

BAA Radio Astronomy Section.

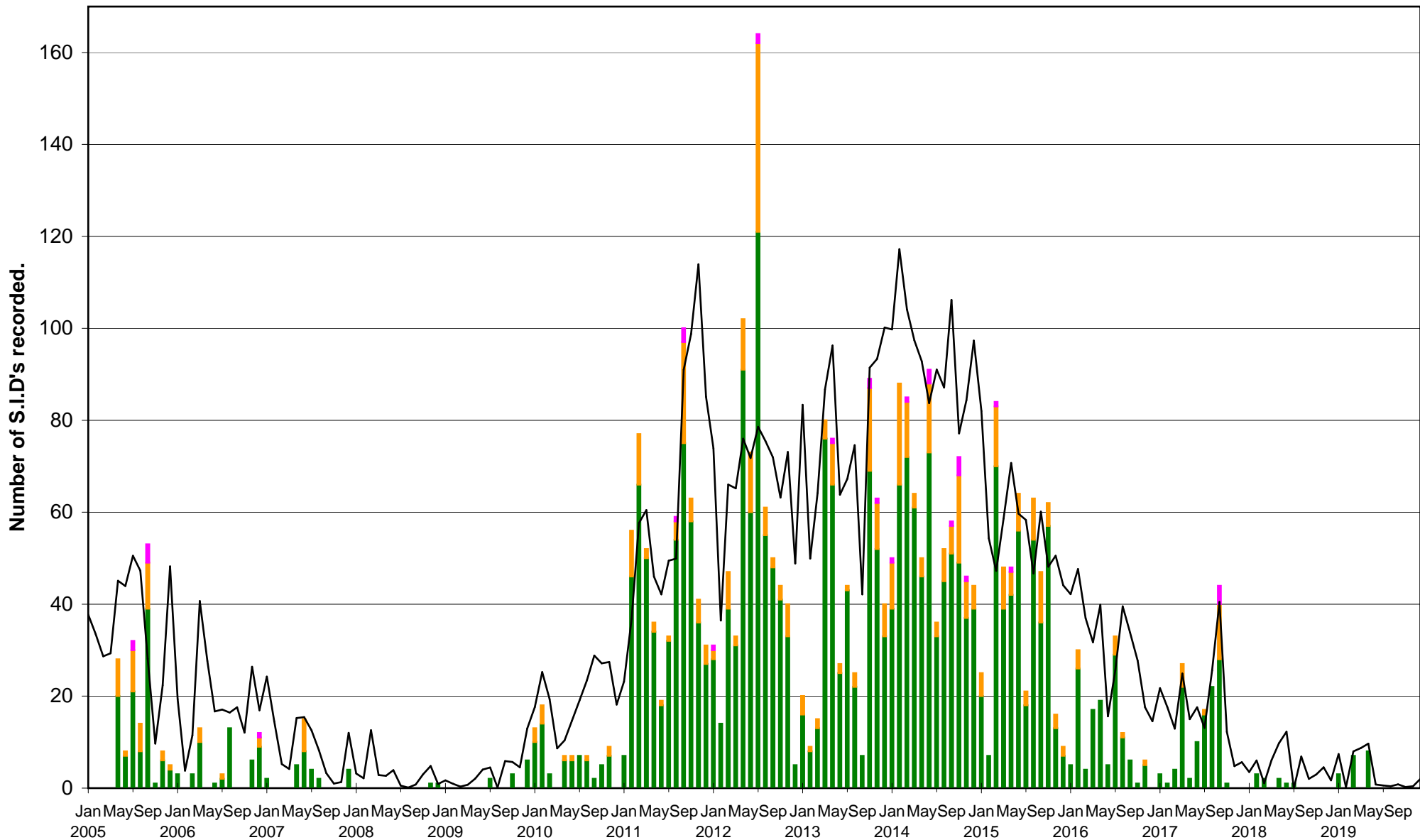
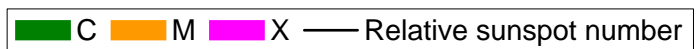
2019 DECEMBER

