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To: EDGES Group
 From: Alan E.E. Rogers
 Subject: Tests of EDGES DP310 12-bit ADC at Forks, Maine

The EDGES system has been modified to use the Agilent/Acqiris 12-bit DP310 PCI bus card. The card is run at its maximum sample rate of 420 Ms/s to analyze 0-210 MHz. In order to reduce systematics “out of band” noise is added in the frequency range 3-80 MHz (see EDGES memo #42). First the system was run in the laboratory using filtered noise from a generator plus a 138 MHz signal from a signal generator. The EDGES electronics allows the relative levels of “out of band” noise and “in-band” level via manual change of SMA attenuators. Following these tests the system was run at the D1 array site near Haystack and then taken to “The Forks” in Maine. The RFI signal levels at the D1 site (see figure 1) are about 30 dB higher than Forks (see figure 2 and 3). The RFI levels at Forks are more than 10 dB higher than at Boolardy. However, the Forks is the quietest site we have found, so far, in the continent of the USA.

File	Location	P_s	P_l	P_c	120-205 MHz rms mK	
2008_364_16	D1 array	0.90	7×10^{-4}	1×10^{-3}		
2009_007_14	LAB	0.01	4×10^{-3}	7×10^{-3}	22	
2009_007_12	LAB	6×10^{-3}	4×10^{-3}	7×10^{-3}	20	
2009_009_06	Forks	2×10^{-2}	2×10^{-3}	3×10^{-3}	126	Figure 4

Table – Summary of results

The table above summarizes the results of the tests for a few selected files. P_s , P_l , P_c are the relative “in-band” powers, normalized for unit total power, of the antenna, load and load plus calibration respectively. Also shown are the rms residuals to a 11 term fit after excision of the 13 kHz which have RFI and smoothing to 13 MHz resolution. Fortunately the channel 9 DTV signal shown in figure 5 was absent during for the 2009_009_06 data.

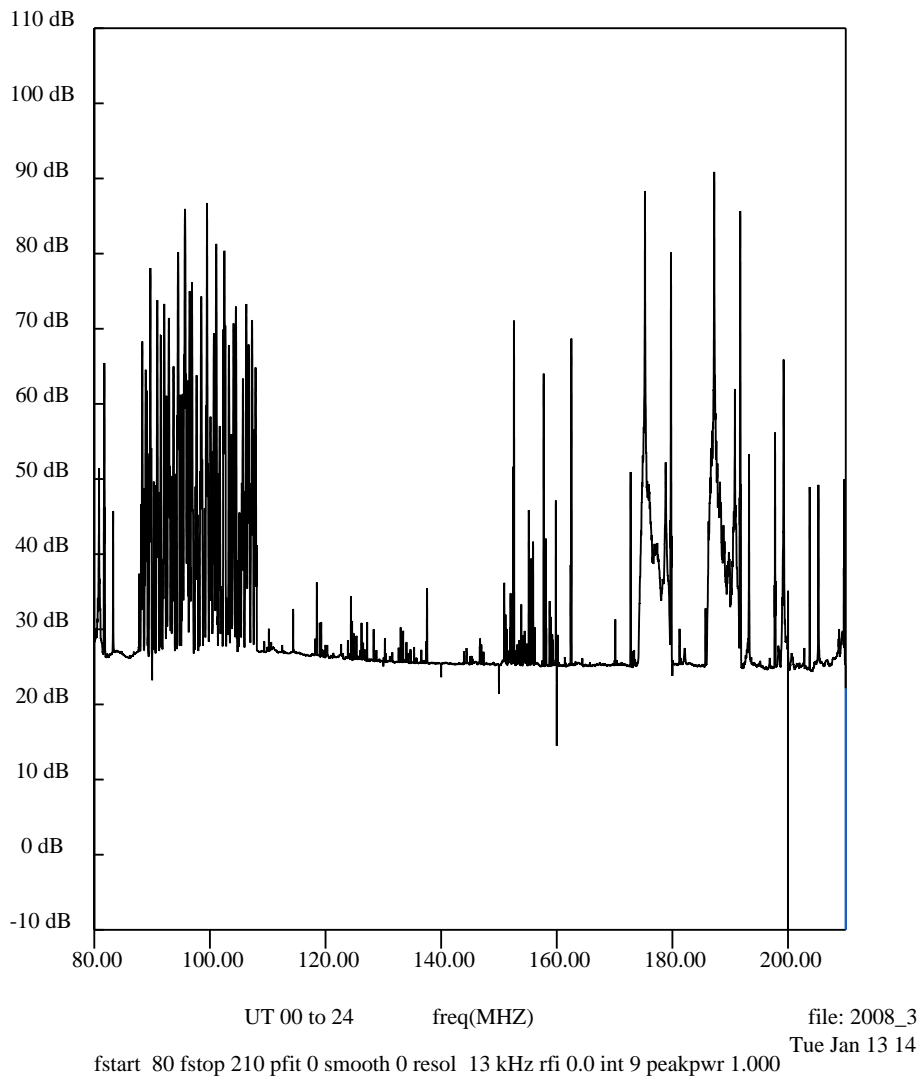


Fig. 1. RFI at D1 array (2008_364)16.acq)

