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# VHF/UHF – An Expanding World

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David Smith VK3HZ

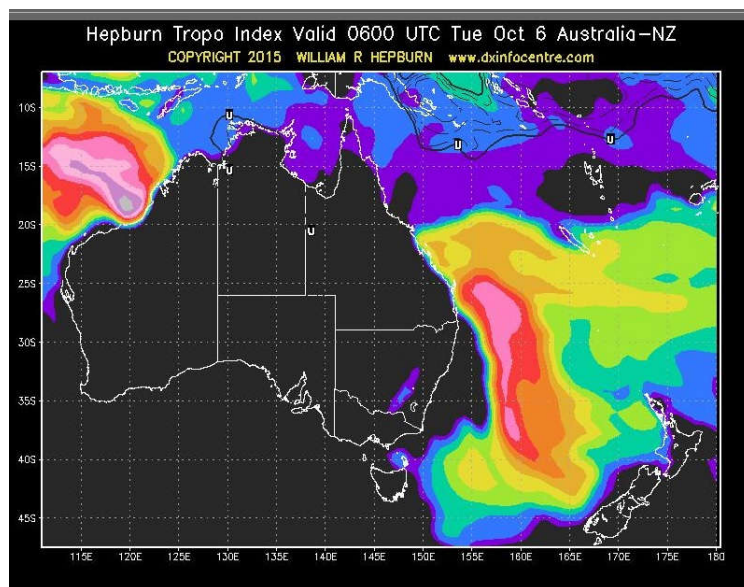
## Weak Signal

David Smith - VK3HZ

Normally I write about propagation of note that happened in the month prior to the magazine deadline – in this case September. Unfortunately, and not all that surprisingly for early Spring, nothing of note happened in September.

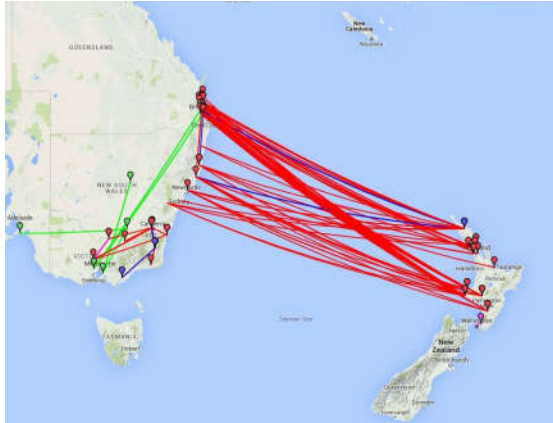
However, with my usual tardiness, I'm finishing this off a few days past the deadline and into the month of October, and there certainly has been propagation of note over the last few days. So, rather than wait another month, here goes.

The Hepburn predictions had been showing a large patch of yellow / orange / red from the southern VK4 / northern VK2 coast all the way to the ZL north island as shown below.

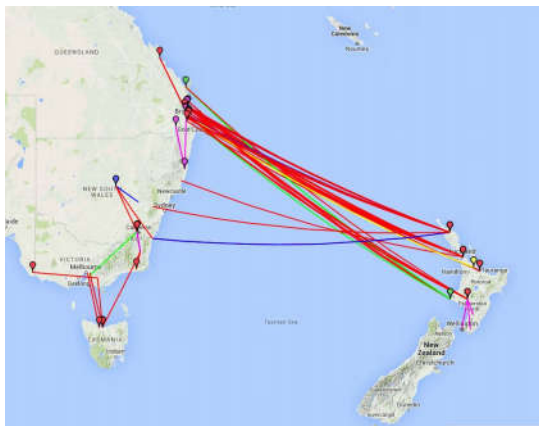


### Hepburn Propagation Forecast for 06/10/15

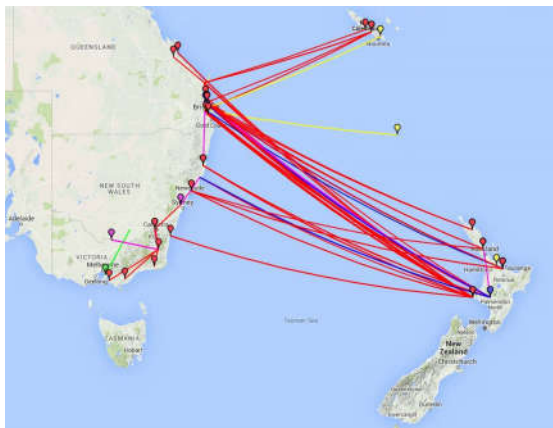
Sure enough, on October 3<sup>rd</sup>, the bands opened up and over the next four days (to date – it's still going), many good contacts were had from VK to ZL on 2 m, 70 cm and 23 cm. Rather than try to report on the stations involved, the following charts from the VK Logger for each of the calendar days provide a good overview of the activity. Note that the colours of the lines indicate the band – Red for 2 m, Blue for 70 cm, Pink for 23 cm, Green for Digi and Yellow for "Other" (e.g. FM radio). Also note that not all lines indicate a contact – some are for Spots only.