	Xray class	Observers	John Cook (23.4kHz/22.1kHz)	Roberto Battaiola (18.3kHz)	Paul Hyde (22.1kHz/24kHz)	Mark Edwards (24.0kHz)	Colin Clements (23.4kHz/18.3kHz)
			Tuned radio frequency receiver, 0.58m frame aerial.	Modified AAVSO receiver.	Spectrum Lab / PC 1.5m frame aerial.	Spectrum Lab / PC 2m loop aerial.	Tuned Radio Frequency receivers, 0.76m screened loop aerial.
DAY		0	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)

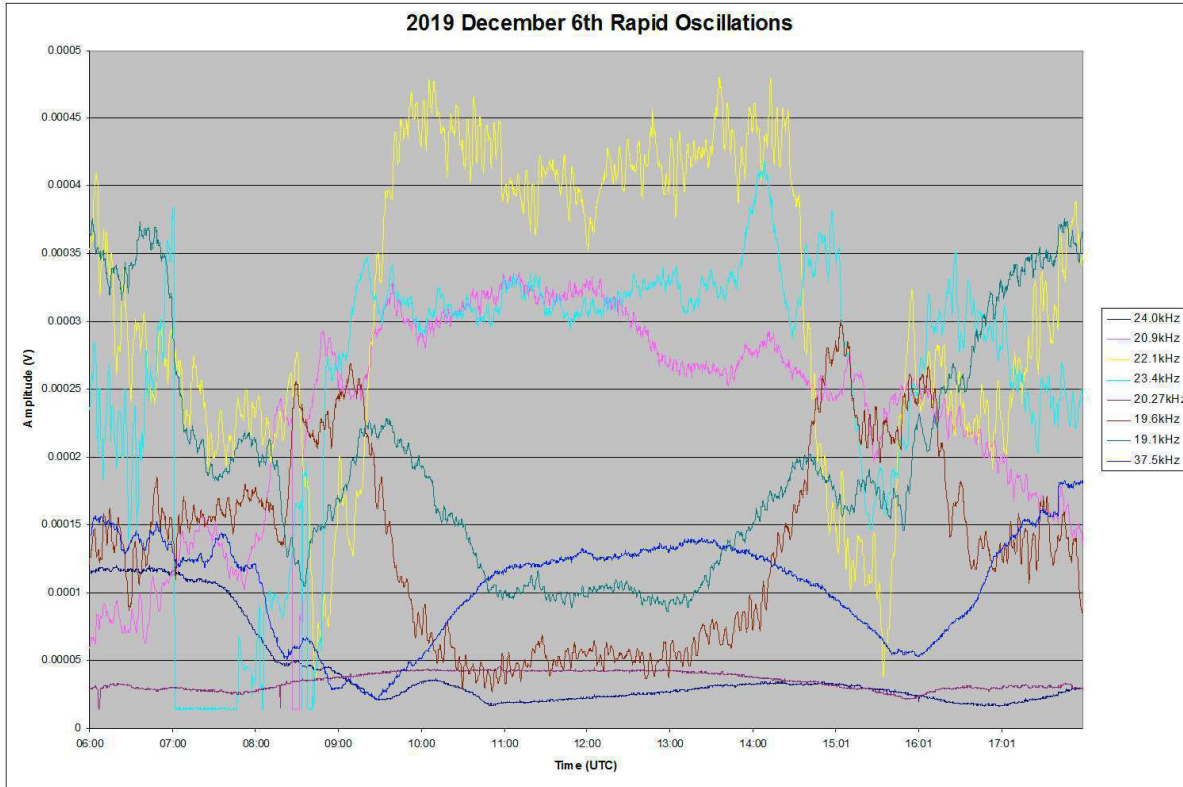
	Xray class		Steve Parkinson (Various)	Andrew Thomas (23.4kHz)	Phil Rourke (23.4kHz)	Jim Barber	John Elliott (18.3kHz)
			Tuned radio frequency receiver, frame aeralis.	Tuned radio frequency receiver, 0.6m frame aerial.	Spectrum Lab, 0.6m frame aerial.	Spectrum Lab, 0.6m frame aerial.	Tuned radio frequency receiver, 0.5m frame aerial.
DAY			START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)

	Xray class		Colin Briden (22.1kHz)				
			Spectrum Lab / PC, 1.2m frame aerial.				
DAY			START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)

VLF flare activity 2005/19.



