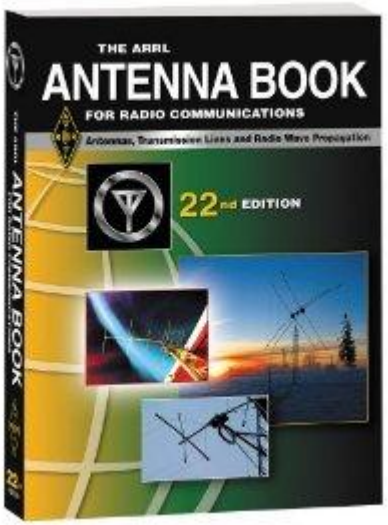
DXCC Honor Roll: The "Final Mile"

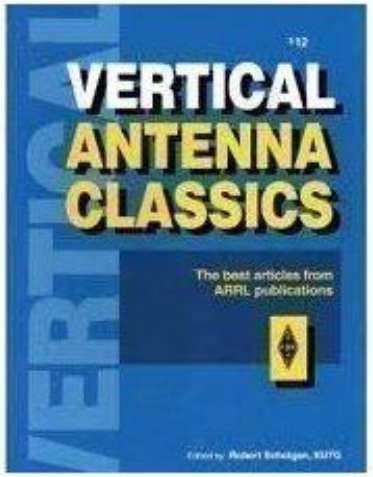
(or how HFTA saved my sanity!)

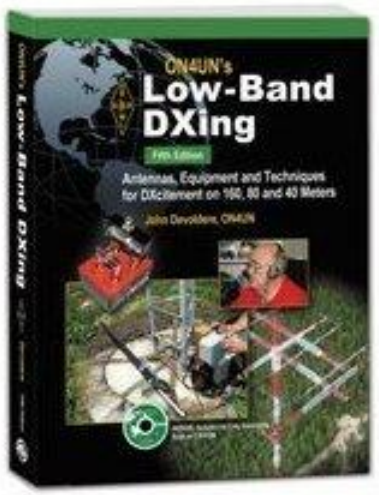
A "Little Pistol" Adventure

Rich Holoch, KY6R

And Now a Word from our Sponsor





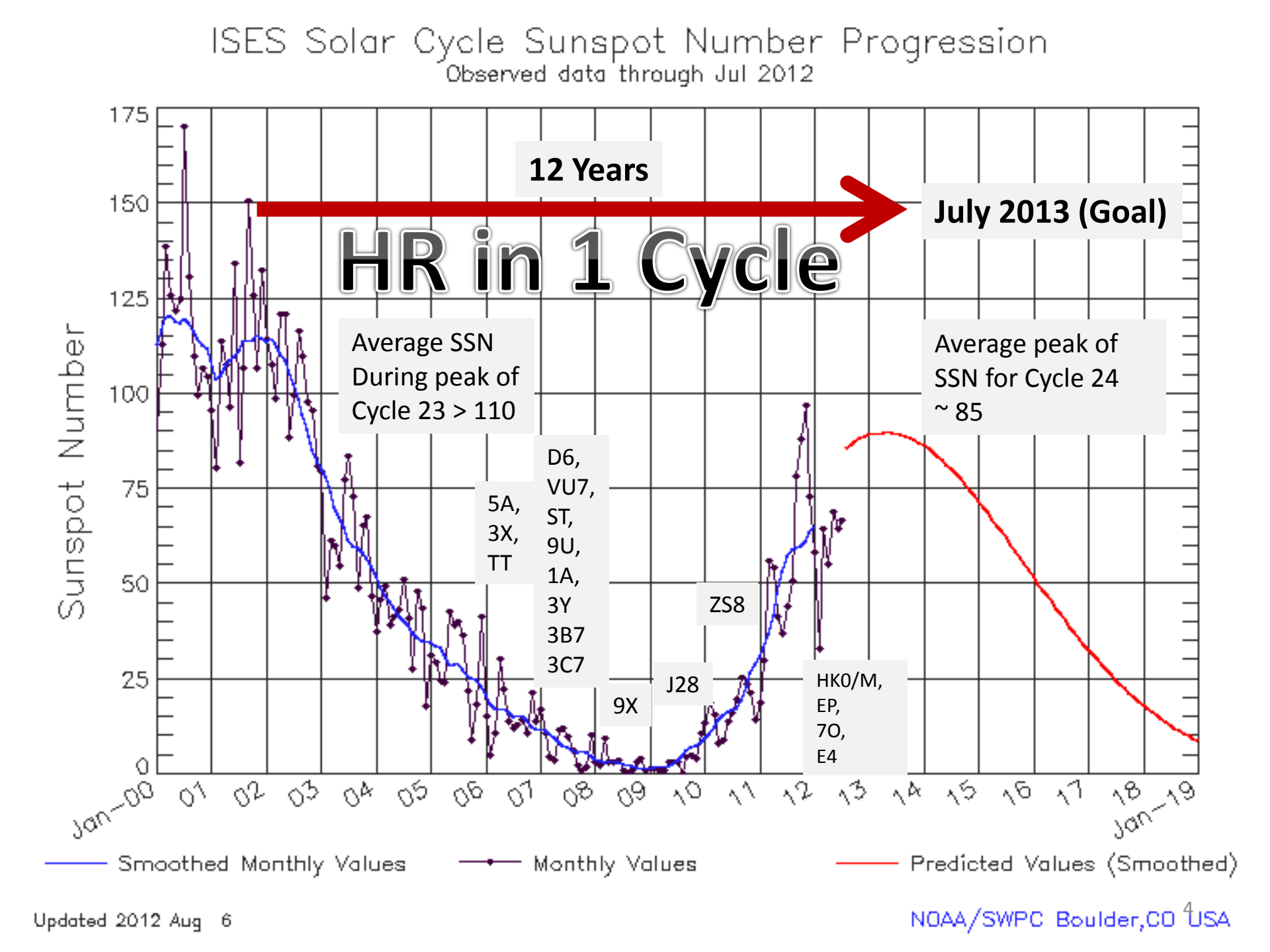


A big thanks to Dean Straw, N6BV, who has been the Chief Editor and contributor of the ARRL Antenna Book as well as many other ARRL publications.

Dean's HFTA and YW programs and propagation charts have made a noticeable improvement in my DX-ing "career" and are featured in this presentation.

Data Architect, Database Designer and Programmer for 31 years

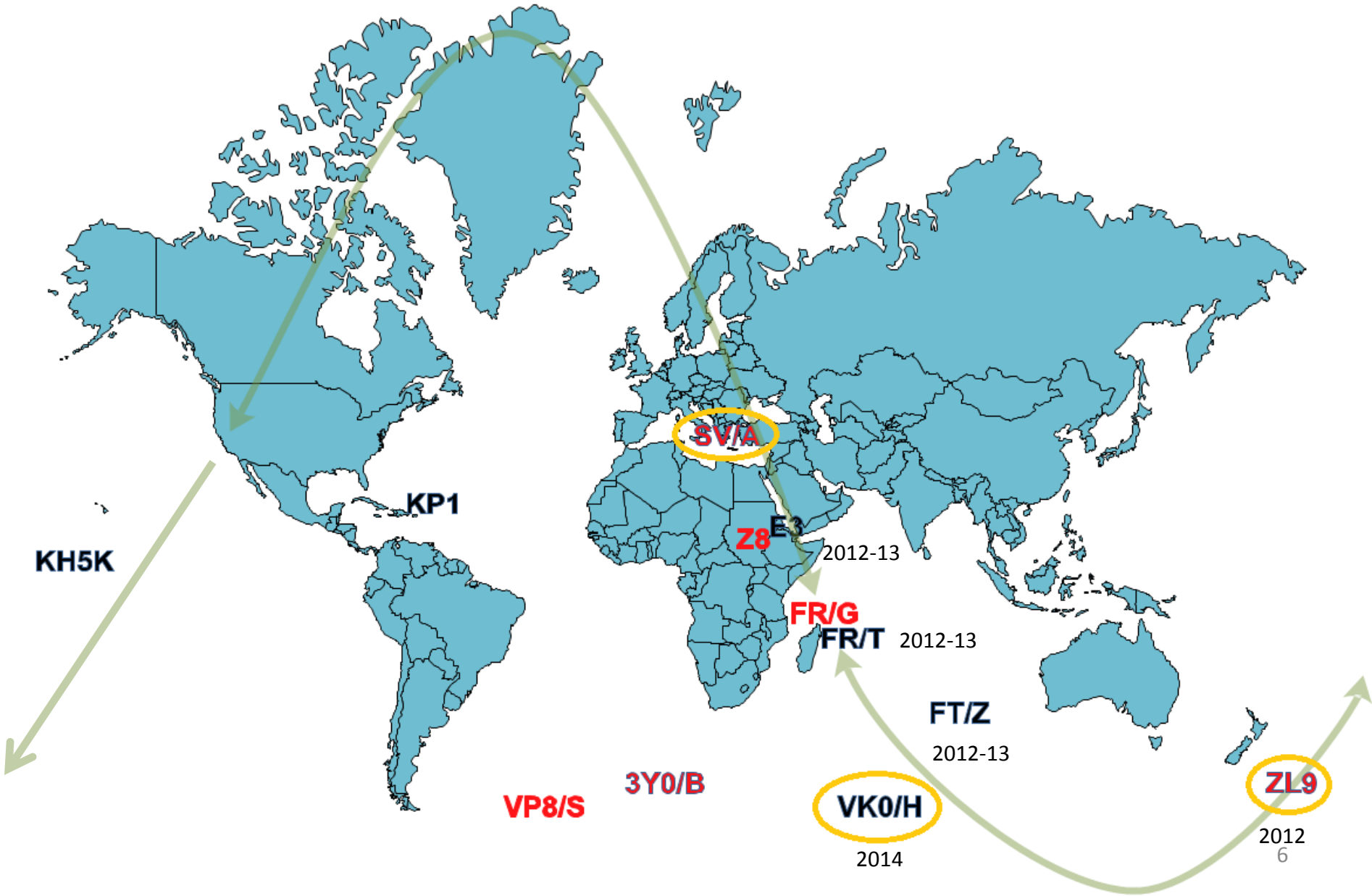
- 130th employee at Oracle
- 30th at Gupta Technologies
- 474th at PeopleSoft
- Senior Data Architect at Macys.com


ISES Solar Cycle Sunspot Number Progression
Observed data through Jul 2012
12 Years
July 2013 (Goal)
HR in 1 Cycle
Average SSN
During peak of
Cycle 23 > 110
Average peak of
SSN for Cycle 24
~ 85
5A,
3X,
TT
D6,
VU7,
ST,
9U,
1A,
3Y
3B7
3C7
9X
J28
ZS8
HK0/M,
EP,
7O,
E4
Sunspot Number
175
150
125
100
75
50
25
0
Jan-00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
Jan-19
Smoothed Monthly Values
Monthly Values
Predicted Values (Smoothed)
Updated 2012 Aug 6
NOAA/SWPC Boulder,CO USA

Lil' Pistol's Big DXCC Adventure!

- Started DX-ing in 2001
  - 332 entities confirmed
  - 328 count for Honor Roll
  - 300 wire and < 200W
  - 8BDXCC
  - 1800 DXCC Challenge

What I Need to Get Them All



PROBLEM: DXCC “Log Jam” 2009 - 2011

As a reference – the SSN for June 2012 is 71 and estimated at 85 for the Cycle 24 peak – May, 2013 November 2001 – the second Cycle 23 peak reached 115. No wonder wire and 200 watts worked!

I Couldn’t compete in these big pileups:

FT5GA

2009 - SSN = 7.1

E4X

2010 - SSN = 16.3

ST0R

2011 - SSN = 57.3

My main goal is to not miss any more.

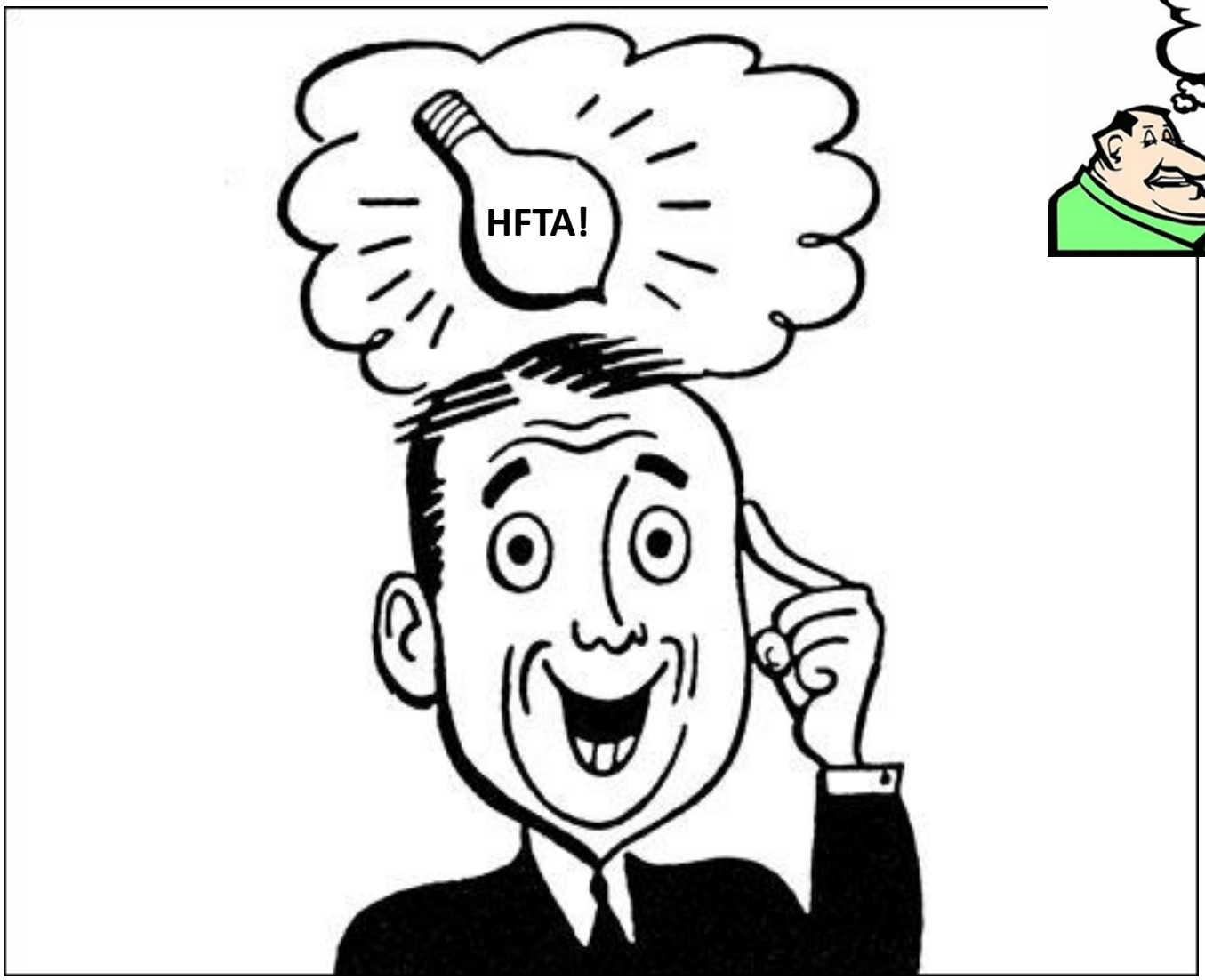
Enter HFTA . . .

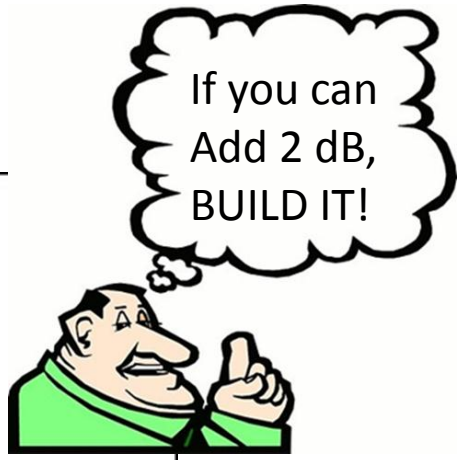
- Dean Straw, N6BV's Pacificon 2011 Antenna Forum Presentation:

  "How Does My Little Gun Compare to a Superstation?".

  "In a pileup, even 1 or 2 dB can make a difference in getting through"

My HFTA "Epiphany"





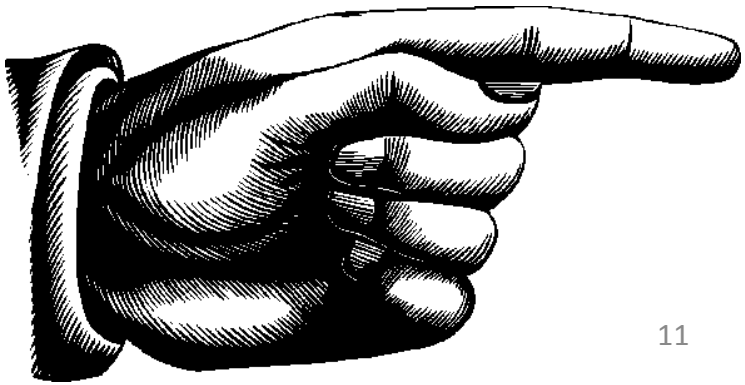
"In a pileup, even 1 or 2 dB can make a difference in getting through"

Why HFTA?

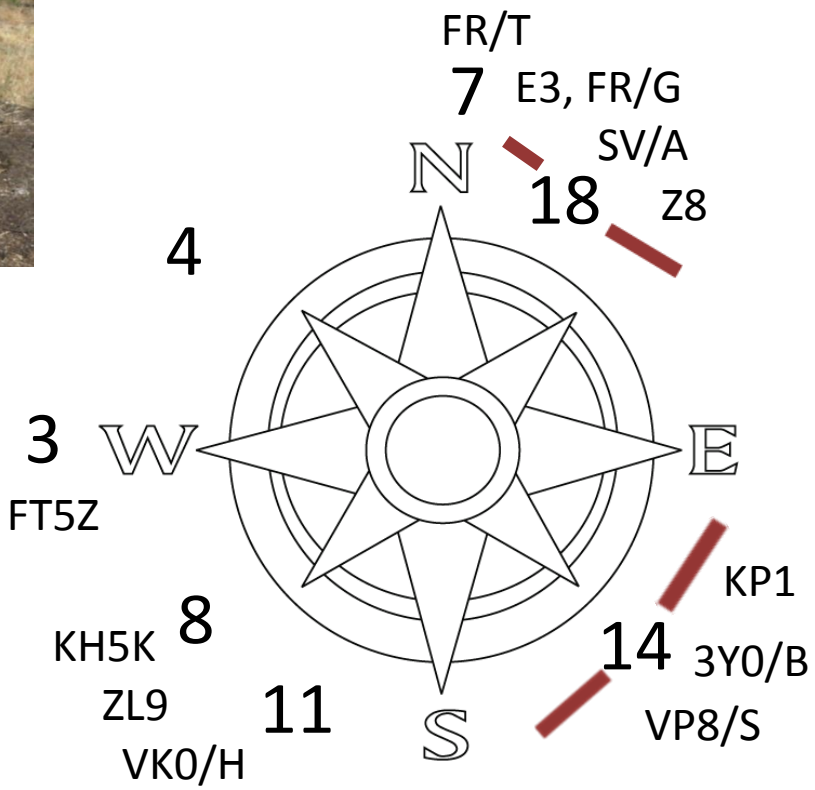
- EZNec is great, but assumes flat ground
- HFTA superimposes horizontal antenna models over your actual terrain
- HFTA lets you know if there is any way you can improve your antenna system

My HFTA "Strategy"

- I ran simulations for the last 16 "needed" entities
- I wanted to answer why others were hearing what I was missing
- I analyzed my terrain to see what was going on



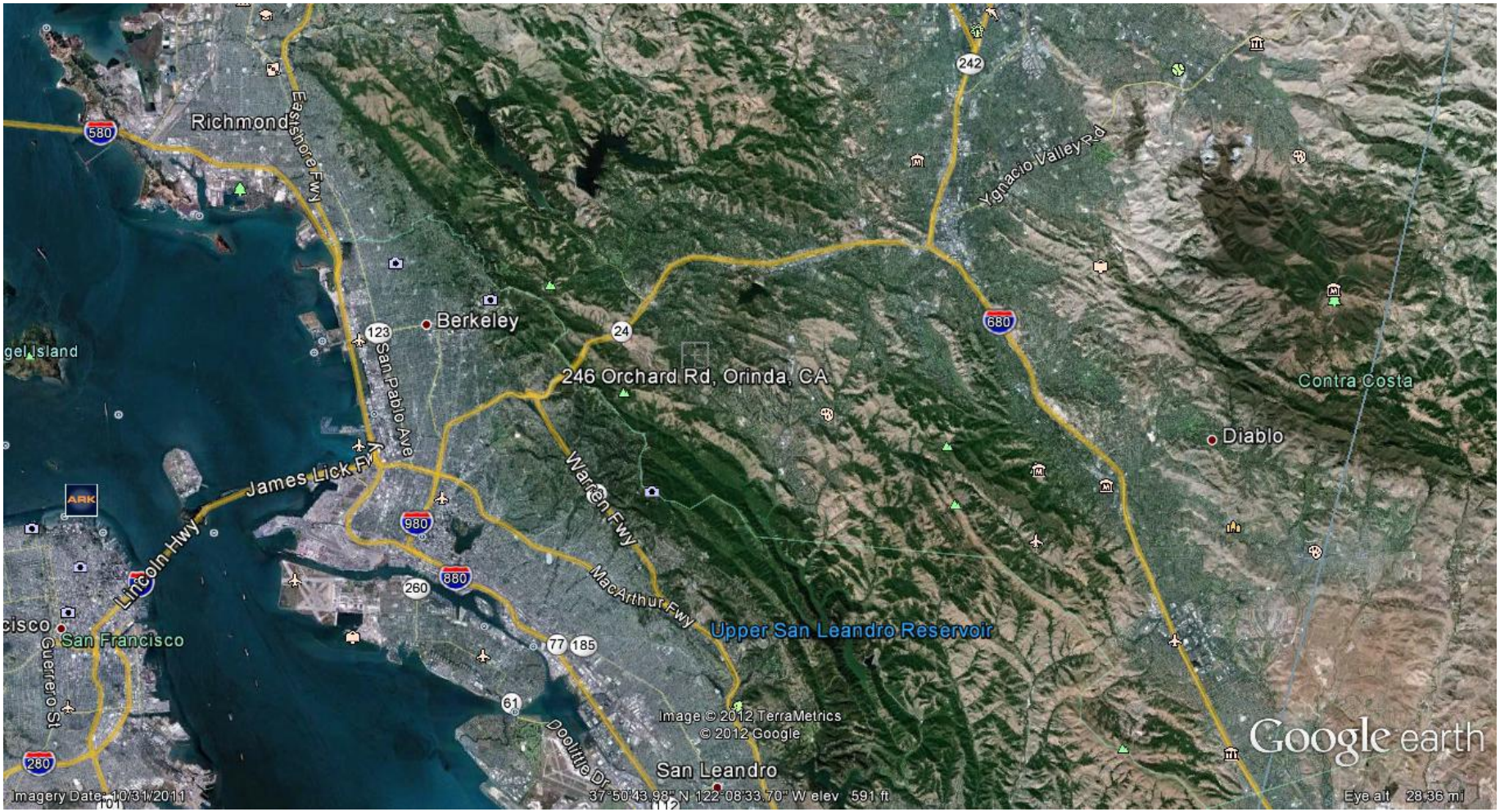
The $12 KY6R Sextant



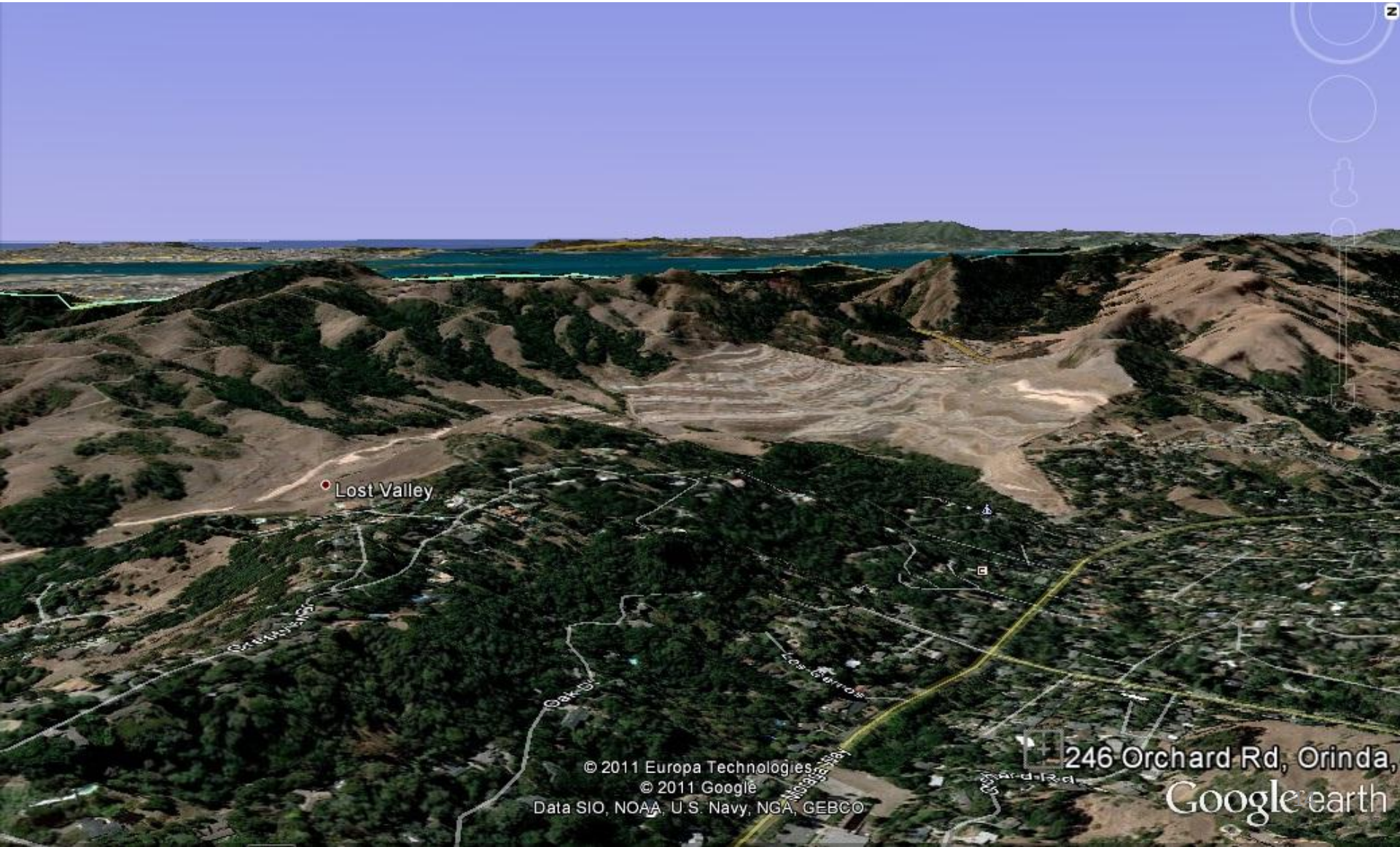
These are readings from the street which is about 15’ above the bottom of the tower base or 30’ below the top. This test proves that HFTA is correct.

