
# An Overview of the High Frequency Terrain Assessment program

# HFTA

## HFTA and your station

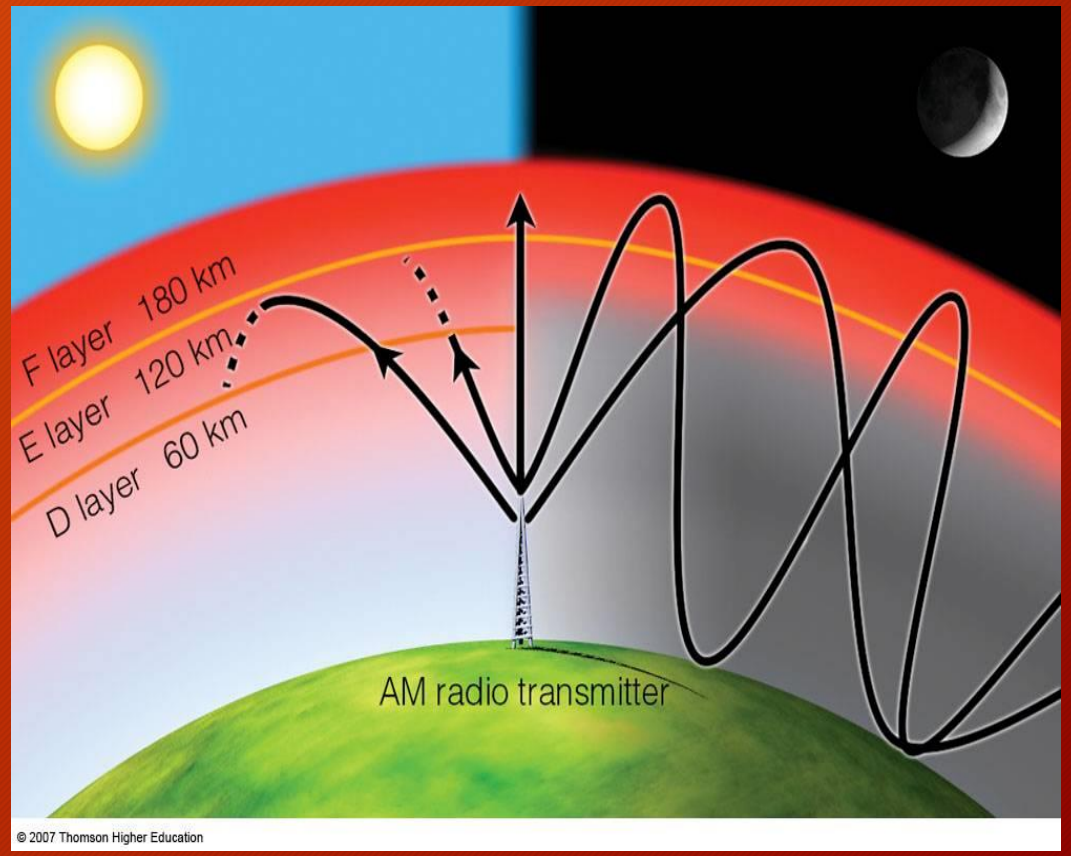
The HFTA program comes on the disk included with the ARRL Antenna Handbook

- Use HFTA to get a better understanding of how the surrounding terrain impacts your station.
- Use HFTA when determining your tower location and antenna heights.

