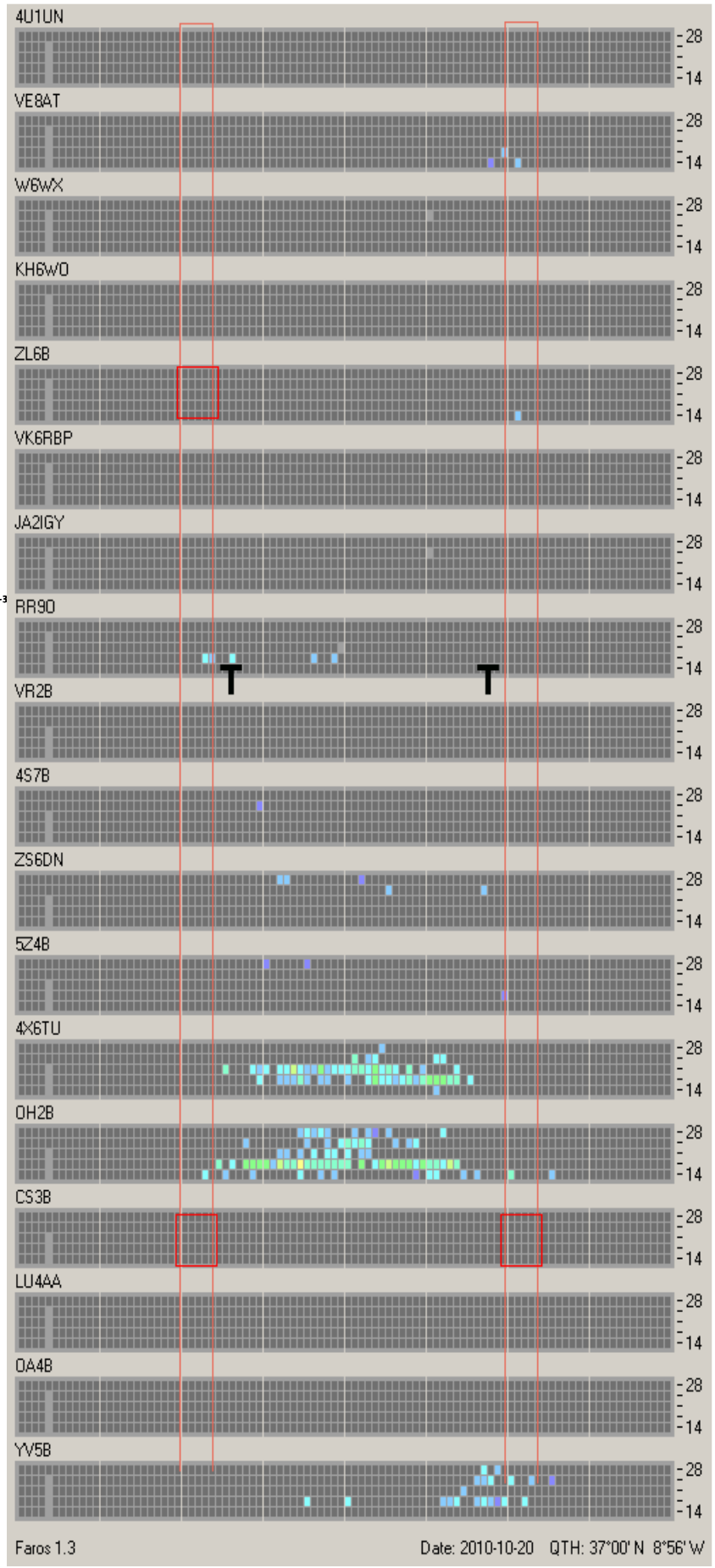


Ki4ezc oct 2011

20 Oct, 2010
sfi: 82.0

```
Portugal (37.0208N,8.9583W)
13S,  71.04E              10-october

sunrise -45 mins @~ 6:47UTC

DXCC Entity                                Bearg Dist  prefix       sun D MTGS
OC-New Zealand                             220   10479 5            5528  39>SS
EU-Madeira Is                              237   471   15           5710  21

Portugal (37.0208N,8.9583W)
13S,  88.9583W            10-october

sunset @~ 17:53UTC

DXCC Entity                                Bearg Dist  prefix       sun D MTGS
EU-Madeira Is                              237   471   15           4950  >gray-3
```