N by NE

Orinda, California

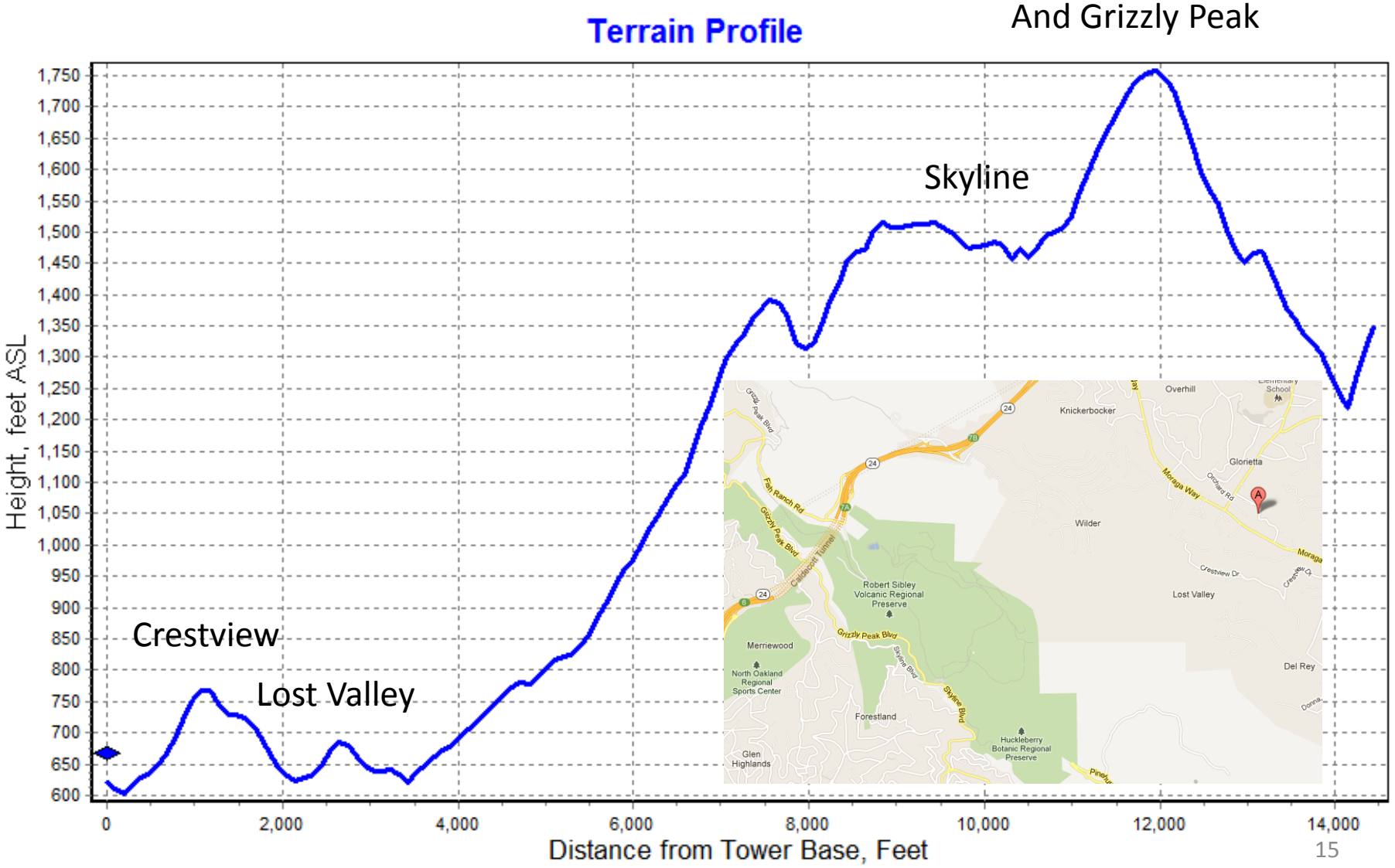


KY6R – Looking West

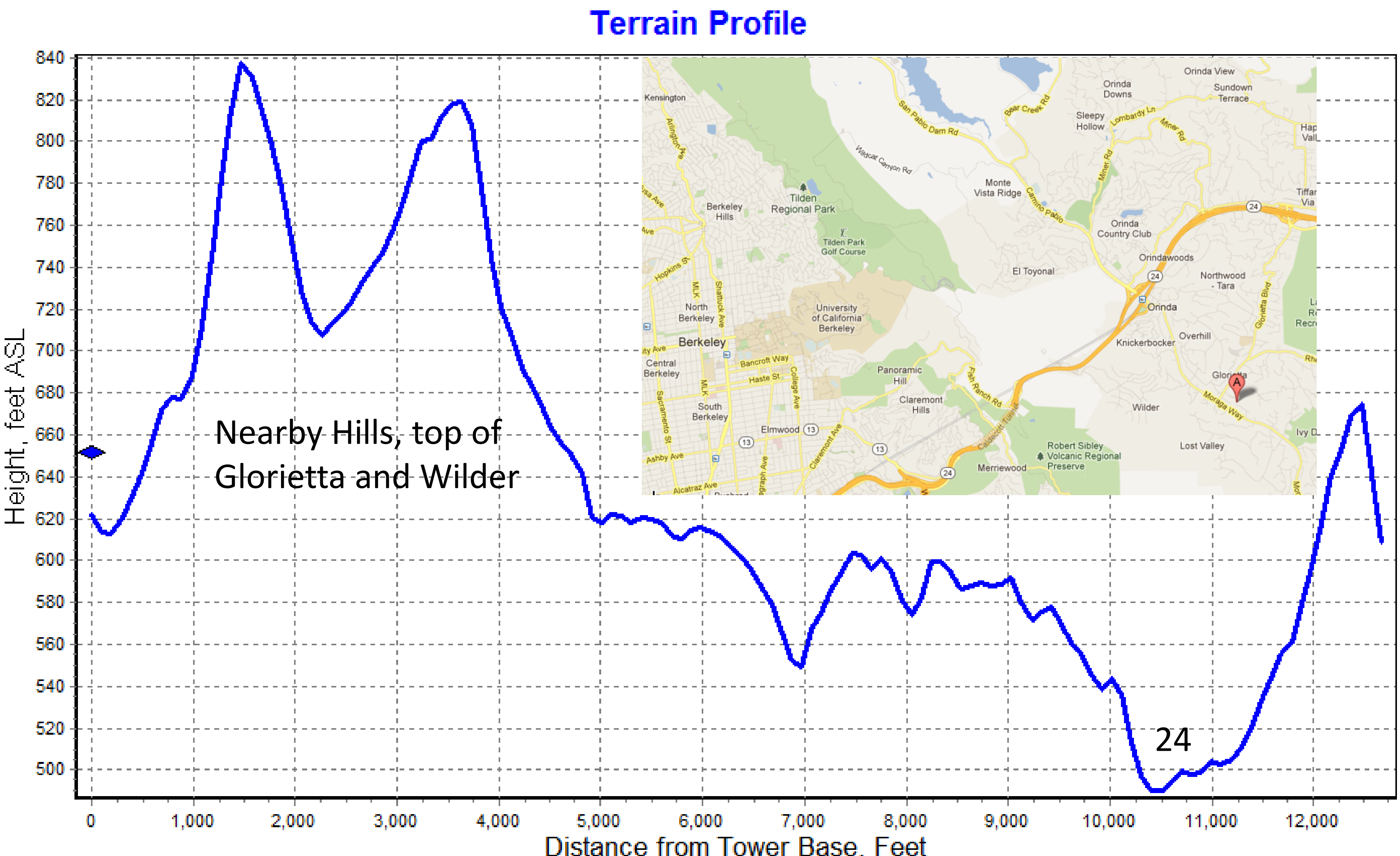


HFTA Says West Looks Like This

Round Top (Sibley)
And Grizzly Peak

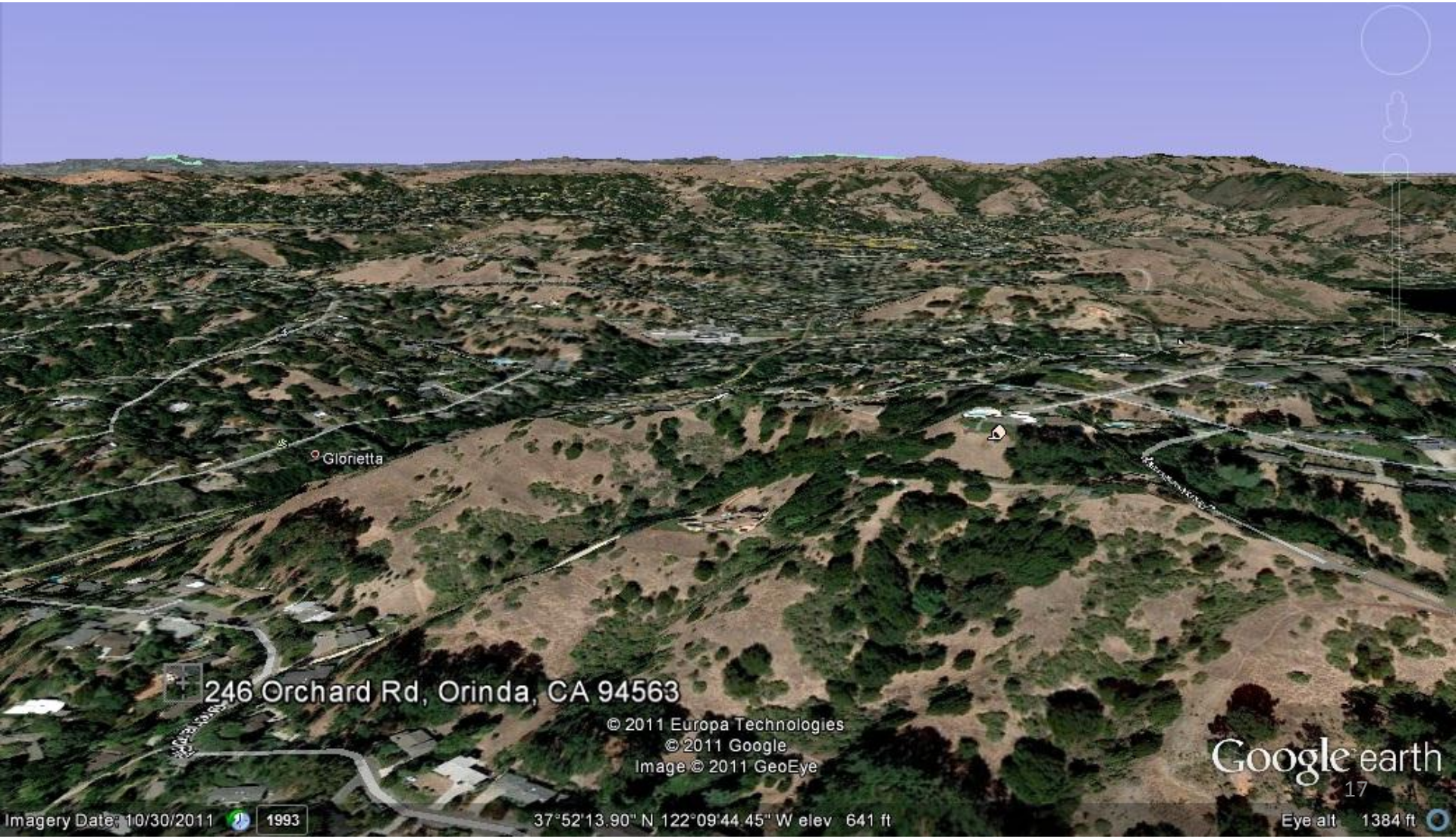


North West

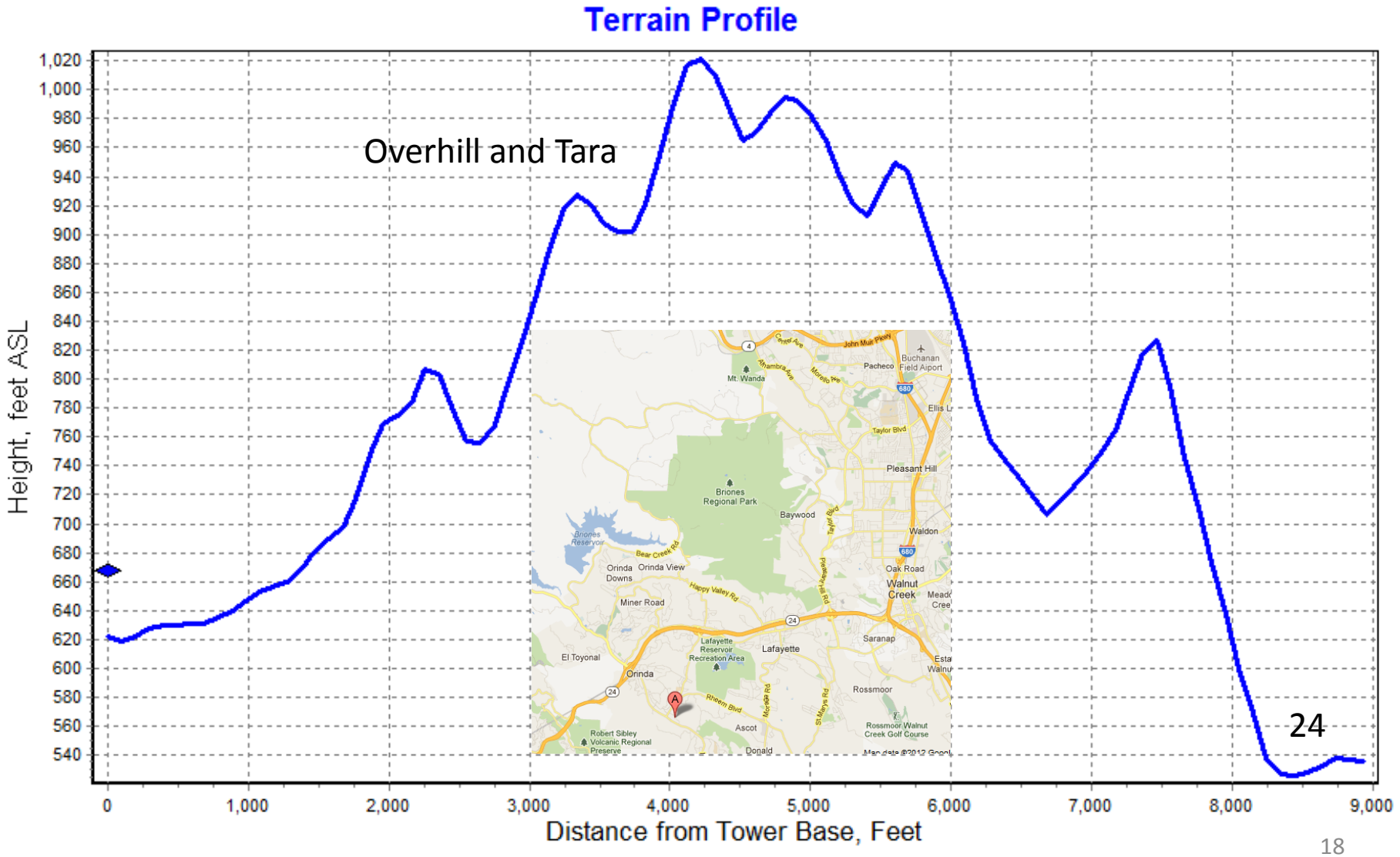


Terrain Profile
Height, feet ASL
Distance from Tower Base, Feet
840
820
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
11,000
12,000
Nearby Hills, top of Glorietta and Wilder
24
Kensington
Berkeley Hills
Tilden Regional Park
Tilden Park Golf Course
North Berkeley
University of California Berkeley
Berkeley
Central Berkeley
South Berkeley
Elmwood
Panoramic Hill
Claremont Hills
Monte Vista Ridge
El Toyonal
Orinda Downs
Sleepy Hollow
Orinda View
Sundown Terrace
Orinda Country Club
Orindawoods
Northwood - Tara
Orinda
Knickerbocker
Overhill
Wilder
Lost Valley
Merriewood
Robert Sibley Volcanic Regional Preserve

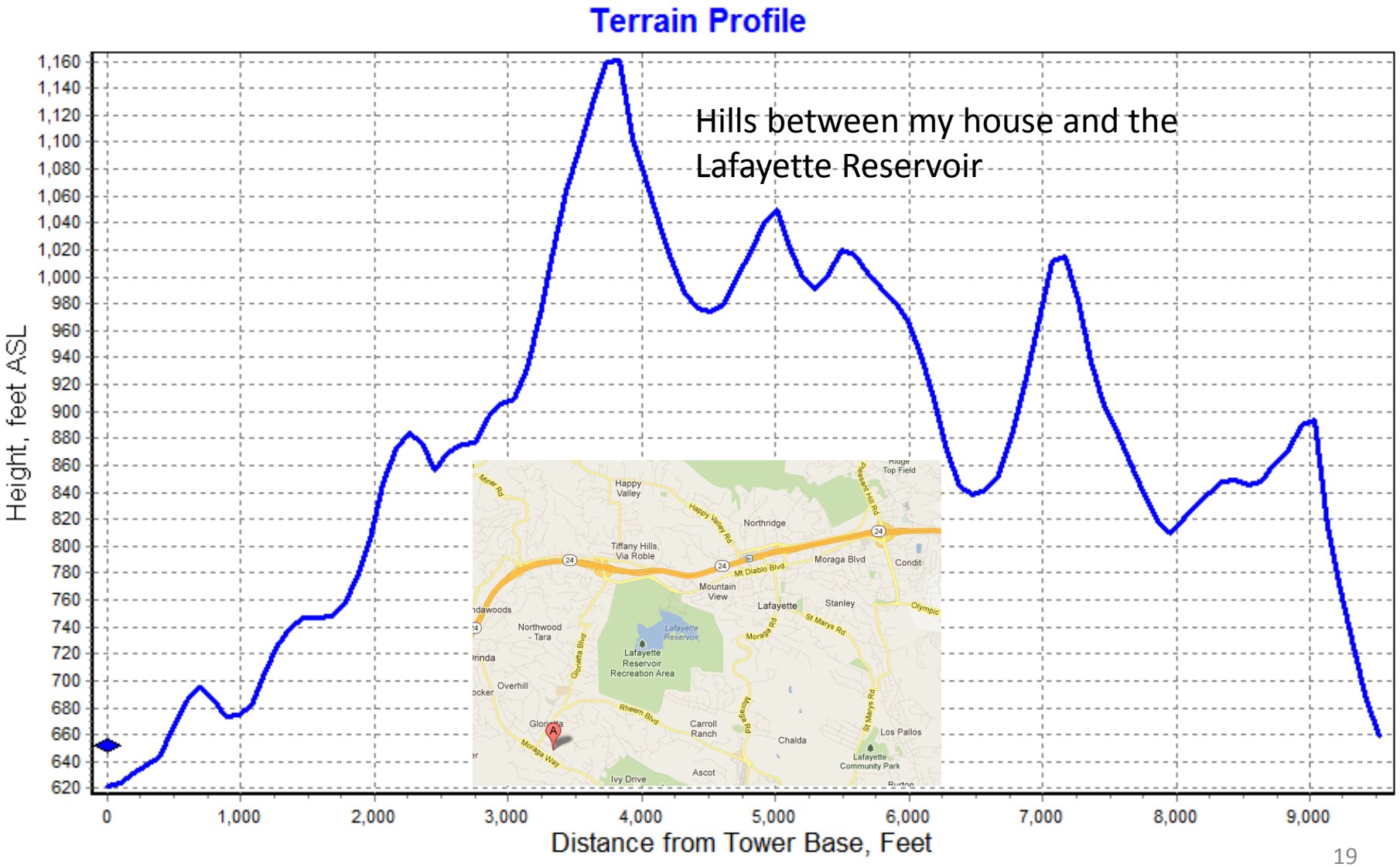
KY6R – Looking North



HFTA Says North Looks Like This

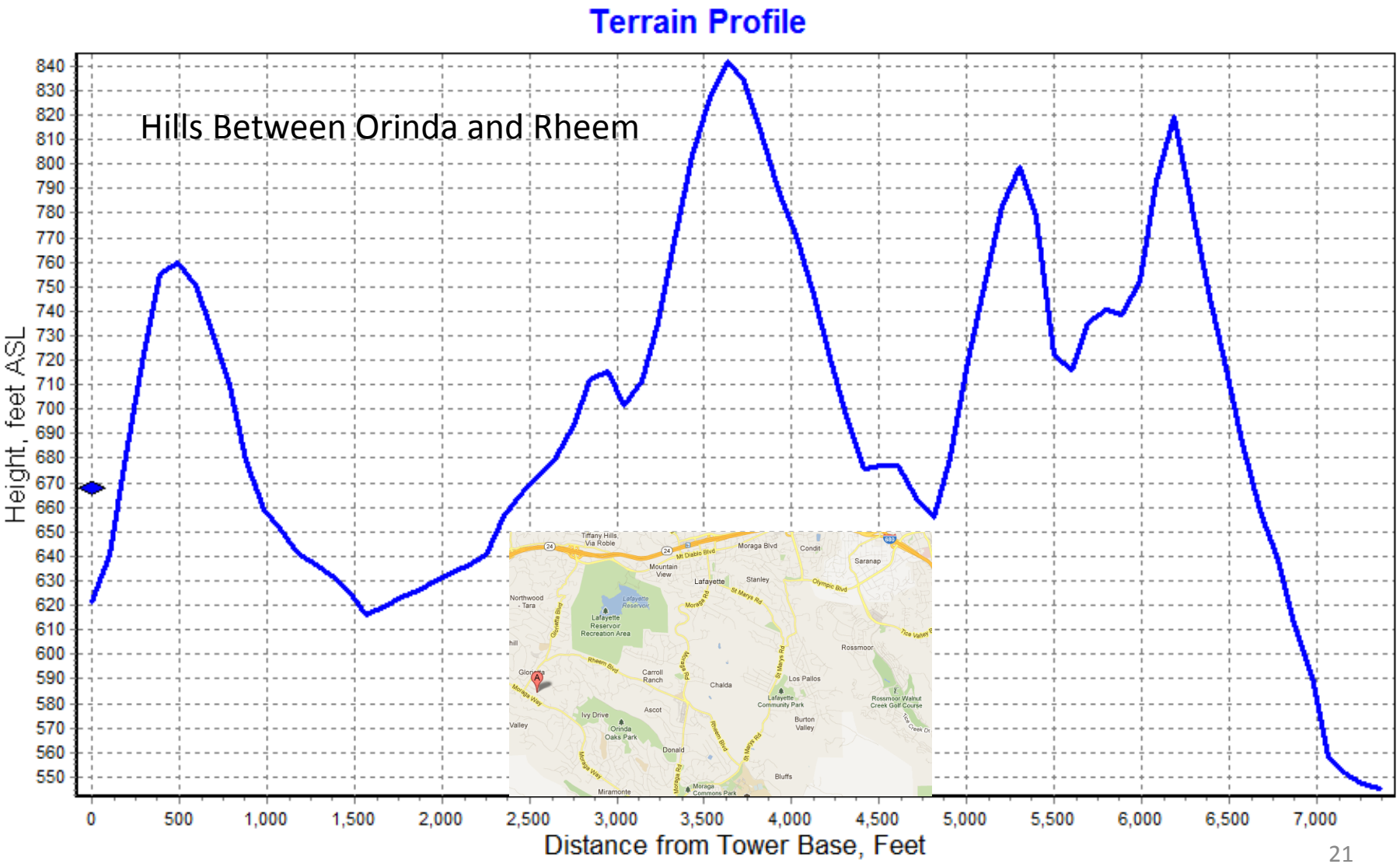


North East

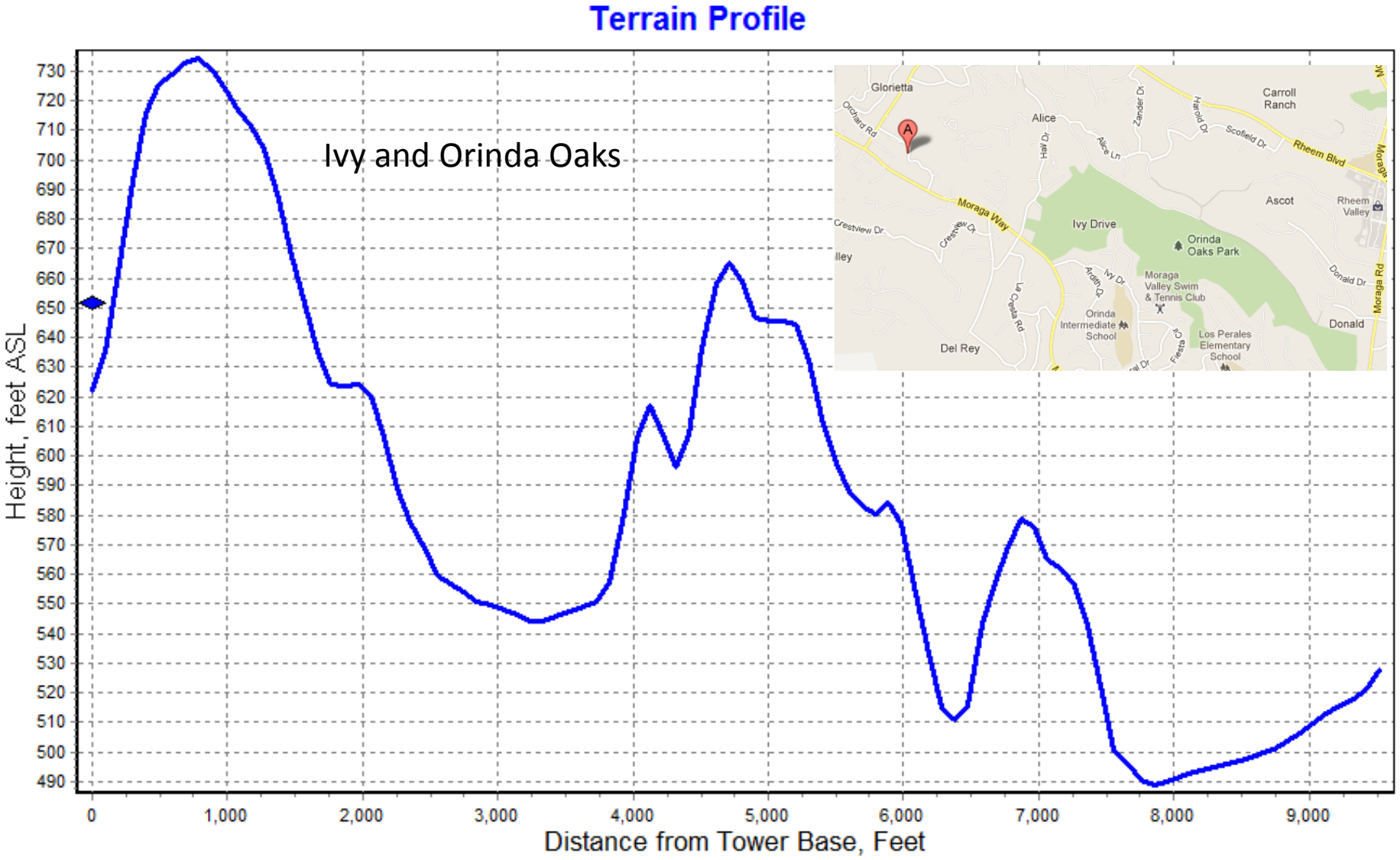

Terrain Profile
Hills between my house and the Lafayette Reservoir
Height, feet ASL
1,160
1,140
1,120
1,100
1,080
1,060
1,040
1,020
1,000
980
960
940
920
900
880
860
840
820
800
780
760
740
720
700
680
660
640
620
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
Distance from Tower Base, Feet
Happy Valley
Happy Valley Rd
Northridge
Tiffany Hills, Via Roble
Mt Diablo Blvd
Moraga Blvd
Condit
Mountain View
Lafayette
Stanley
Olympic
Northwood - Tara
Lafayette Reservoir
Lafayette Reservoir Recreation Area
Moraga Rd
St Marys Rd
Overhill
Gloria Ct
Rheem Blvd
Carroll Ranch
Chalda
Los Pallos
Lafayette Community Park
Ascot
Ivy Drive
Pleasant Hill Rd
Top Field
Glorietta Blvd

KY6R – Looking East

HFTA Says East Looks Like This

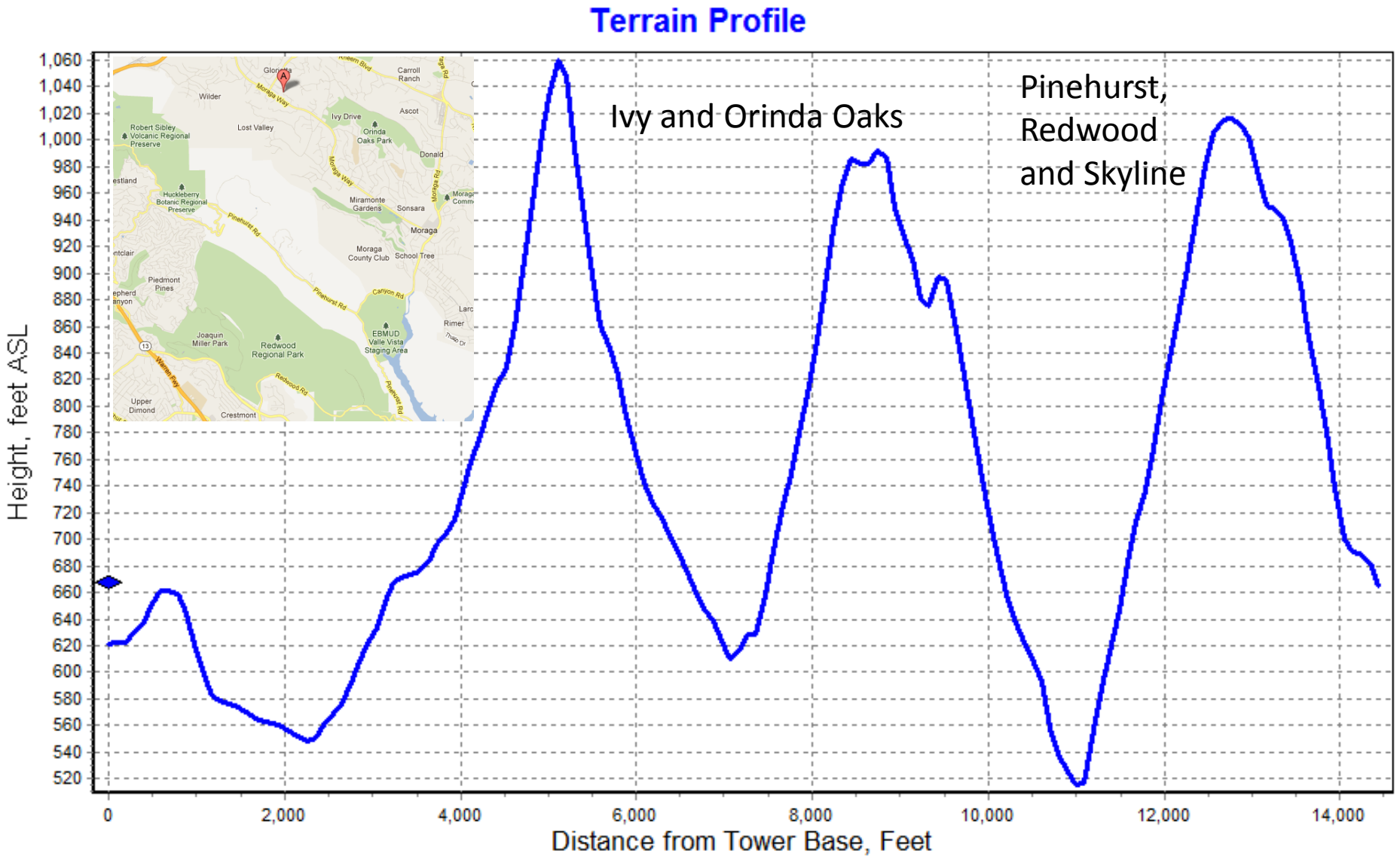


South East

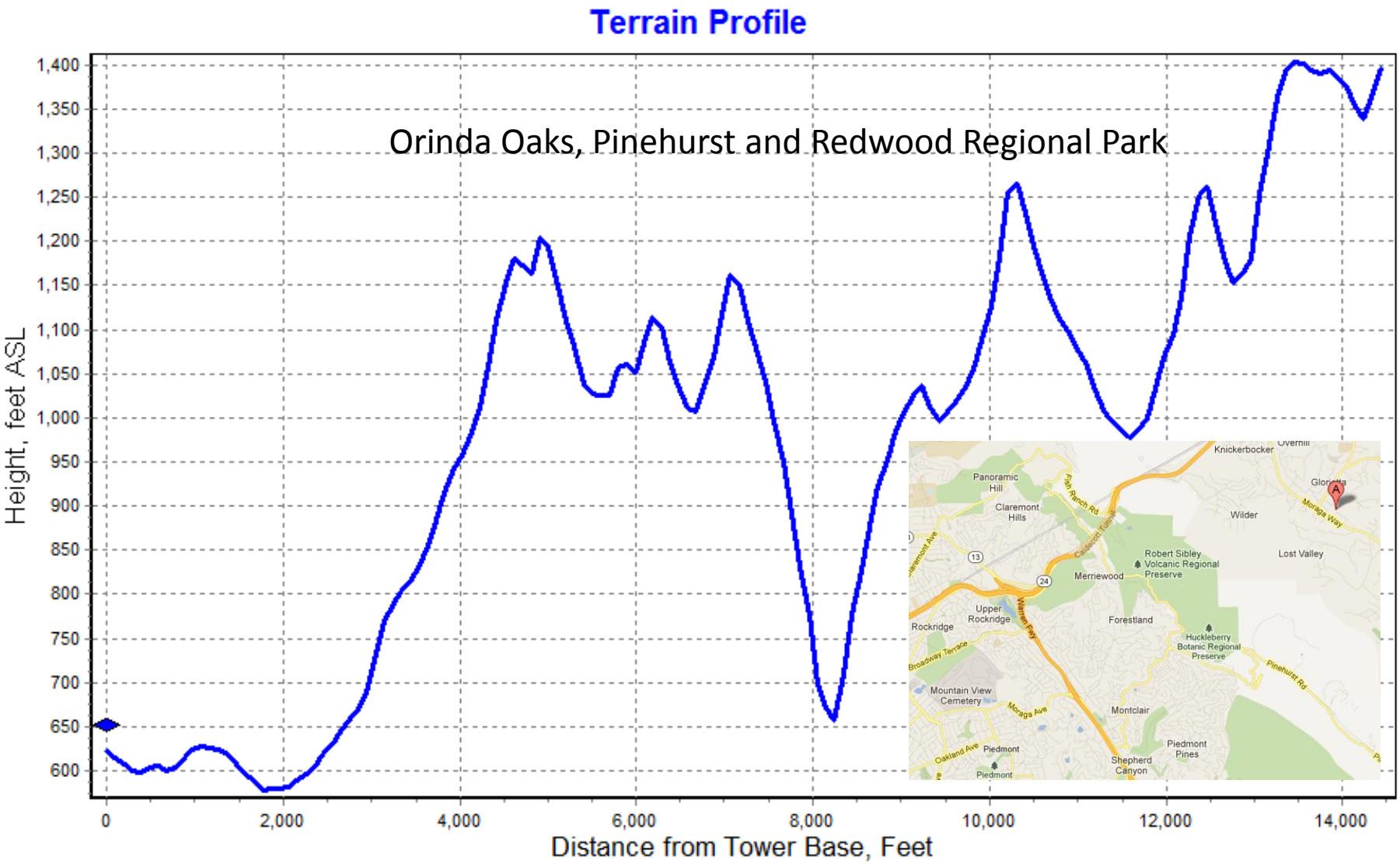

Terrain Profile
Ivy and Orinda Oaks
Height, feet ASL
730
720
710
700
690
680
670
660
650
640
630
620
610
600
590
580
570
560
550
540
530
520
510
500
490
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
Distance from Tower Base, Feet
Glorietta
Orchard Rd
Alice
Carroll Ranch
Scofield Dr
Rheem Blvd
Moraga
Moraga Way
Ascot
Rheem Valley
Crestview Dr
Ivy Drive
Orinda Oaks Park
Moraga Valley Swim & Tennis Club
Donald Dr
Donald
Moraga Rd
Orinda Intermediate School
Los Perales Elementary School
Del Rey

