CTU Presents

Antennas for Contesting
How They Do What They Do

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6 dB of “Free” Ground Gain

- Horizontal polarization produces 6 dB of “free” ground gain on 80-10 meters even over relatively poor soil
  - unless you cannot install your antenna at the needed height
- What if you can’t install a horizontal antenna at the needed height?
  - Four square verticals produce useful gain and significantly reduced radial system loss because power is distributed among four verticals and their associated radials
  - Use a properly designed and installed four-square vertical array
    - at least 32-64 shallow buried ¼ wavelength radials on each vertical

Competitive Antennas for Domestic Contests

- A horizontal dipole or inverted-V dipole for 80 meters
  - 35 - 70 feet high produces competitive results at 500 miles or more
  - 100 feet or higher produces competitive results at 1000 miles or more
  - A dipole 70 to 100 feet high is a very competitive single antenna
- A horizontal dipole and a small 2 element Yagi for 40 meters
  - 25 - 50 feet high produces competitive results at 500 miles or more
  - 70 -100 feet high produces competitive results at 1000 miles or more
  - A good choice is a dipole at 50 feet and a small Yagi at 100 feet
- A small triband Yagi for 20, 15 and 10 meters
  - A small Yagi 50 feet high produces competitive results at 1500 miles
  - A small Yagi 80-100 feet high is excellent for 1500 miles or more
  - two stacked triband Yagis at 40 and 80 ft produces excellent results

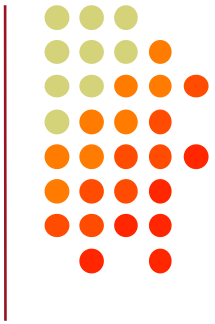
Competitive Antennas for 160 Meter DX

- A full size vertical or inverted-L is almost always more effective for DX than a horizontally polarized antenna (>99%)
- Major factors affecting vertical antenna performance:
  - nearby towers over 80 feet high will severely degrade 160 meter vertical antenna performance
  - at least 32-64 shallow buried 125 foot radials makes the difference between an excellent antenna and a disappointing antenna
- Very effective low noise directive receiving antennas
  - Beverages, loops, and arrays of short verticals

Vertically Polarized Antennas

- Horizontal polarization is rarely effective on 160 meters
- If possible, use a full size quarter wave vertical
  - install at least 120 feet from all tall towers (over 80 feet tall)
  - use much more than 120 feet of spacing for best performance
- An Inverted-L vertical can also be very effective
  - with as little as 40 feet vertical (but more is better…)
  - can be supported from a tower or trees
  - Use at least 32-64 shallow buried 125 foot radials
  - What if buried radials are impossible?
  - use at least two (preferably four or more) elevated 125 foot radials

Competitive Antennas for 80 Meter DX



- A horizontal dipole at least 70 feet high
- Or a full size vertical or inverted-L
  - only if you install at least 32-64 shallow buried 65 foot radials
- Major factors affecting vertical antenna performance:
  - nearby towers over 40 feet high will degrade 80 meter vertical performance
  - at least 32-64 shallow buried 65 foot radials makes the difference between an excellent antenna and a disappointing antenna
- Very effective low noise directive receiving antennas
  - Beverages, loops, and arrays of short verticals

Vertically Polarized Antennas for 80 Meters

- An 80 meter four square vertical array is very competitive with high horizontal arrays and is an excellent receiving antenna
  - Four square verticals produce gain and significantly less loss in the radial system because power is distributed among four verticals and their associated radials
  - install at least 140 feet from all other towers
    - more spacing from other towers will significantly improve performance
  - install at least 32-64 slightly buried 65 foot radials on each vertical