KR9U - May 2016

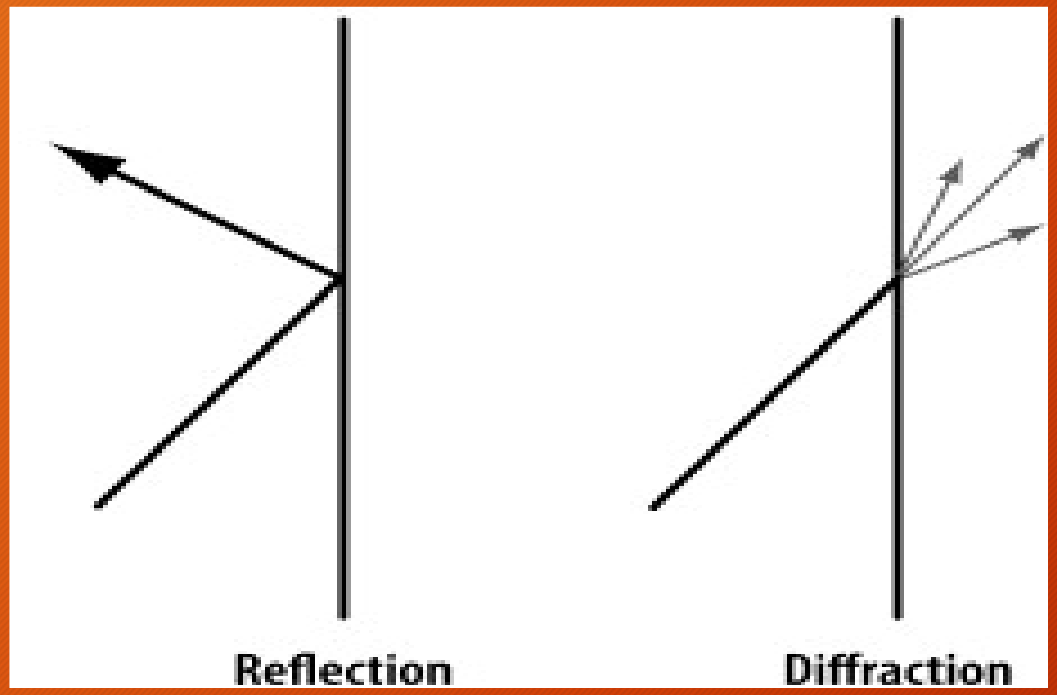
# HFTA and your station

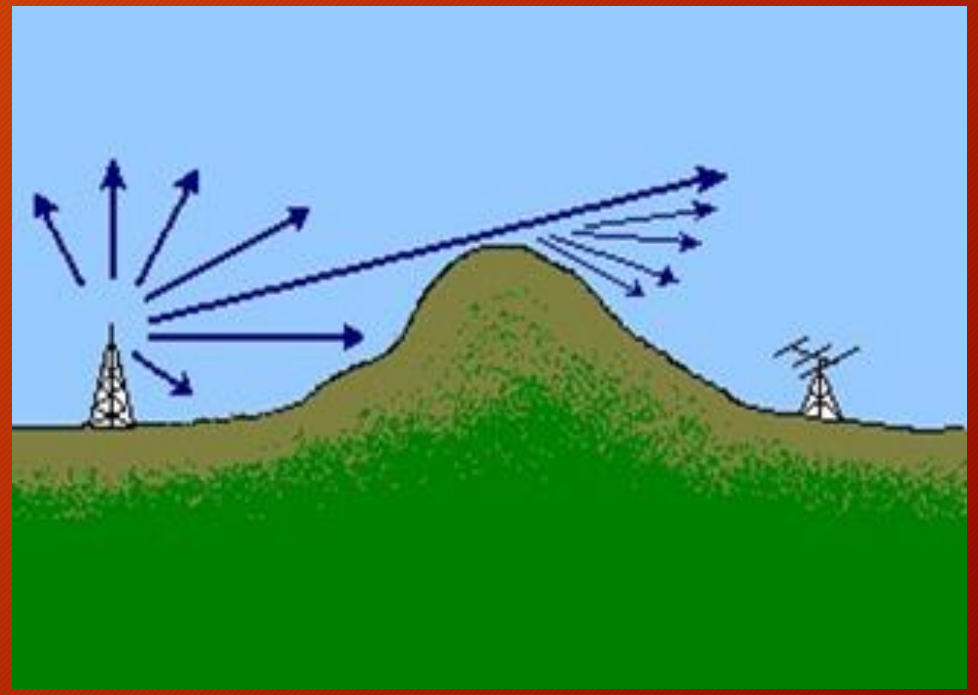
- HFTA takes ground elevation data, frequency and height of your antenna to calculate the take off angle.
- HFTA is a ray-tracing program
- HFTA calculates only horizontally polarized signals.



# HFTA and your station

- HFTA takes reflection and refraction properties into account



# HFTA and your station

- The geometry of the first hop establishes the geometry for all succeeding hops.
- A significant loss of signal occurs with each hop.
  - Loss through lower layers of the ionosphere and scattering of signals at the reflection point.
  - Scattering of the signal at the earth reflection point.
  - Typically 7-10 dB of loss per hop.

# HFTA and your station

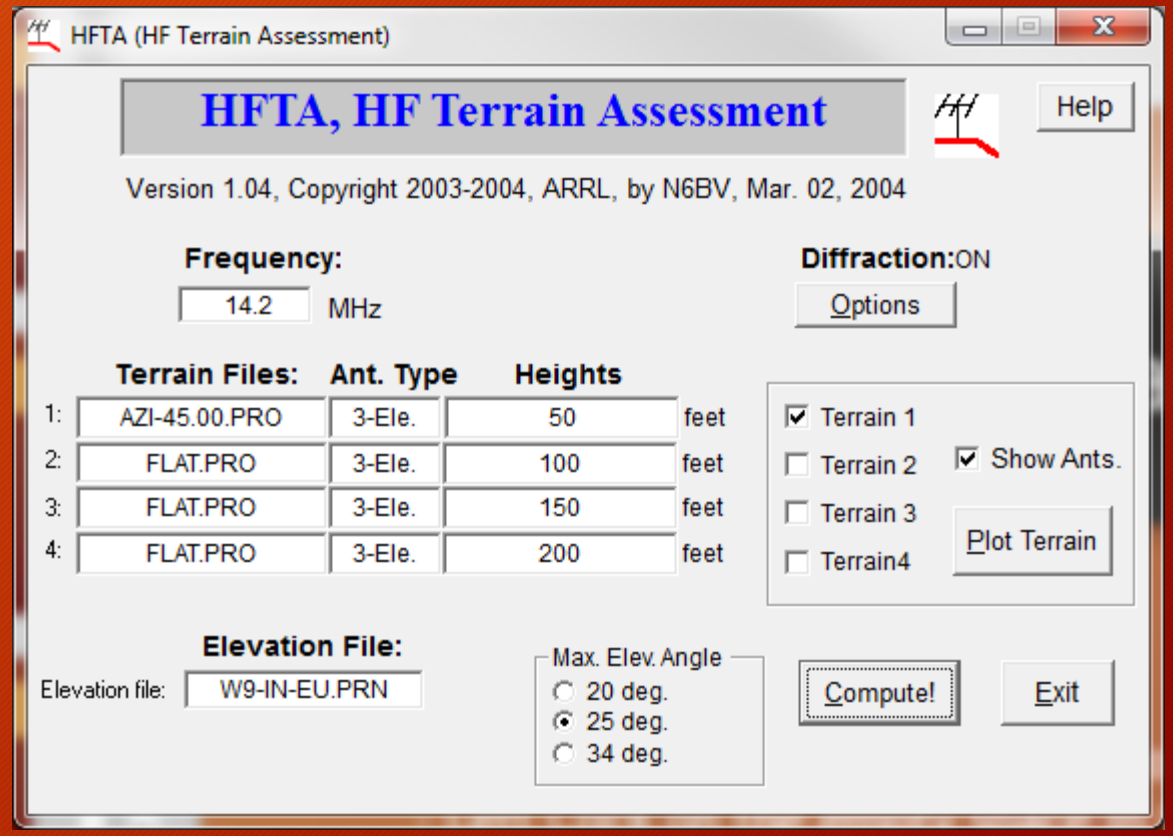
- HFTA needs terrain data to work.
  - These are .PRO files.
  - Get Terrian data here:
    - http://k6tu.net/?q=TerrainProfiles

- Do NOT use the MicroDEM program in the HFTA instructions.