KY6R – Looking South

What HFTA Says South Looks Like



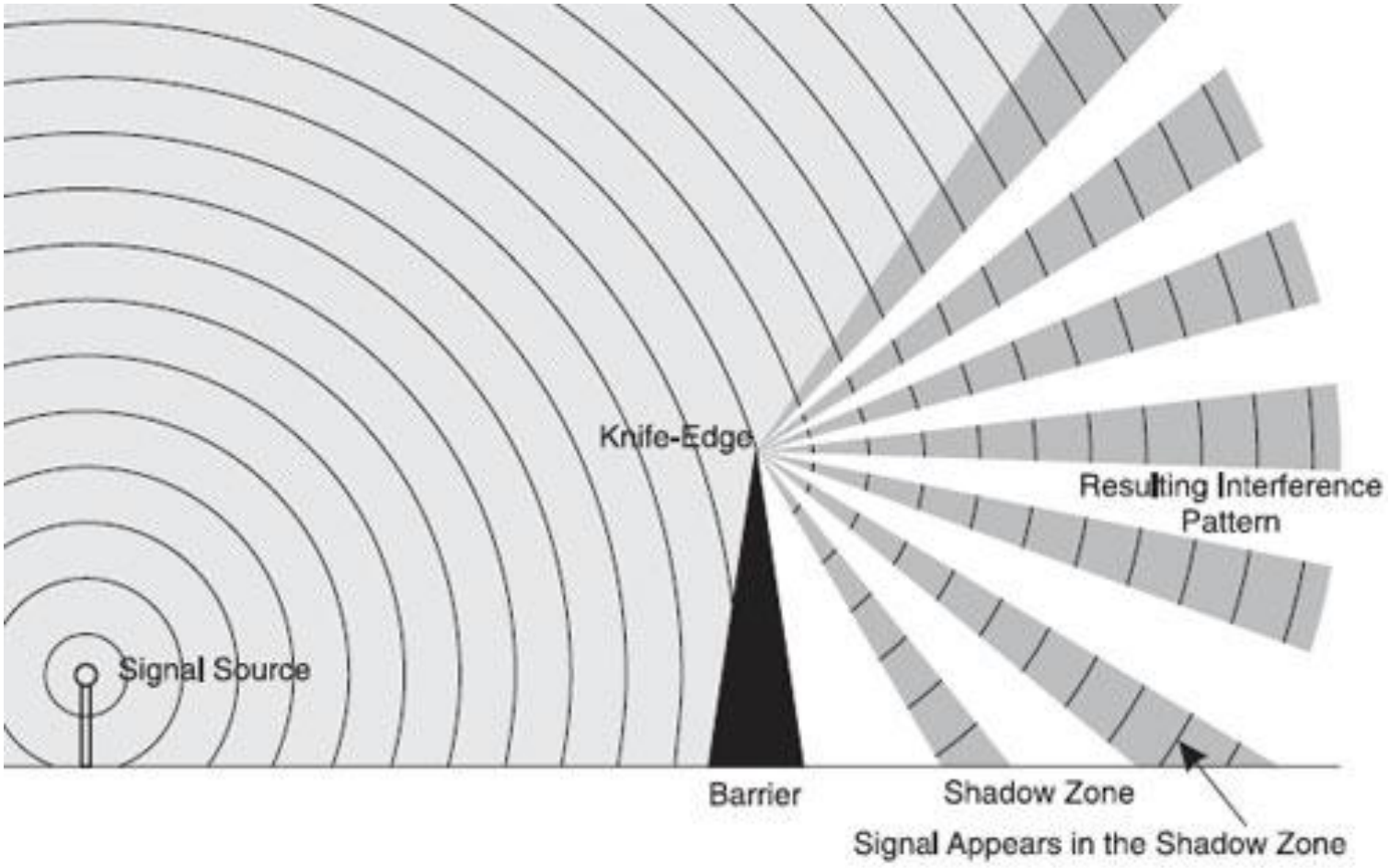
South West


Terrain Profile
Orinda Oaks, Pinehurst and Redwood Regional Park
Height, feet ASL
1,400
1,350
1,300
1,250
1,200
1,150
1,100
1,050
1,000
950
900
850
800
750
700
650
600
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
Distance from Tower Base, Feet
Knickerbocker
Panoramic Hill
Claremont Hills
Fish Ranch Rd
Wilder
Moraga Way
Lost Valley
Robert Sibley Volcanic Regional Preserve
Merriewood
Upper Rockridge
Rockridge
Warren Fwy
Forestland
Huckleberry Botanic Regional Preserve
Broadway Terrace
Pinehurst Rd
Mountain View Cemetery
Moraga Ave
Montclair
Oakland Ave
Piedmont
Piedmont Pines
Shepherd Canyon
13
24

So What is My Problem?

- Hills, Hills and More Hills!
  - SP ME / AF suffers most
  - Low TOA needed at bottom of cycle
  - Nearby hills diffracts low TOA signals
  - No (or very low) sun spots – weak F2
  - I have worked stations in the same areas before – but either with higher SSN's and smaller pileups, and sometimes LP

Theory #1: Knife Edge Diffraction?



I actually posted on a forum asking if anyone knew about “selective propagation “. Then I came to my senses and realized this is science – not séance.

What Should I Do?

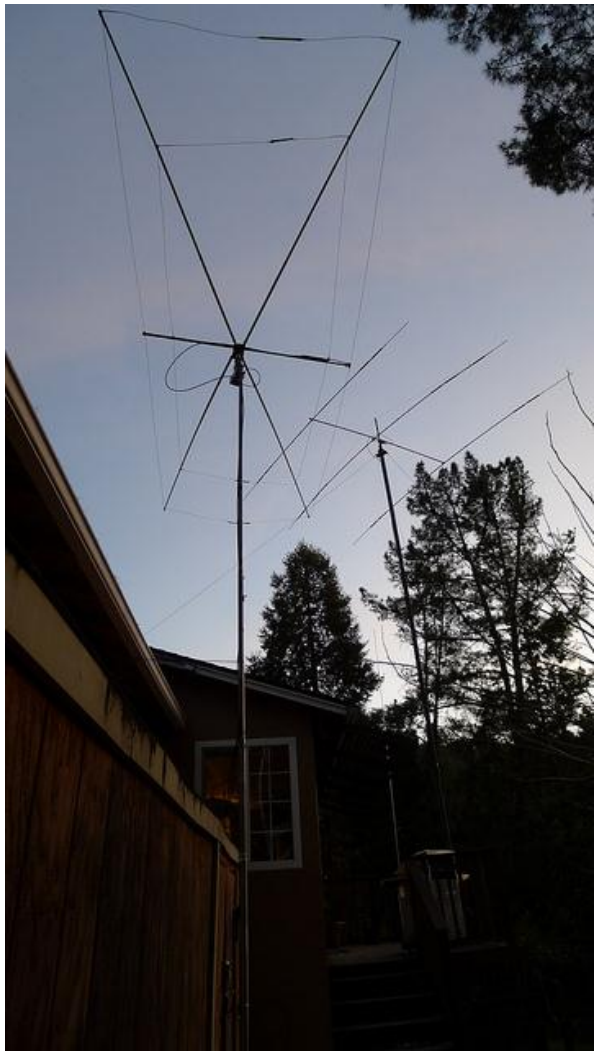
- Possibilities include:
  - Improve gain of low-band verticals
  - Increase height and gain of horizontally polarized antennas
  - Forget about low TOA SP polar paths – use LP, or, wait until a really lucky high TOA opening occurs
  - Drink heavily
- What is not possible:
  - Anything wider than a 40M half square (70')
  - More than 800 watts
  - Put up fixed tower
  - Bulldoze nearby hills

Testing an Assumption

- If I were to buy a portable / semi permanent Military Surplus Mast System (AB-952 or AB-577) what would be the best height?
- How does it compare to my A3S that is up 30’?
- How does it compare to what I had before (20M Moxon up 30’)
- Will it be worth investing $800?

Paid $1500 for >2+ dB gain 24+ dB F/B

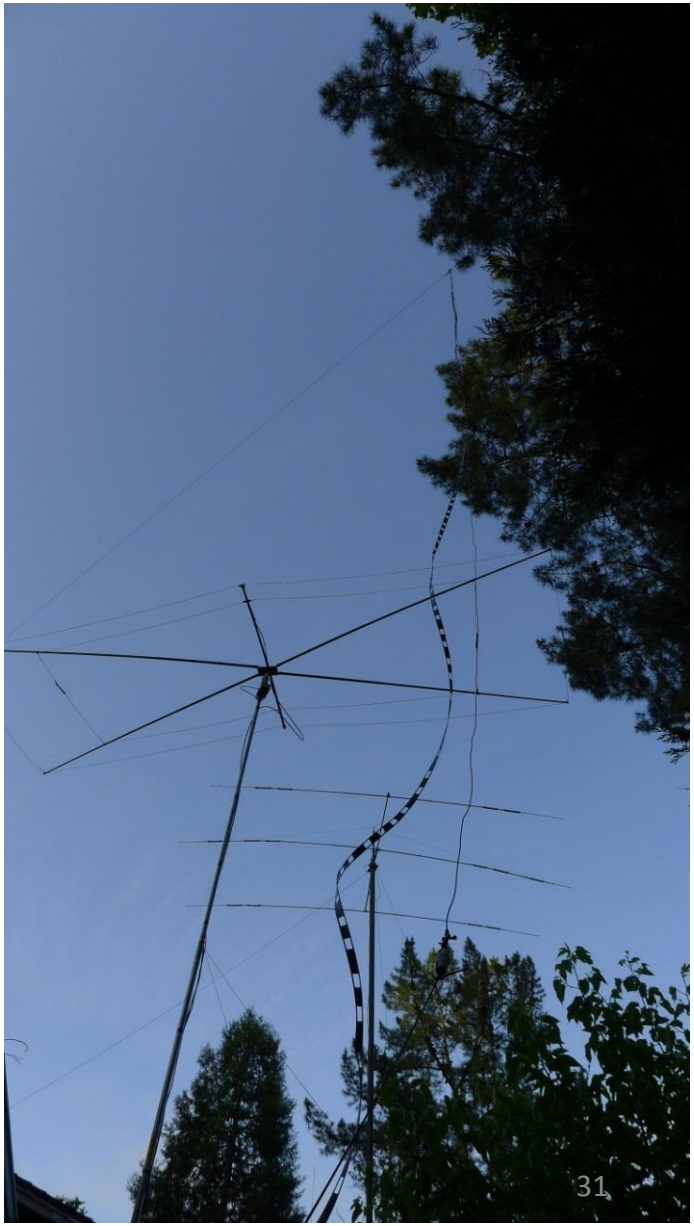
A3S + 30M at 46’ on AB-952
- Replaced 20M Moxon at 30’



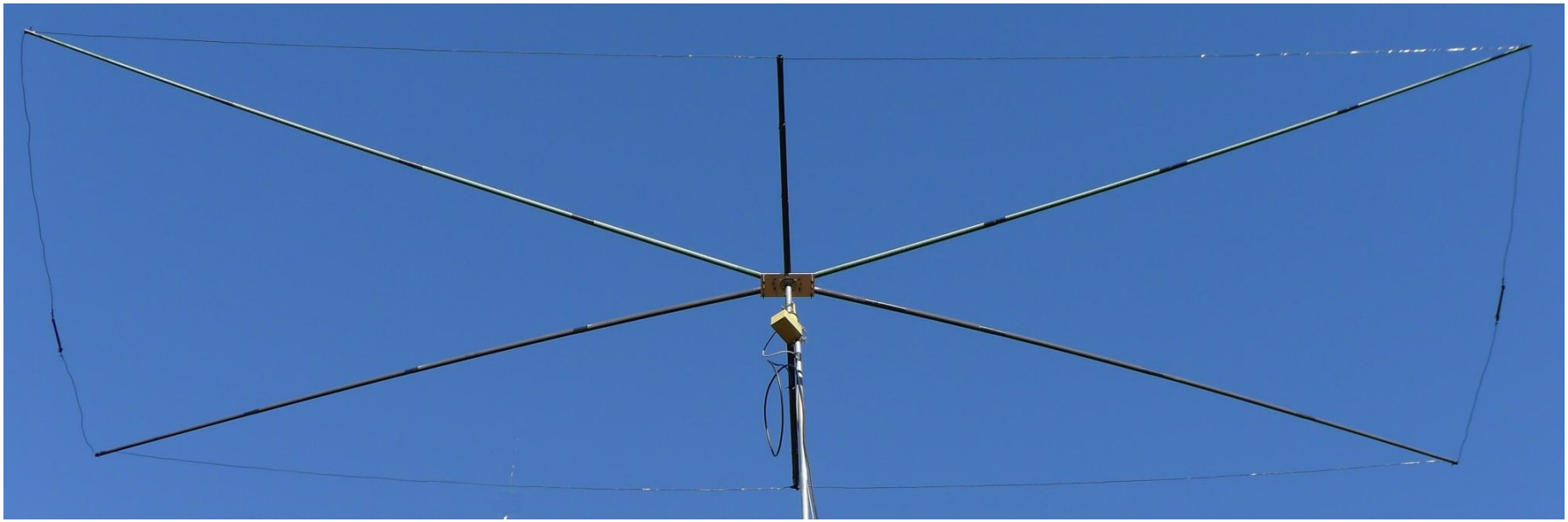
17/12M Nested Moxon
- Replaced 20M Moxon at 30’ (which acted as a dipole)

Increased 33’ vertical to 45’ w/six 5’ top hats, added Switchable Base LC’s

K9AY Loops for RX and 40M Half Square



My Old High Band HF Antenna



Missing ST0R motivated me to replace wire 20M Moxon (5.2 dBi gain and 24 dB F/B, up 30') with:

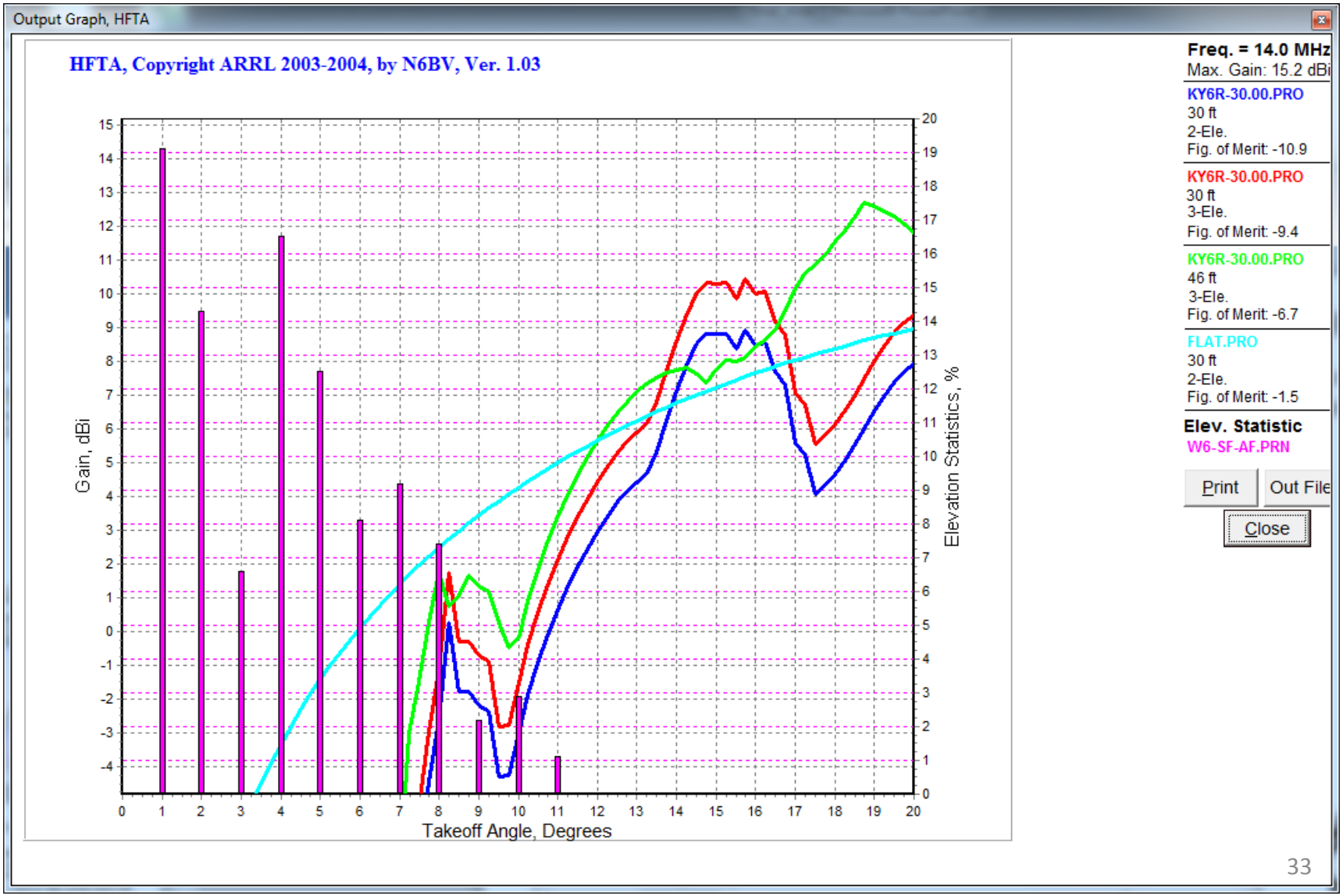
⇒ The A3S - 2 dB more gain on 20M, 5 dB more on 15/10M

⇒ The Nested 17/12M Moxon - gave me 3+ dB more gain

⇒ The new height of the A3S and Moxon greatly lowers the TOA

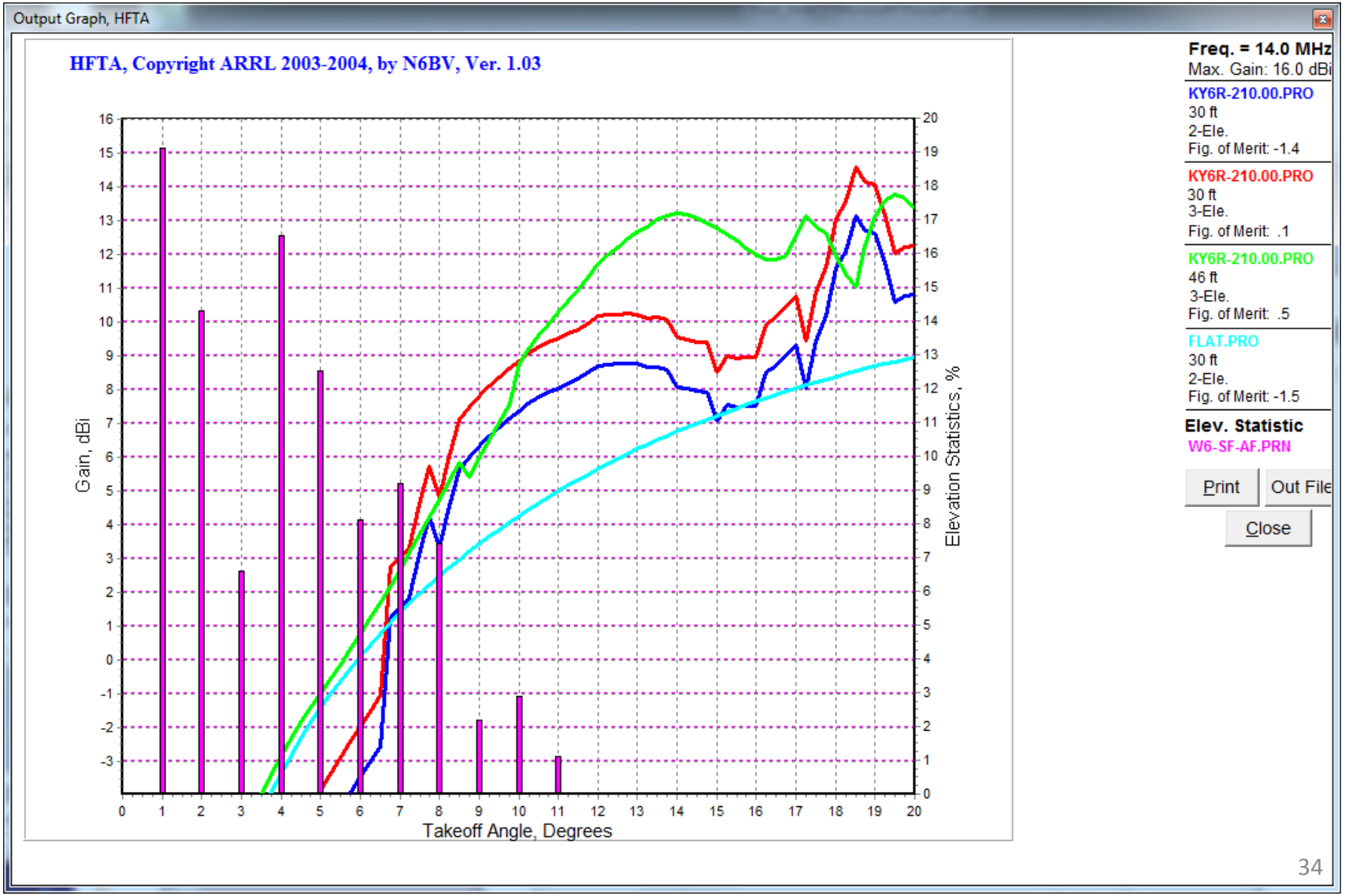
Sudan / South Sudan Case Study

On the short path, it *would* have made the difference between working them or not. Notice the “shear” below 10 degrees TOA. I would have had a +2 dB better signal.

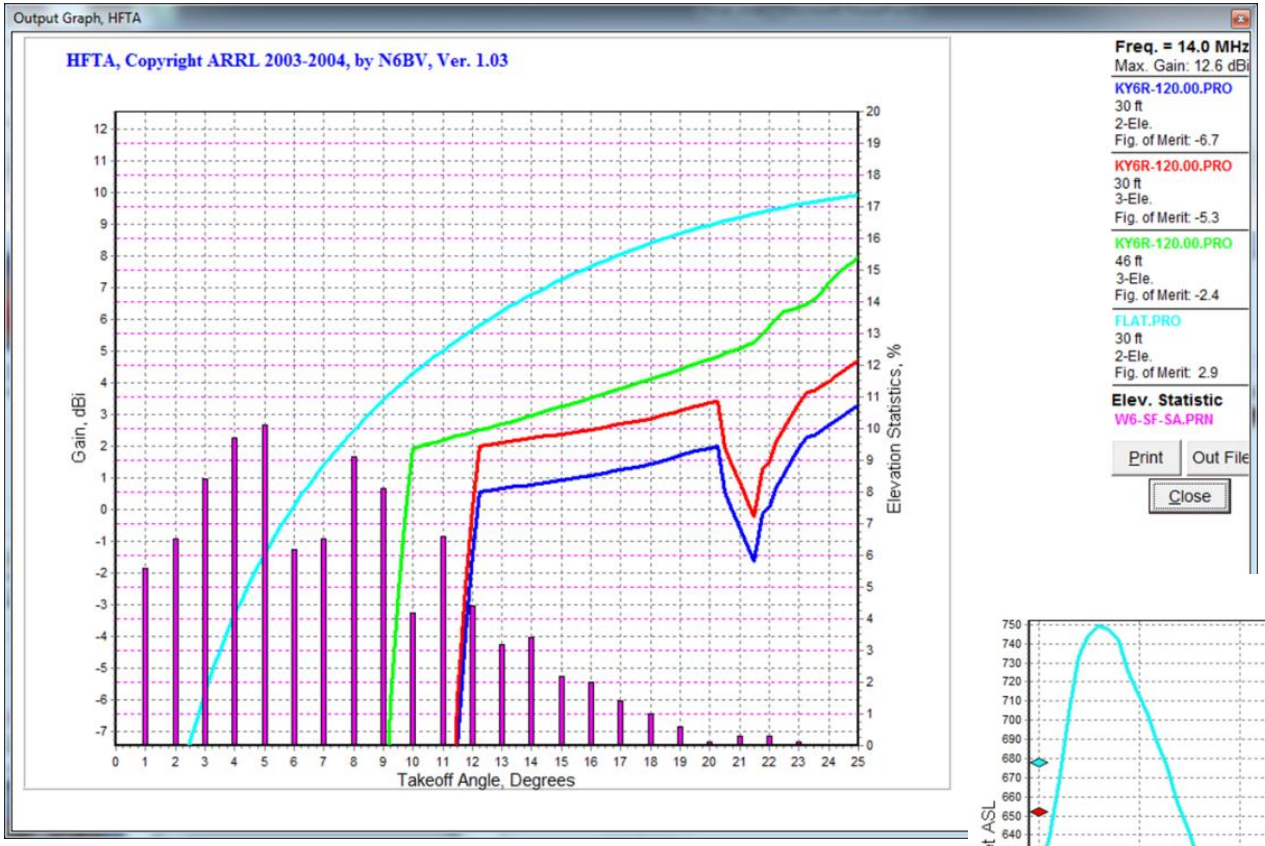


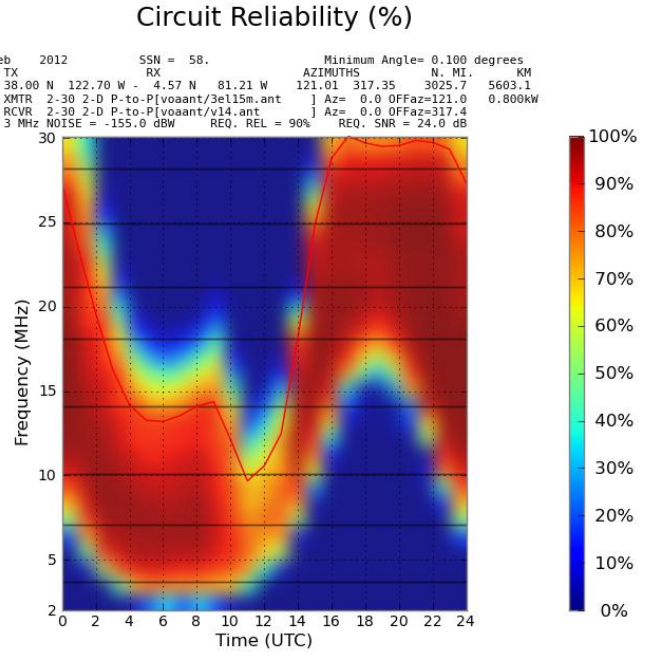
Sudan / South Sudan Case Study

The long path is a much better story – and shows a 4dB improvement over my old 2 element 20M Moxon. But the hills shear anything below 6 degrees off.

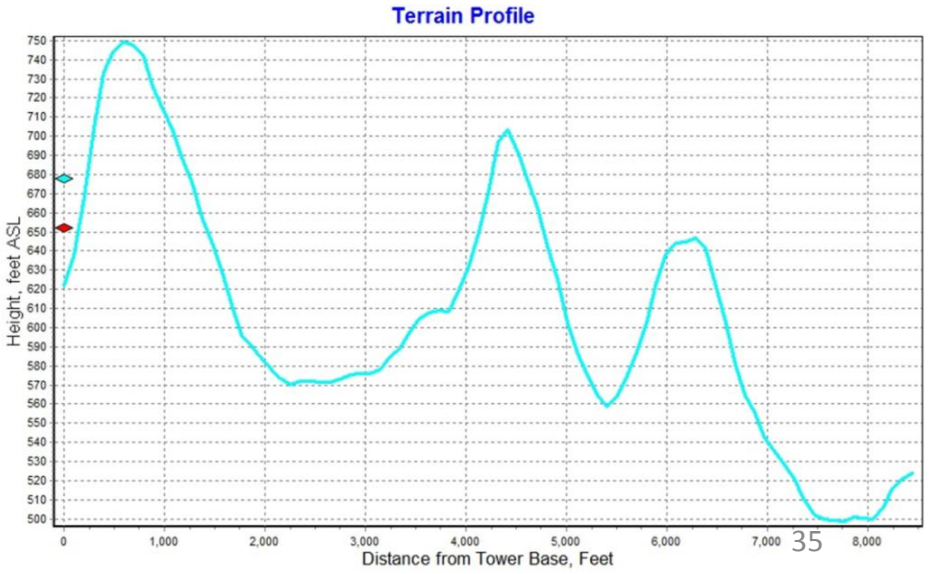


HK0NA:Malpelo January 2012



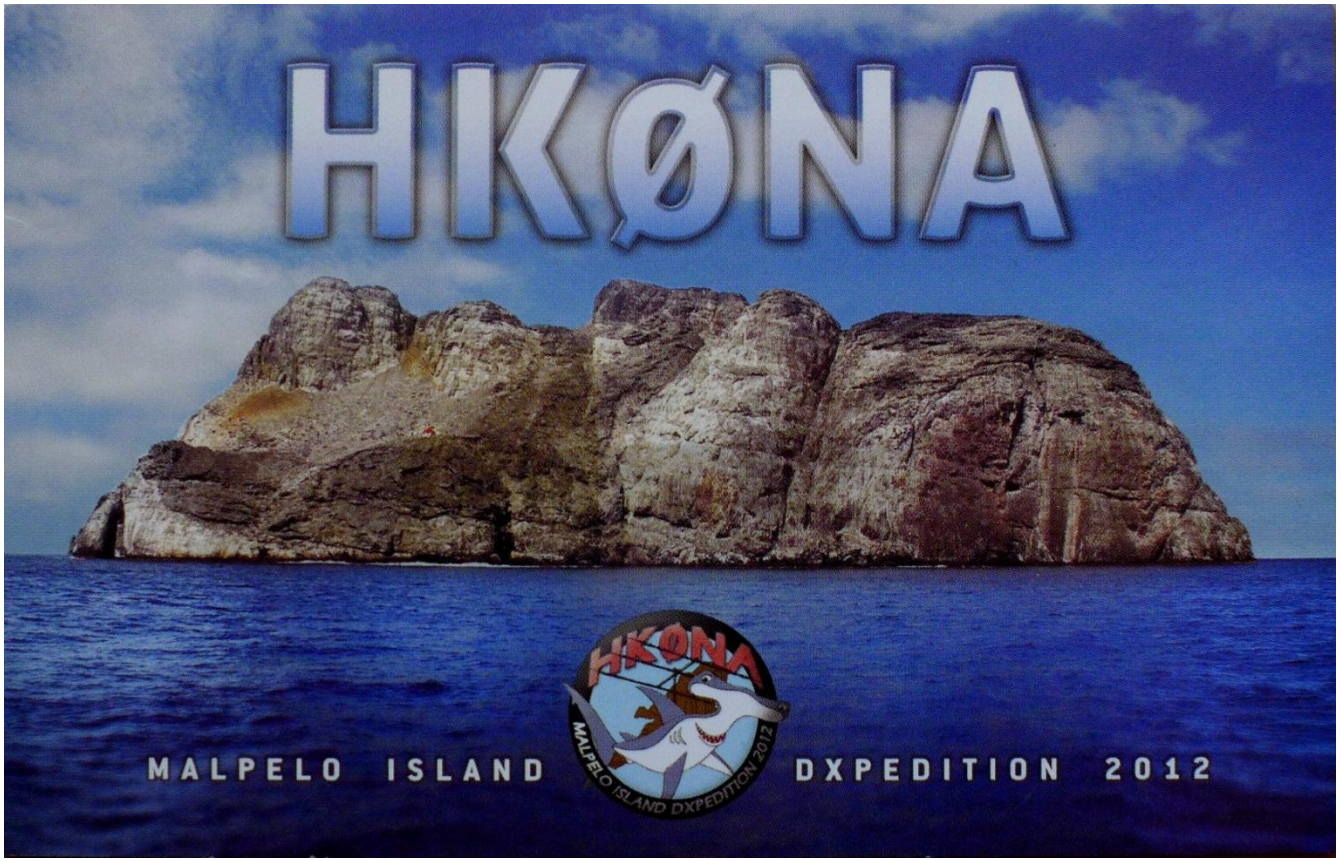


All bands were open



New antenna farm made easy work on all bands.

