

# WSJT TROPO AND EME SIGNAL EXPERIMENT (frequency doppler and time delay effects)

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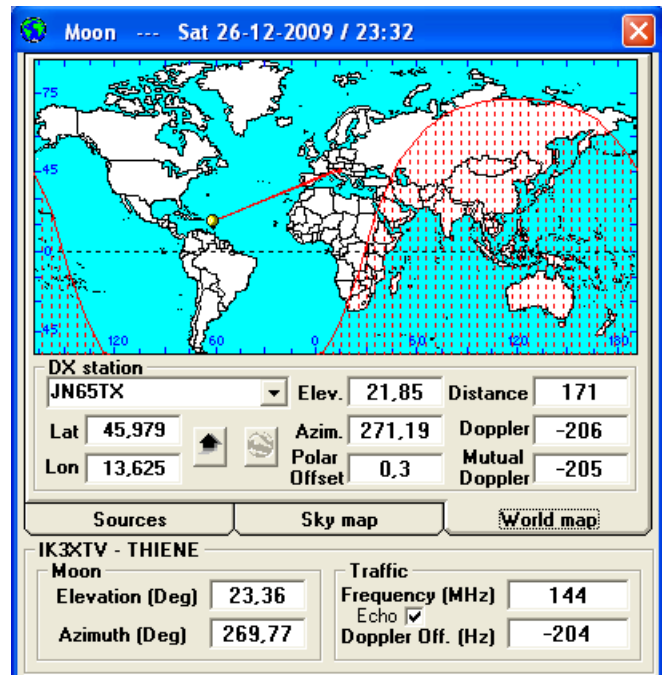
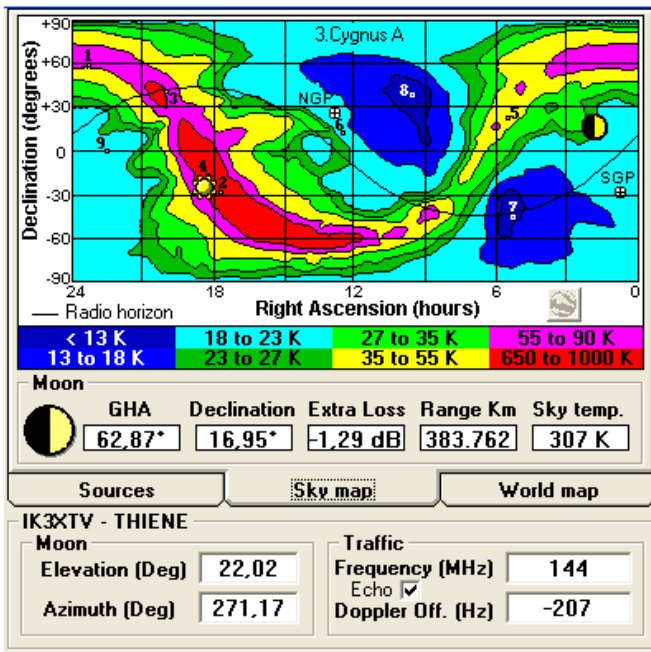
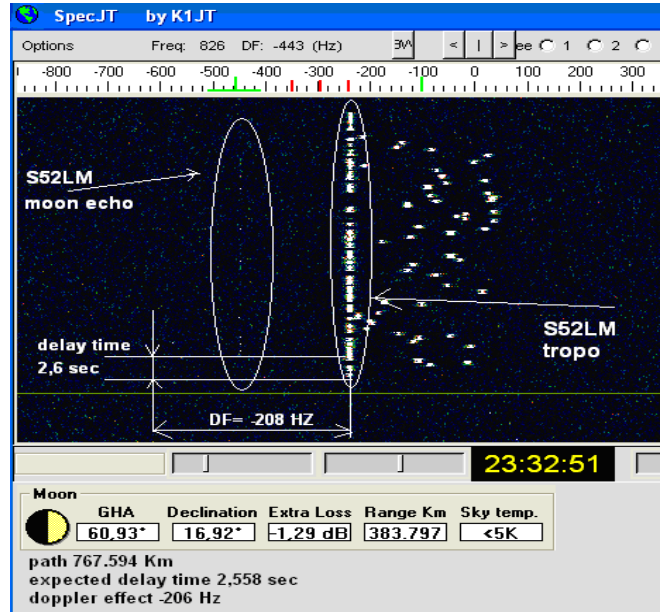
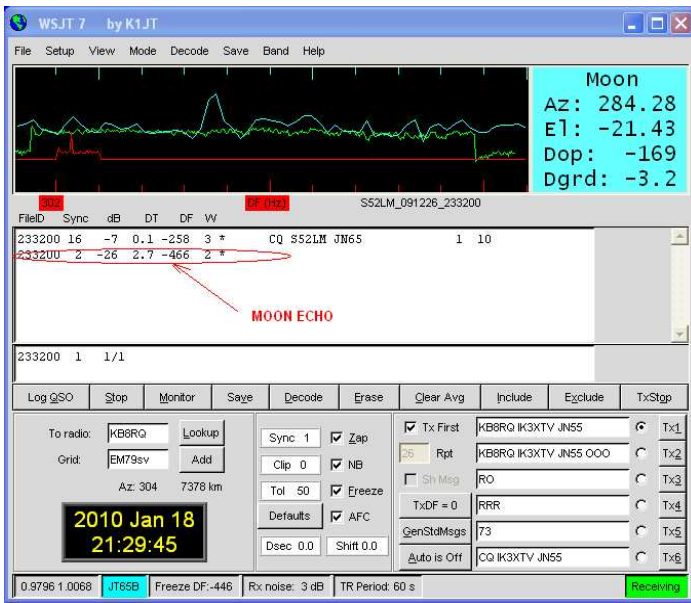
Date of experiment December 26, 2009  
 Utc time 23.32  
 Station S52LM (4X17 elements 1,5kw)