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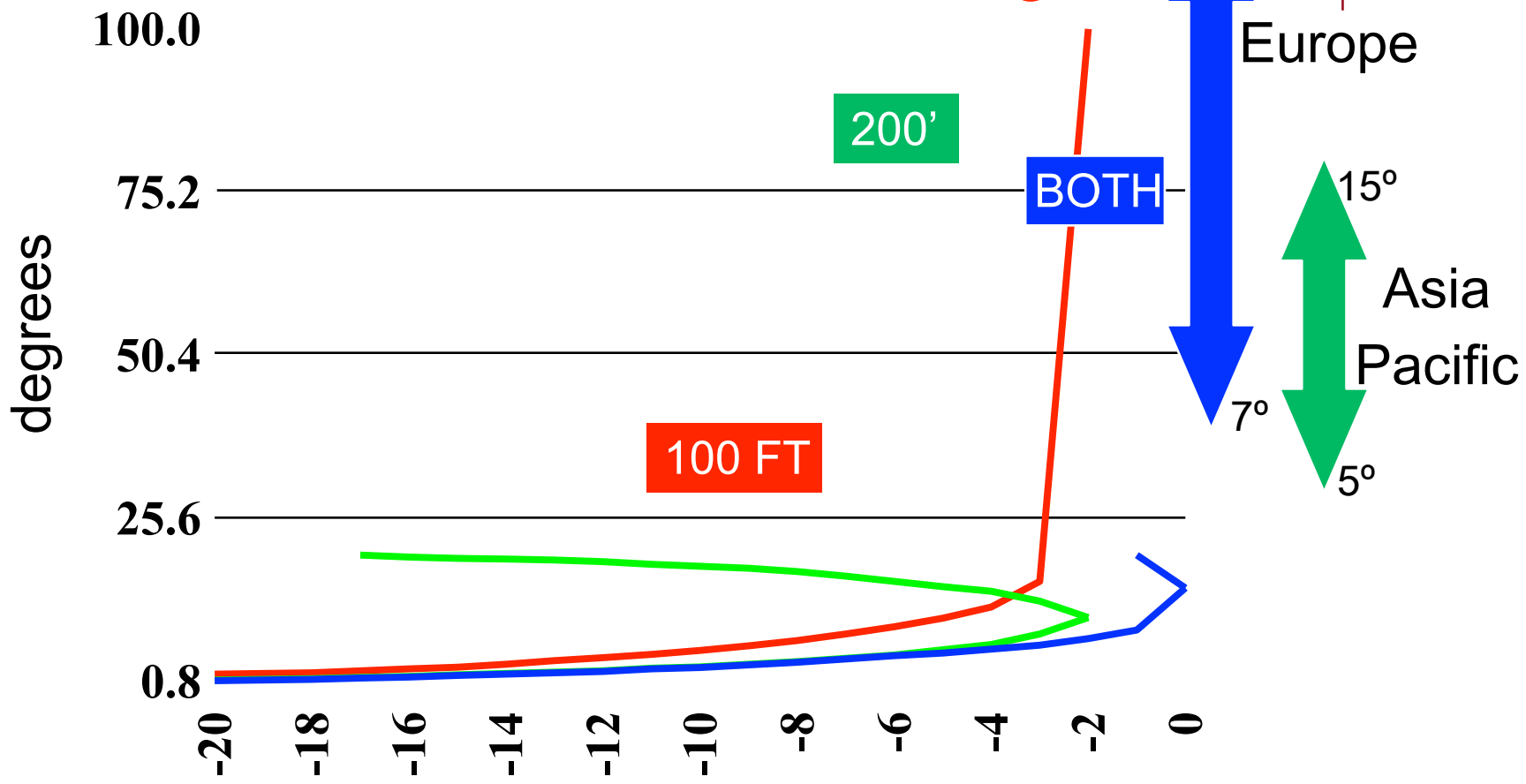
Competitive Antennas for 40 Meter DX

- Horizontal antennas are always the best choice
  - at least 70 to 100 feet high
  - otherwise use a four-square vertical array with extensive radials
- 2 element Yagi 70 to100 ft high
  - very significant improvement over a horizontal dipole
  - a Cushcraft XM-240 is very cost effective
- Full size 3 element Yagi 100 to 140 feet high
  - will compete at the highest levels
  - but don't underestimate the high cost and complexity of the effort
- Very effective low noise directive receiving antennas
  - Beverages, loops, and arrays of short verticals