HK0NA - #329/325– all bands and modes!



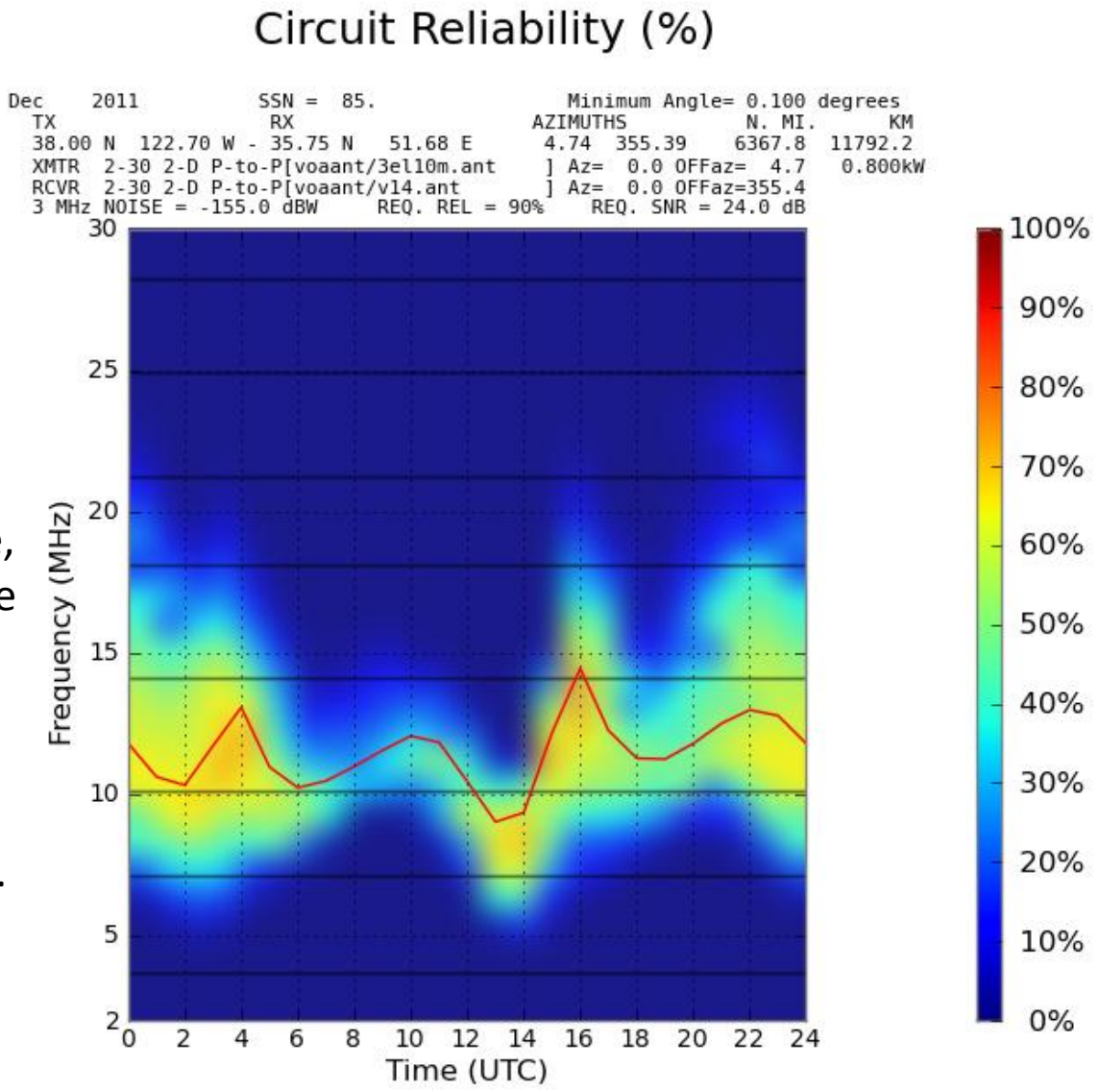
This is the first time I worked a rare DX-pedition first on 80M. The new vertical is the Best 80M antenna I have ever had. Once they activated “OP B” I had no problem on any band. This is a good indicator for working ZL9HR, and KP1 and KH5K . . .

EP3PK – Iran Case Study – 12/2011

This circuit requires a 90% probability, so 60% just didn't cut it.

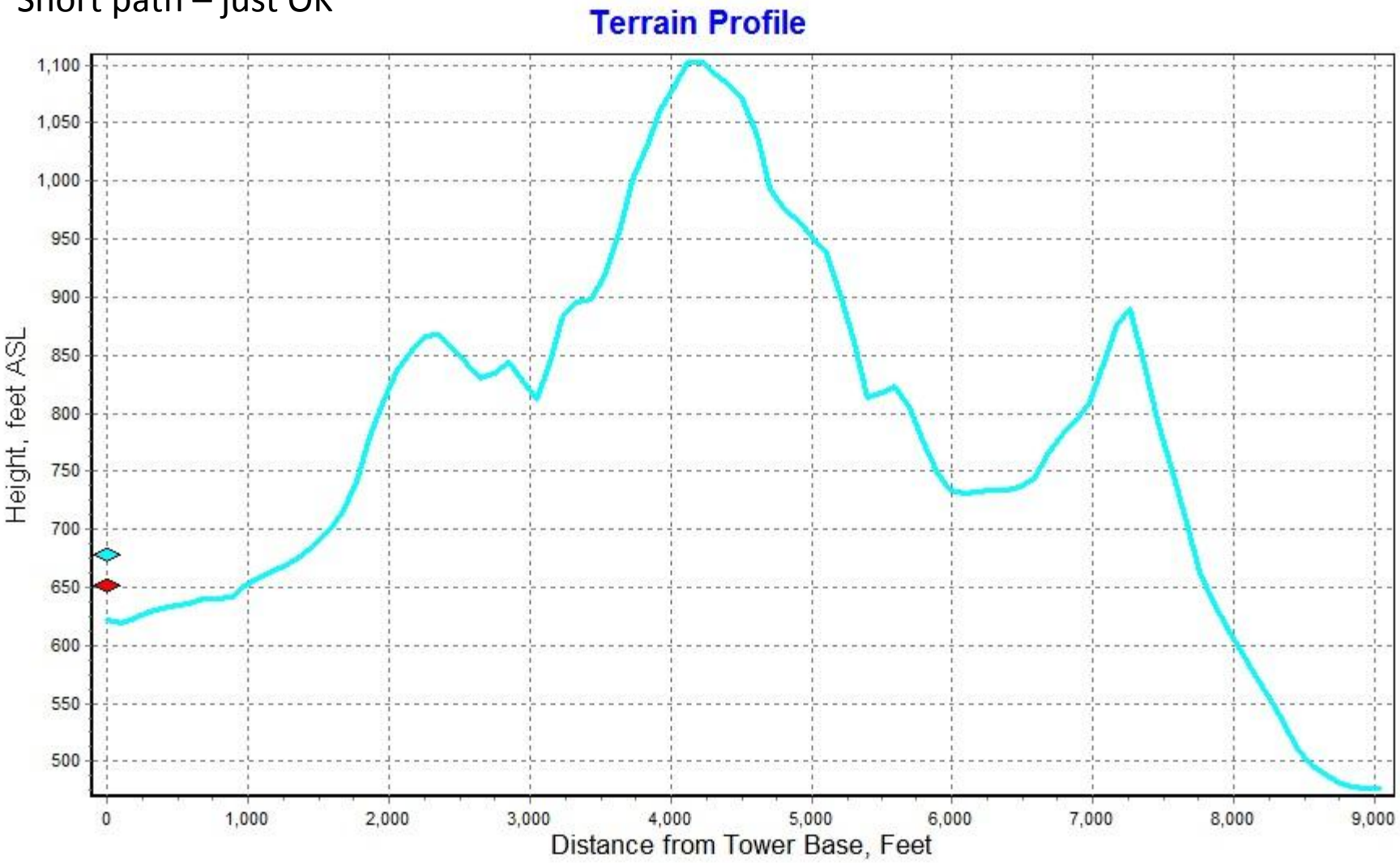
In the same timeframe, E44PM was in Palestine and never heard him either.

Some worked E44PM On 17M around 1600z.



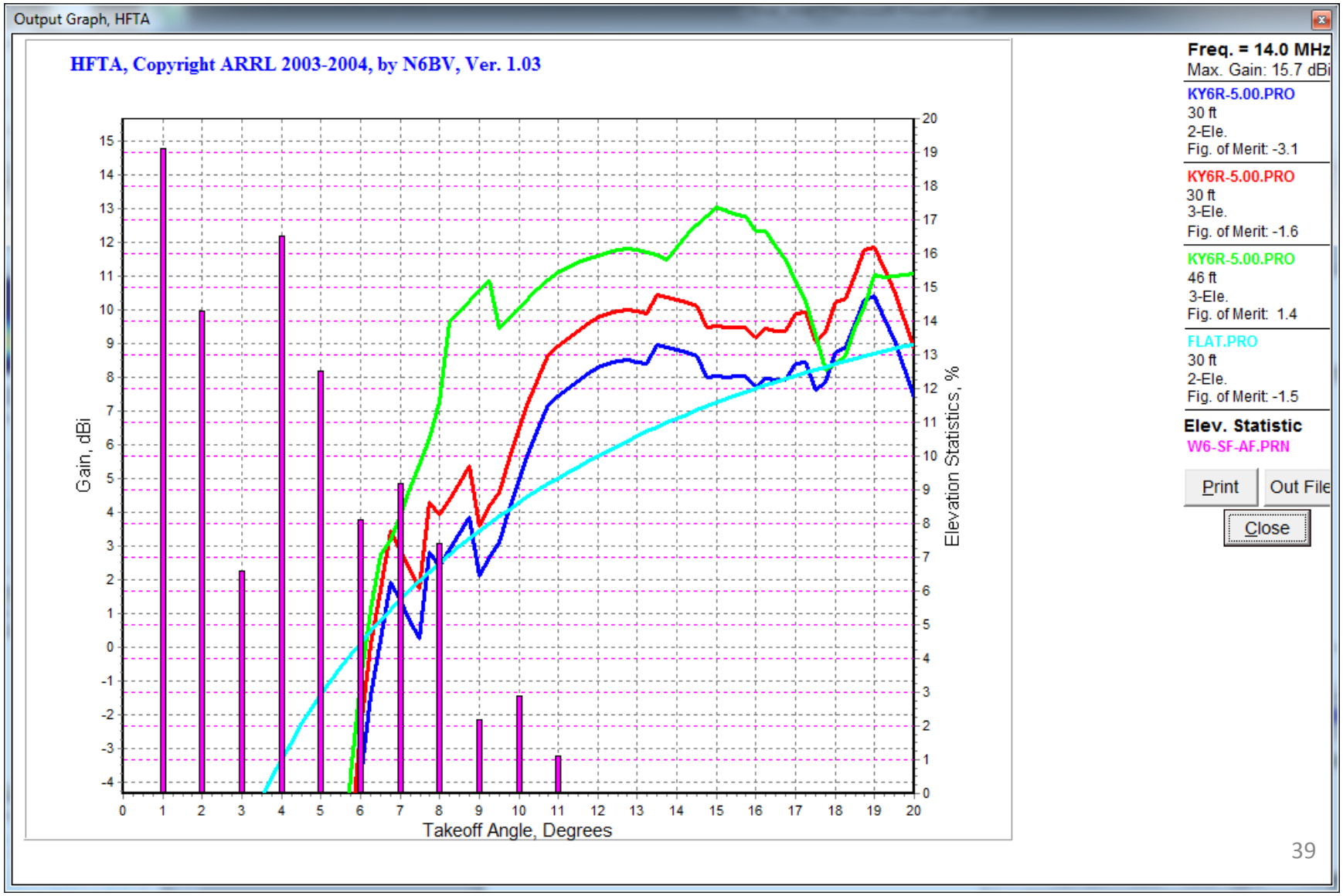
EP3PK – Iran Case Study

Short path – just OK



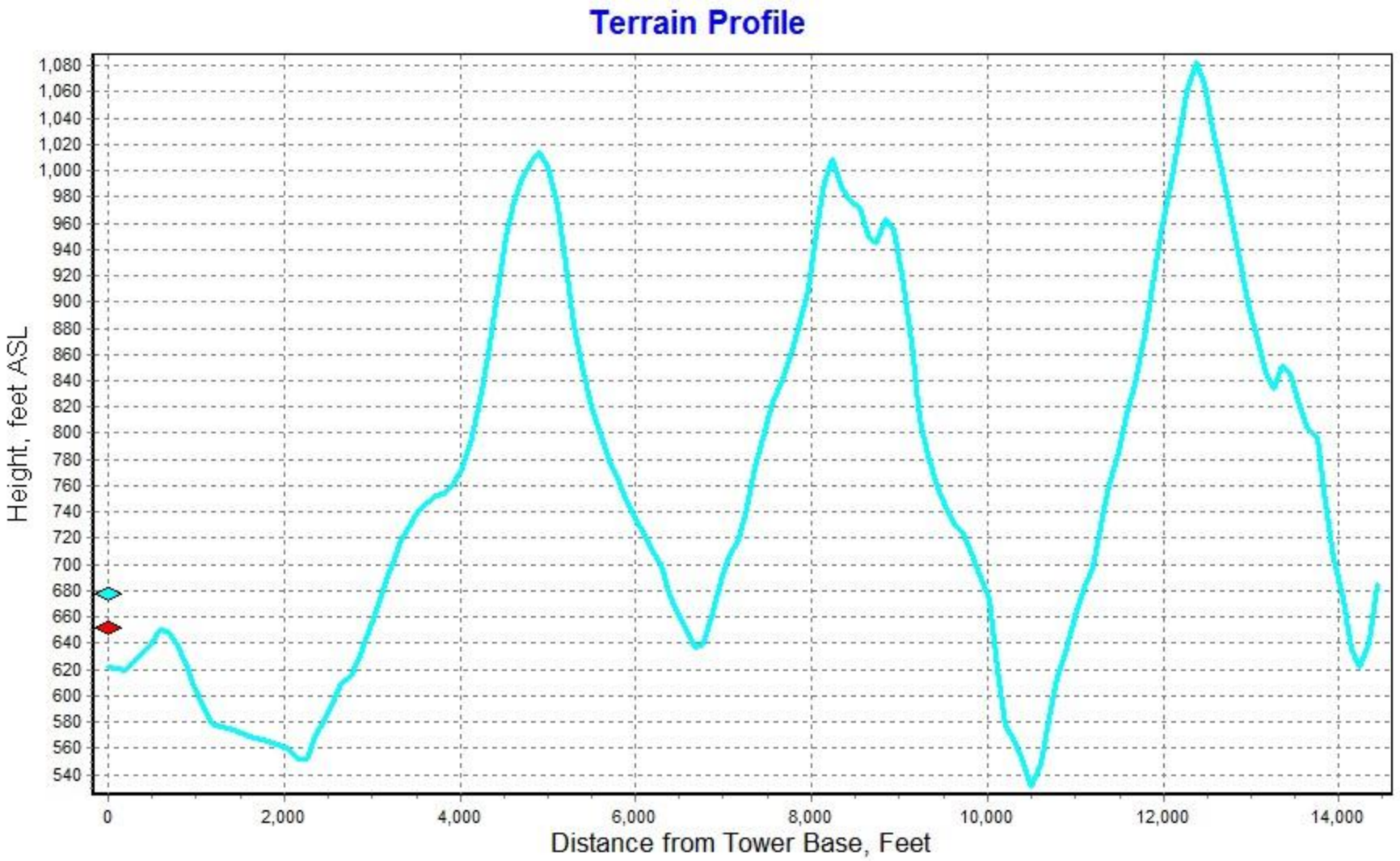
EP3PK – Iran Case Study

Short path – some angles will be possible with the right propagation . . At 46', EP will be 4 dB stronger than a Moxon at 30'. Well worth the money.



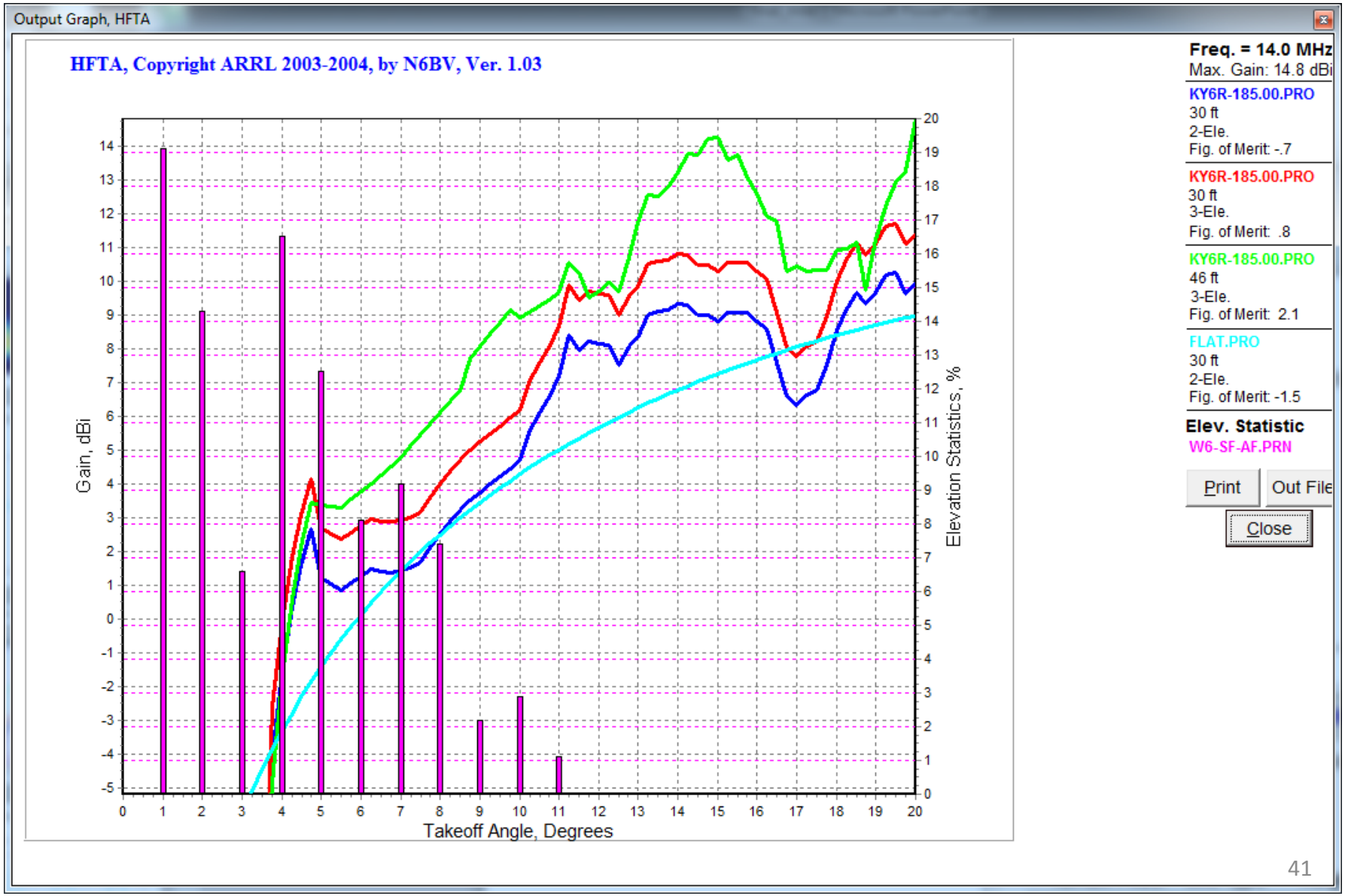
EP3PK – Iran Case Study

Long path – a bit better



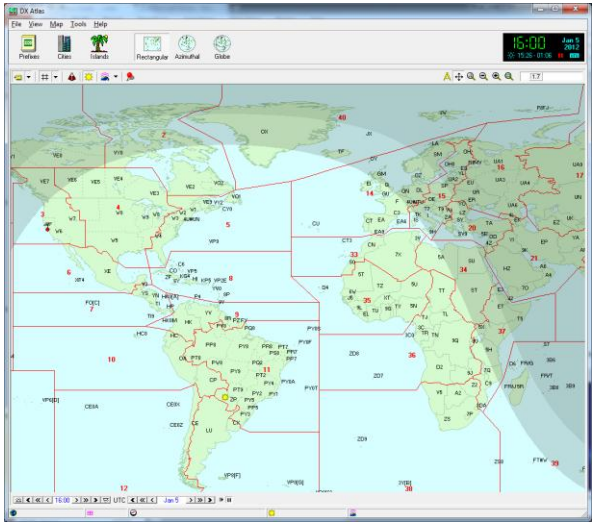
EP3PK – Iran Case Study

On the LP, 46’ will be 3 dB stronger in most cases. Worth the money.

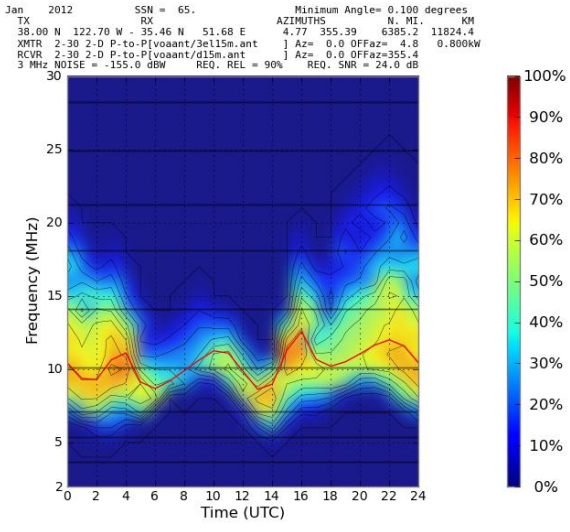


EP3PK

January 5, 2012 – 1609z

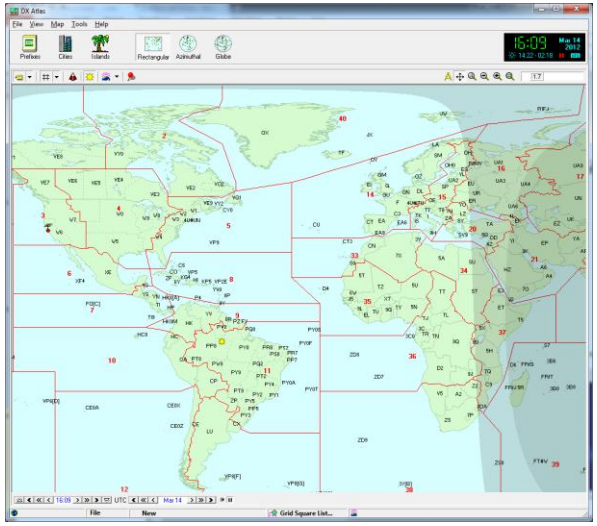


Circuit Reliability (%)

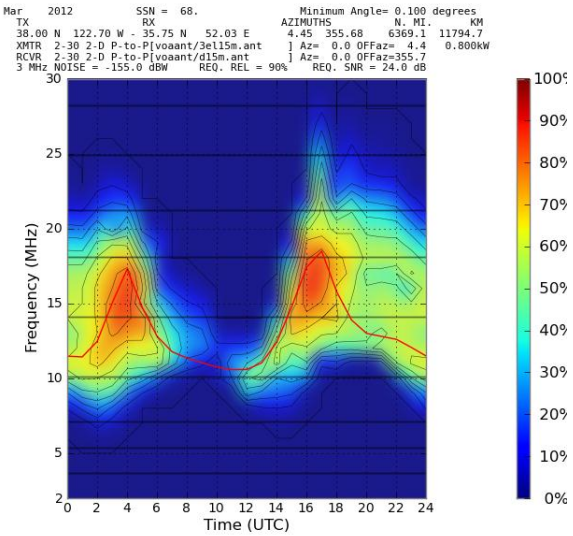


Did hear 4X via 20M LP

March 14, 2012 – 1609z

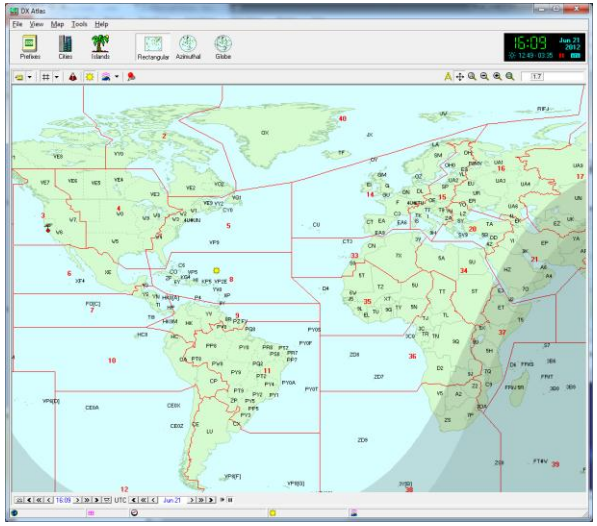


Circuit Reliability (%)

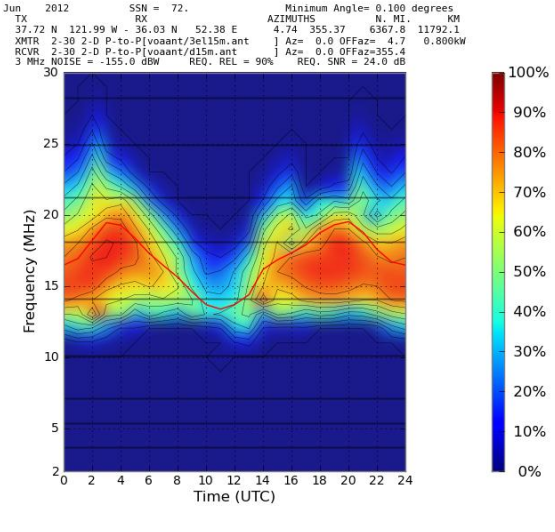


17M predicted, worked 20M

June 21, 2012 – 1609z

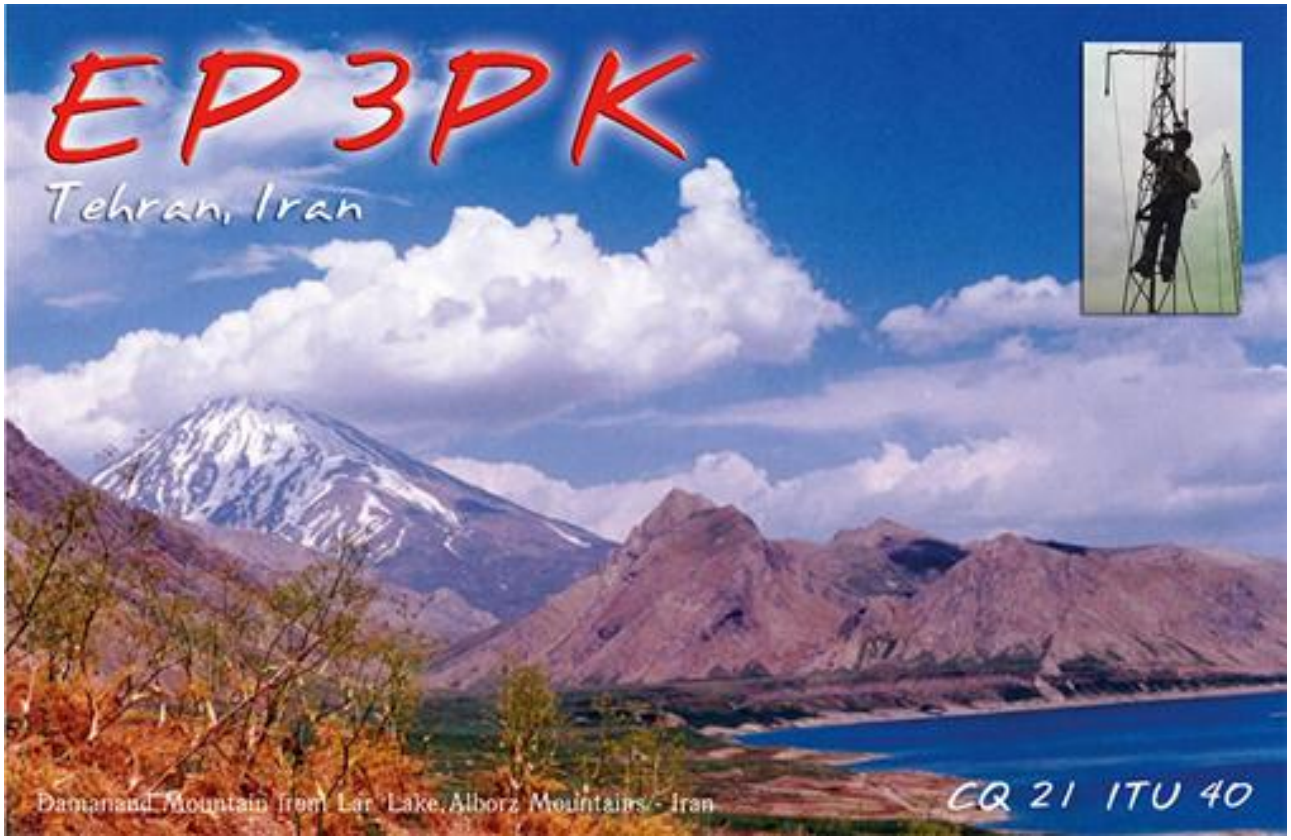


Circuit Reliability (%)