# HFTA and your station

**Setup:**

- Set the Frequency.
- Set Diffraction to ON in the Options tab.
- Left Click on the empty space in the Terrain Files.
  Select the .PRO file for the direction to analyze.
  For instance, AZI-45.00.PRO for 45 degrees.
- Left click on “Ant. Type” white space box and select the type of antenna.
- Left click on the “Heights” box and input the antenna height you want to analyze.
- Left click on the “Elevation File” white space and select the elevation file for W9 to the area of the world you want to analyze.
  For instance, W9-IN-EU.PRN



# HFTA and your station

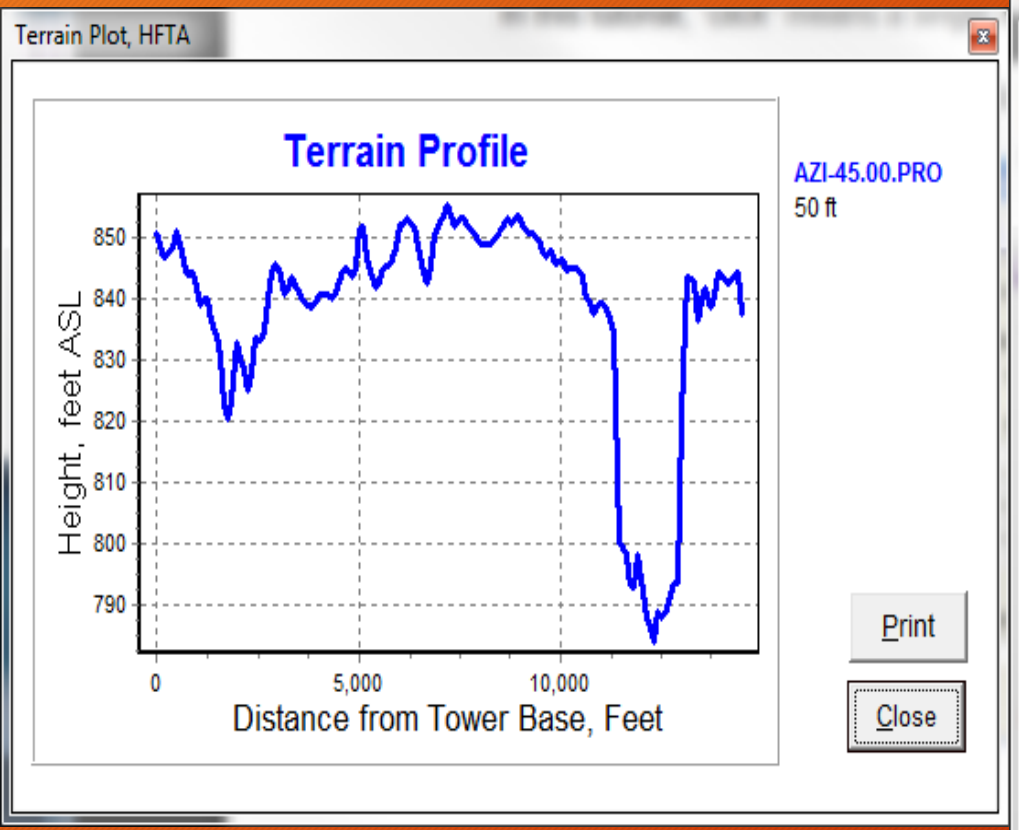
- Elevation Files (Signal of Arrival) are .PRN files
  - Installed as part of the program install files.
  - For the Indiana area, select W9-IN-XX.PRN
    Where ‘XX’ is the direction of interest.
    - (EU) Europe
    - (JA) Far East
    - (SA) South America
    - (AS) South Asia
    - (AF) Southern Africa
    - (OC) South Pacific