Zoom to 200% for view

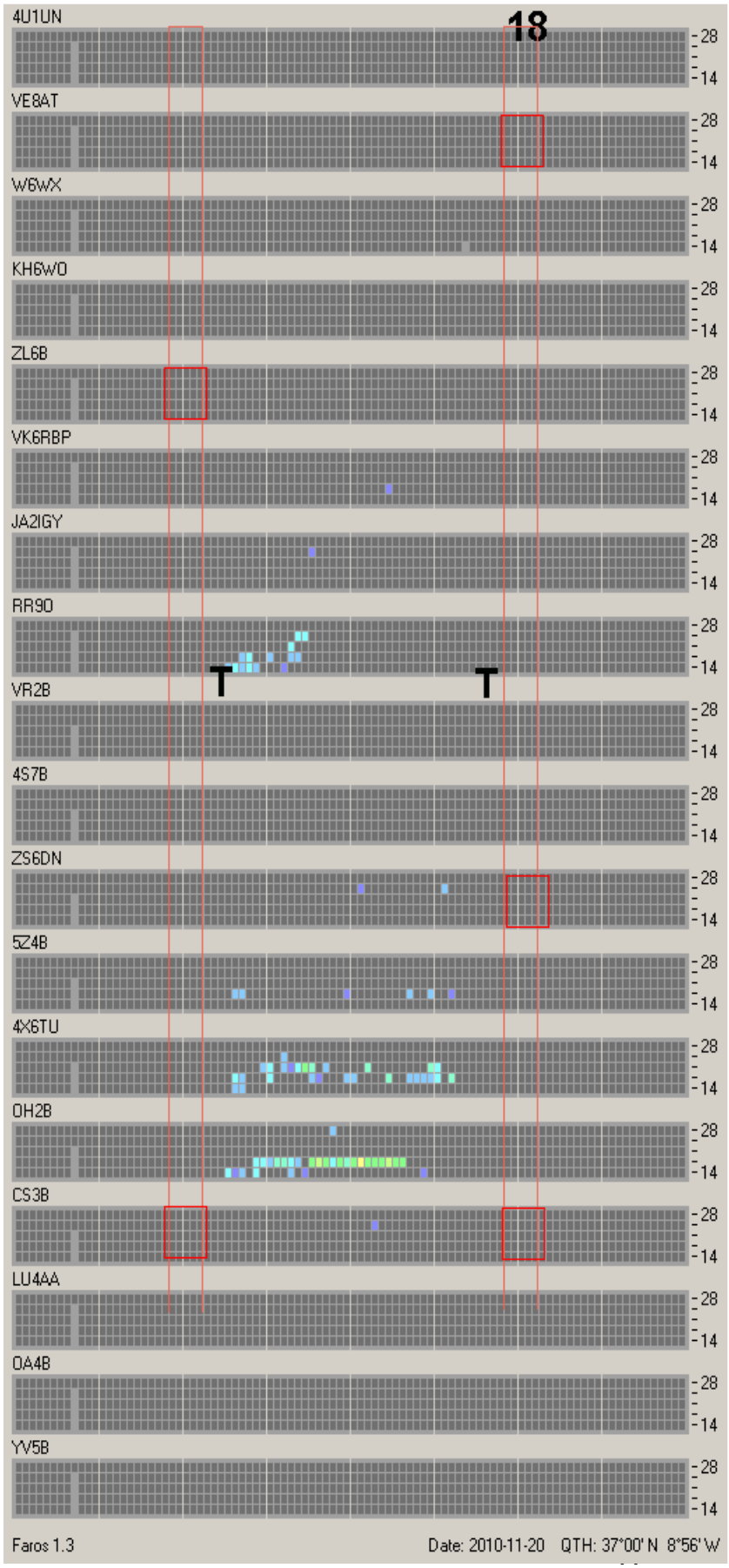


Ki4ezc oct 2011

20 Nov
sfi: 76.9

```
Portugal (37.0208N,8.9583W)
20.5S,  65.04E            11-november

sunrise -45 mins @- 7:17UTC

DXCC Entity                          Bearg Dist  prefix       sun D MTGS
OC-New Zealand                       220   10479 5            5463  44>SS
EU-Madeira Is                        237   471   15           5663  18

Portugal (37.0208N,8.9583W)
20.5S,  82.96W            11-november

sunset @- 17:26UTC

DXCC Entity                          Bearg Dist  prefix       sun D MTGS
NA-Canada                            336   3709  2            5489  6>SR
AF-South Africa (Republic of)        145   4321  11           5926  35>SR
EU-Madeira Is                        237   471   15           4949  >gray-30
```