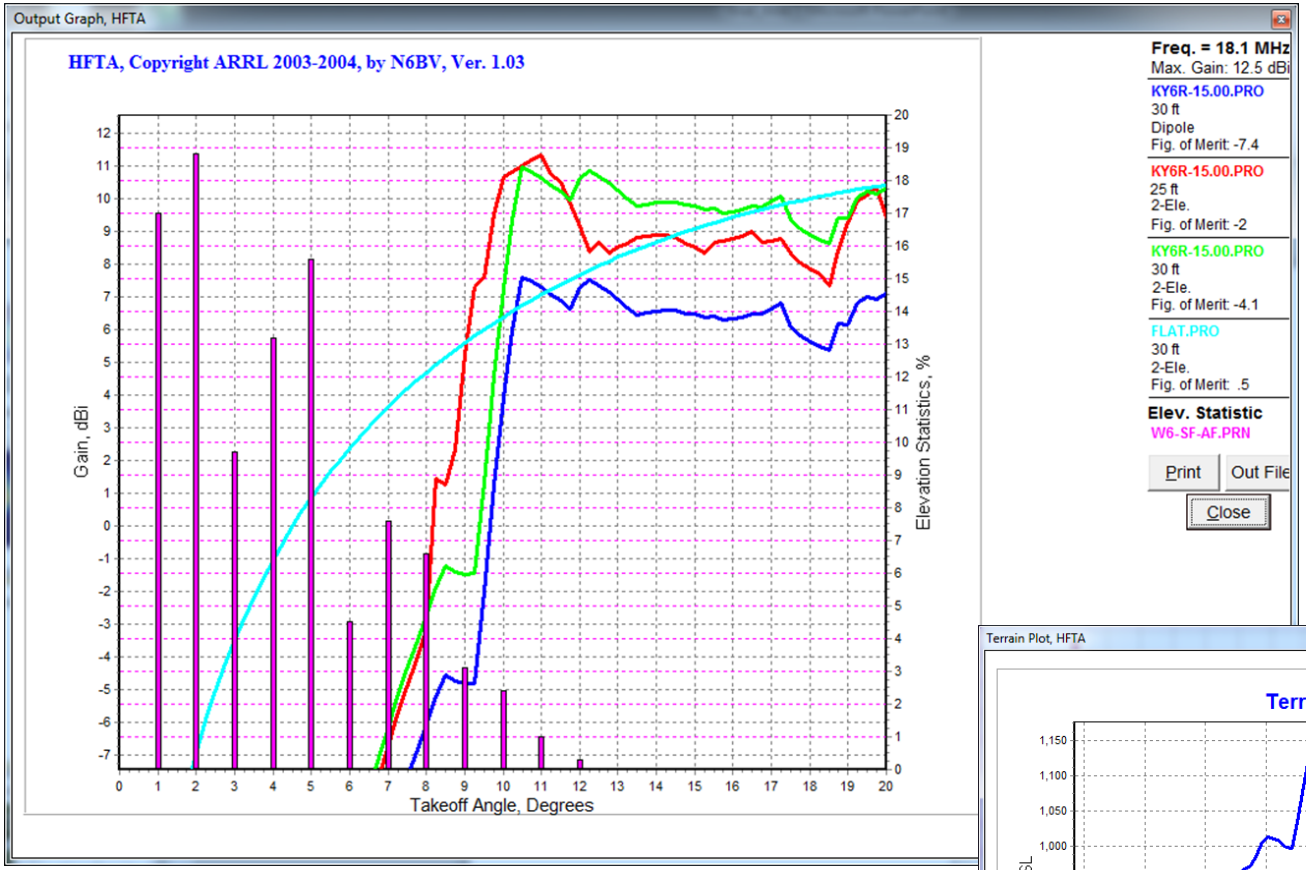


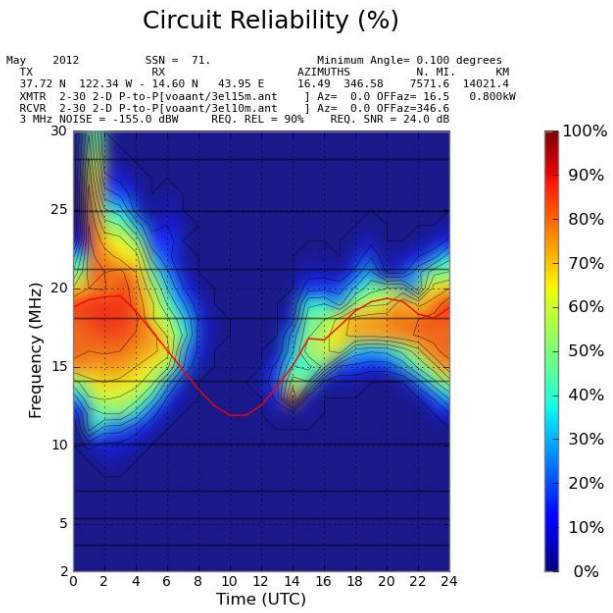
17M should be good

EP3PK - #330/326 - 3/14/12 1609z

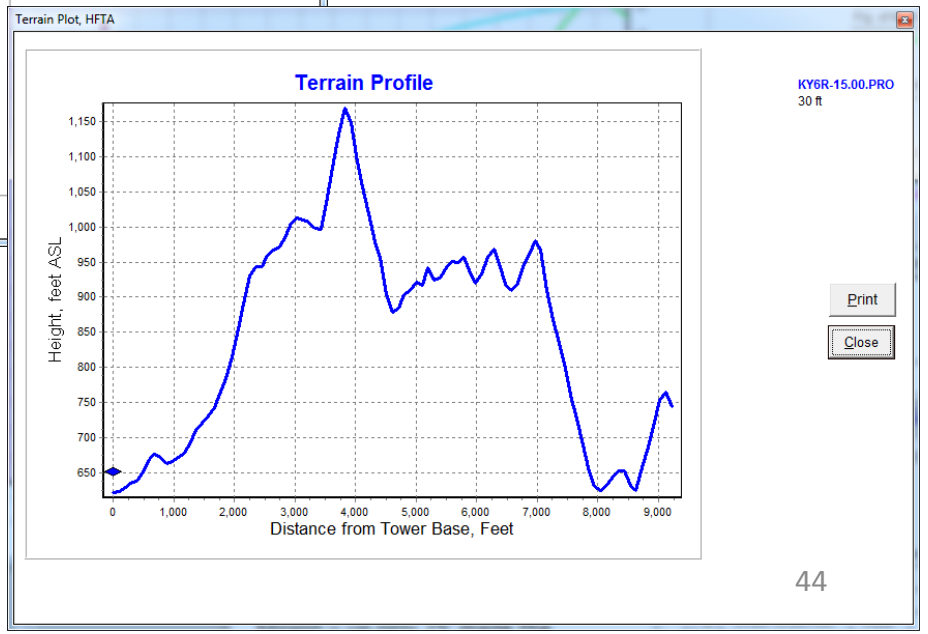


7O6T - Yemen



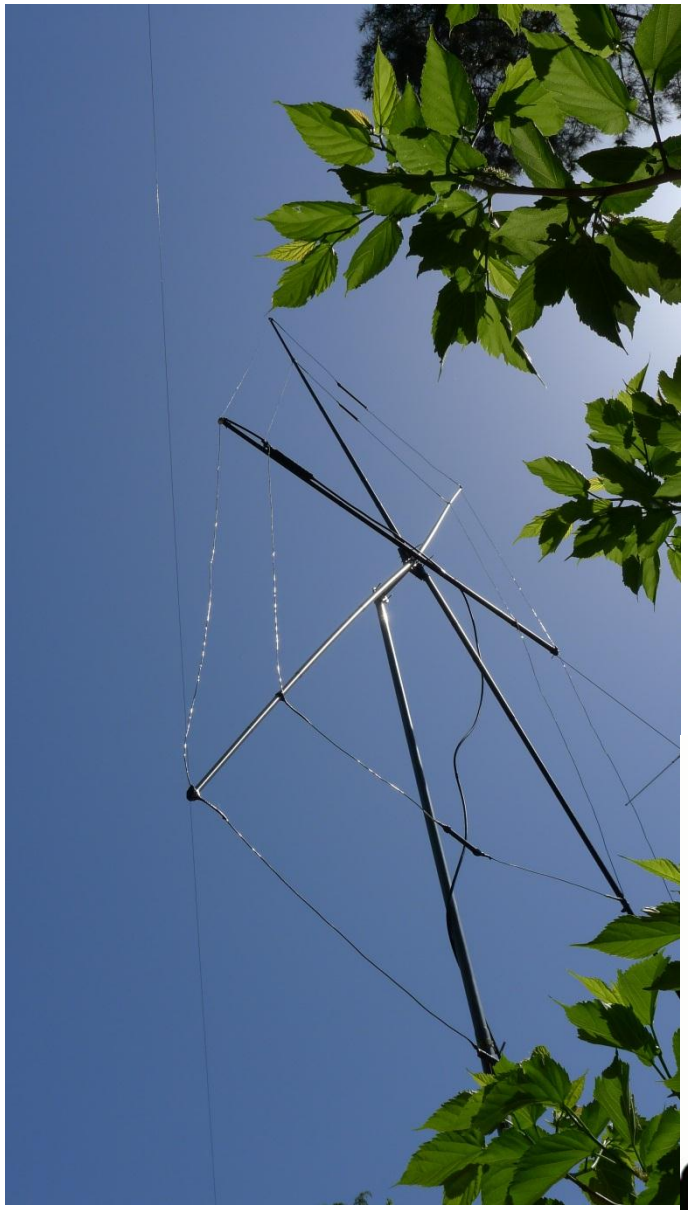


17M emerging as Important in Cycle 24

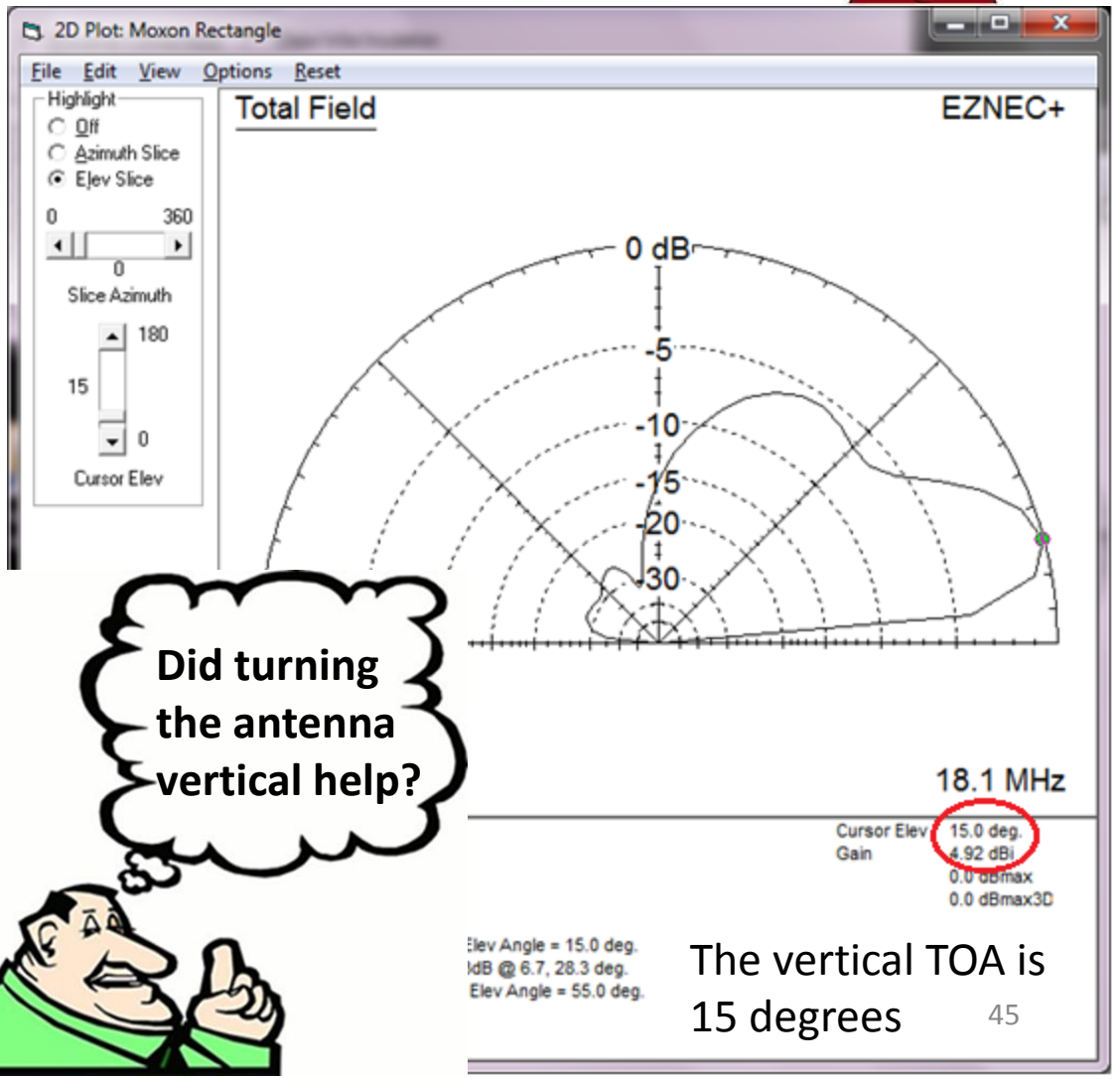


My old 20M Moxon up 30’ would have been a dipole on 17M. My new 17/12M Nested Moxon – up only 25’ made the difference in working Yemen. +6 dB for 10% more angles (3+ dB free space gain)

7O6T – The Ghost of ST0R



VOACAP correctly Predicted 17M

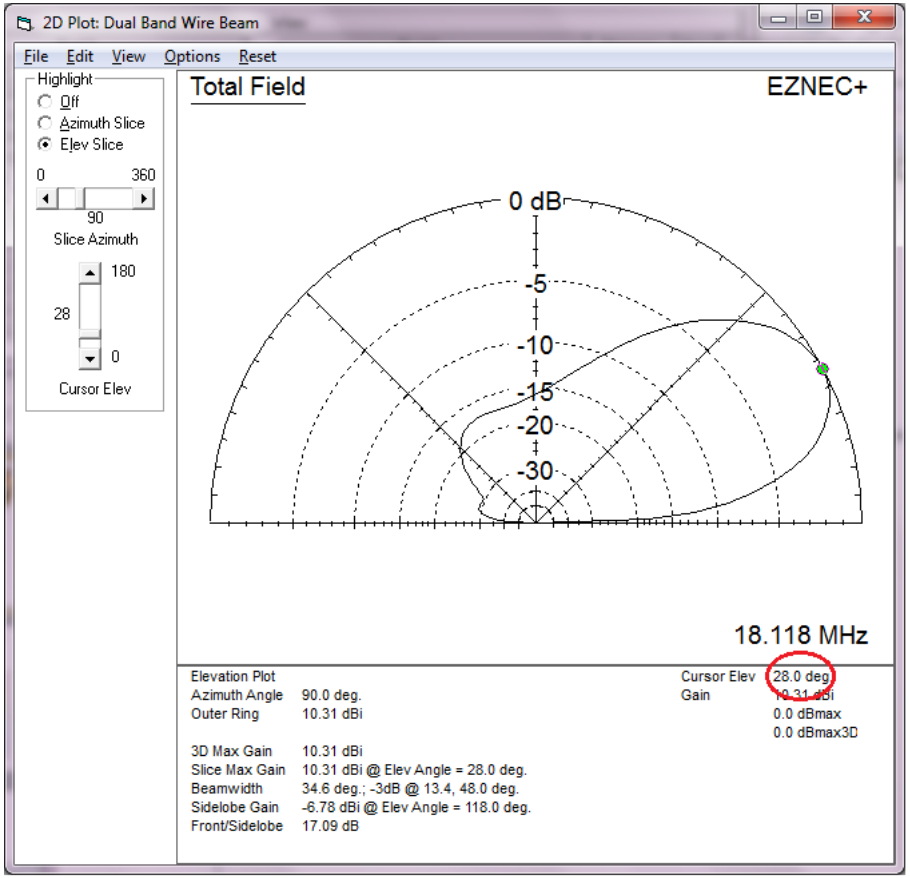


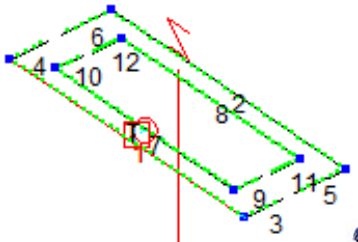
The vertical TOA is 15 degrees

7O6T = #331/327 0136z, 17M SSB

"Yes, I worked you. Your signal was probably the weakest of any I have worked. Propagation was outstanding. Even NE5EE on his screwdriver antenna in SF was louder than you." - Paul, N6PSE

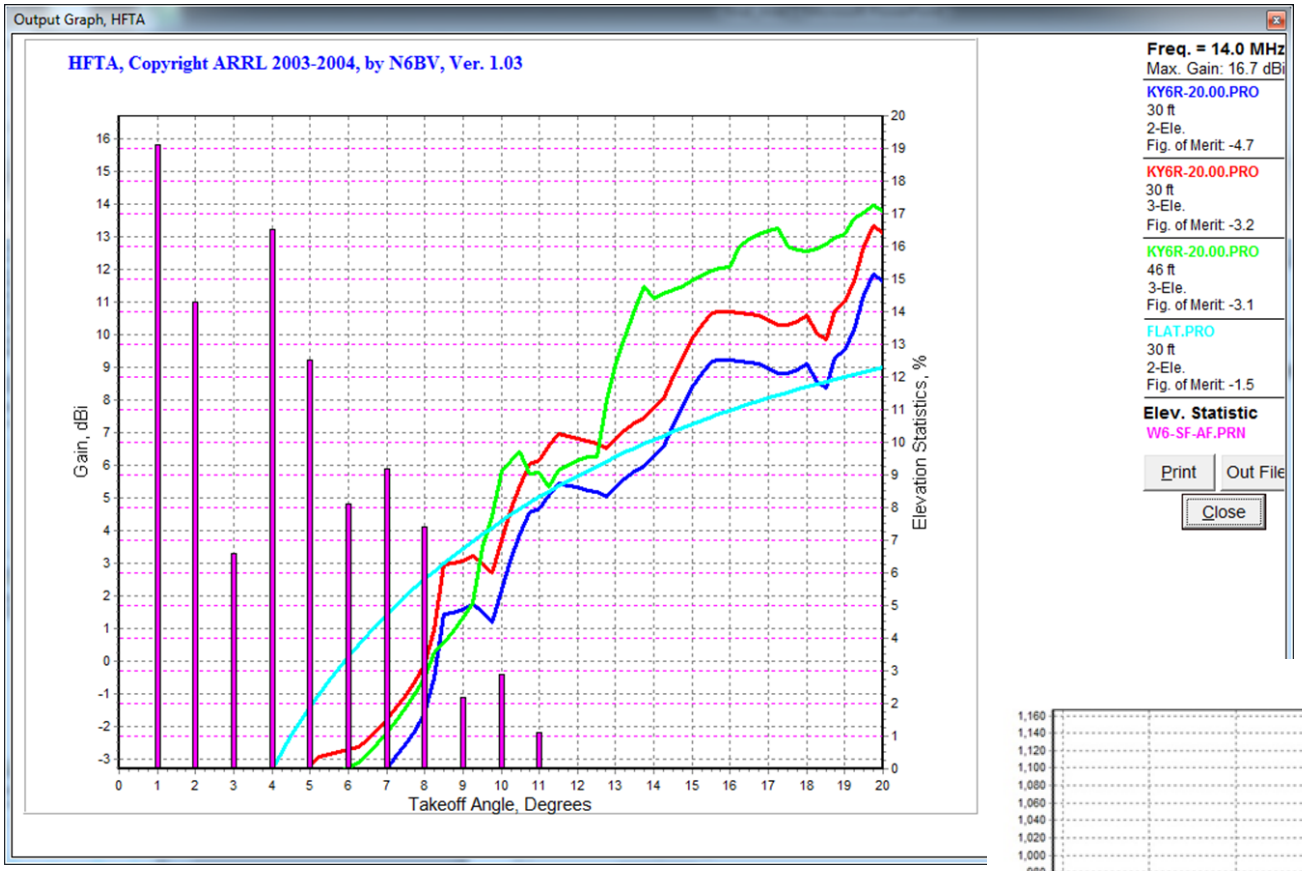
This is a good indicator for working Z8 and E3 later this year.

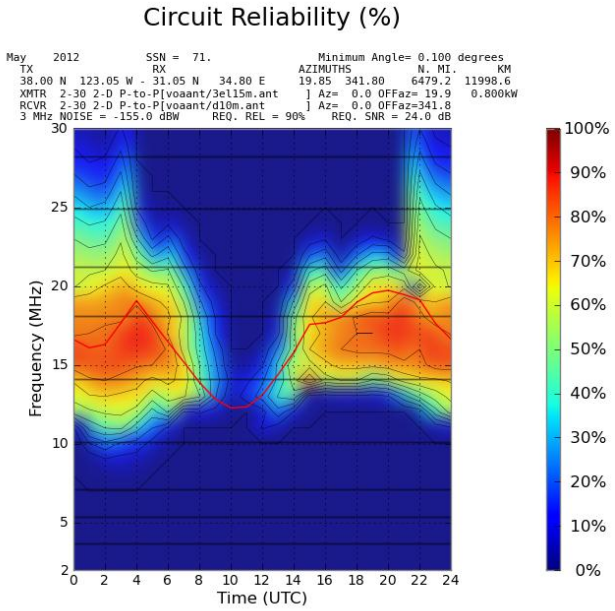




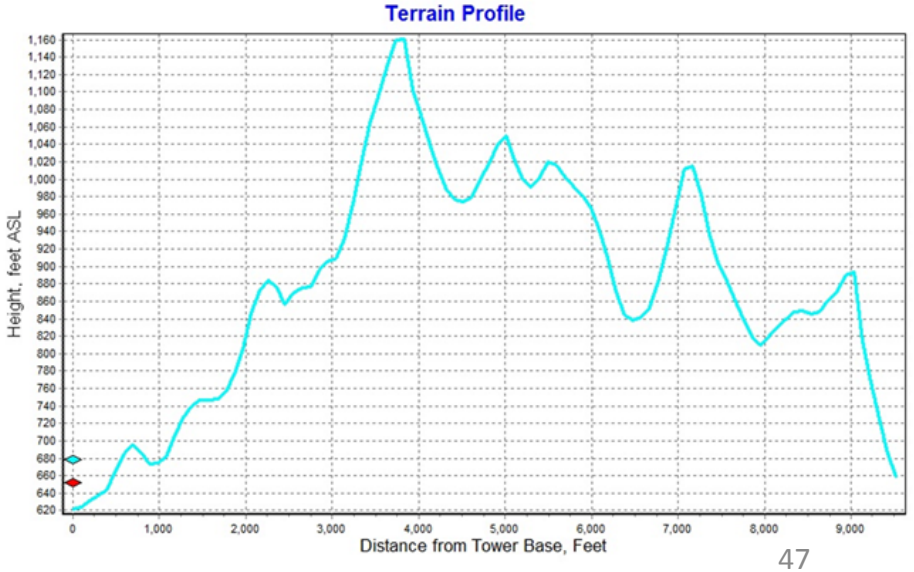
The horizontal TOA
At 25' is 28 degrees

E40VB - #332/328 – May 15, 2012 0429z





17M should have been good - but worked him (ESP but easily) on the 20M evening greyline

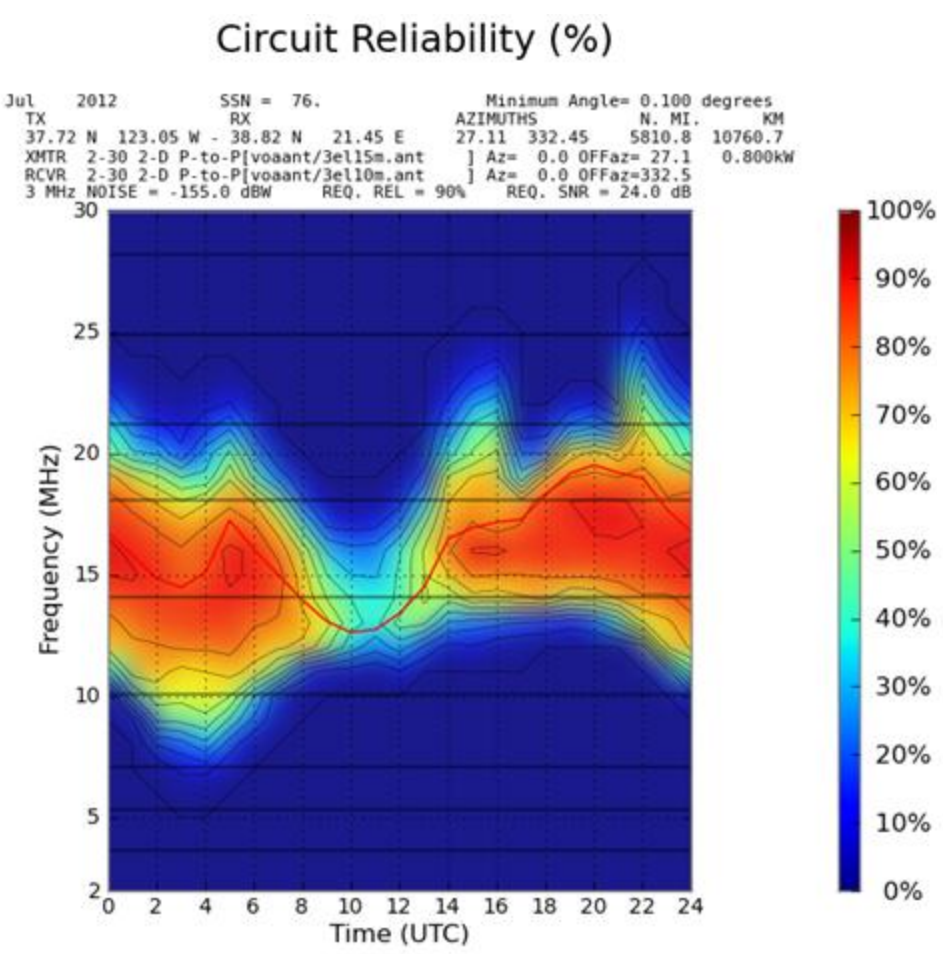


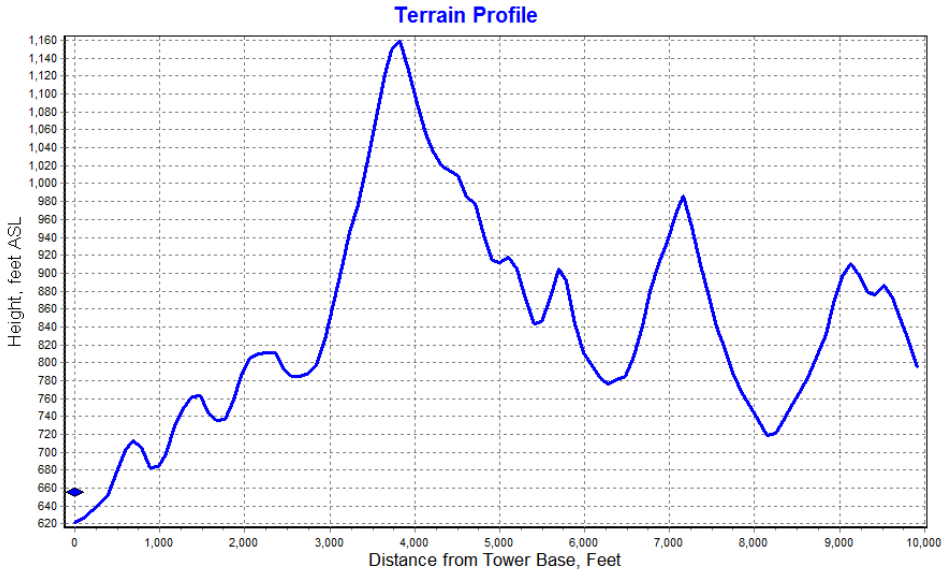
And Now, The Final Mile!

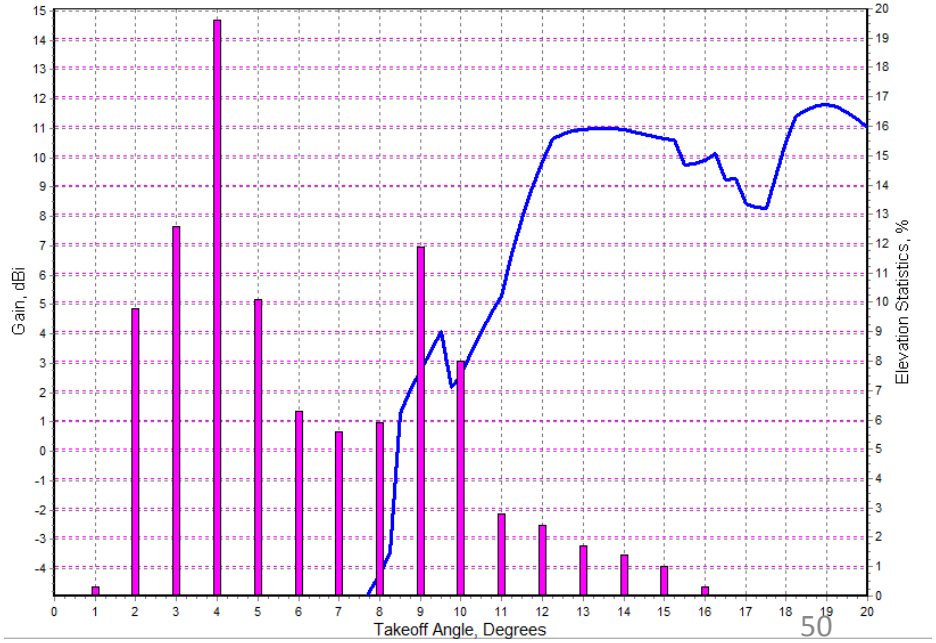
Summer 2012 Antenna Fun: One Old Wilson M520 Yagi ($150)

Still have enough left over for a 3 element yagi!

SV2ASP/A – Why Not?