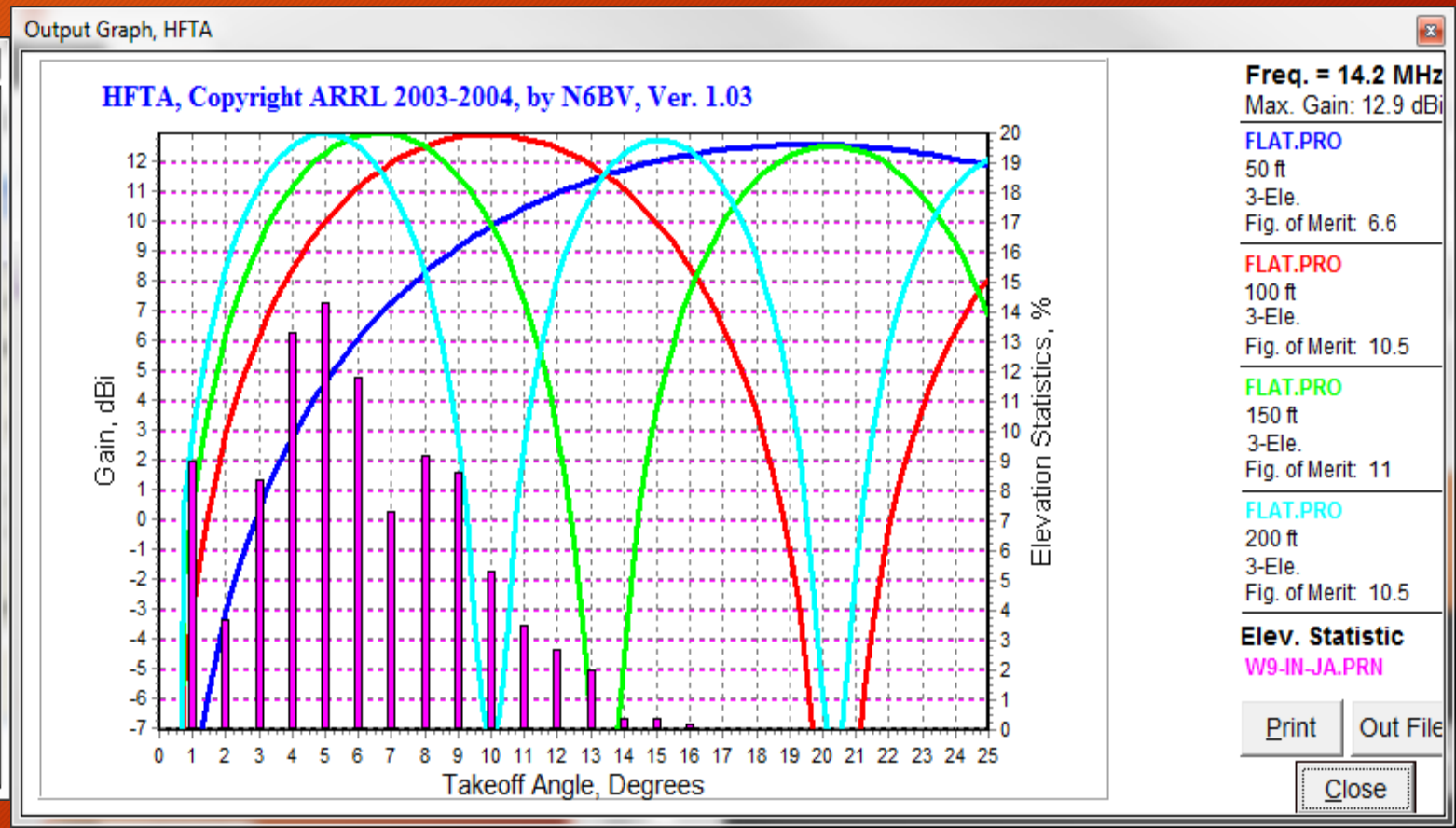
⁂ For South Asia you would use: W9-IN-AS.PRN

# HFTA and your station

Plot the Terrain
KR9U terrain looking at EU

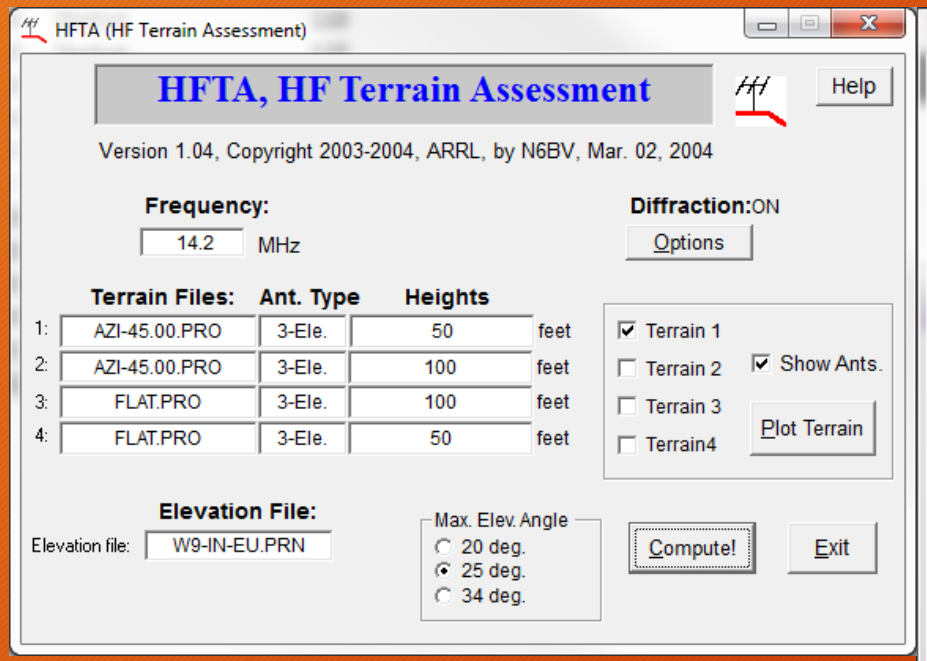
KR9U terrain looking at Japan with various heights, flat terrain