Four Square Verticals

- A 40 meter four-square vertical array is a good alternative when a horizontal antenna isn't possible
  - if a horizontal antenna can't be installed at least 50 feet high
  - a four-square vertical is a good antenna for a second radio
  - a four-square vertical is also an excellent receiving antenna
- A 20, 15 or 10 meter four-square vertical is a useful alternative when a horizontal antenna isn't possible
  - if a horizontal antenna can't be installed at least 30 feet high
  - a four-square vertical is an good antenna for a second radio
  - a four-square vertical is also an excellent receiving antenna

Stacked 3 Element 40 Meter Yagis
48 Foot Booms
100 and 200 Feet High



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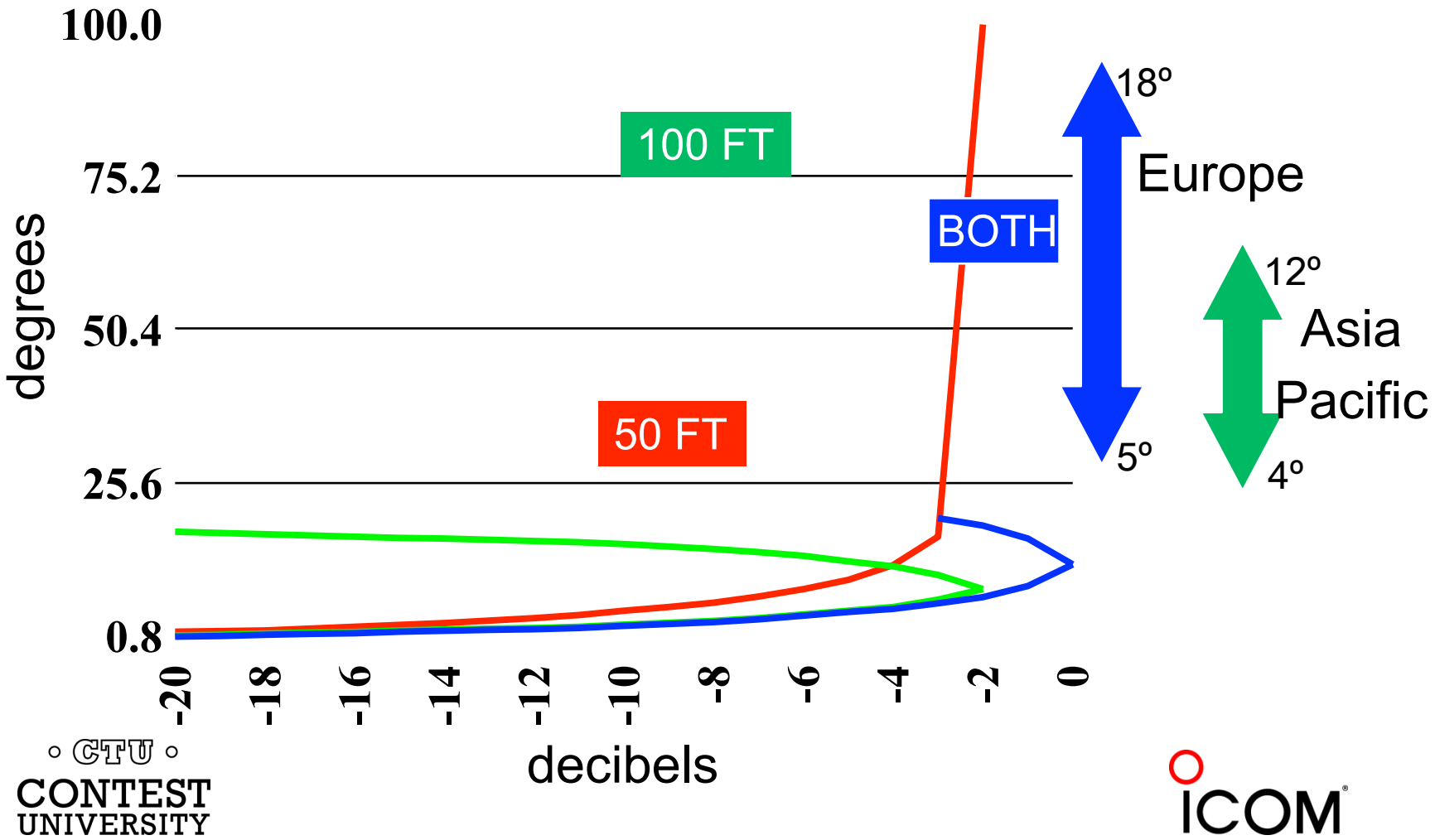
Competitive Antennas for 20 Meter DX