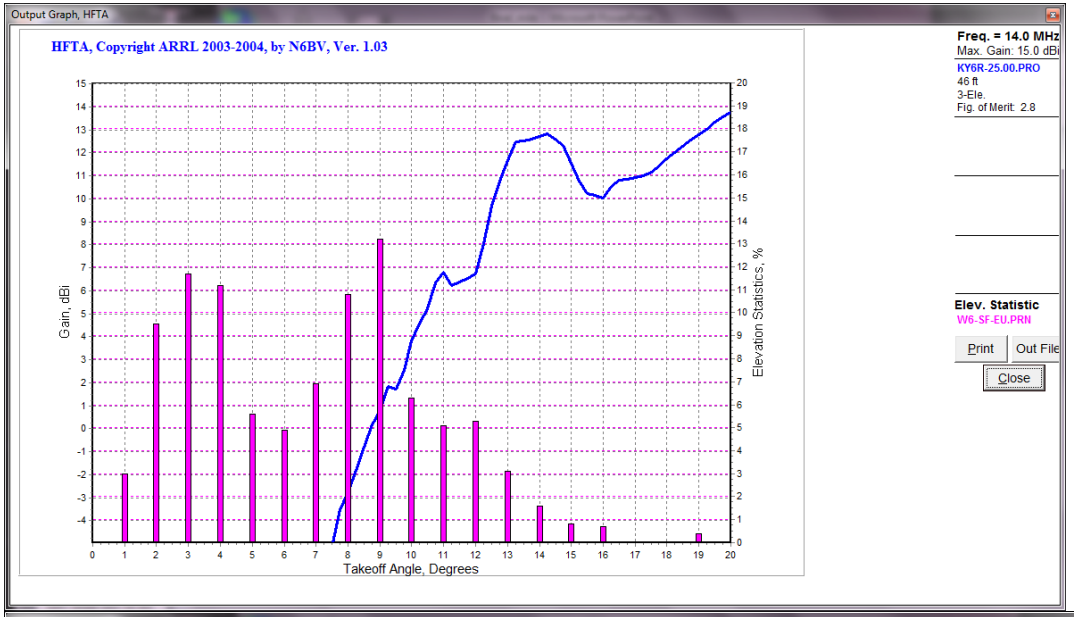


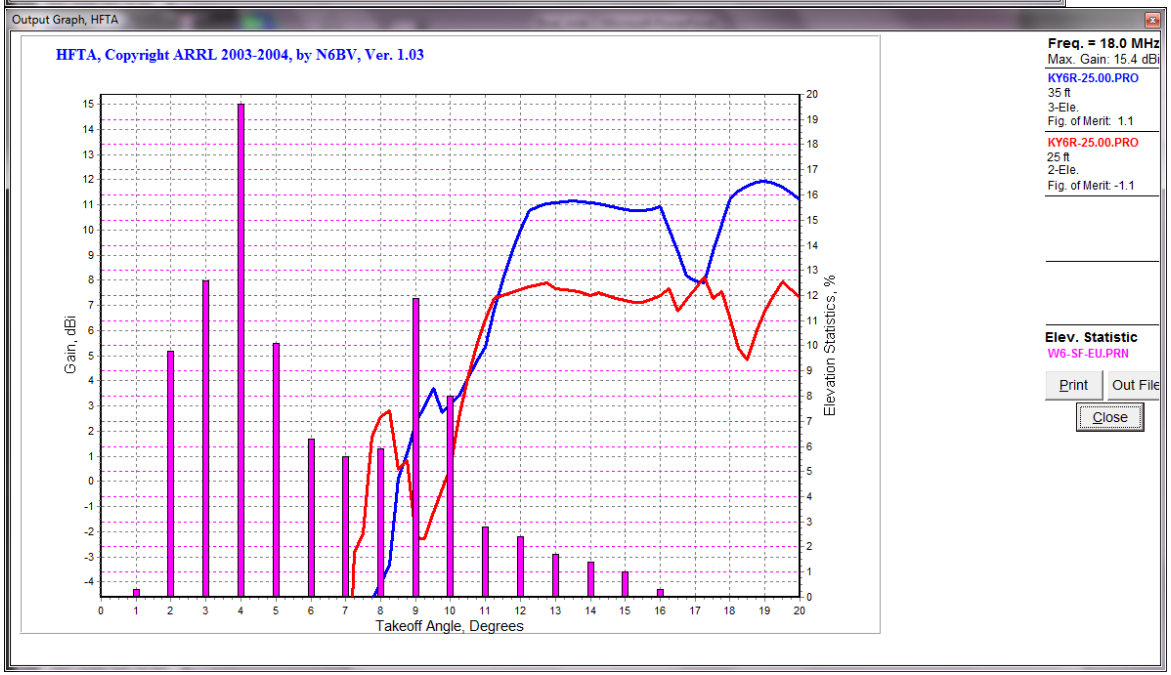




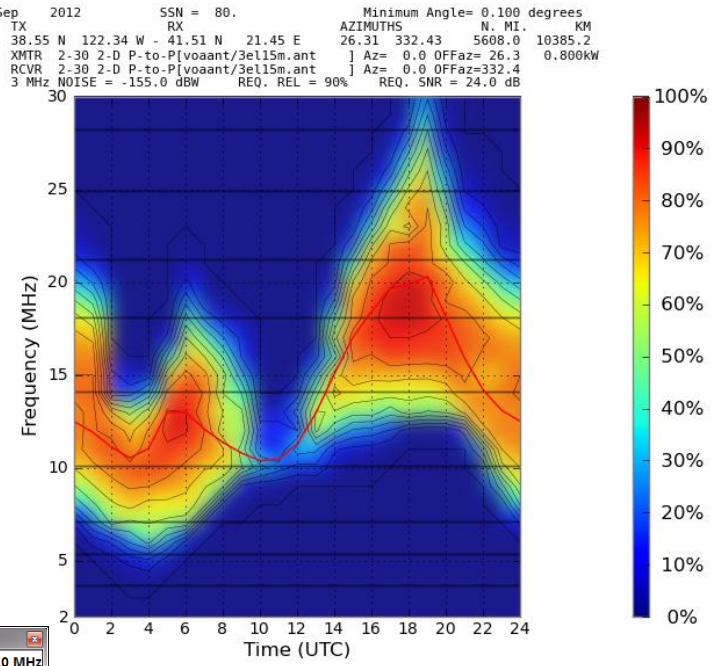
20M between 0000 – 0600z and
17M between 1800 – 2200z

Kosovo



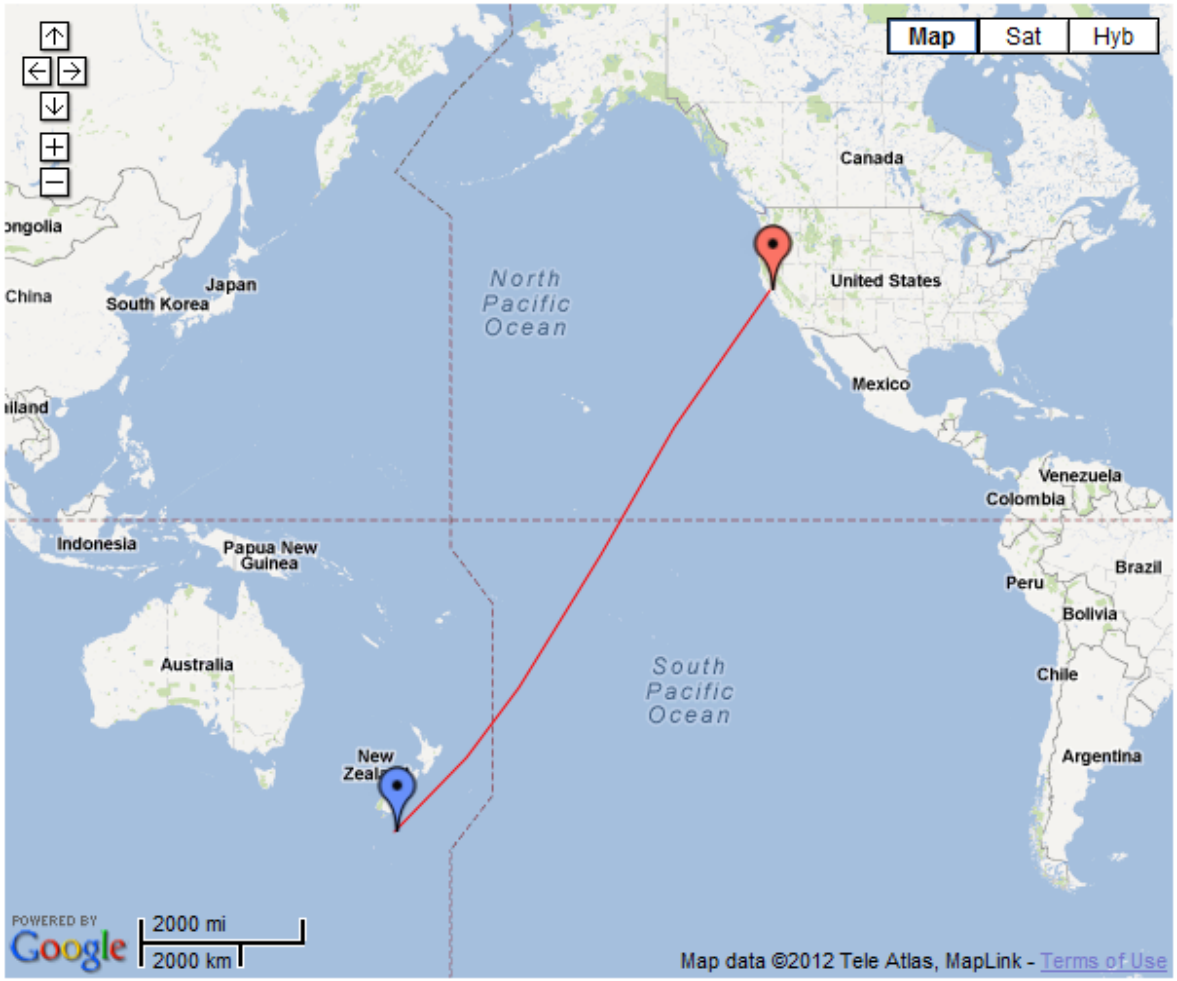


Circuit Reliability (%)

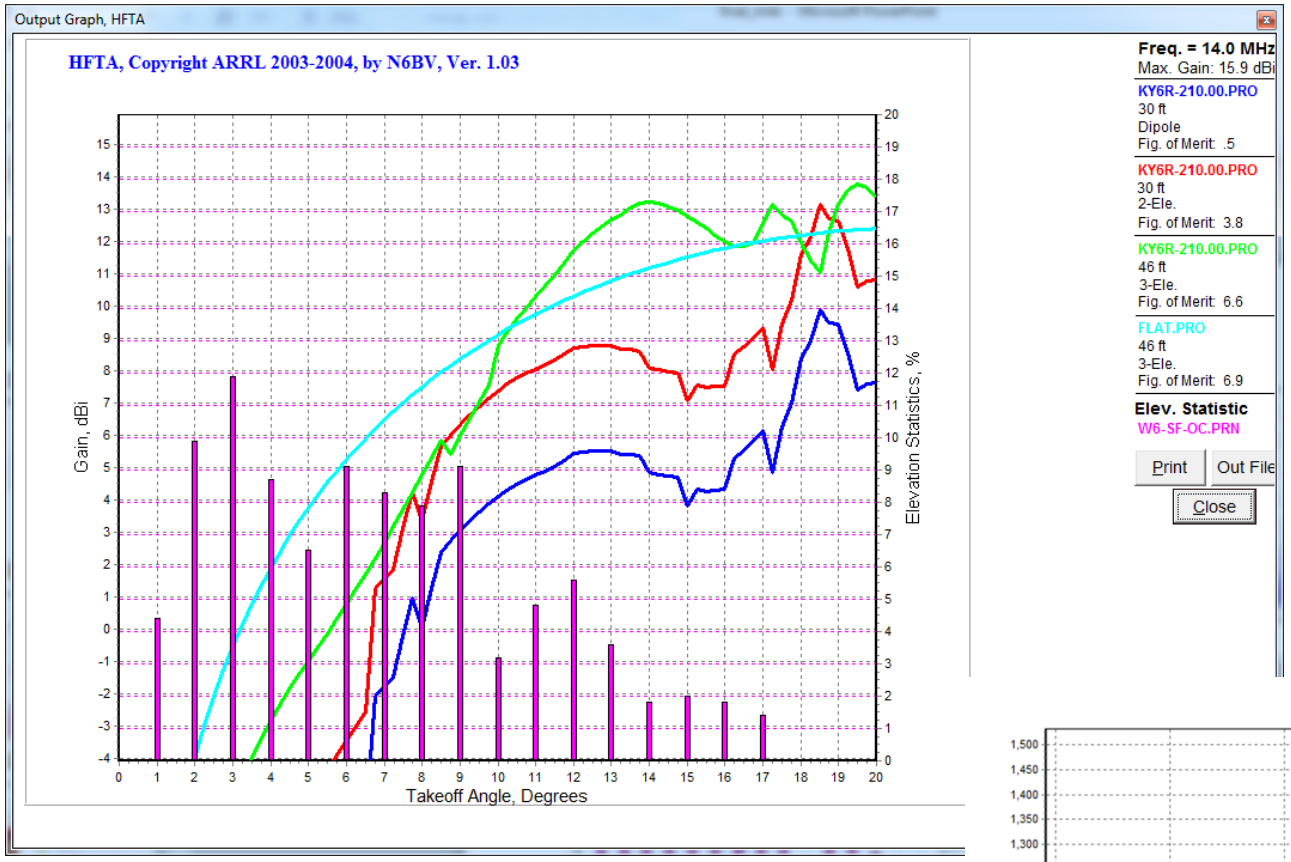


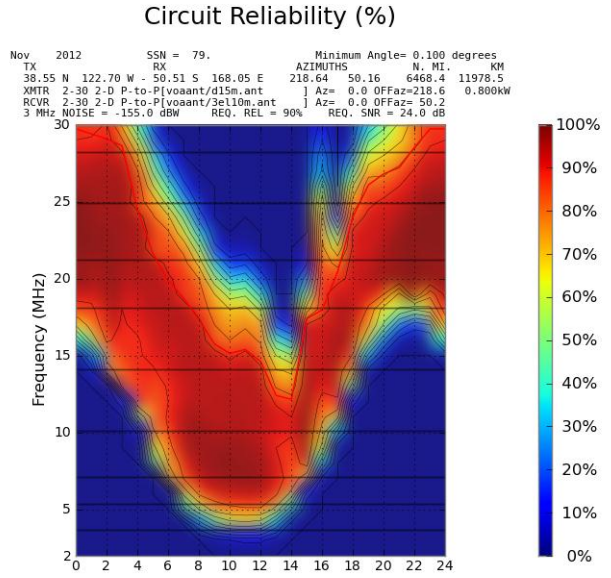
On 20M, Kosovo will be easy. I hear that part of the world almost daily – even when Conditions aren't great. The new 3 element 17M yagi at 35' should do better than the old Moxon up 25' . On average it is > 2 dB better on most angles – except 8 degrees

ZL9HR – Campbell Island – Nov 2012

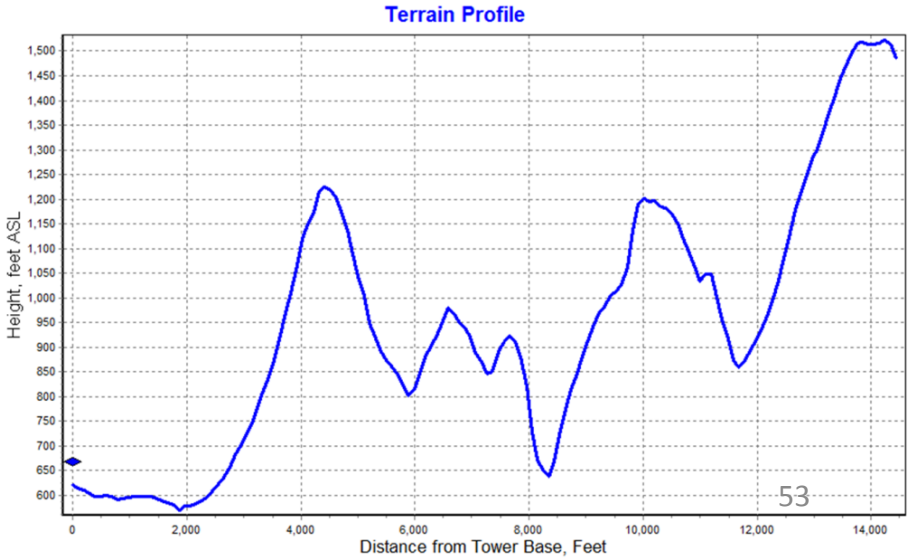


ZL9HR – Campbell Island





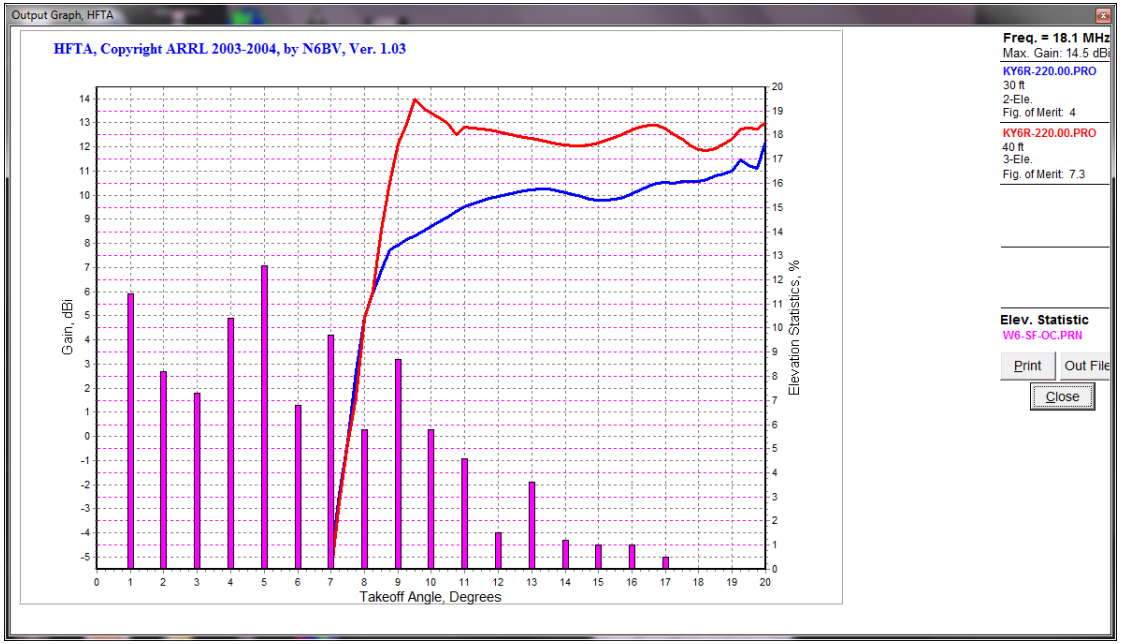
All bands should be good

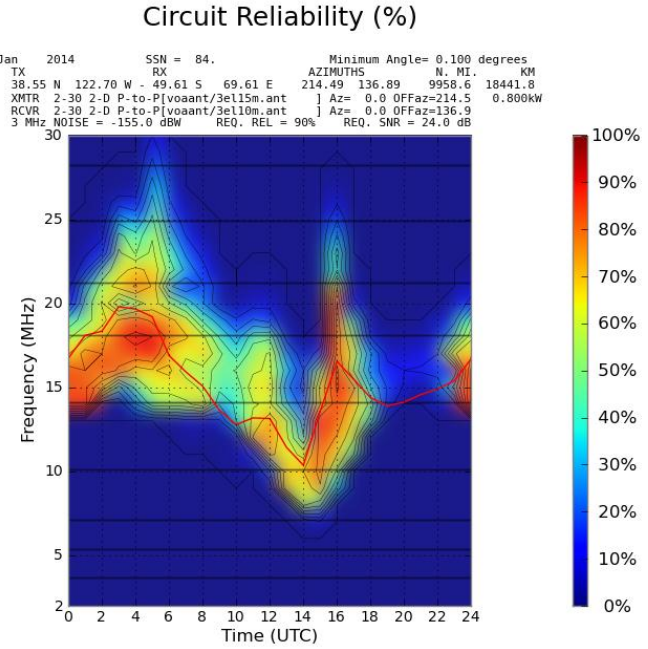


For >20% of the angles, the A3S at 46’ is 4 dB better than what I had last year. I understand that they can not stay over night – so 20M and up will be the bands to work. This will benefit the US and West Coast.

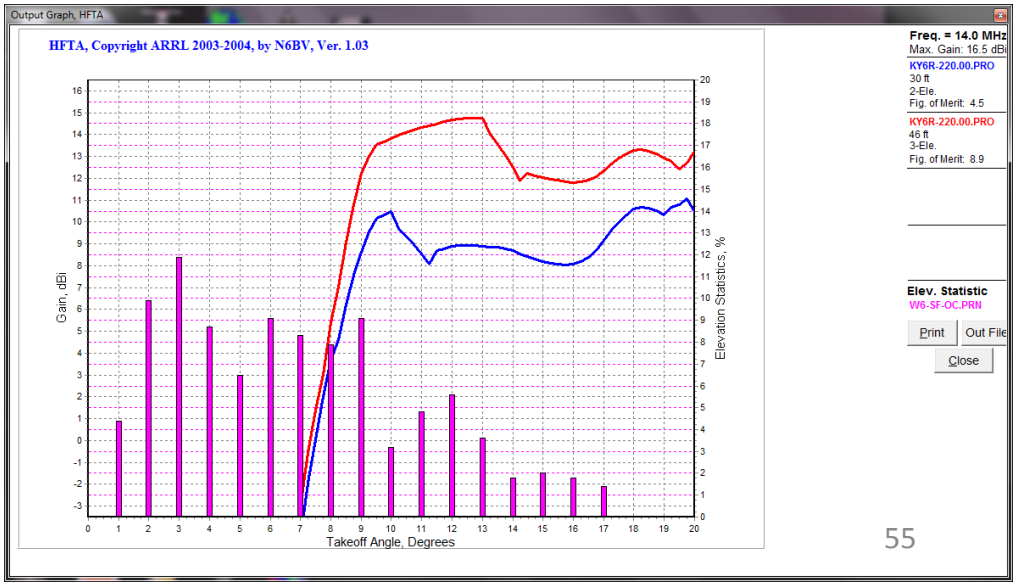
VK0/H Heard Island

VK0/H – Heard Island (Jan 2014)

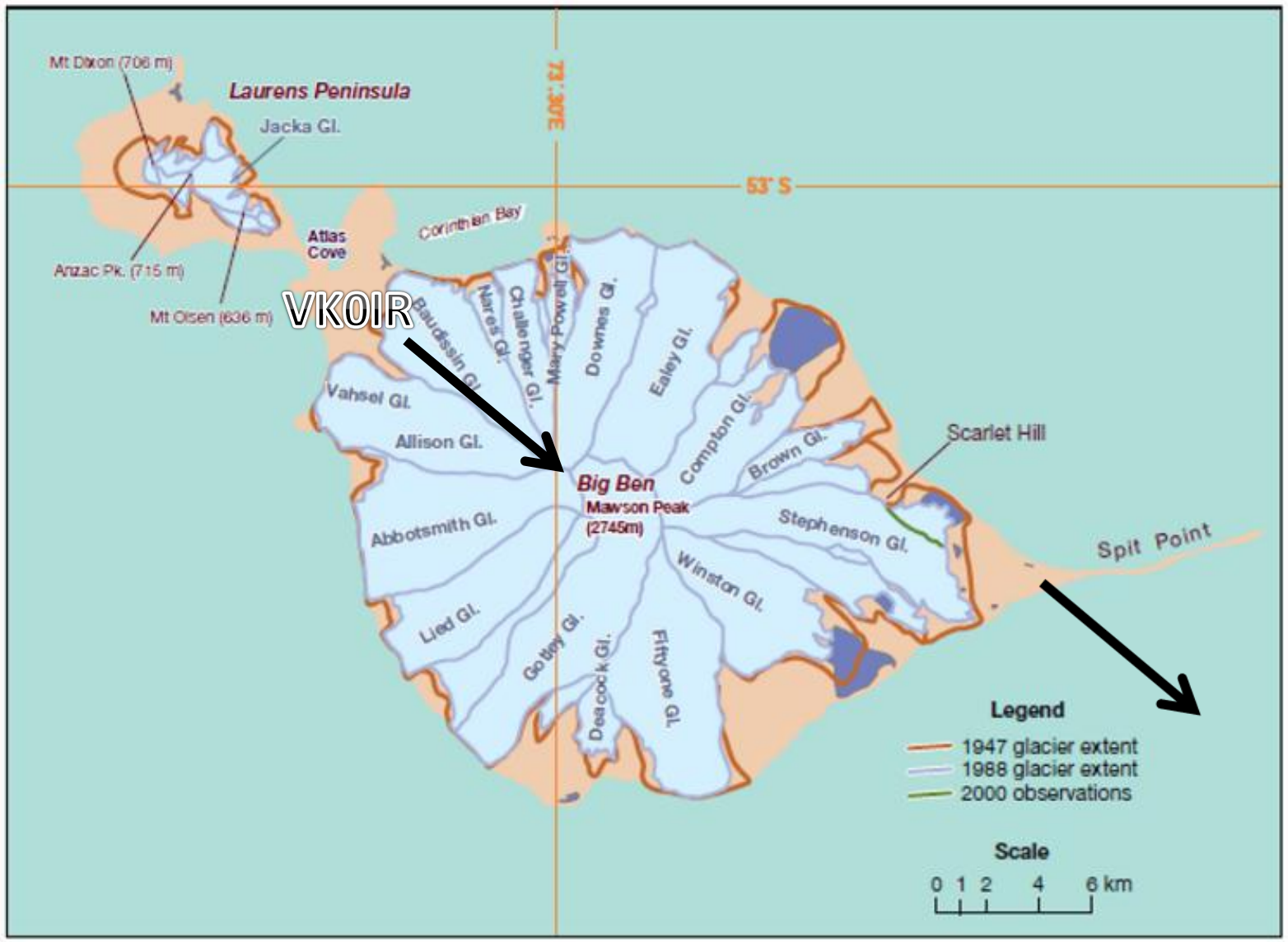




20M and 17M should be best. My nested Moxon is much better than what I had. But if I built a 3 element 17M yagi it would be +5 dB over a dipole and 2dB better than the Moxon. The A3S on 20M @46' is 5 dB better than what I had last year! If I built a 5 element 20M yagi, it would be 2 dB better than the A3S. This will require low angles.

