W3OH spectrum from 210 to 272GHz with IRAM-30m

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Abstract

The calibration source CALW3OH (Mauersberger et al. 1989, A&ASS 79, 217) was observed with the IRAM-30m facility and its EMIR band 2 (230GHz) receiver. We used the FTS spectrometer with 200 kHz resolution covering 2×8 GHz (USB and LSB) in each polarization with EMIR 2 which operates in DSB mode. The 1.3mm band was nearly fully covered with 5 different setups, with local oscillator set at 222300, 230080, 236600, 252080 and 260425 MHz. The source was observed as a calibrator for comet observations during the observing runs of program 115-12. Beam efficiency (η_{mb}) was checked mainly on Uranus and spectra have been corrected for additionnal losses due to variation of efficiency as a function of elevation. The spectra are given in Tmb scale. Observation were obtained on the 14th of March, 6th, 7th and 8th of April 2013. We have selected the observations with best focus (FWHM and Beam efficencies close to nominal, i.e. η_{mb} between 0.54 and 0.43 from 210 to 270 GHz) and elevation was between 32 and 64°. Atmospheric precipitable water vapour ranged from 1 to 6 mm. The observing mode used was position switching every 30 s with a reference at 600". Several spectra were averaged, baseline subtracted, and spectra with poor baselines (e.g. ripples in one polarization) were removed.

1 The spectra

All spectra have been combined in one single spectrum spaning 62 GHz and is in 12×6 sections of 860 GHz. Vertical scale is automatically set by class software according to the strongest line in the window. Noise may vary depending on integration time and sky transmission at the time of observations.

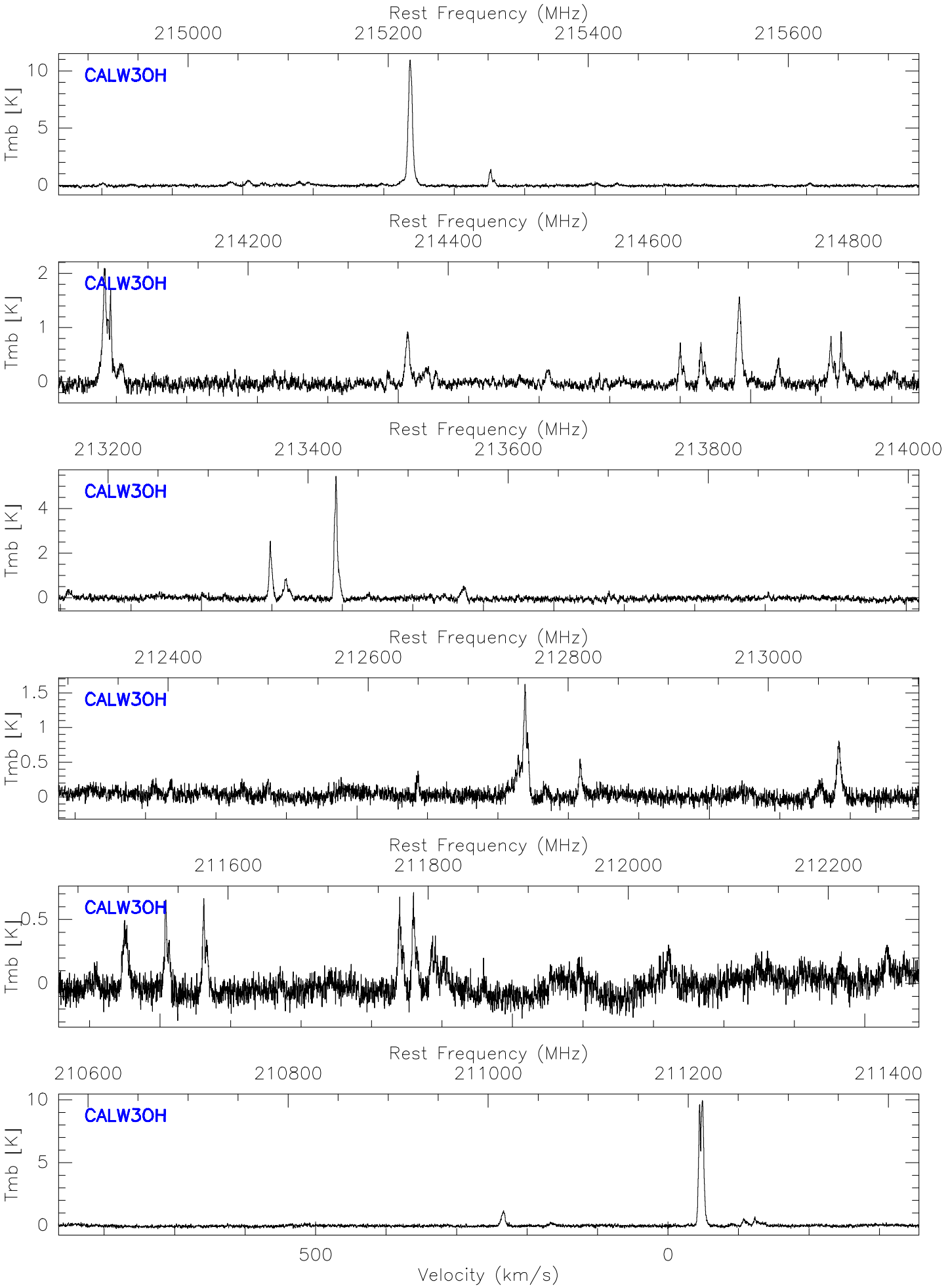
Rest Frequency (MHz)
215000
215200
215400
215600
CALW3OH
Tmb [K]
10
5
0
Rest Frequency (MHz)
214200
214400
214600
214800
CALW3OH
Tmb [K]
2
1
0
Rest Frequency (MHz)
213200
213400
213600
213800
214000
CALW3OH
Tmb [K]
4
2
0
Rest Frequency (MHz)
212400
212600
212800
213000
CALW3OH
Tmb [K]
1.5
1
0.5
0
Rest Frequency (MHz)
211600
211800
212000
212200
CALW3OH
Tmb [K]
0.5
0
Rest Frequency (MHz)
210600
210800
211000
211200
211400
CALW3OH
Tmb [K]
10
5
0
500
0
Velocity (km/s)