- Horizontal antennas are always the best choice
  - if you can install your antenna at 35 feet or higher
  - otherwise use a four-square vertical array with extensive radials
- Small triband Yagi or a small 2 element Yagi or quad
  - a small Yagi 50 to 70 feet high will produce good results
- Full size triband Yagi or 3 element monoband Yagi
  - a full sized tribander or monoband Yagi 60 to 90 feet high will produce competitive results
- Stacked monoband Yagis or large triband Yagis
  - stacked full sized tribanders or Yagis on a 100-120 foot tower (or 150 to 200 ft for three Yagis) will compete at the highest levels
  - stack switching (a “stackmatch”) provides high payoff at low cost

Stacked 5 Element 20 Meter Yagis
48 Foot Booms
50 and 100 Feet High



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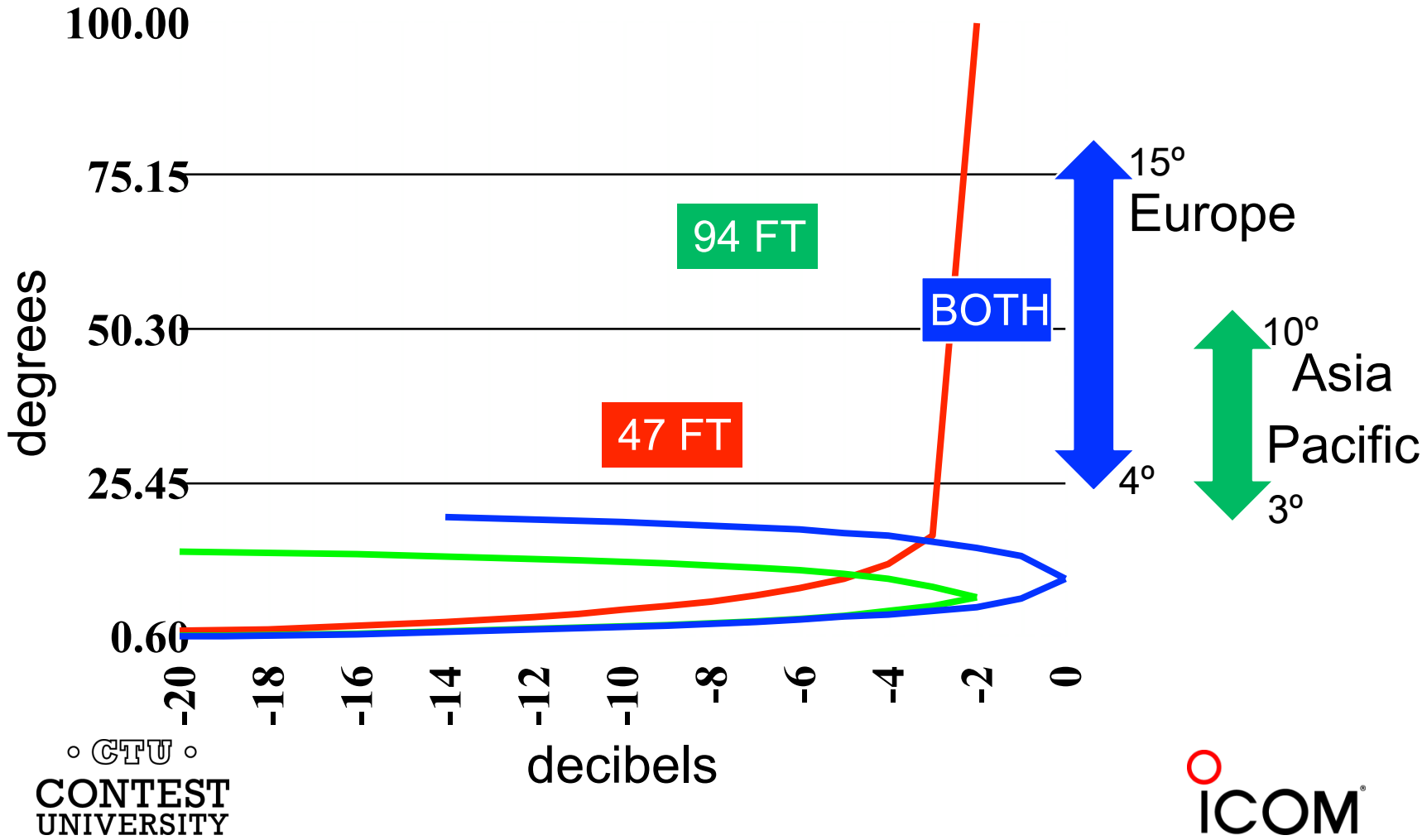
Competitive Antennas for 15 Meter DX