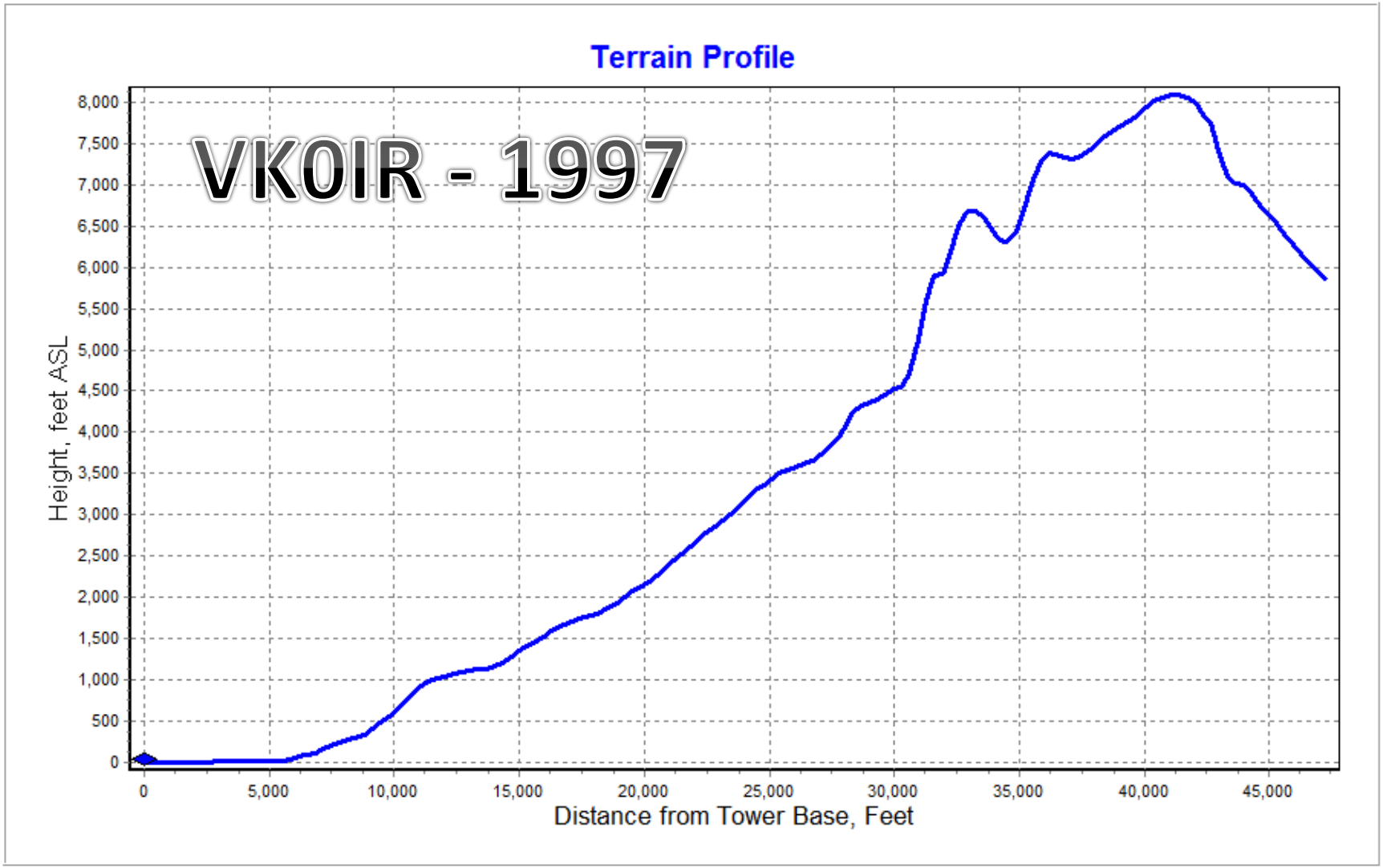


From VK0/H to KY6R = 138º



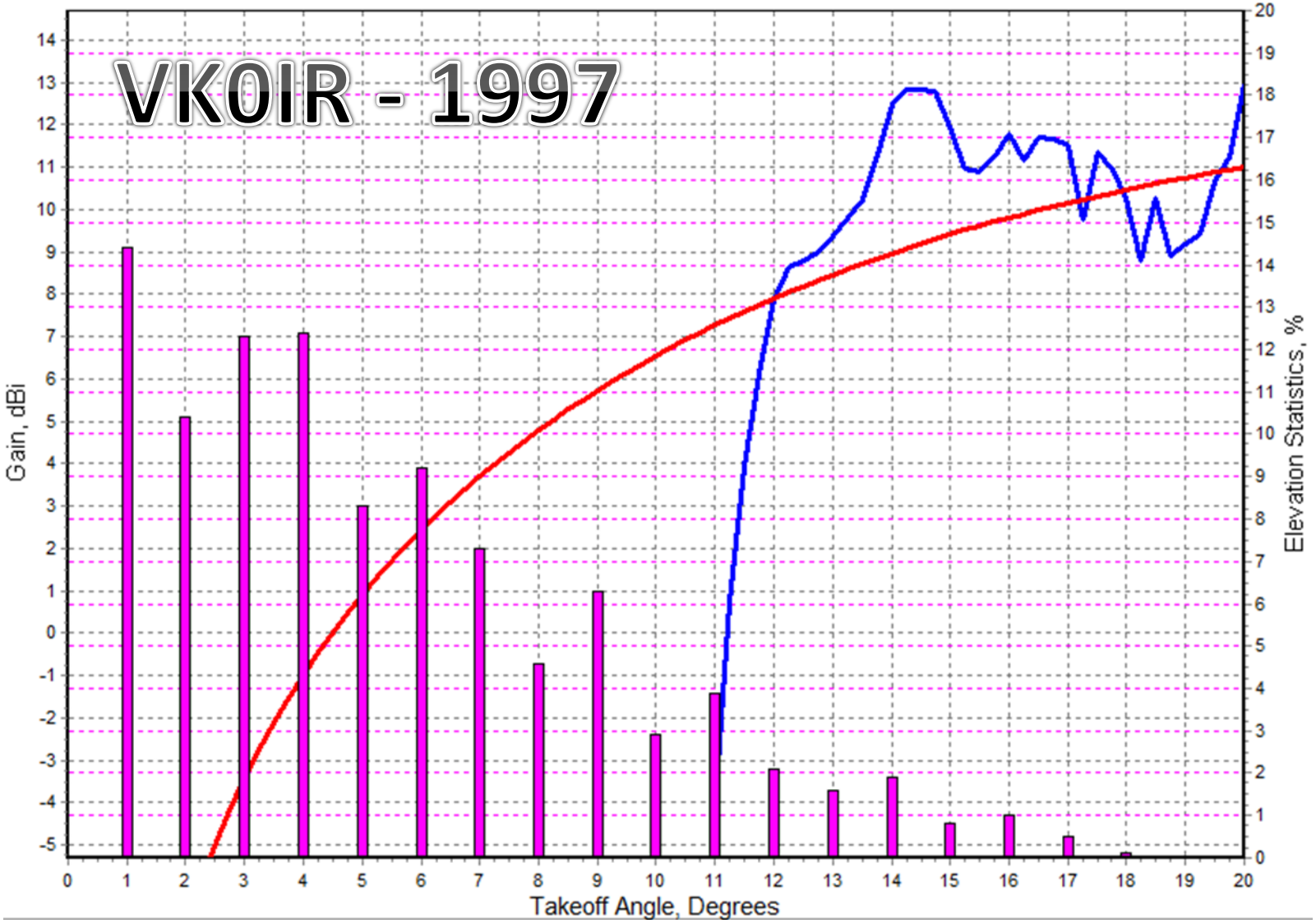
ANDREW RUDDELL

From “Atlas Cove” to KY6R = 138°



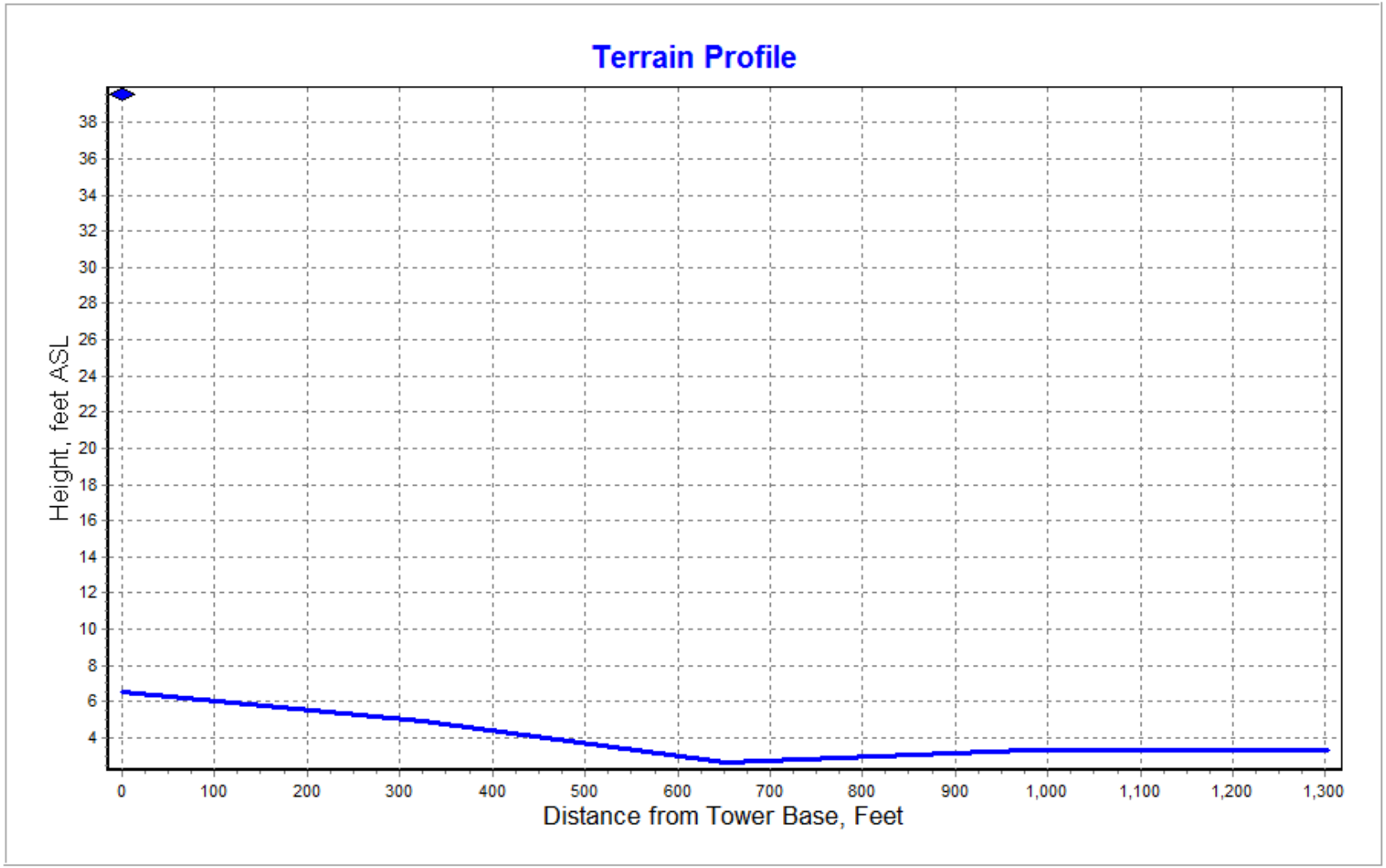
HFTA Data and Analysis provided by Dean Straw, N6BV

From “Atlas Cove” to KY6R = 138º



HFTA Data and Analysis provided by Dean Straw, N6BV

From “Spit Point” to KY6R = 138^{o}

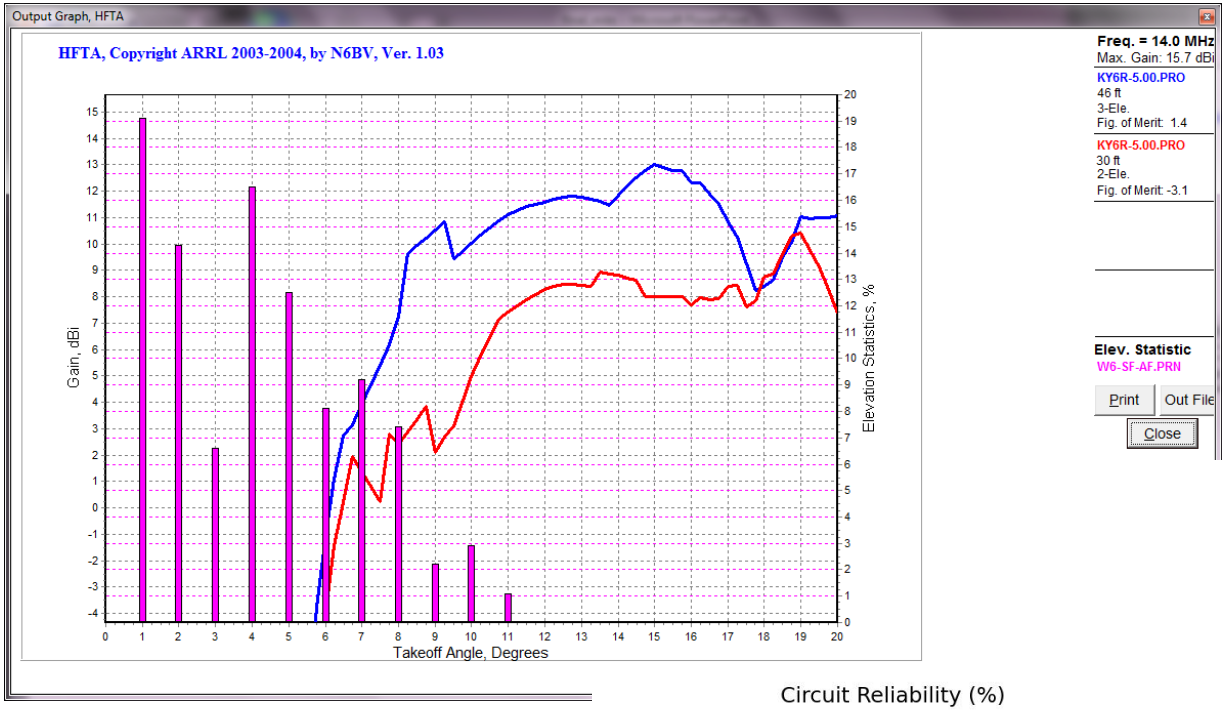


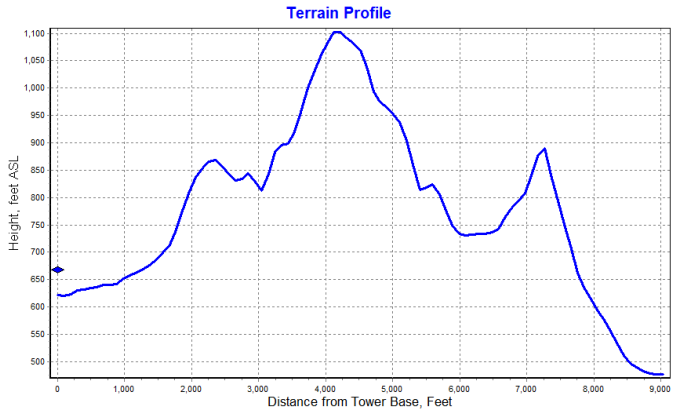
HFTA Data and Analysis provided by Dean Straw, N6BV

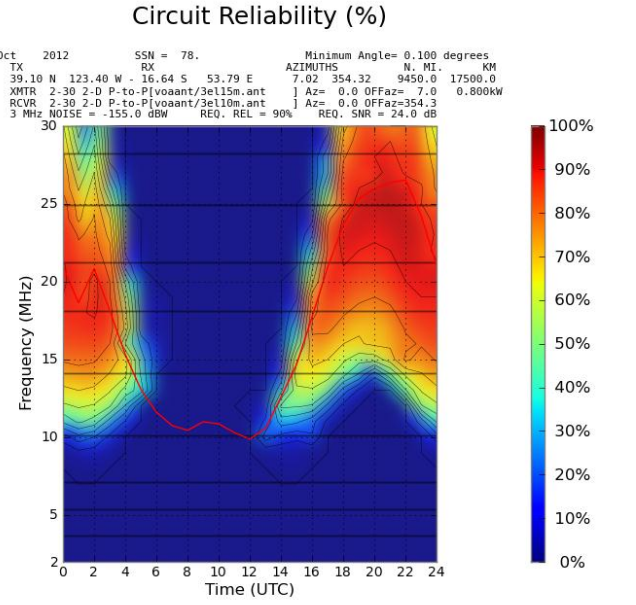
From “Spit Point” to KY6R = 138º

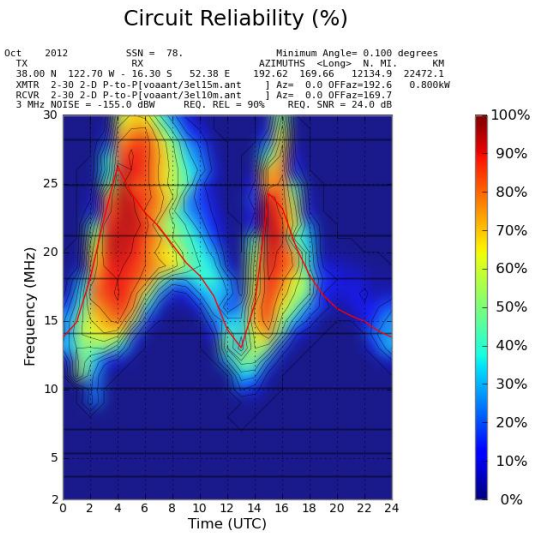
HFTA Data and Analysis provided by Dean Straw, N6BV

FR/T - Tromelin



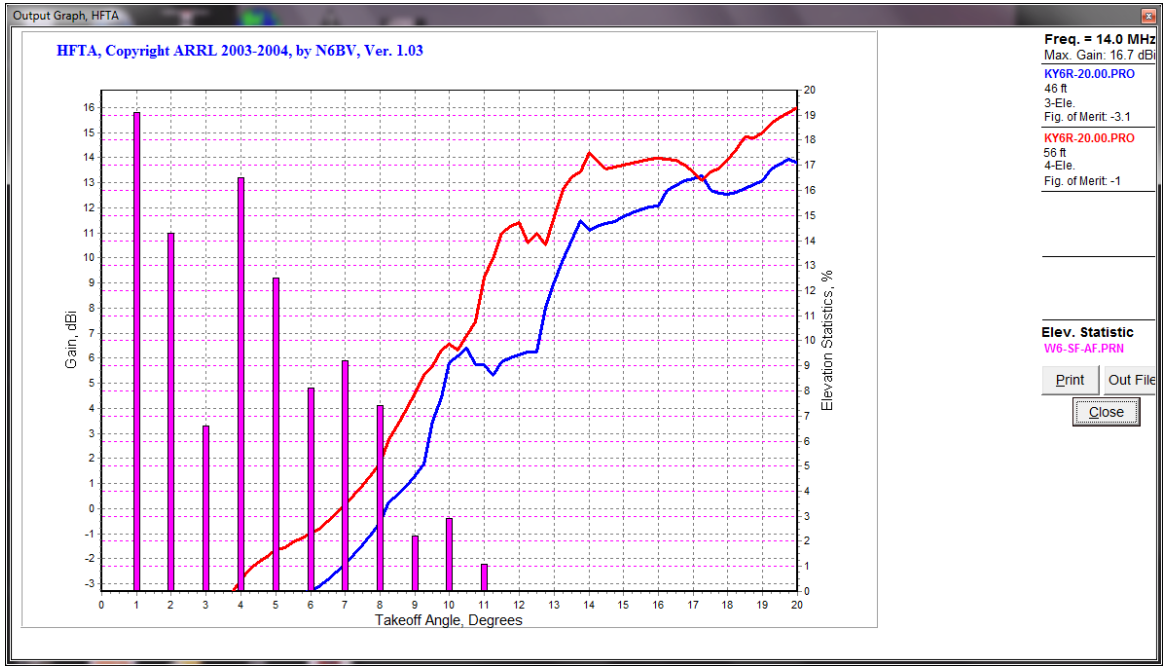


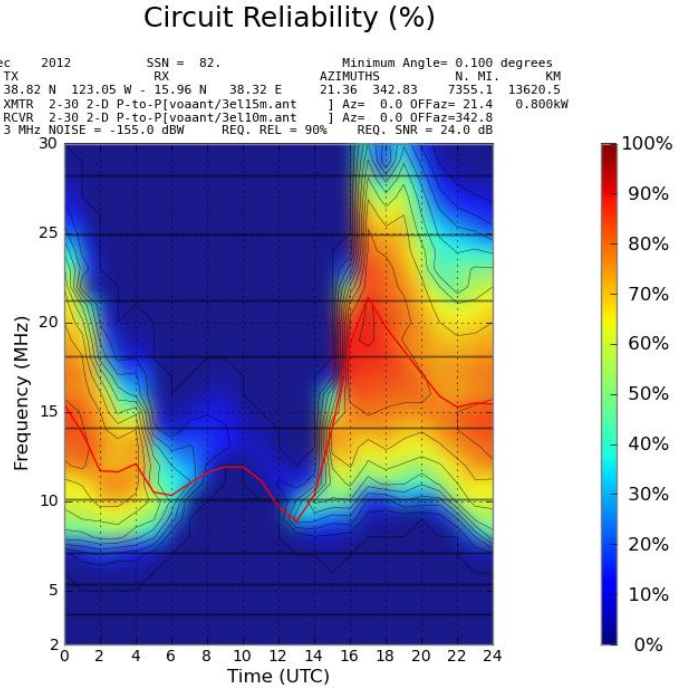




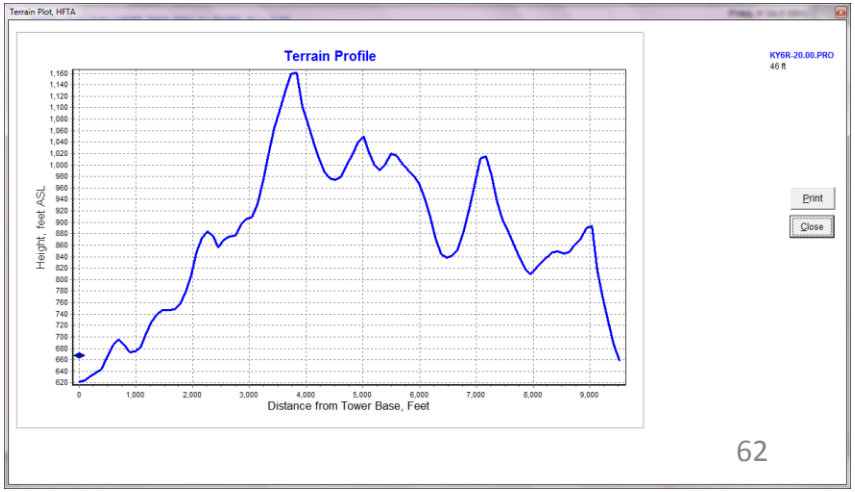
On the short path, I just skirt past the same hill and ridge
That is in the way for anything
Between 5 and 30 degrees N-NE

E3 - Eritrea

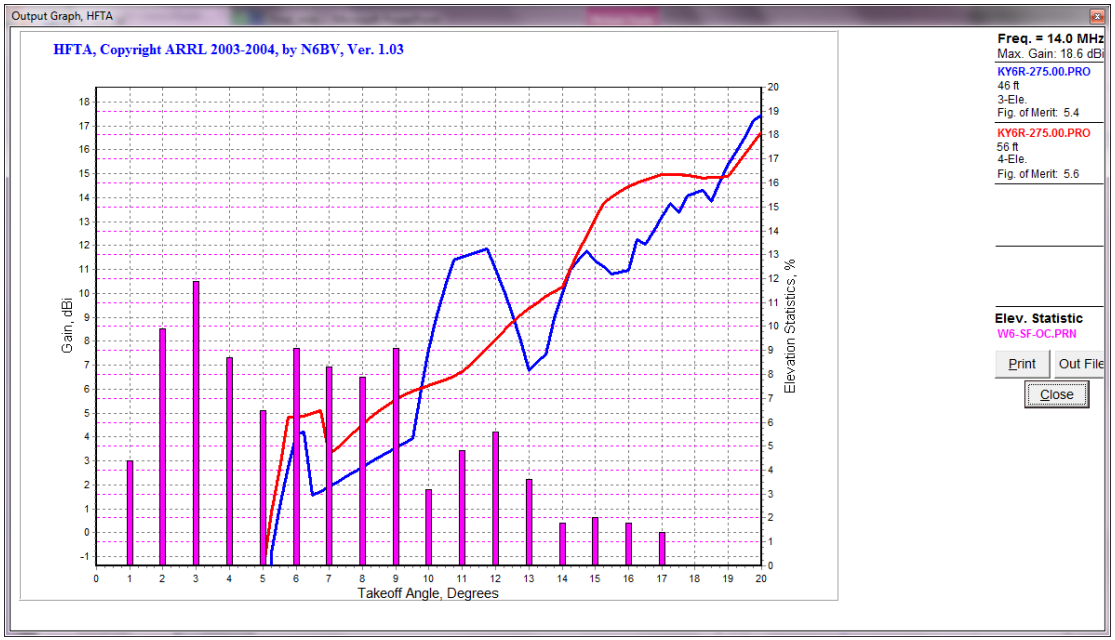


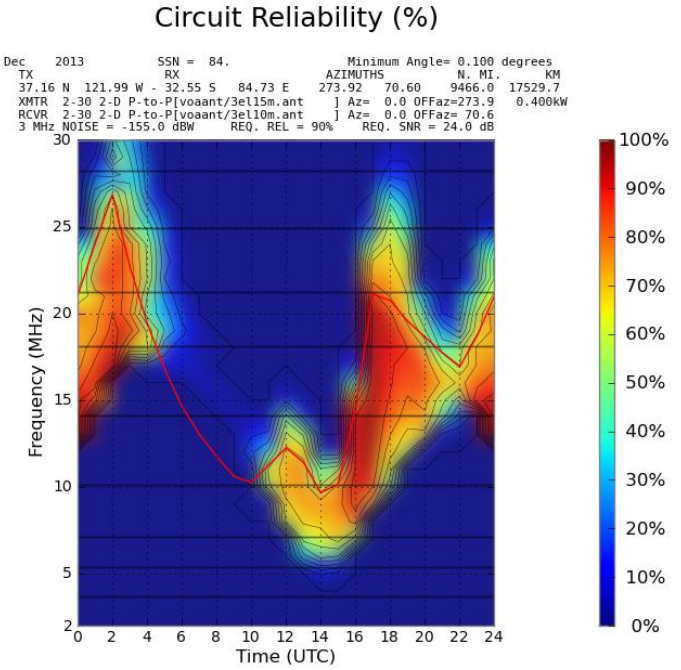


I've designed a 4 element 20M monoband yagi that I am tempted to build and replace the A3S with. The problem is that I would then degrade 15M – which would be a good band to work Eritrea – if it is activated at the end of the year as rumored.

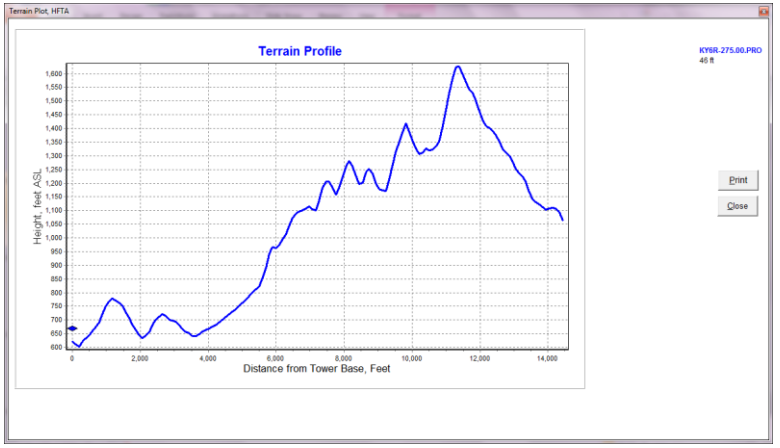


FT5Z – Amsterdam / St. Paul

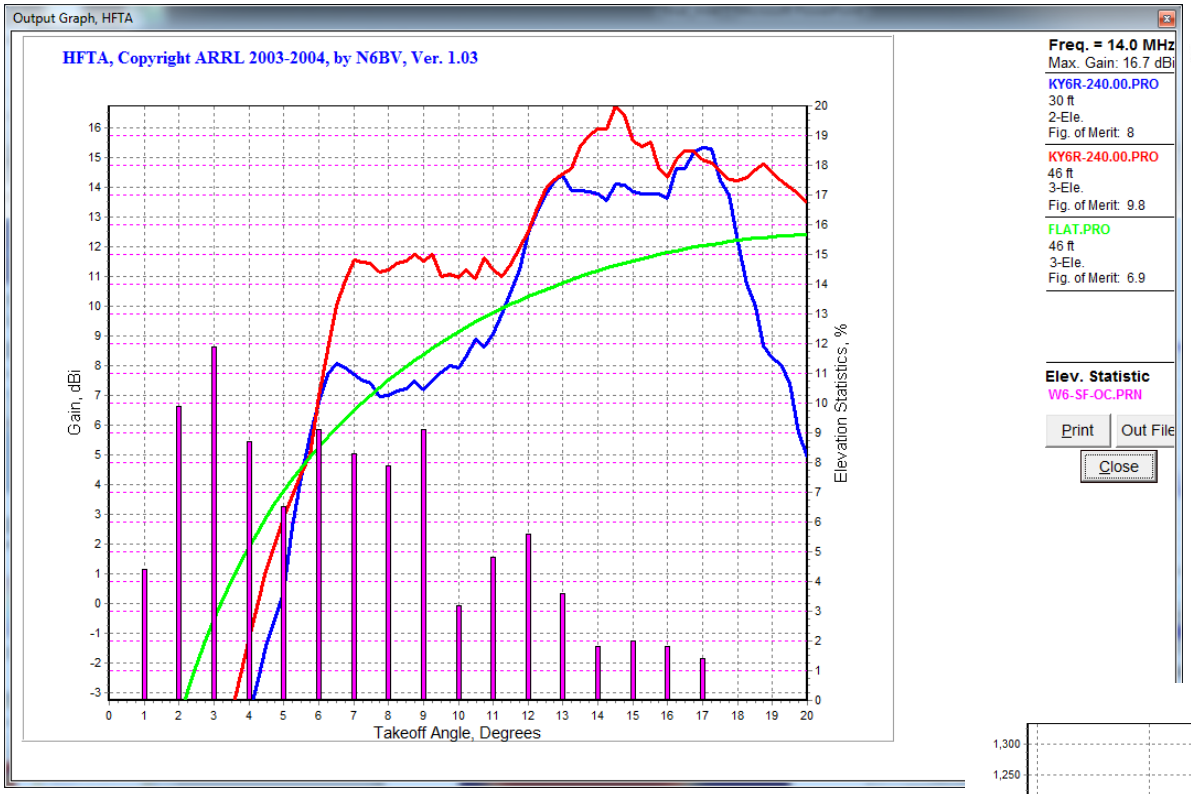


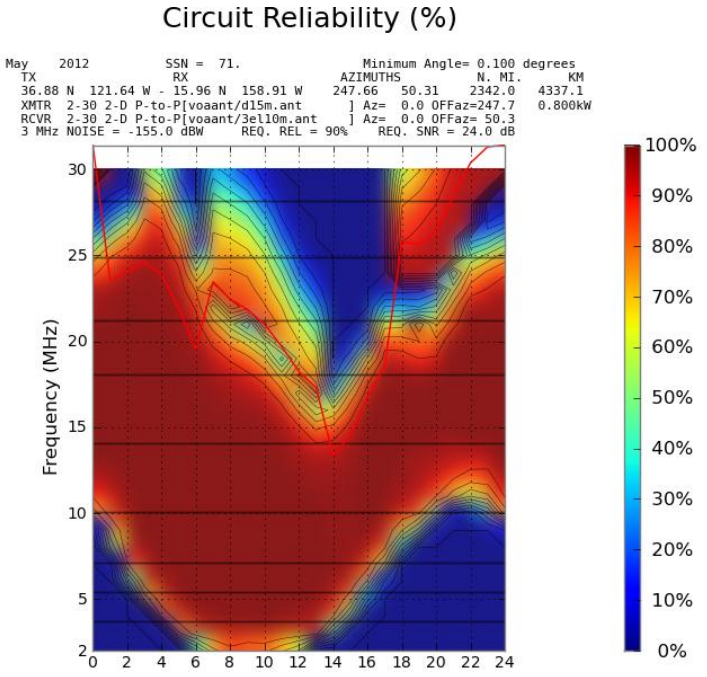


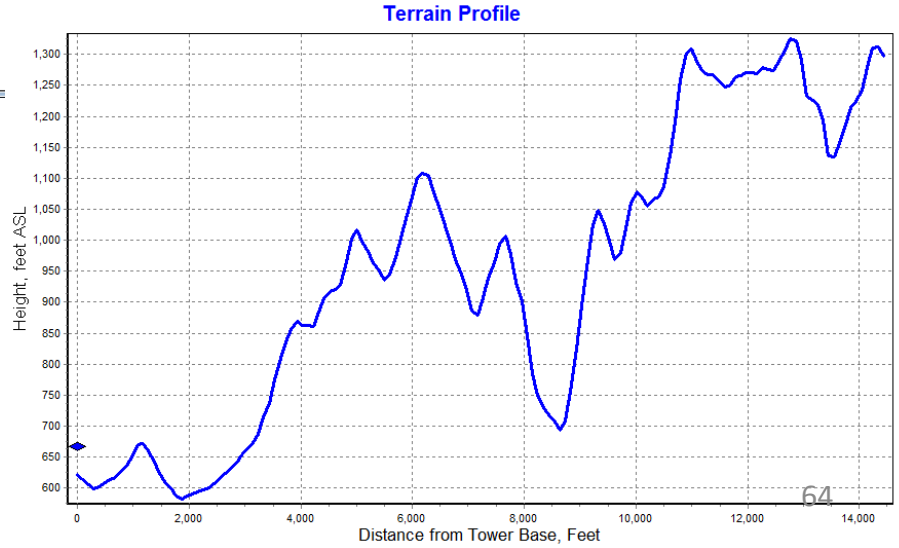
If FT5Z were to be activated in December 2013,
I would be in hog (ham) heaven! The best argument to keep my A3S up through the top of Cycle 24.



KH5K – Kingman Island

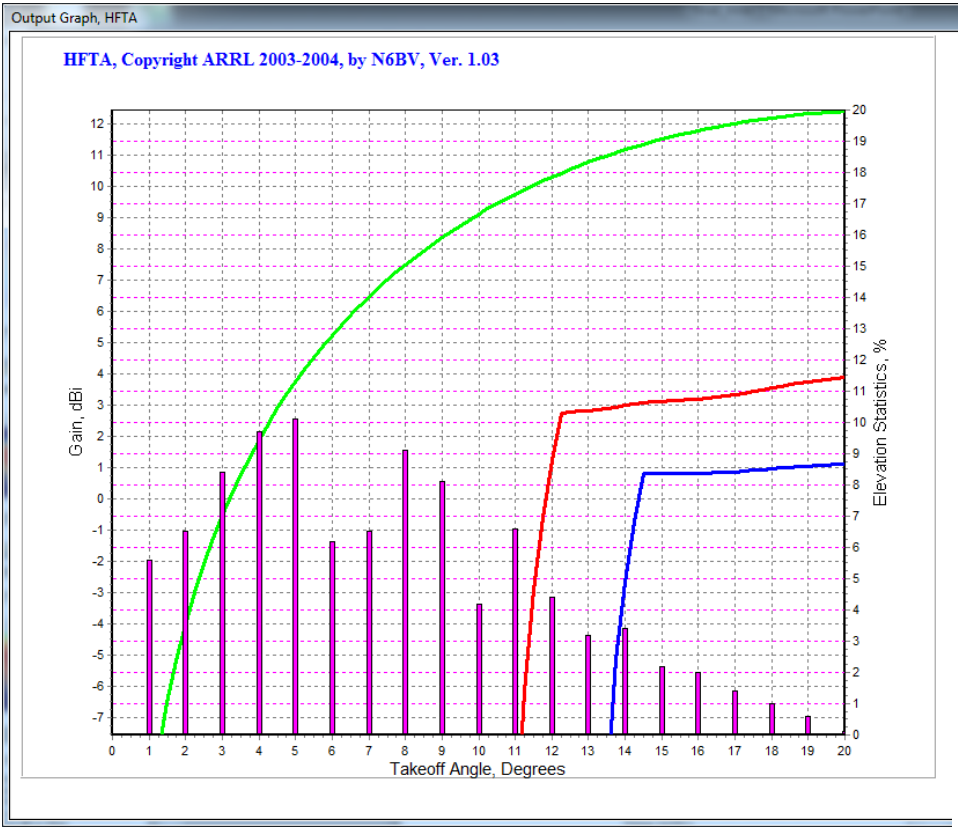


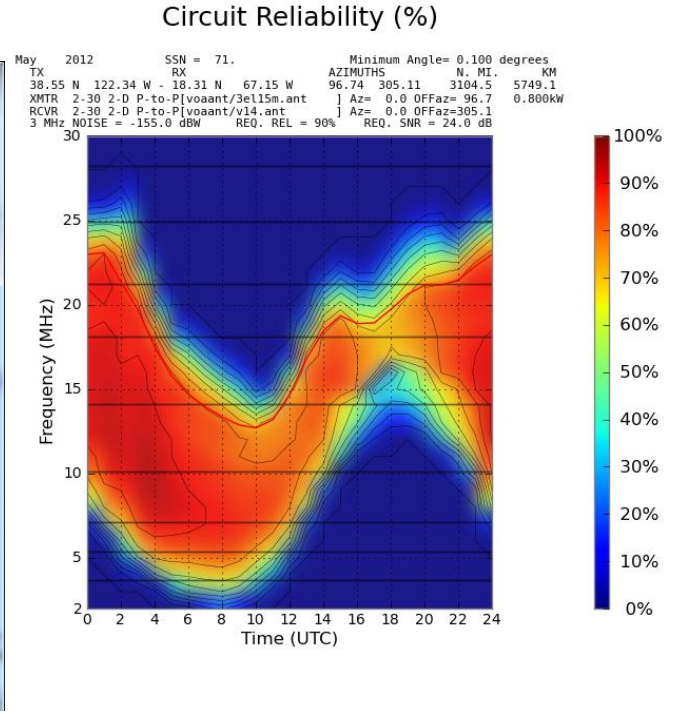


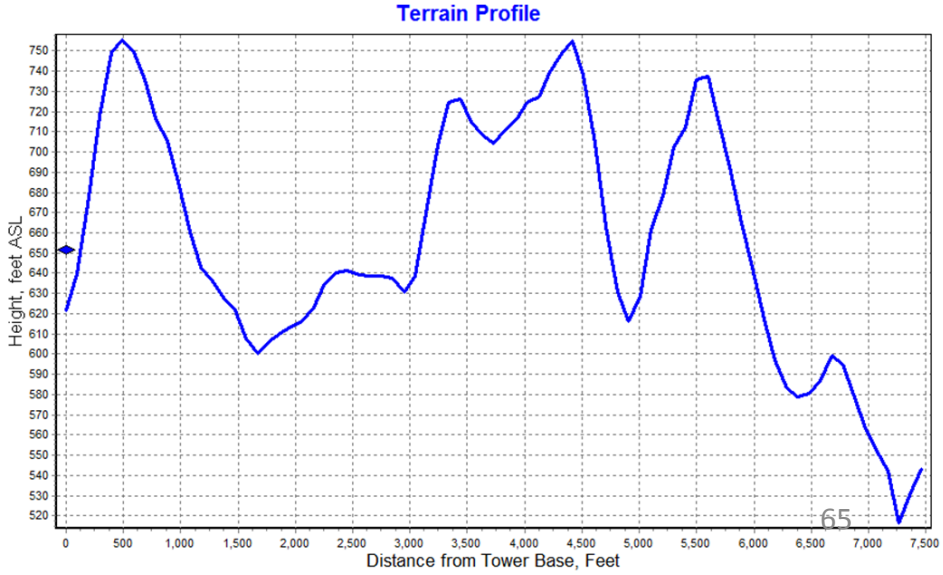


Will be 3 dB better with A3S up 46’
Would have been easy any way. All bands should be open. Just a dream for now.