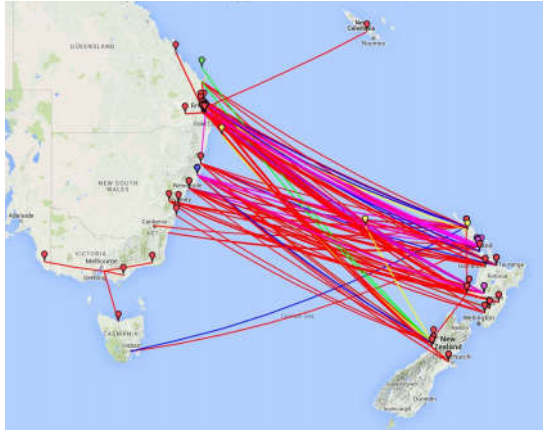
October 3<sup>rd</sup>



October 4<sup>th</sup>



October 5<sup>th</sup>



## October 6<sup>th</sup>

A number of 23 cm contacts were achieved. Steve ZL1TPH reports working several stations from his portable location towards the top of the north island:

*Today (6/10) worked VK4REX, VK4ADM, VK2MAX, VK2DVZ and VK2ZT on 23 cm. Highlights for me were three new VK stations on this band - VK4REX, VK4ADM and VK2MAX (have worked VK2DVZ and VK2ZT many times before). The VK4 contacts are my first and my best DX on 23 cm at 2310 km and 2308 km. With VK2MAX, we have been close in the past, but finally have done it.*

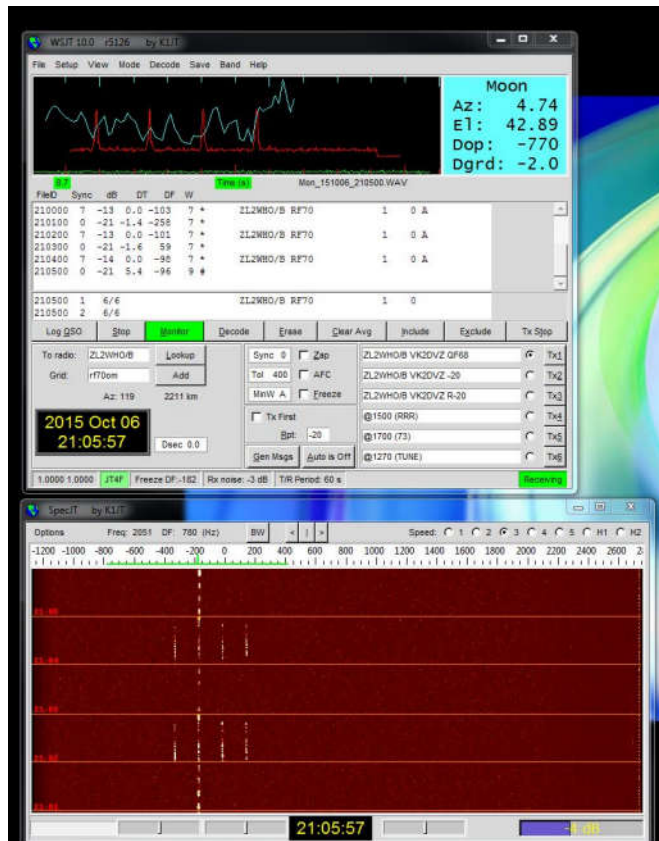
*My 23 cm (VK stations) contacts in total are now 9 since 2003 when I first worked VK2DVZ. They are, in rough order, VK2DVZ, VK2ZAB, VK2KU/VK2TS/p, VK2FZ, VK2AMS, VK2ZT, VK4REX, VK4ADM and VK2MAX.*

*The VK Logger has helped immensely with these contacts so thanks Adam for providing this invaluable resource. Also the 23 cm activity sessions up in VK4 have helped greatly and produced results today.*

Ross VK2DVZ gave Steve a 5x7 report and received 5x9. Then, on October 7<sup>th</sup>, Steve reported:

*To add to my total, this morning I worked on 23 cm VK4AFL, VK4CZ, and VK4UH.*

The ZL2WHO/B CW/JT4 beacon in the centre of the north island was booming through on 2 and 70. Rex VK4REX also received the 23 cm signal, even though the two panel antennas used on the beacon point north and south to favour ZL and place him well off the main lobe. Ross VK2DVZ, who is almost in a null for the beacon antenna, also had no troubles receiving the beacon, peaking to -11 as seen in the WSJT screen dump below.



### ZL2WHO/B 23cm Beacon as received by VK2DVZ

Plans for an additional west-facing antenna for the beacon are advancing.