- Horizontal antennas are always the best choice
  - if you can install your antenna at 25 feet or higher
  - otherwise use a four-square vertical array with extensive radials
- Small triband Yagi or a small 2 element Yagi or quad
  - a small Yagi 35 to 50 feet high will produce good results
- Full size triband Yagi or 3 element monoband Yagi
  - a full sized tribander or monoband Yagi at 50 to 70 feet high will produce competitive results
- Stacked monoband Yagis or large triband Yagis
  - stacked full sized tribanders or Yagis on a 60 to 90 foot tower (or 120 to 140 ft for three Yagis) will compete at the highest levels
  - stack switching (a “stackmatch”) provides high payoff at low cost

Stacked 6 Element 15 Meter Yagis
48 Foot Booms
47 and 94 Feet High



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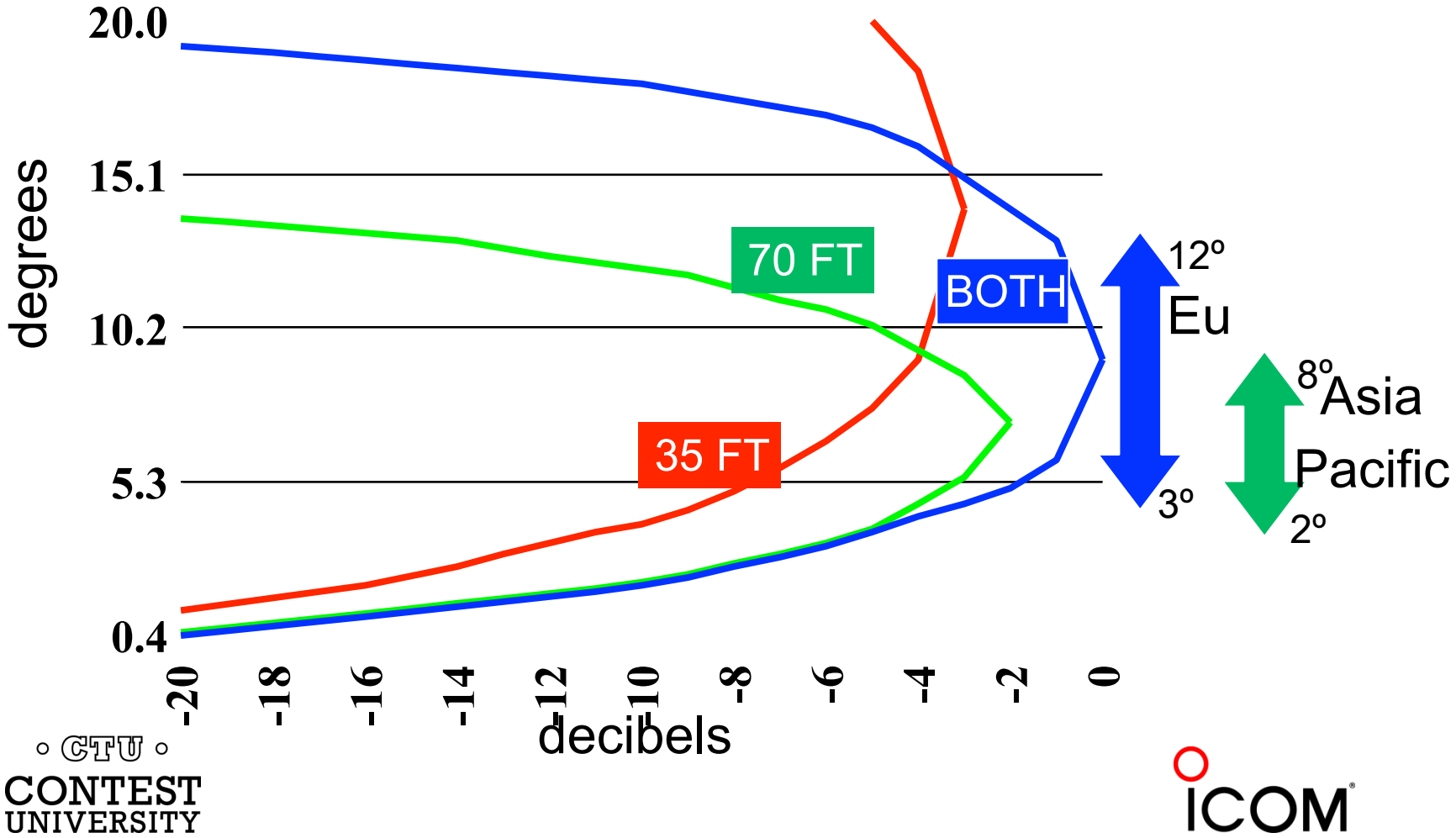
Competitive Antennas for 15 Meter DX

- Horizontal antennas are always the best choice
  - if you can install your antenna at 20 feet or higher
  - otherwise use a four-square vertical array with extensive radials
- Small triband Yagi or a small 2 element Yagi or quad
  - a small Yagi 30 to 50 feet high will produce good results