KP1 - Navassa

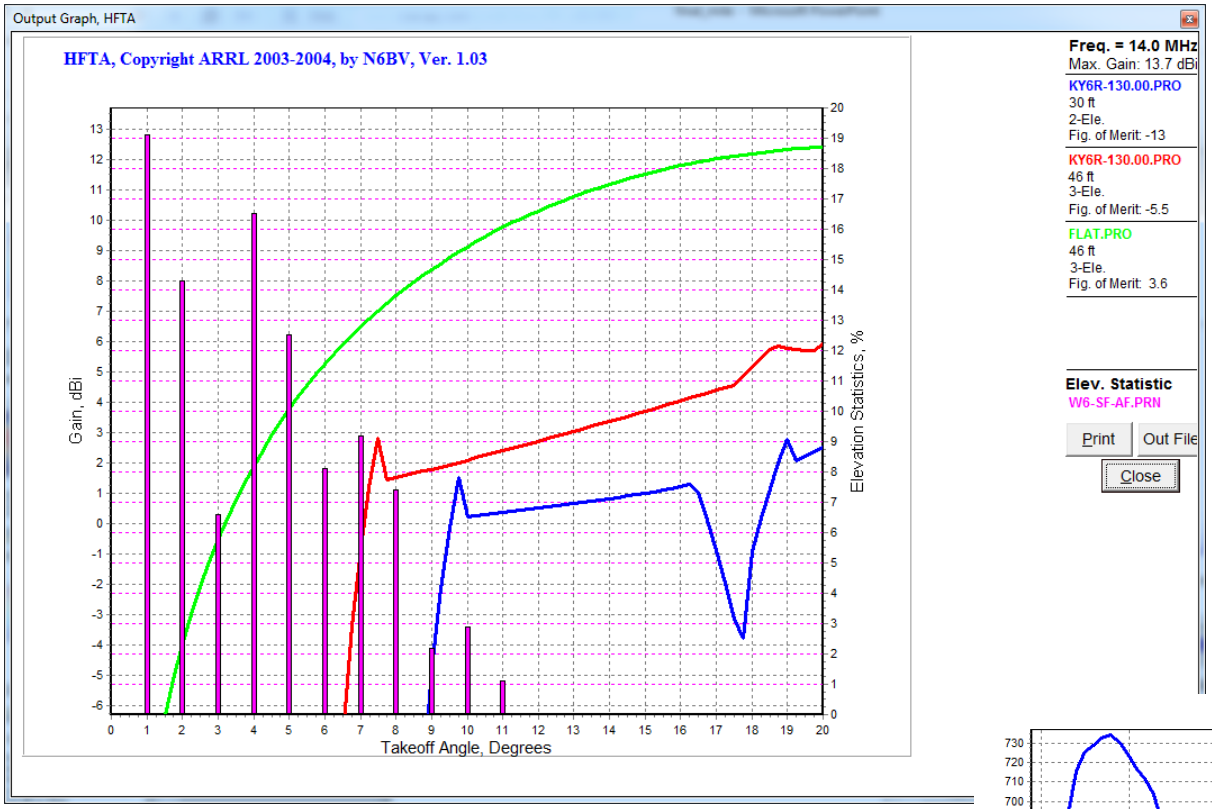


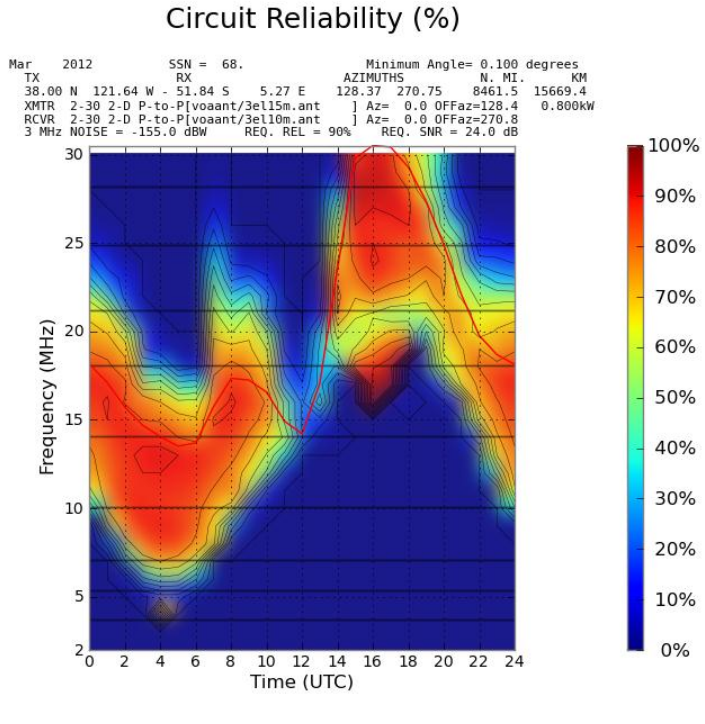




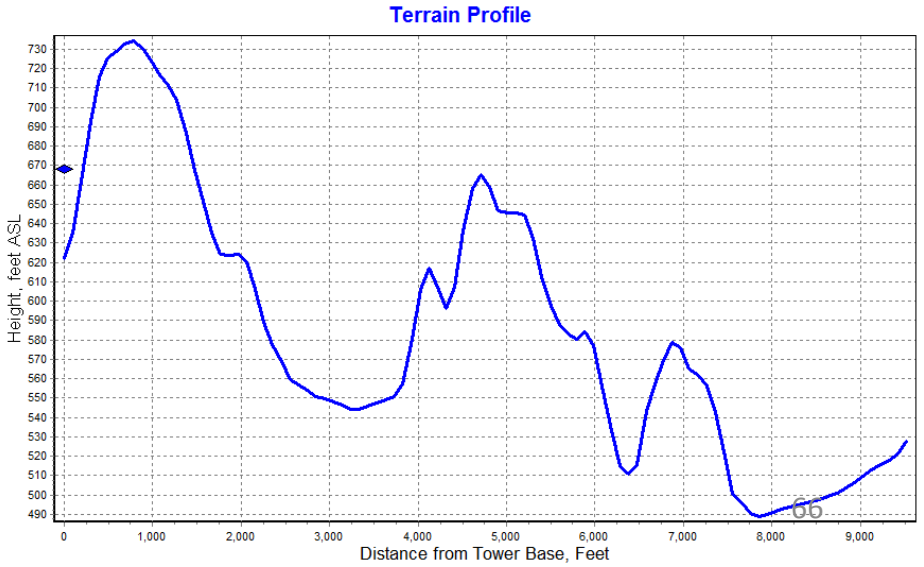
It was rumored that KP1 would be Activated in Spring 2012, SSN = 85. A3S at 46’ will make this much easier, but would have been pretty easy any way. Just a dream for now.

3Y0/B - Bouvet

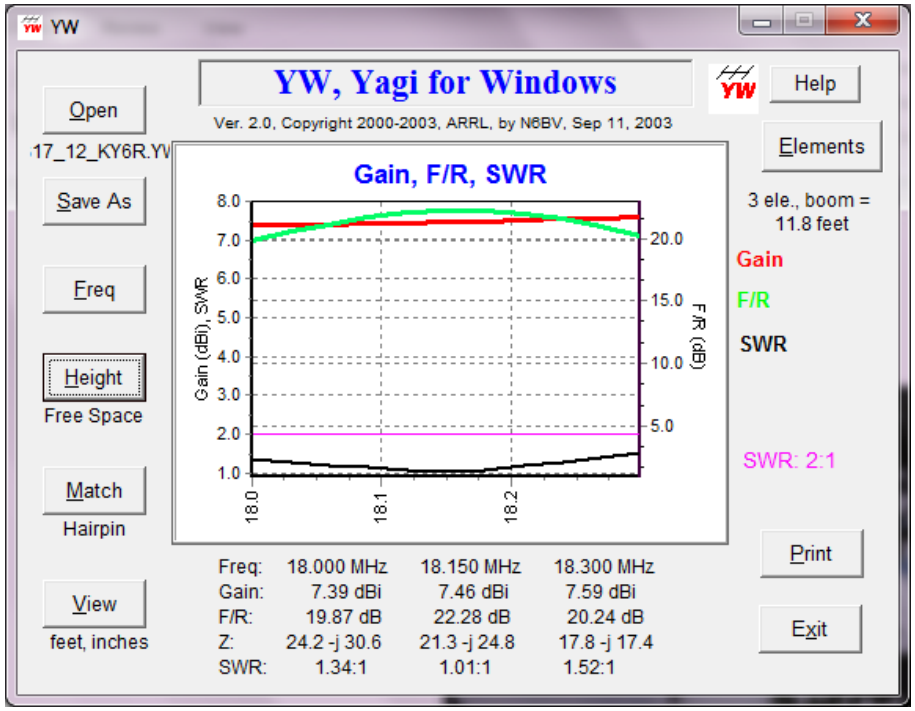




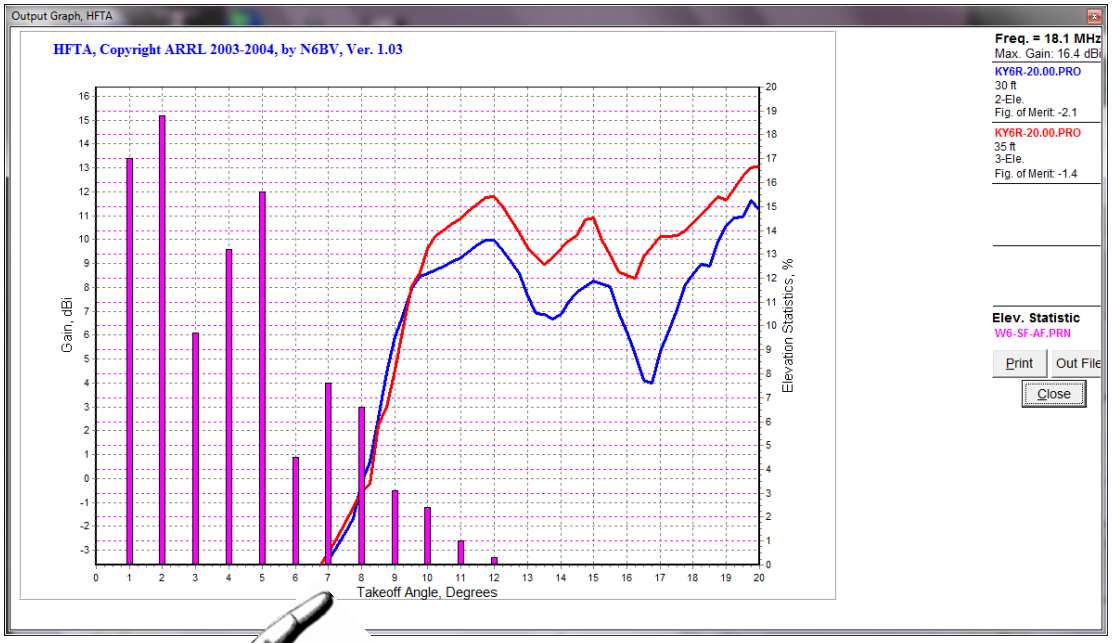
If Bouvet were activated in March 2012, my A3S would have out performed my old 20M Moxon 2 dB and with 17% more angles Available. Just a dream for now.



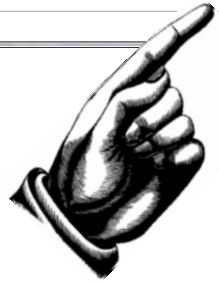
17M Seems to be “Emerging” in Cycle 24



I keep seeing 17M as the band “open for business” in Cycle 24. So I designed and built a 3 element 17M monoband yagi using another N6BV program, Yagi for Windows (YW). This antenna is 2 dB better than my nested 17/12M Moxon – and willing to give up 12M gain.



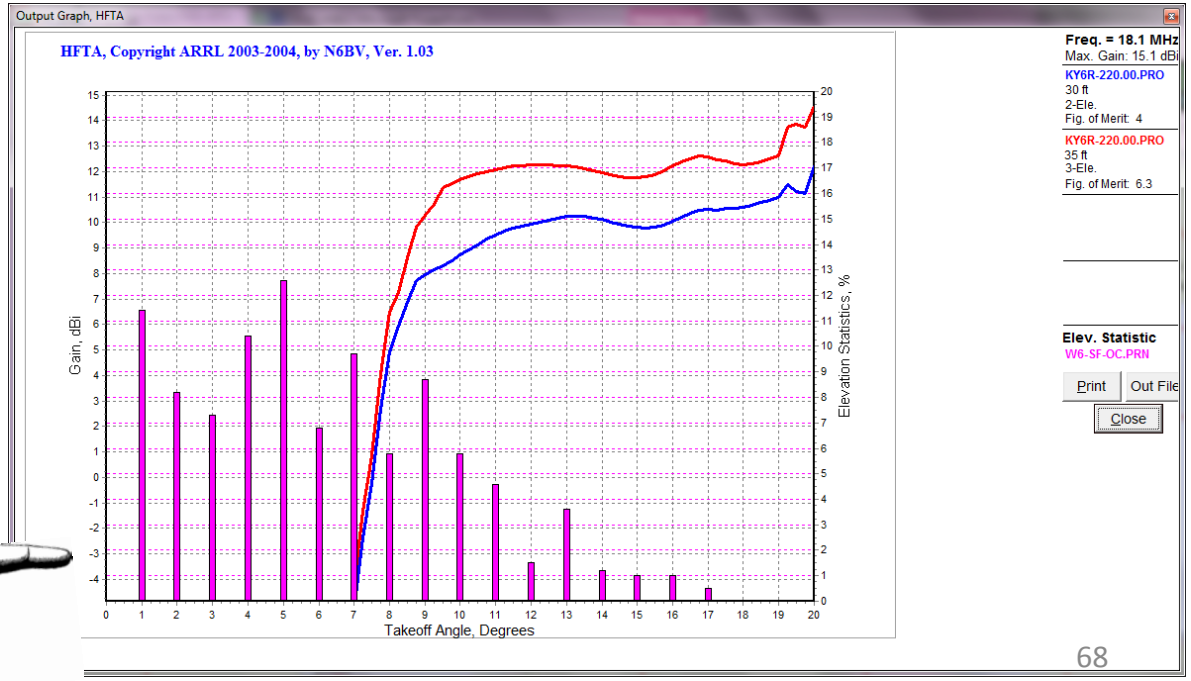
How Does it Compare to the Nested Moxon?



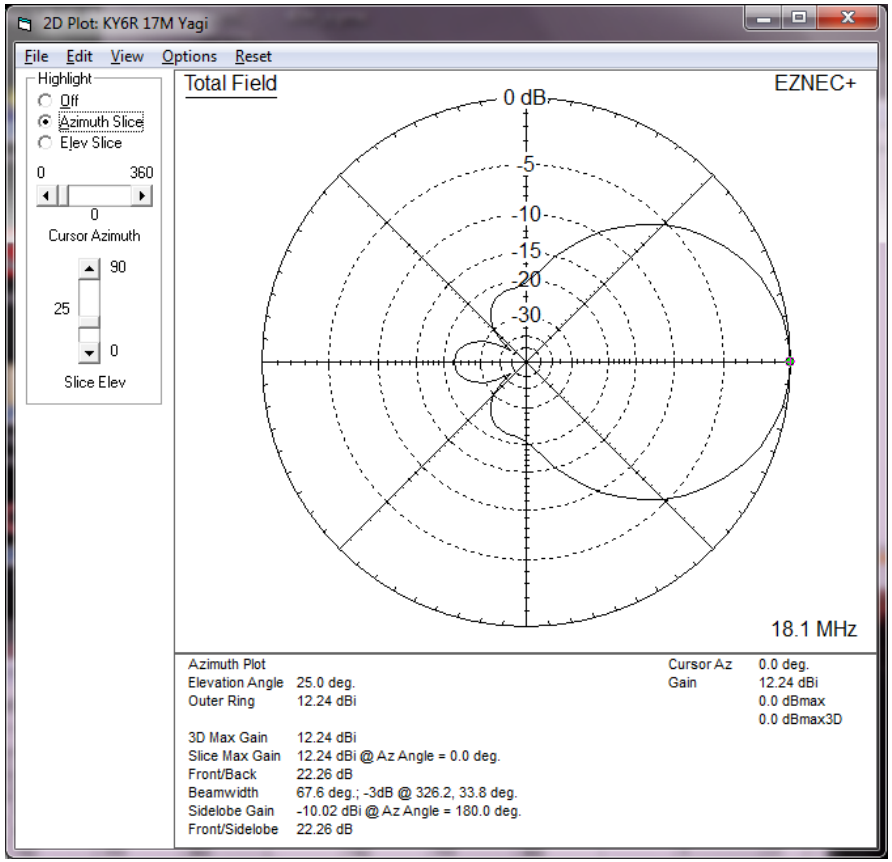
1+ dB better for E3 and Z8 (rumored for end of 2012)

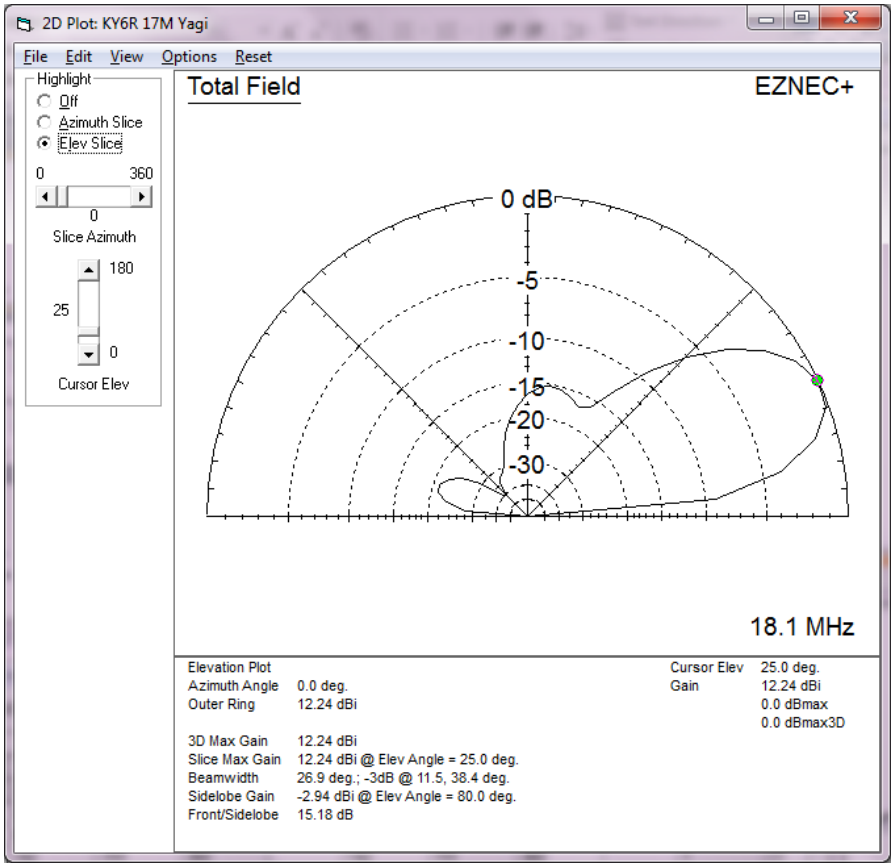
Notice how it doesn't bulldoze my hills!

2 dB better for VK0/H and ZL9



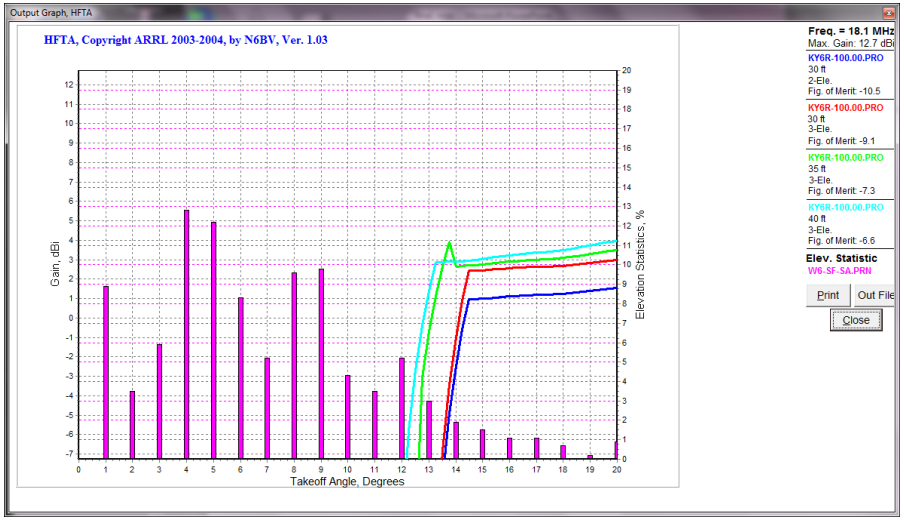
EZNec Cross Check



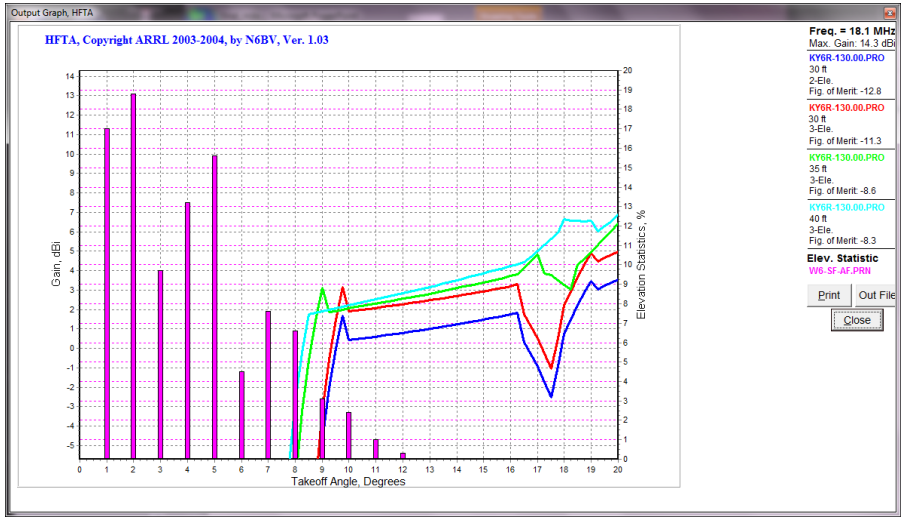


This EZNec model just uses 1” elements – which is “close enough” to validate the design.

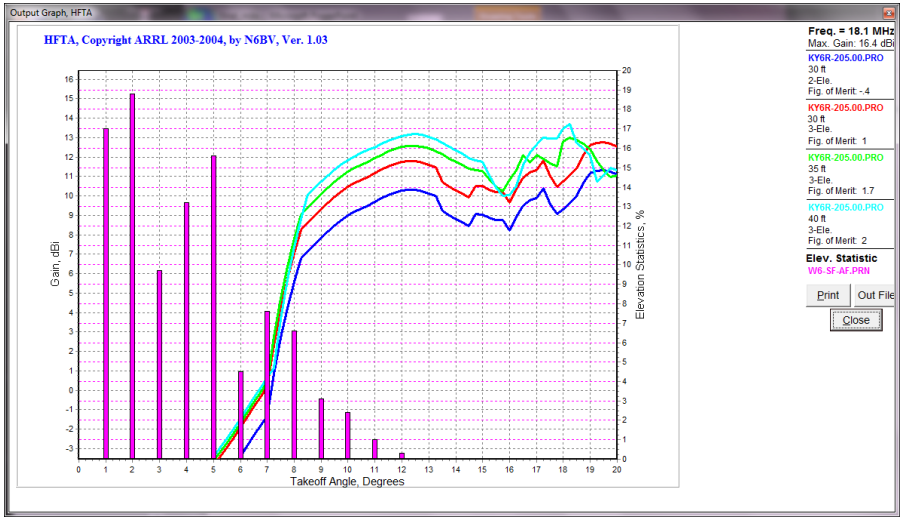
HFTA Cross Check



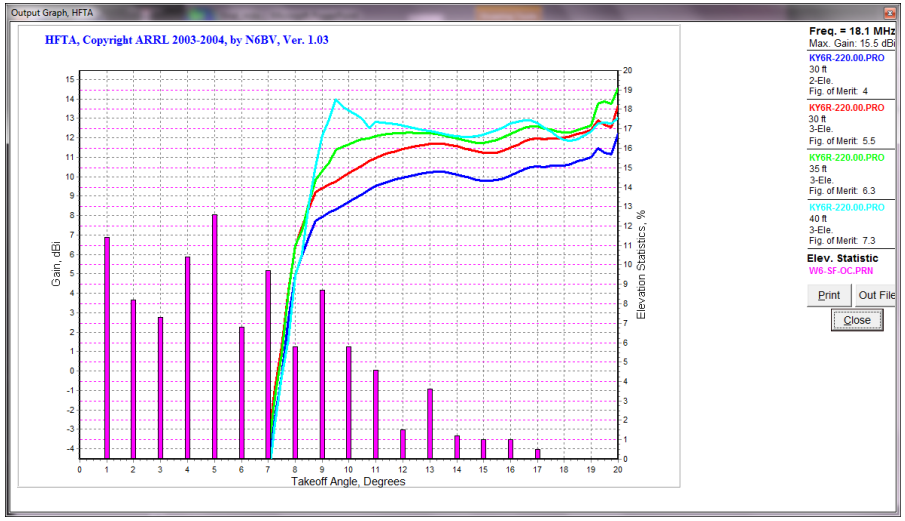
KP1 - Navassa



3Y0/B - Bouvet



VK0/H - Heard

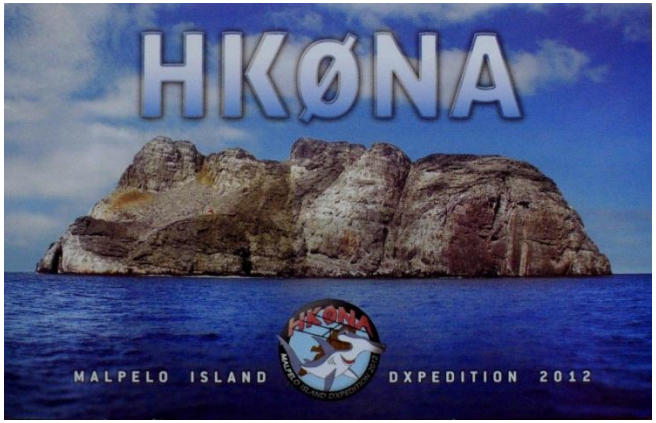


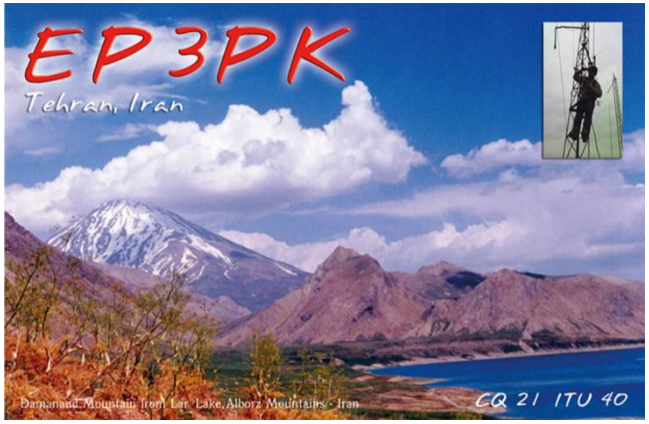
ZL9 – Auckland / Campbell

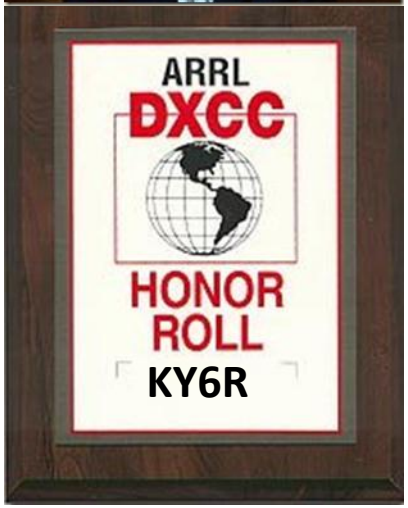
Conclusion

- HFTA, YW and VOACAP have helped me visualize:
  - My QTH constraints, and how to overcome these
    - What to improve in my antenna system
    - How much money to spend for best ROI
  - How a one to two dB gain improvement ***does*** help your chances of busting a pileup
    - How it has conclusively made the difference between working the DX or not at my QTH
  - How to get the DX-peds signals ***above*** the noise level and walk the DXCC HR “Final Mile”

Results!







2013!

I look forward to adding ZL9, FR/T, FT5/Z, Z8, E3, in 2012 – 2013 and VK0/H in 2014. Others are working to activate 3Y0/B and KP1. Kosovo Will most likely be a new entity. I should earn Honor Roll in 2013!