(negative excursions are the result of a an interaction of the output control to switch the input with the ADC – which has been fixed by controlling the input switch using the PC parallel port)

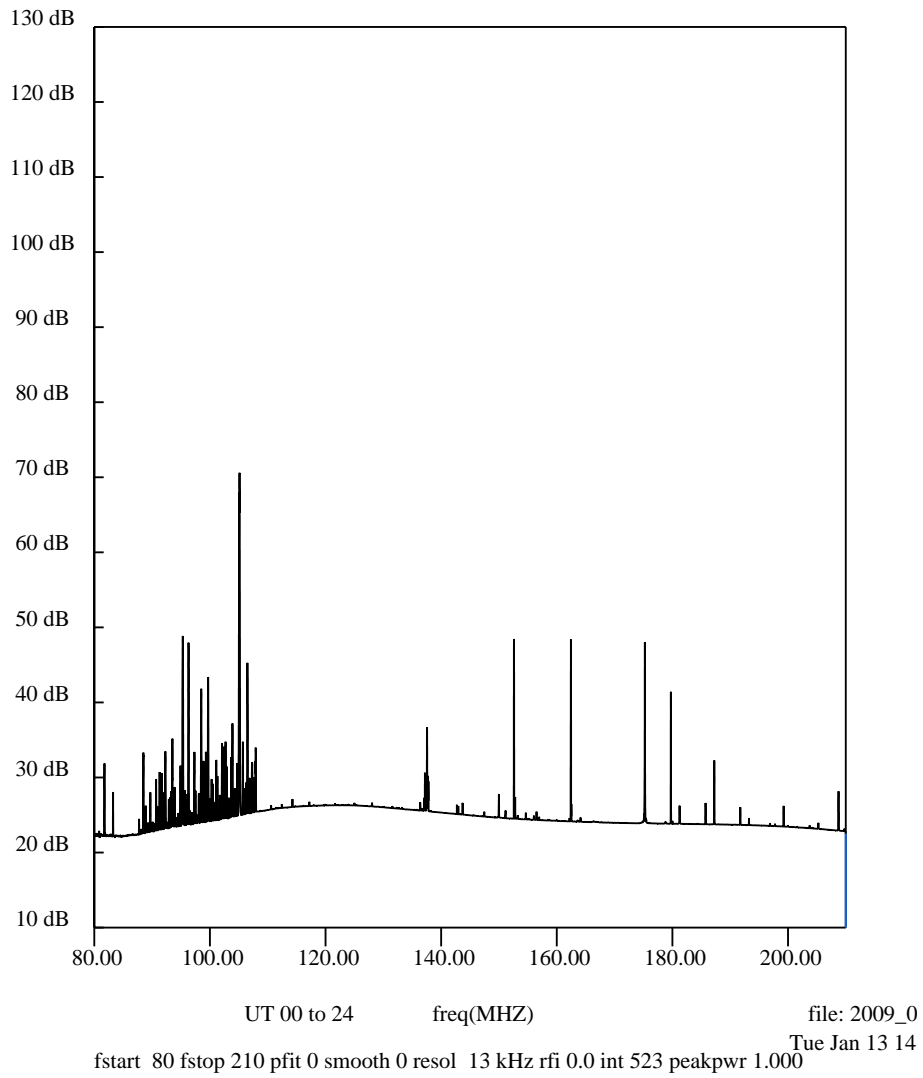


Fig. 2. RFI at the Forks, ME (2009_009_06.acq)

