Spectra Scan testing update: March 30, 2014

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Status: FINAL

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Spectra Scan testing update: March 30, 2014 (Chris Wilson)

1. Problems in recent data sets

The most recent data set is uid://A002/X7a_1660/X16f taken on 01-Feb-2014 01:30-2:30 UTC (approx) using software version 10.4 (Build : ALMA-10_4_0-B-2014-01-29-01-00-00). It is a Band 3 observation of 3 nearby quasars around RA=05:30 hr.

The data set shows very low amplitudes (essentially no coherence) for the first several subscans of each scan that is taken immediately following a Tsys measurement. See figures 1-3 on next page.

A similar problem was seen in data taken on December 10 and 11; at that time, Neil Phillips told me he thought it could be a problem with the timing of the laser synthesizer tuning.

2. What needs to be done next

It is not clear to me whether the problem affecting the coherence after a Tsys measurement has been fixed. On February 16 Alison Peck did not think the problem had gone away, and Denis Barkats was perhaps going to have a look at it. I have not heard anything since.

Therefore, we should first try running the Band 6 SB using software 10.4. (The Band 3 SB may be substituted if the weather is not good enough for Band 6.) **The SB should be run only once and then the data checked to see if the coherence problem still exists**. It is quite likely the SB will crash after one hour, but as long as a reasonable number of scans are taken, I will be able to check for the decoherence problem.

Project code: 000.0.00164.CSV
Project name: spectral scans (Version 3.3)

Unfortunately I was not able to get the CSV OT to work today, so I don't know the exact name of the Band 6 SB. But it should be similar to the Band 3 SB name (which was "3 quasars band 3 – spectral scan diffgaincal") except with Band 6 in the title.

3. Three figures illustrating when the decoherence problem occurred in the February 1 dataset

Figure 1 (below): amplitude versus time for the phase calibrator. For this source, Tsys measurements were done before the first and third observations, but not before the second and fourth observations. The decoherence problem shows up as low amplitudes in the first and third observations
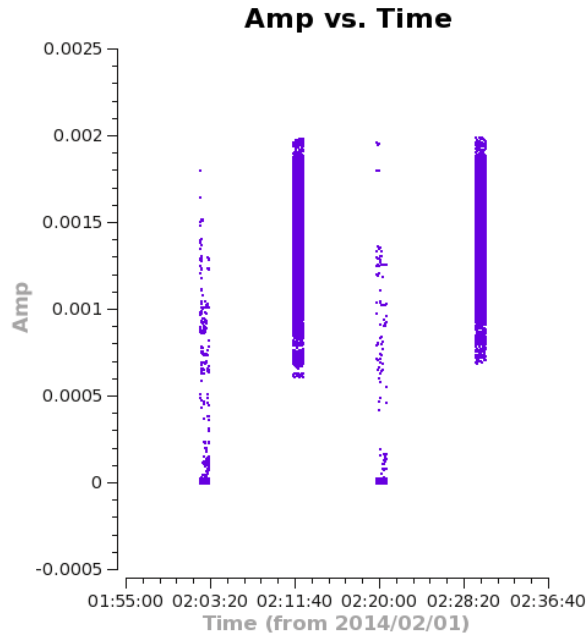

Figure 2 (below): observations of the science target. For this source, a Tsys was done before each scan and all scans show the decoherence problem. Different colors indicate different spw showing how the spectral scan tuning is changing with time
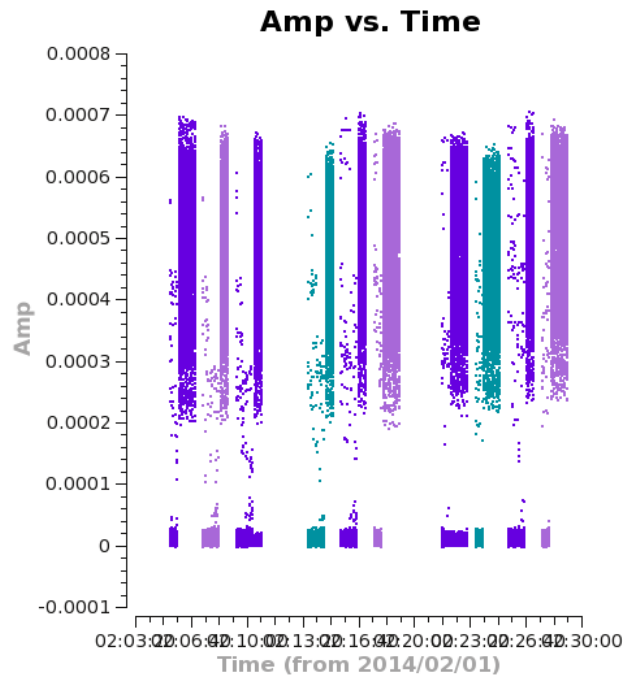
Figure 3: observations of the DiffGainCal source. Different colors indicate different sets of spw tunings. For this source, the Tsys measurements for all four tunings are done immediately before the first scan shown in this plot. The first scan shows the decoherence problem but none of the subsequent scans do. To me this plot shows that the system is capable of shifting frequencies quickly without causing the decoherence problem, and pinpoints something in the [Tsys scan+subsequent scan] operation as the problem. (Note the cluster of low purple points seems to be unrelated and just DA46 having some problem at this specific tuning.)