Zoom to 200% for view



Ki4ezc oct 2011

20 Dec
sfi: 75.3

Portugal (37.0208N,8.9583W)
23.5S, 62.04E 12~december

sunrise -45 mins @~ 7:44UTC

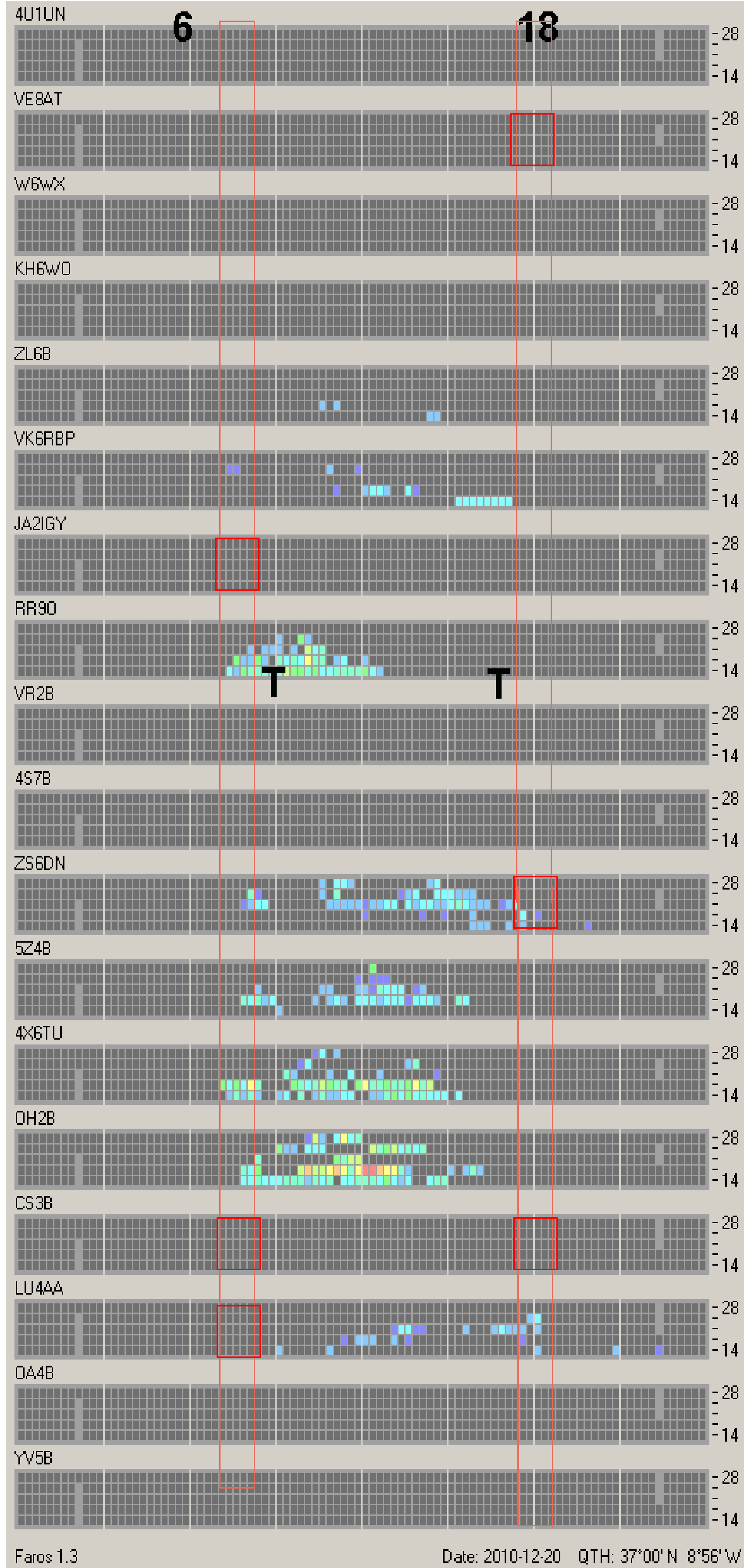
DXCC Entity	Bearg	Dist	prefix	sun D	MTGS
OC-New Zealand	220	10479	5	5451	45>SS
AS-Japan	28	6105	7	5492	42>SS
EU-Madeira Is	237	471	15	5623	15
SA-Argentine Republic	219	5106	16	5936	36

Portugal (37.0208N,8.9583W)
23.5S, 79.96W 12~december

sunset @~ 17:23UTC

DXCC Entity	Bearg	Dist	prefix	sun D	MTGS
NA-Canada	336	3709	2	5700	20>SR
AF-South Africa (Republic of)	145	4321	11	5689	19>SR
EU-Madeira Is	237	471	15	4936	>gray-31

Zoom to 200% for view



Ki4ezc oct 2011