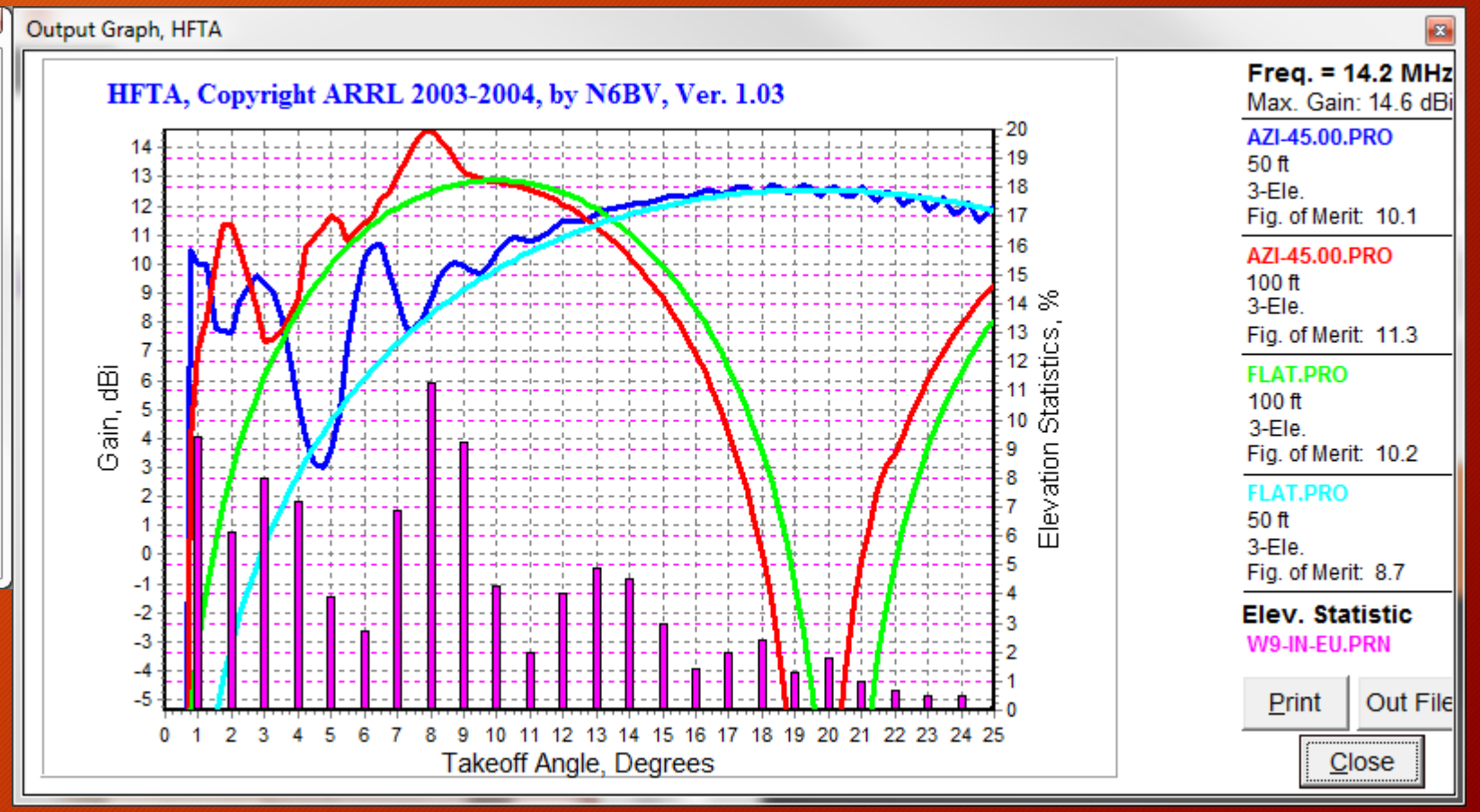


# HFTA and your station

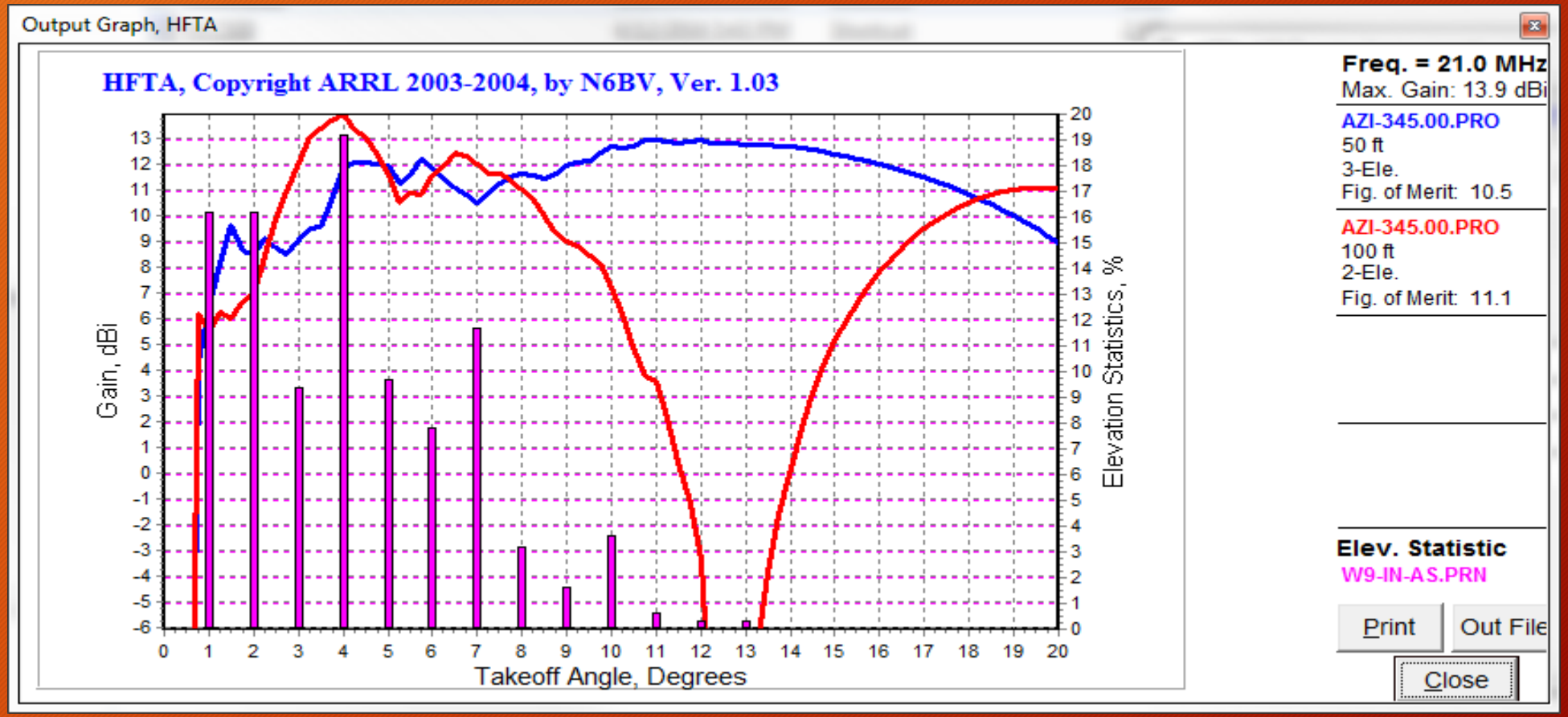
KR9U to Europe over Actual Terrain, 50 and 100 ft. Antennas, 14.2 MHz



