Oberon Citizen Science Network

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M6.7 Earthquake Off Coast of NZ

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Investigation of Unusual Seismic Signal Received by Raspberry Shakes in SE Australia

Hypothesis: Wave is due to Oceanic Infrasound Stimulating Seismic Waves at the Coast

Quake:	**Lat**	**Lon**	**Time**	
	-46.7	165.9	1:43:12	UTC

Station	**R21C0**	**R4FA0**	**R5968**
Lat	33.769	-33.7685	-33.823
Lon	149.884	149.884	149.901
P arrival	1:47:17	1:47:17	1:47:16
D, km	1971	1971	1965
dT, s	245	245	244
V_P, km/s	8.044897959	8.044897959	8.053278689

Average P wave speed is typical for deep seismic waves. Probably not suitable for seismic waves over a shorter distance, so use P wave surface velocity of 6 km/s.

V_{PS}, km/s	6
V_{sw}, km/s	1.5

Measured arrival times for the unusual seismic signal in question:

Start	2:03:15	2:03:15	2:03:12
Peak	2:04:15	2:04:15	2:04:05
End	2:05:51	2:05:51	2:06:03

Calculate the transit times:

T_S, s	1203	1203	1200
T_{Peak}, s	1263	1263	1253
T_E, s	1359	1359	1371

Calculate the average velocities:

V_S, km/s	1.63840399	1.63840399	1.6375
V_{peak}, km/s	1.560570071	1.560570071	1.568236233
V_E, km/s	1.450331126	1.450331126	1.433260394

Note the average velocities for V_S are above but close to the velocity of sound in water. This is a good sign for the hypothesis.

Slower average velocities for the Peak and End of the signal are to be expected due to less direct paths leading to longer combined path lengths.

Solving Simultaneous Equations:

T_{IRW}, s	1166	1166	1163.333333
T_{seis}, s	37	37	36.66666667
D_{IRW}, km	1749	1749	1745
D_{seis}, km	222	222	220

Plotting these results on a map confirms the point of interaction where the Infrasound signal begins to stimulate a seismic signal is not the coast. It would appear to be associated with the continental shelf.

Test if Peak signal corresponds to the coast:

Solving Simultaneous Equations:

T_{IRW}, s	1246	1246	1234
T_{seis}, s	17	17	19
D_{IRW}, km	1869	1869	1851
D_{seis}, km	102	102	114

Plotting this on the map on the line between the quake and the stations gives point close to but on shore. This cannot be correct as a point for infrasound in the water to stimulate a seismic wave, however these point suggest the peak signal strength is a result of seismic signals created along the coast.

For the stations in Oberon, the most likely part of the coast to produce the peak signals is between Wollongong and Botany Bay which are within the right range given the precision involved with these measurements and calculations.

Towards the end of the signal the path is even less direct, resulting in the a longer overall path length, reduced signal strength and later arrival times.