Experiment of EME and tropo reception with S52LM (4x17 1.5 kW) just to highlight the differences and characteristics of the moon echo compared with a tropo signal. The WSJT software has detected a delay time of 2.7 seconds.

**DT = d / c**

(The Calculation of the DT for a range of 383,797 kilometers away, is  $DT = d / c$  where d is the earth-moon-earth path range and c the speed of light  $DT = 767,594 / 299 792.458 = 2.56 \text{ sec}$ ).

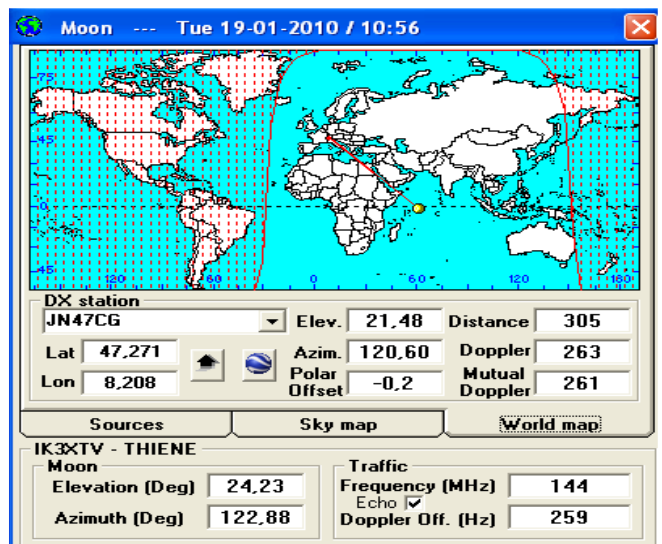
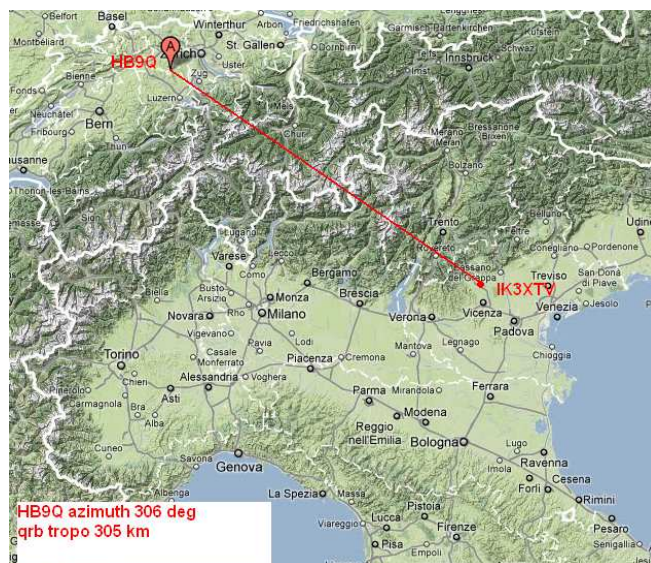
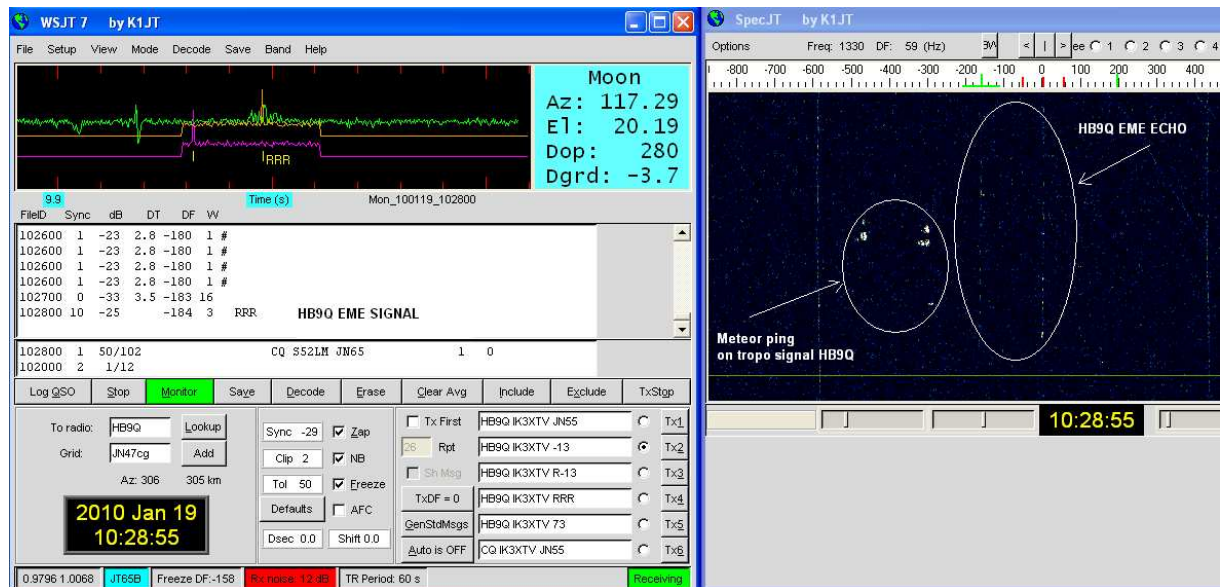
The tropo signal has a DT of 0.1 sec and this mean the offset synchronization time is just 0.1 second.  
 The frequency shift is -208 Hz. The tropo signal was detected at -7 dB and the moon echo at -26 dB. I did this test at the moonset when the moon signals are afflicted by a negative doppler effect while at the moonrise, the doppler is positive.



The Doppler offset calculated from the EME SYSTEM software is -206 Hz. This Doppler value has been confirmed from the experiment (-208 Hz detected). The sky noise temperature was 307 K, and the extra loss path -1,29 dB

## EME signal with tropo and meteor scatter ping experiment with HB9Q

I noticed in the below lay out an experiment with eme echo from HB9Q station calling beaming to the moon with some reflection from meteors.



## DOPPLER EFFECT

Doppler effect - 300 Cycles at Moonrise/set

At Moonrise, due to the Doppler effect between the Earth and Moon, Your echo's will appear 300 or so cycles higher in frequency at Moonrise. As the Moon traverses the sky to a point due south the Doppler approaches nil. As the Moon sets your echo's will appear lower in frequency till at Moonset they are now 300 cycles less. Doppler effects cause many problems when tuning into and locking signals from the Moon.

## VHF configuration

- Antenna YAGI 13 elements (3WL) 15,3 dBd
- Solid state PA ( n. 2 MRF245 push-pull) max output power 150W
- LNA gasfet transistor NE41137 (23 dB NF<1dB)
- Rtx Kenwood TS711E
- The audio output is processing by a Digital signal processing device " SP-1 Contel"

## Bibliografy:

Wikipedia:

Amateur radio propagation studies <http://www.qsl.net/ik3xtv/>

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