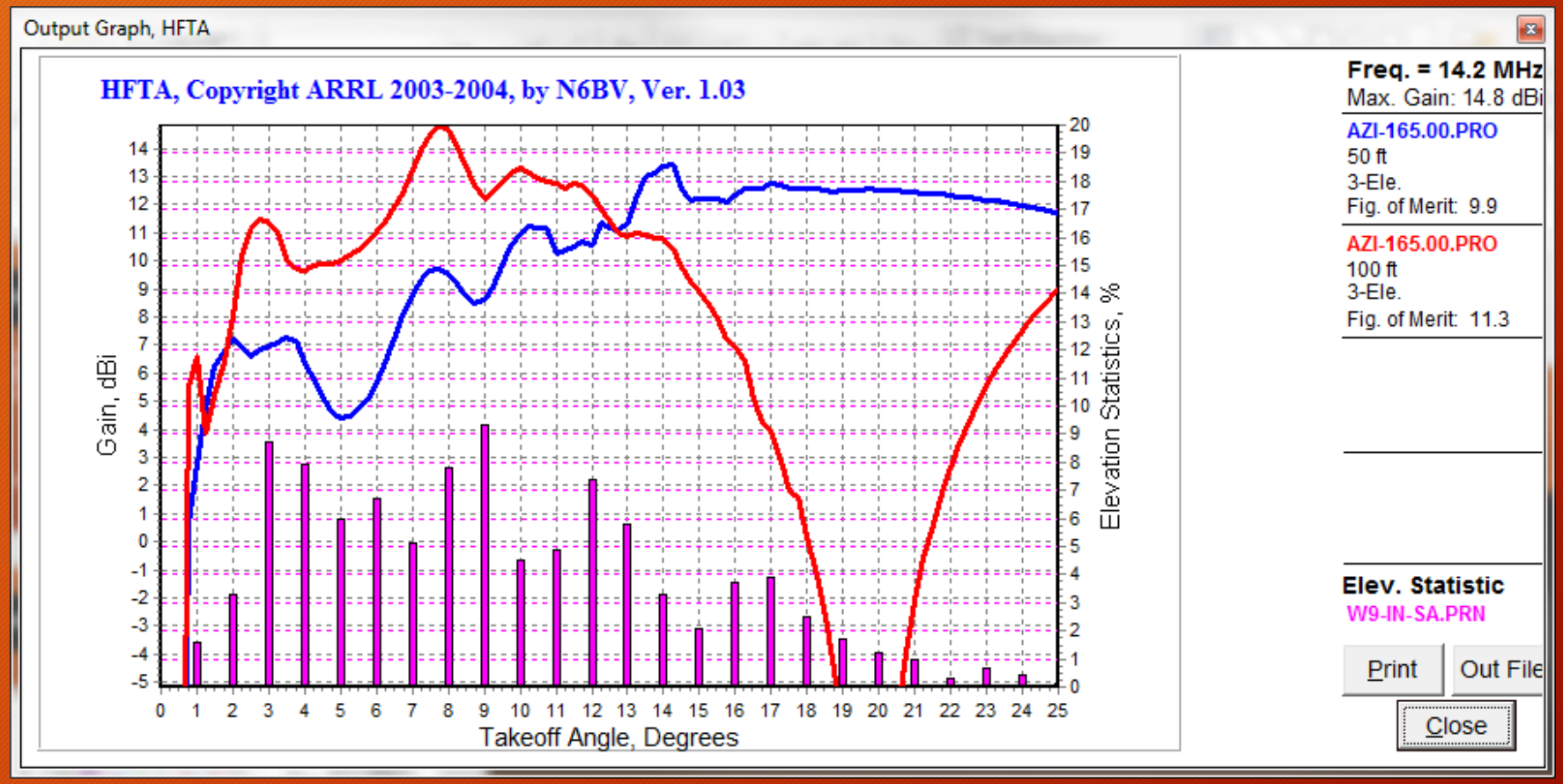
# HFTA and your station

KR9U to Asia, 50 and 100 ft. Antennas, 21.1 MHz



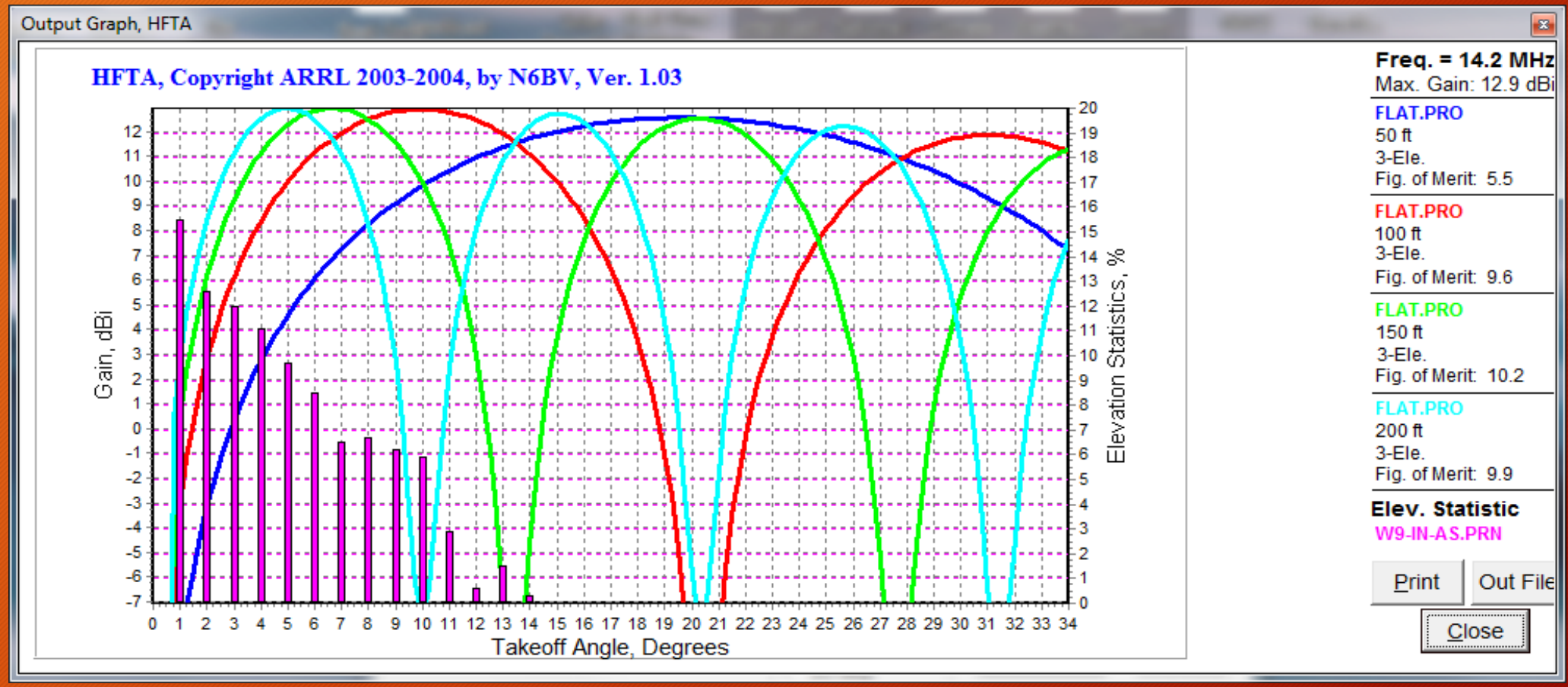
# HFTA and your station

KR9U to South America, 50 and 100 ft. 14.2 MHz

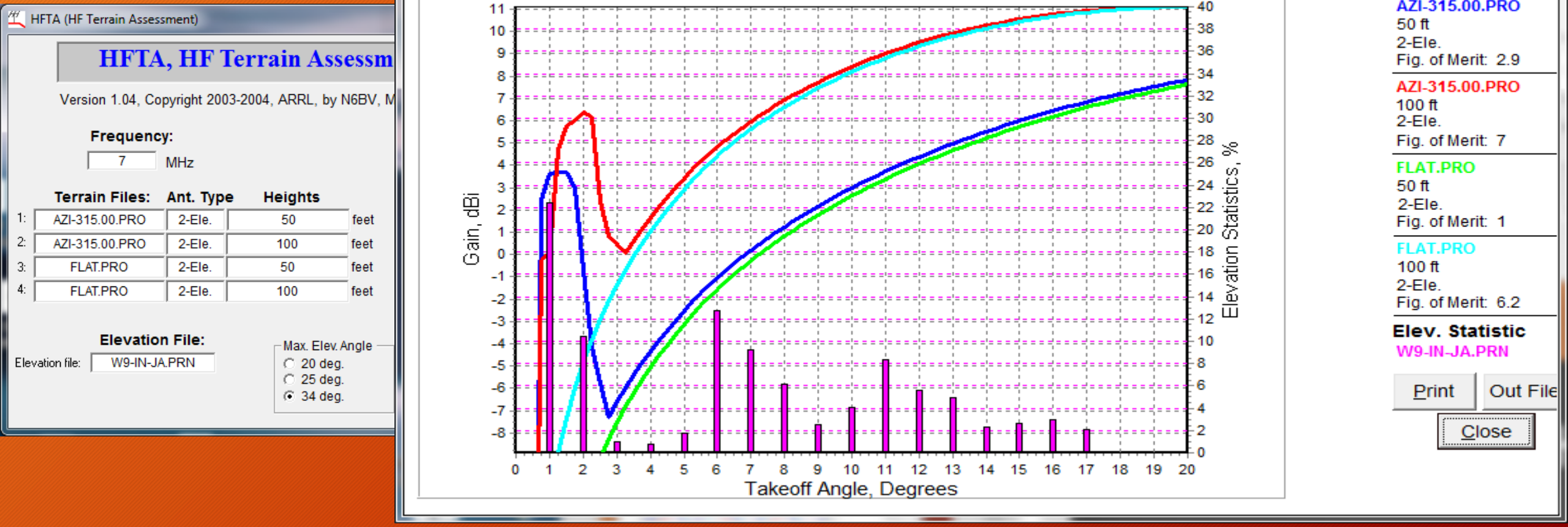


# HFTA and your station

KR9U to Asia Varoius Antenna Heights over Flat Ground,  14.2 MHz

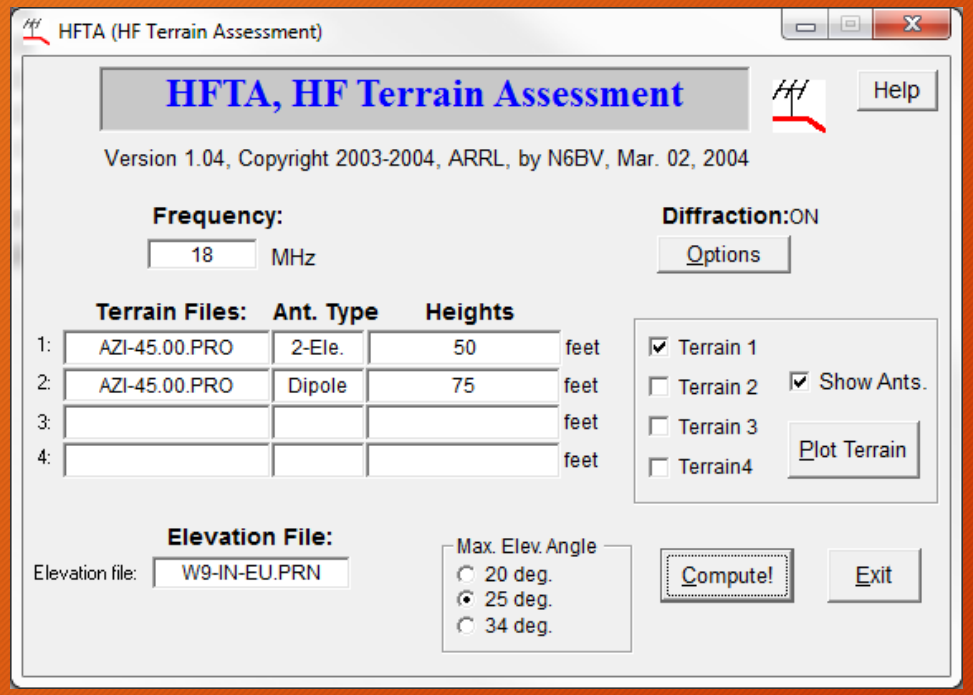