- Full size triband Yagi or 3 element monoband Yagi
  - a full sized tribander or monoband Yagi at 40 to 70 feet high will produce competitive results
- Stacked monoband Yagis or large triband Yagis
  - Stacked full sized tribanders or Yagis on a 50 to 70 foot tower (or 80 to 120 ft with three Yagis) will compete at the highest levels
  - stack switching (a “stackmatch”) provides high payoff at low cost

Stacked 6 Element 10 Meter Yagis
36 Foot Booms
35 and 70 Feet High



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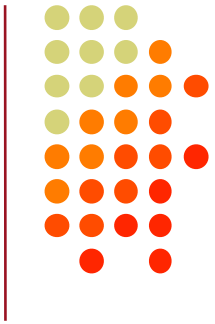
Low Loss Coaxial Cables



- Reduce the loss in your coaxial cables to improve the competitiveness and reliability of your station
- Andrew Heliax or CATV hardline reduces the loss and improves the reliability of cables longer than 100 feet
  - RG-213 and other flexible jacket coaxial cables are very susceptible to physical damage and water intrusion
    - even a pin hole produced by a lightning strike can quickly result in a high loss cable
    - protection of cables and connectors physical damage and water intrusion is critical
- Test and inspect your low loss cables and connectors before major competitive contests