The X-ray flux has again remained fairly constant throughout the month, with just a couple of A-class flares shown in the SWPC reports. There were two small sunspot groups over the Christmas period, but they remained inactive and faded after a few days. Both groups were from the new solar cycle, judging by their magnetic orientation. With the sun at its lowest altitude in December, signals were often very unstable, with large variations in strength from one day to the next. There was also plenty of noise and oscillations present on the European signals, as shown in this recording from the 6th, by Mark Edwards:

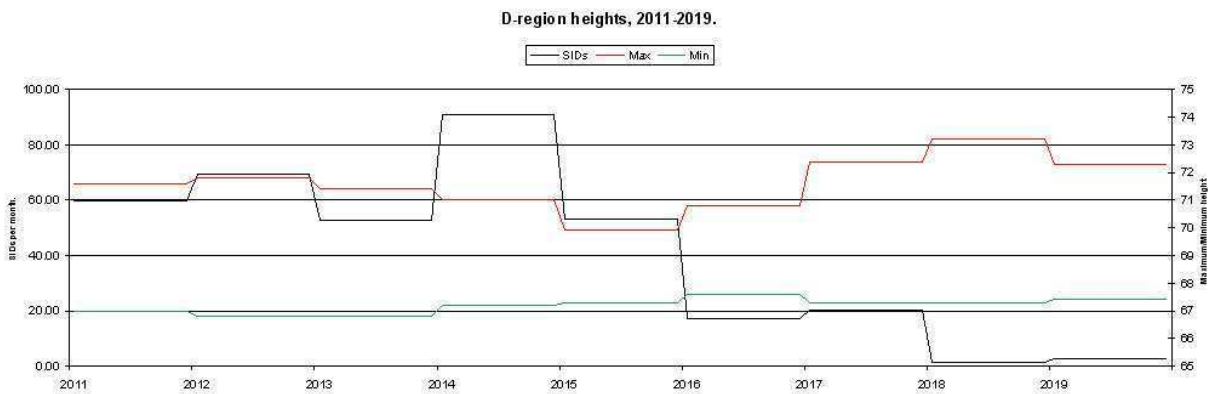
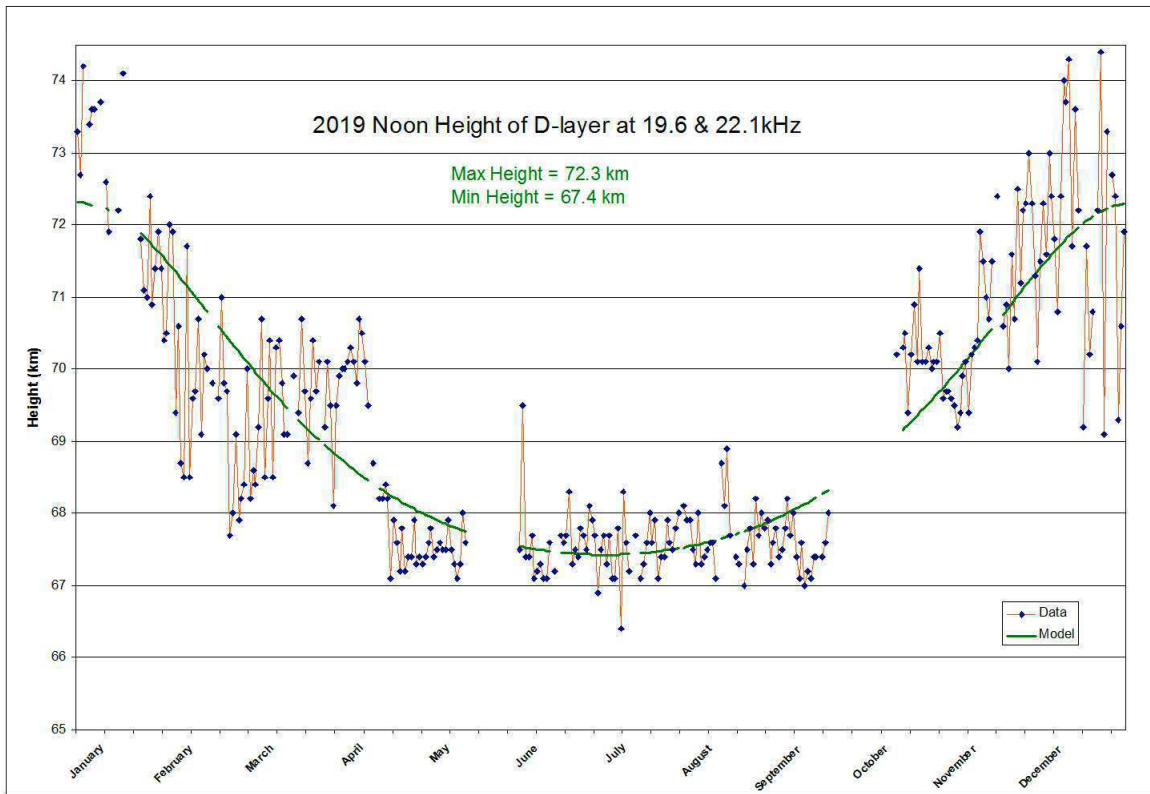