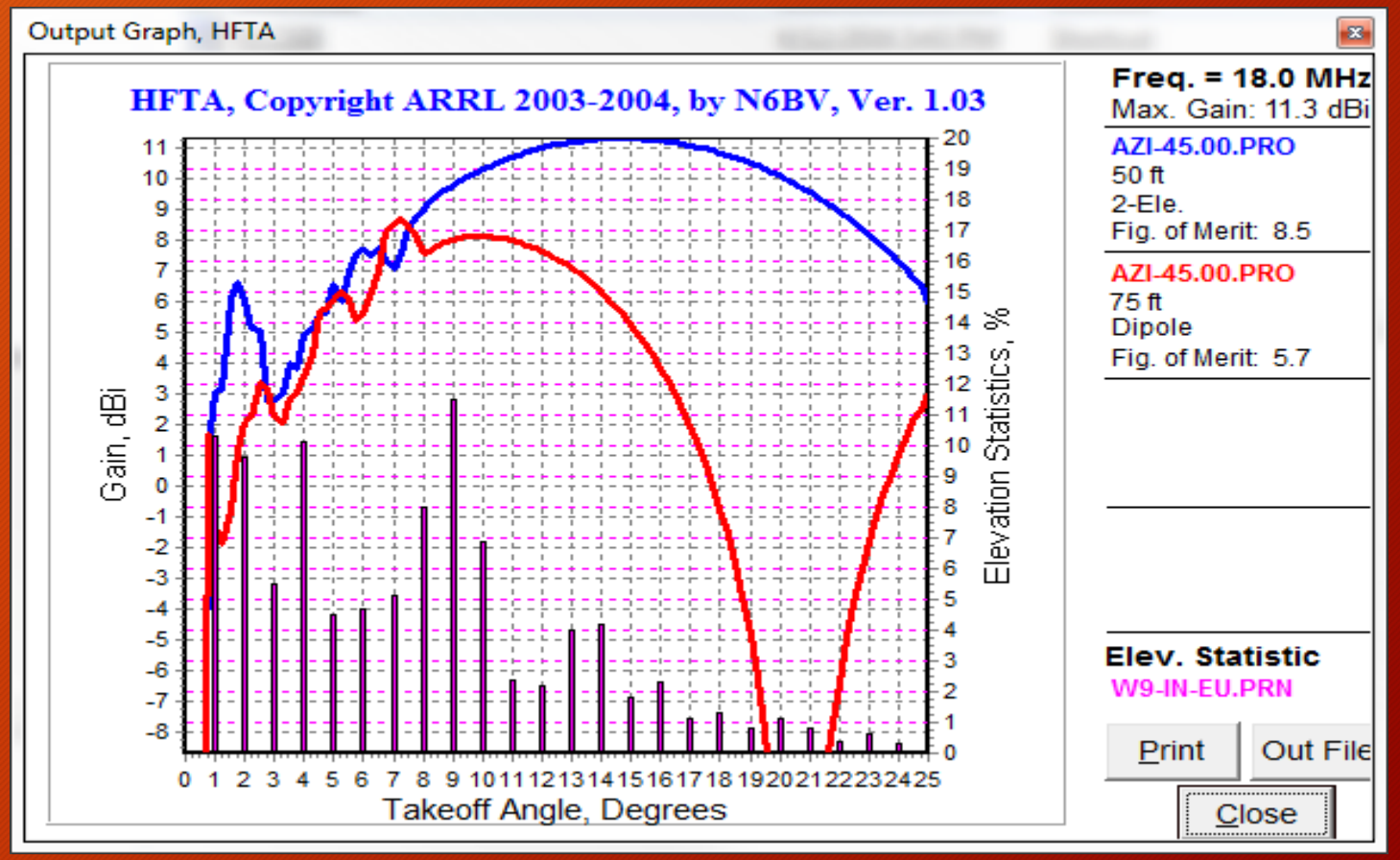
# HFTA and your station



# HFTA and your station

Which Antenna would you use?



# HFTA and your station

- **In Conclusion:**
  - The latest version of HFTA is Version 1.04.
  - The ionosphere controls the elevation angle, not our transmit antennas.
  - We want our transmit antennas to be at the correct elevation to utilize the ionosphere conditions that support radio communications.
  - The first hop establishes the geometry for all succeeding hops.
  - HFTA will show you how your antennas cover the elevation angles.
  - KE4PT Study on elevation angles: http://www.arrl.org/files/file/QEX_Next_Issue/May-Jun_2011/QEX_5_11_Siwiak.pdf
  - ARRL antenna book has study of elevation angles.

- Latest ARRL instruction manual: 22 February 2013
  - http://www.arrl.org/files/file/Product%2520Notes/Antenna%2520Book/hfta.pdf