The enhancement reached well south, and on the 6<sup>th</sup>, Rex VK7MO managed to get into the duct and join the action. At 0310Z, he worked Steve ZL1TPH (4x1) on 2 m. Then at 0610Z, he worked Nick ZL1IU (5x5) on 70 cm.

As can be seen from the Hepburn chart and from the maps of the 4<sup>th</sup> and 5<sup>th</sup>, New Caledonia also was covered by the opening. However, it seemed to be mostly a case of "lights on, nobody home". The FK8ZHA repeater was heard a number of times up to S7. There was a report that FK8CE worked into VK4 through the Bundaberg repeater (unfortunately on the same frequency as FK8ZHA).

The opening continues, so there may be more to report next month.

### New VK2 76 GHz record

Matt VK2DAG and Justin VK2CU, with the able assistance of Dave VK2JDS, have been working hard on improving their 76 GHz equipment. Range testing over several months started with a few hundred metres, then 4 km, 16 km and finally, on September 26<sup>th</sup>, 39.7 km to set a new VK2 Record. Dave provided an excellent hilltop at his QTH in central NSW from which Matt operated.



**Matt VK2DAG at the QTH of Dave VK2JDS**

The equipment used is DL2AM-based, with Kuhne local oscillators. Both transverters are dual 47 / 76 GHz which enables aiming on 47, then hopefully they will roughly be there on 76.

Congratulations to all involved.

### **Microwave Enthusiast Award**

Following on from his very successful "GPS-Locked Beacon" grants, Alan VK3XPD has announced at the recent GippsTech conference another initiative to support and encourage more VK activity on the Microwave bands.

The "Microwave Enthusiast Award" will be awarded annually to a VK Amateur who mentors and provides technical assistance to others through their knowledge and experience of microwave techniques. The winner of the award will receive a cash grant and commemorative plaque, provided by Alan.

Nominations for the Award will be requested and a Peer group selected by Alan will decide on the eventual recipient.

More details may be found on Alan's web site at: <http://www.rfresale.com/ME.html>

Congratulations to Alan for establishing another exciting initiative to further encourage microwave activity in VK.

### **Spring VHF/UHF Field Day**

Just a reminder not to forget the first VHF/UHF Field Day for the season. The Spring FD is on the weekend of 14/15 November commencing at midday AESST for the eastern states.

The bizarre situation of having two sets of rules for the one contest still persists. This means that two groups of organisers each have to wade through the results to determine the classifications for each of the Divisions. I would encourage all participants to only enter one of the Divisions so that the organisers can see what the majority prefer. Only then will we be able to settle the confusion.

Please send any Weak Signal reports to David VK3HZ

# Meteor Scatter

Dr Kevin Johnston – VK4UH

I start this month by reporting the sad news of the passing of Waldis Jorgens VK1WJ who became a Silent Keyboard from the Meteor Scatter community this month. Waldis had been a stalwart of VK Meteor Scatter activity for many years, was a regular participant in the weekend activity sessions and a frequent contributor of reports to this column. Waldis and his XYL Sigrid were also frequent visitors to the annual GippsTech conferences. In recent months, I have been collaborating with Waldis in Meteor Scatter tests on 28 MHz and we had been planning to investigate lower frequencies still. With regret those tests will not be completed. I wish to pass on condolences from the Meteor Scatter community to Sigrid.

In the September edition of AR I made reference to a new version of the WSJT software package (v. 10.0 r.5639) with the addition of several new features for the ISCAT modes including shorter transmit cycles and “Auto Reply”. Unfortunately, in the production process of the magazine the labels on the two figures in the article became transposed and the colour rendition of the screen grabs is too dark to see clearly. I apologise for this, the originals were much better.

Over the intervening period there have been several more exciting developments in both the WSJT and the WSJT-X software suites relating to Meteor Scatter activity. As has been reported elsewhere, ongoing development of both packages is now being undertaken by working groups across the world rather than exclusively by Prof Joe Taylor K1JT himself. One package now focusing on developments of the fast modes (FSK441, JTMS, ISCAT, JT9M and now FSK315) for meteor and ionospheric scatter etc., the other for the slow modes intended for extremely weak signal work JT4, JT9, JT65 and WSPR.

This month two new modes FSK315 and JTMSK have been released for experimentation in Meteor Scatter Propagation. To clarify, JTMSK is quite distinct from JTMS mode which has been available for some time in previous versions of WSJT.