NAA at 24kHz and Grindavik at 37.5kHz are very clean by comparison, perhaps due to the jet stream being well to the south of these paths, while it was near overhead through northern Europe. Although the jet stream is much higher than the base of the D-region, its presence may be causing ionospheric turbulence.

Mark has also produced his annual chart of D-region height, as measured from observations at 19.6kHz and 22.1kHz. Gaps in the chart are periods when one of these signals was not present. Comparing the results over the last nine years:

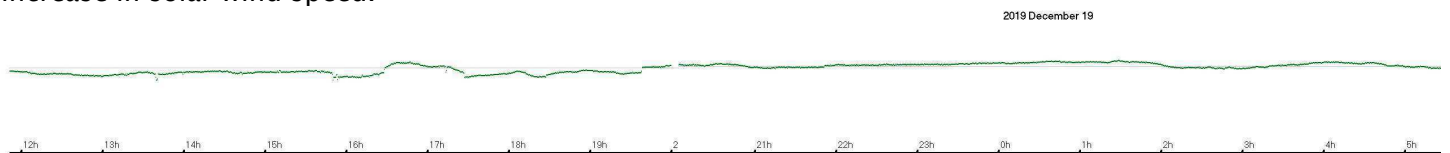
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Max	71.6	71.8	71.4	71.0	69.9	70.8	72.4	73.2	72.3km
Min	67.0	66.8	66.8	67.2	67.3	67.6	67.3	67.3	67.4km

The 2011 data represents the first year of stronger cycle 24 activity, with a short peak in 2012 and a longer peak in 2014/15. I have put these figures into a chart to see how the cycle activity has affected the D-region, shown on the next page. The maximum height (red trace) appears to have drifted lower with the highest flare activity, perhaps with a slight time delay. The black trace shows flare activity as the number of SIDs recorded per month for each year. Changes in the minimum height (green) during the summer months seem rather less related to flare activity.



MAGNETIC OBSERVATIONS.

The coronal hole seen over recent months made another appearance over the 18th and 19th with a mild increase in solar wind speed.



My single-axis recording shows the disturbance starting just after 12UT on the 18th, gaining in strength at 16UT. It faded out slowly overnight with just some very weak disturbances on the 19th. A very weak CME shown in satellite data may have been the cause of a very short disturbance late on the 15th. The rest of the month was very quiet.

Magnetic observations received from Colin Clements, Paul Hearn, Roger Blackwell and John Cook.

