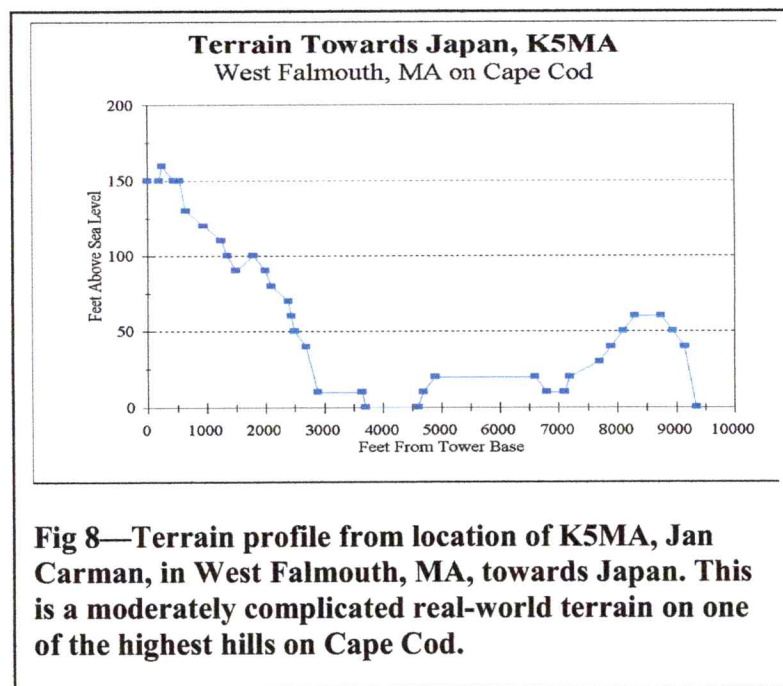


For simplicity, first consider an antenna on the top of a hill with a constant slope downward. The general effect is to lower the effective elevation angle by an amount equal to the downslope of the hill. For example, if the downslope is -3° for a long distance away from the tower and the flat-ground peak elevation angle is 10° (due to the height of the antenna), then the net result will be $10^\circ - 3^\circ = 7^\circ$ peak angle. However, if the local terrain is rough, with many bumps and valleys in the desired direction, the response can be modified considerably. **Fig 8** shows the fairly complicated terrain profile for Jan Carman, K5MA, in the direction of Japan. Jan is located on one of the tallest hills in West Falmouth, Massachusetts. Within 500 feet of his tower is a small hill with a water tower on the top, and then the ground quickly falls away, so that at a distance of about 3000 feet from the tower base, the elevation has fallen to sea level, at 0 feet.



The computed responses toward Japan from this location, using a 120- and a 70-foot high Yagi, are shown in **Fig 9**, overlaid for comparison with the response for a 120-foot Yagi over flat ground. Over this particular terrain, the elevation pattern for the 70-foot antenna is actually better than that of the 120-foot antenna for angles below about 3° , but not for medium angles! The responses for each height oscillate around the pattern for flat ground — all due to the complex reflections and diffractions occurring off the terrain.

At an elevation angle of 5° , the situation reverses itself and the gain is now higher for the 120-foot-high antenna than for the 70-foot antenna. A pair of antennas on one tower would be required to cover all the angles properly. To avoid any electrical interactions between similar antennas on one tower, two towers would be much better. Compared to the flat-ground situation, the responses of real-world antenna can be very complicated due to the interactions with the local terrain.