## FSK315

This new mode is available in WSJT version 10.0 r.5755 (1.). This mode can be considered as a “slowed down” or “half-speed” version of the more familiar FSK441 mode, which remains the mainstay of VK MS operation at the current time. Most of the encoding and decoding process is identical to FSK441 (FSK, four tones, at 315 baud), however, running at the lower baud rate, FSK315 has a lower overall bandwidth. The intention, I believe in developing this mode was to reduce the overall bandwidth of Meteor Scatter signals so as to comply with bandplan regulations for use in the USA “CW and Data” section of 10m. I have had a brief opportunity to test out FSK315 on-air, as this article was being prepared, and have completed QSOs with Alan VK2ZIW (QF56hg) and with Peter VK5PJ (PF95mk) on 50.230 outside of the normal activity sessions. My impression from these early tests was that, although successful, FSK315 required more “blarp” than FSK441. Meaning that with FSK315 it appeared that longer and stronger pings were required to achieve a decode and shorter pings that one would anticipate would be sufficient in FSK441 gave nothing in FSK315 even on 50MHz. In reality this is what one would expect. I have not had the opportunity to test the mode on 28MHz but my initial impression is that FSK315 has little to offer us here in VK, where we are not faced with such

bandwidth limitations as in the US, even for use on 50MHz.

## JTMSK

This is an entirely new mode, not to be confused with JTMS which has been available for some time. This mode has been specifically designed for Amateur Meteor Scatter. It runs at the same signal levels required for FSK441 but at almost twice the character transmission rate and potentially makes much better use of short pings. MSK is an acronym for “Minimum Shift Keying” using continuous-phase FSK and achieving a high transmission rate with a narrow bandwidth and a constant envelope waveform. JTMSK uses FSK between two sinusoidal tones at 1000Hz (0 bit) and 2000Hz (1bit) with characters encoded to 6 bits plus odd parity. Decoding employs real-to-complex Fast Fourier Transformation and strong Forward Error Correction. A comparison of the transmission parameters can be seen in Table 1. below.

	Meteor	Scatter		Iono-scatter	
	FSK441	JTMS	JTMSK	JT6M	ISCAT
T/R Period secs	30	30	30	30	30
Modulation type	4-FSK	MSK	MSK	44-FSK	41-FSK
Keying rate (baud)	441	1378	2000	21.5	43.1
Bit Rate (bps)	882	1378	2000	----	----
Characters/sec	147	197	286	14.3	32.3
Bandwidth (Hz)	1764	1378	2000	947	1809

Table 1. Transmission Parameters of the “Fast Modes”

Upgrades and bug-fixes have been appearing every few day or so as this article is being prepared. The early version tried here would only run for a few seconds before locking up my shack laptop and requiring a full reboot to restart. I eventually had success using version WSJT-X release 5924 (2) and was able to complete one QSO with VK5PJ and received decodes from VK2ZIW just before writing this month’s column. It is likely that more releases will occur before this gets into print so I suggest anyone interested in having a try does a search around the web and on the forums for the latest stable version of WSJT-X at that time.

I will say however that those early tests were very interesting indeed; in fact Joe Taylor himself has suggested that JTMSK may well prove to be the replacement for FSK441 in the future. The “New Pretender to the Throne” perhaps? Although practice with this new mode has been confined to just a few QSO’s it was immediately obvious that there are some significant changes from FSK441 operating that have to be addressed. Firstly the current discussion supports the use of this mode with 15 second periods rather than 30 seconds. The reporting structure is more akin to JT65 with signal levels ie -15dB rather than the more familiar “26” and there is less flexibility and shorter allowable character strings to contend with which will make current practices like working multiple stations simultaneously problematic.

Neither of the new modes is compatible with FSK441. My plea to everyone is that while testing out these or any other new modes, they NOT be used on the primary MS operating frequencies 144.230 MHz and 50.230 MHz during the weekend activity sessions. This would just create untold confusion. My suggestion to everyone is to use the secondary MS frequencies 144.330 and 50.330 and coordinate via the band-appropriate I-Chat facility of the VK Logger. Another request also not to just QSY to 144.335 or 50.335 during the activity sessions when operating other modes, periods

or timings. 5KHz just isn't far enough away from the primary frequencies to allow near-by and high-performance digital stations to operate effectively without causing QRM or de-sensing to each other. Please move up the full 100 KHz to those secondary frequencies to ensure everyone gets a fair go.

It will be interesting to see what the future brings. If this mode turns out to have advantages over the current Status Quo then the Meteor Scatter community will have to adapt and come to some consensus as to how, when and where we operate these modes. Let us see.

The next significant meteor showers on the calendar are the Orionids expected to peak around the 22nd October (ZHR 25/hr) followed by the Leonids (ZHR 20/hr) expected to peak around 18th November.

#### References

- (1) <http://jt65-dx.com/download/wsjt.html>  
Select download WSJT version 10.0 rev 5755
- (2) <http://jt65-dx.com/download/wsjt-x.html>  
Select download WSJTX-1.6.1-Devel-r5924

Please send any reports, questions or enquiries about Meteor Scatter in general or the digital modes used to Kevin VK4UH