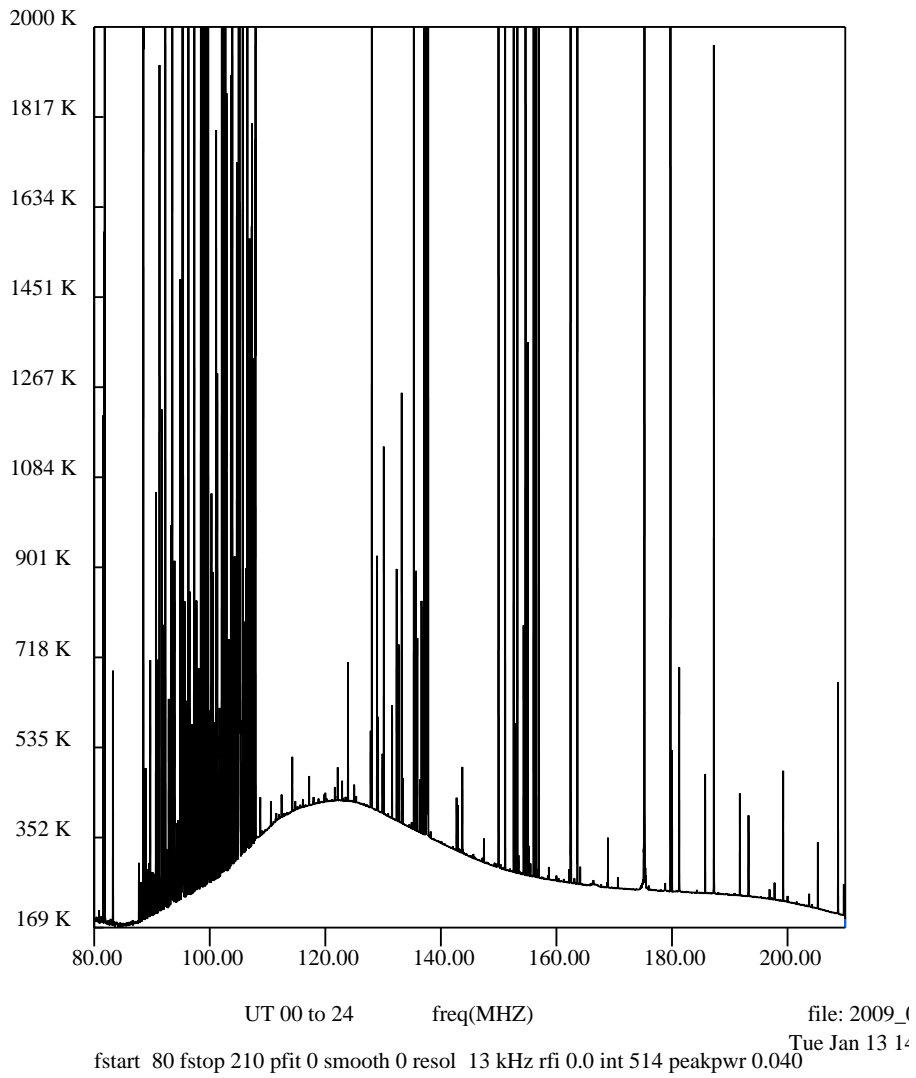


Fig. 3. RFI at the Forks, ME on linear scale. (2009_009_06.acq)

