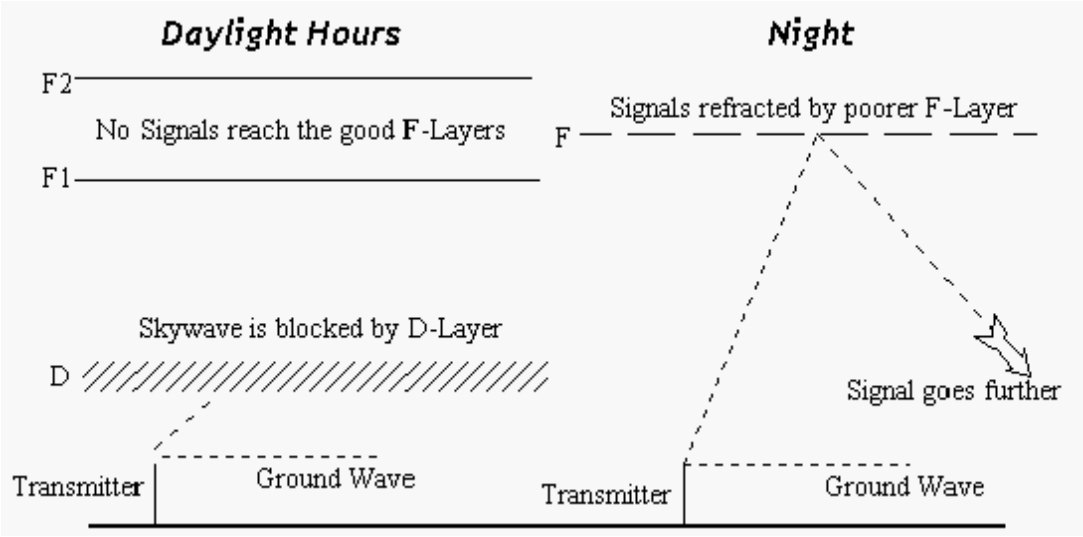
Effects of the Solar Eclipse of 11th August 1999 on European Medium Wave Broadcasts: 1305kHz - 1485kHz

The Solar Eclipse extended from Cornwall (South-West England) over France, Germany, Austria, Romania, Turkey, Saudi Arabia and finally India. The moon's shadow passed over my house for about 30 seconds at 10:14:30 UTC on this day. Regrettably, it was overcast and so we only saw it become dark and then light again. It was, nevertheless, quite an eerie experience. Following advice from both the RSGB and Radio Netherland's Media Network show, I decided to spend some time monitoring Medium Wave, to see how propagation changed. Below are the findings of my little experiments:

Some Theory: At Medium-Wave, it is the ionosphere's D and F layers that are most responsible for propagation by astmospheric reflection. The F-Layer exists during daylight hours (except mid-winter) as two layers, known as F1 and F2. F1 (at 300-400km AGL) reflects lower frequency waves, F2 (at 200km AGL) higher ones. During darkness hours, a single F-Layer is formed at about 250kms. The F Layers perform best during daylight, when the sun is ionising them the most, but fortunately, they do keep the ionisation for a little while after darkness, as the two layers combine. The D-Layer, meanwhile, exists only during daylight and disperses almost immediately darkness arrives. It has the effect of attenuating signals so that they do not reach the F-Layers. This is why, although the F-Layers may be best-suited to refracting waves during the daytime, few signals are to be heard. Regrettably, dawn and dusk happen too slowly for us to monitor the effects of these layers, so total solar eclipses are among the rare occasions when it is possible to bounce a signal off the F1-Layer, without the intrusion of the D-Layer.



Method: Since there is so much to the medium-wave band (more than 110 channels using Europe's 9kHz spacing), I decided to monitor the portion from 1305-1485kHz. I choose this section as stations from Central Europe (such as RTL Luxembourg and Deutschlandfünk Germany) can be heard here, along with many low-powered UK Local stations, including my local BBC Radio Devon, which I used as a reference. In order to listen, I decided to use my Yaesu FT-757GXII amateur radio transceiver. Although it is not ideal as a medium wave receiver, it does have a signal strength meter: a vital piece of equipment for the experiment. I did not set myself any regular times at which to listen (eg every thirty minutes), since I

wanted to watch the event myself, and my family had the television on, which caused too much interference to allow the experiment to be completed. When I did listen, I choose to monitor each 9kHz channel for fifteen seconds and take the mean signal strength reading to the nearest quater point. One point is worth roughly 6dB above ambient noise, so I am told, but I cannot verify this fact.

Results: A results table showing frequency, signal strengths in points for each UTC time and station name appears below. It should be recalled that the eclipse took place here at 10:15 UTC. UNID refers to a station which I have so-far not been able to identify. Please email me if you have any ideas!

	09:35	**10:35**	**12:15**	**12:25**	**14:35**	
1305kHz	3	3.5	3	3	3	UNID English
1323kHz	4	4.5	4	4.5	4.5	BBC Bristol
1332kHz	0	2.5	2	0	0	UNID Many inc. Spain
1341kHz	4.5	5.25	4.5	4.25	4	BBC Ulster
1359kHz	2	2.75	1.5	1.5	1	BBC Solent
1368kHz	2.5	3.5	2.5	2.5	2.5	Manx Radio
1377kHz	3.5	3.5	3.5	4	3.5	Radio Bleue (Lille)
1395kHz	0	3	0	0	0	UNID Dutch
1404kHz	4.25	3.5	4.5	4.5	4	Radio Bleue (Rennes)
1413kHz	0	2	1	0	0	Sunrise Radio (London)
1422kHz	0	3	0	0	0	Deutschlandfünk
1440kHz	0	3	0	0	0	RTL: Die grössten Oldies
1458kHz	7	7.5	7.5	8	7.5	BBC Devon
1485kHz	1.5	3	1.5	1.5	0	UNID English x2

Conclusions: As can be clearly seen here, in general at least, signals did dramatically improve just after the eclipse, but these conditions did not last. Some stations from Central Europe became audiable at 10:30UTC before disappearing again just as suddenly. Only French Radio Bleue's Rennes transmitter was the exception, I assume because the skywaves started to interfere with the already-present ground waves. BBC Radio Devon uses only ground-waves on its path to me and do its results should be ignored. Unlike many other experiments held at this time, I decided not to monitor the next day at the same time, as I felt that, instead of providing a comparison, such results would only serve to confuse the reader as the geomagnetic field would probably have changed. If you are to witness a solar eclipse in your part of the world, I really recommend trying this experiment or looking for some DX signals below on Medium Wave (AM) or Tropical Band (TB), where it is used.