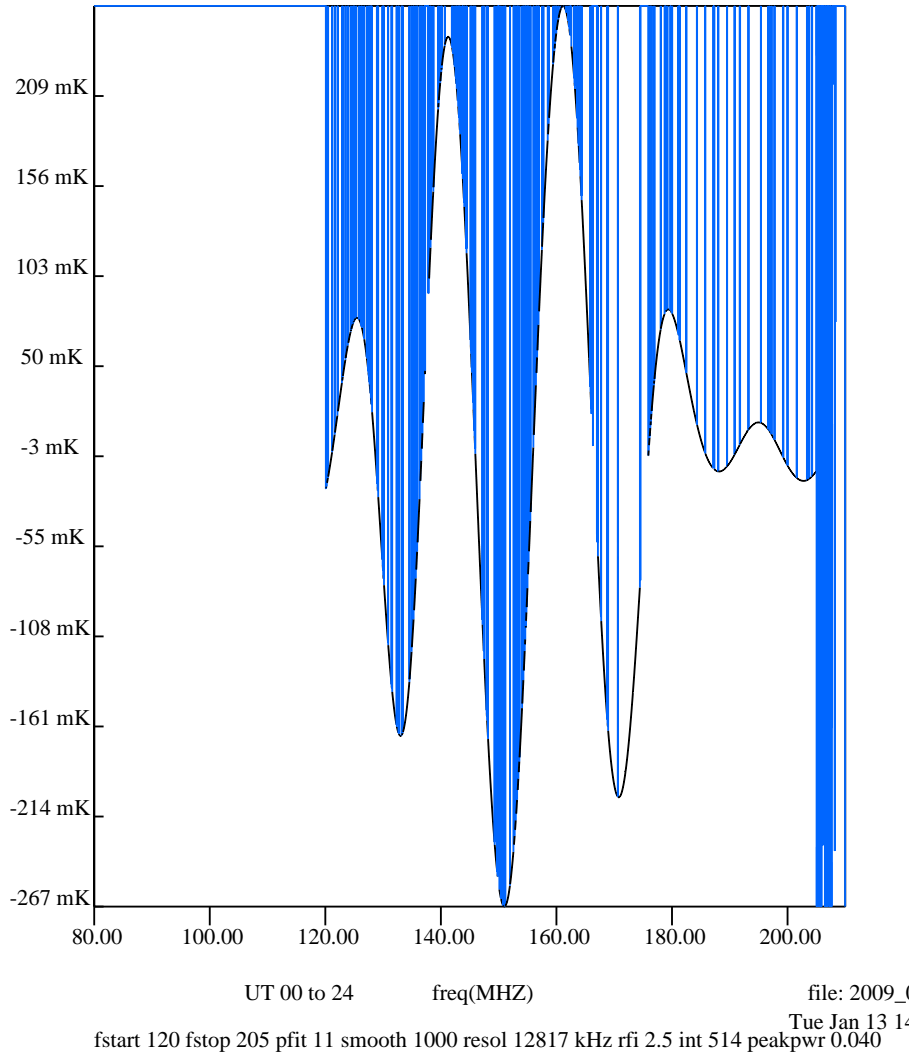


Fig. 4. Residuals to polynomial fit (2009_09_06.acq)
 (blue lines indicate 13 kHz excised due to RFI).

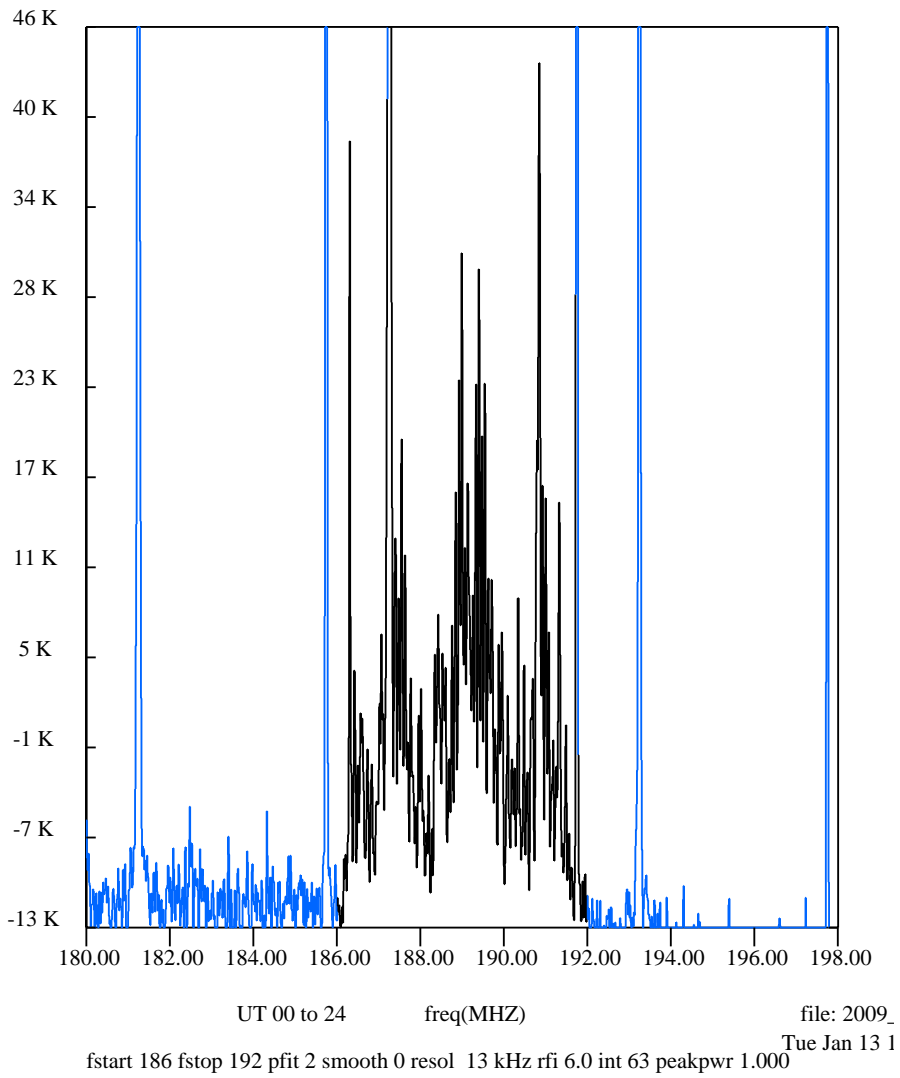


Fig. 5. Ch. 9 DTV (2009_008_22.acq)