Figure 1:

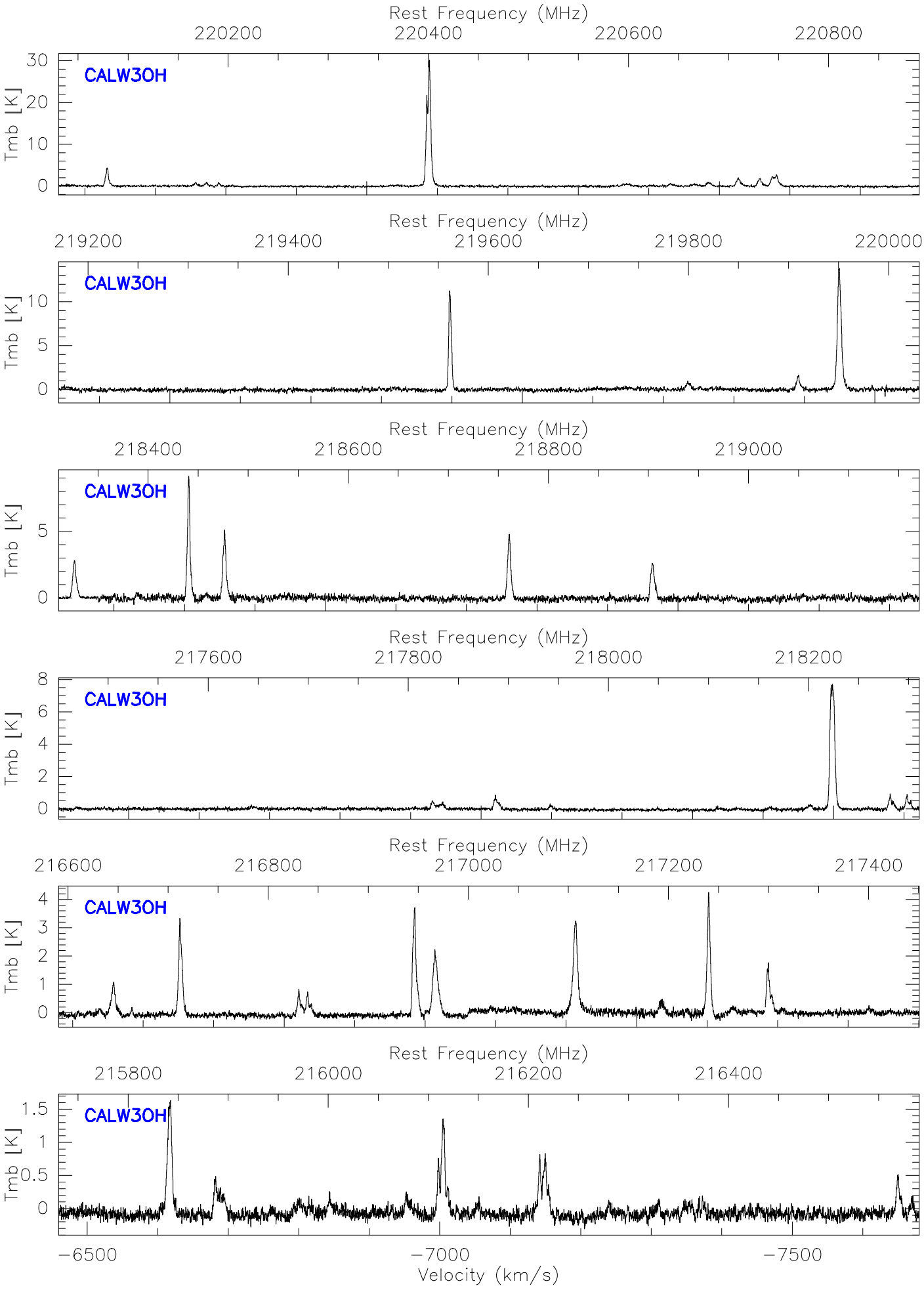
Rest Frequency (MHz)
220200
220400
220600
220800
CALW3OH
Tmb [K]
30
20
10
0
Rest Frequency (MHz)
219200
219400
219600
219800
220000
CALW3OH
Tmb [K]
10
5
0
Rest Frequency (MHz)
218400
218600
218800
219000
CALW3OH
Tmb [K]
5
0
Rest Frequency (MHz)
217600
217800
218000
218200
CALW3OH
Tmb [K]
8
6
4
2
0
Rest Frequency (MHz)
216600
216800
217000
217200
217400
CALW3OH
Tmb [K]
4
3
2
1
0
Rest Frequency (MHz)
215800
216000
216200
216400
CALW3OH
Tmb [K]
1.5
1
0.5
0
−6500
−7000
−7500
Velocity (km/s)

Figure 2:

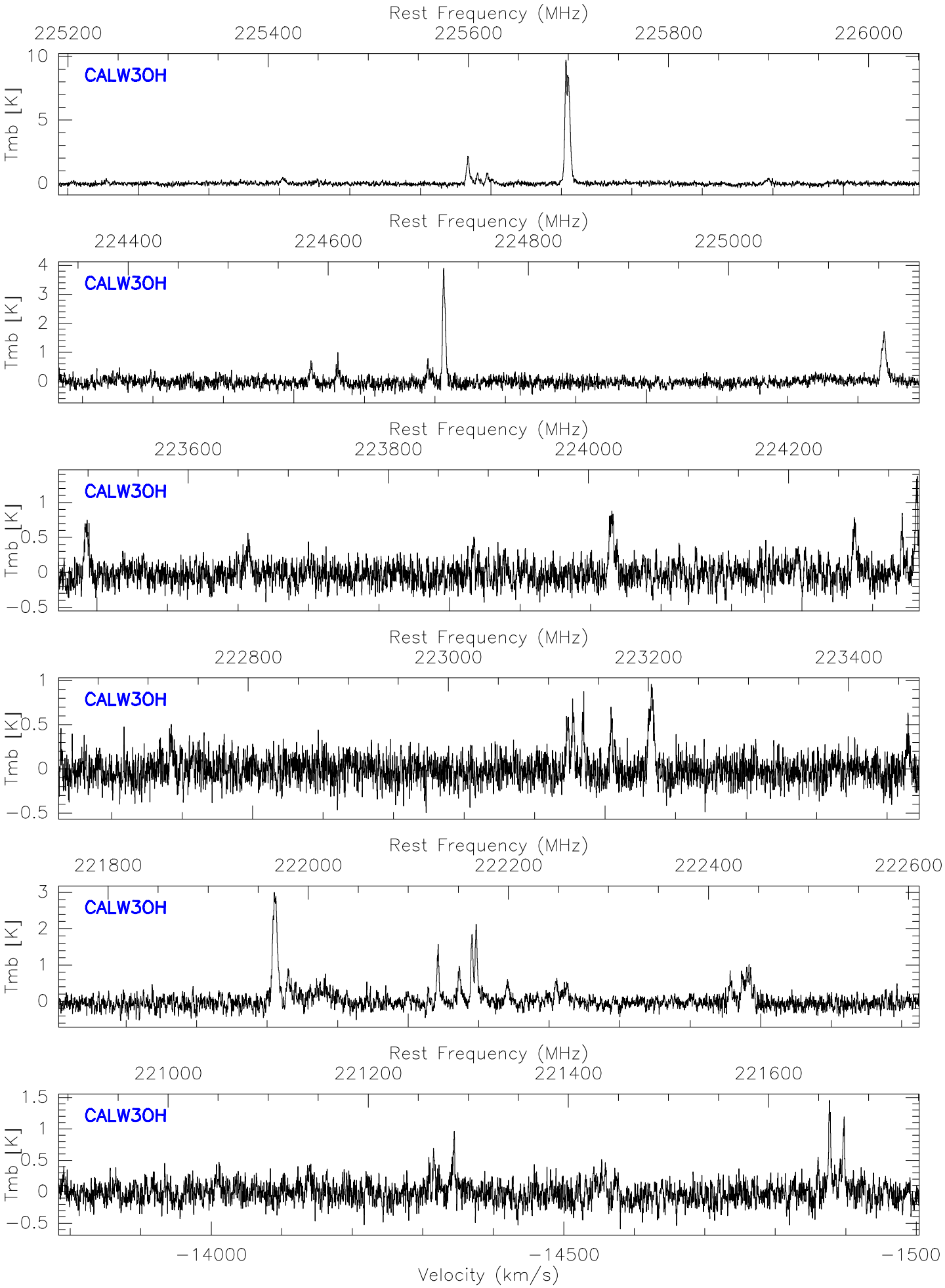
Rest Frequency (MHz)
225200
225400
225600
225800
226000
CALW3OH
Tmb [K]
10
5
0
Rest Frequency (MHz)
224400
224600
224800
225000
CALW3OH
Tmb [K]
4
3
2
1
0
Rest Frequency (MHz)
223600
223800
224000
224200
CALW3OH
Tmb [K]
1
0.5
0
−0.5
Rest Frequency (MHz)
222800
223000
223200
223400
CALW3OH
Tmb [K]
1
0.5
0
−0.5
Rest Frequency (MHz)
221800
222000
222200
222400
222600
CALW3OH
Tmb [K]
3
2
1
0
Rest Frequency (MHz)
221000
221200
221400
221600
CALW3OH
Tmb [K]
1.5
1
0.5
0
−0.5
−14000
−14500
−1500
Velocity (km/s)

Figure 3:

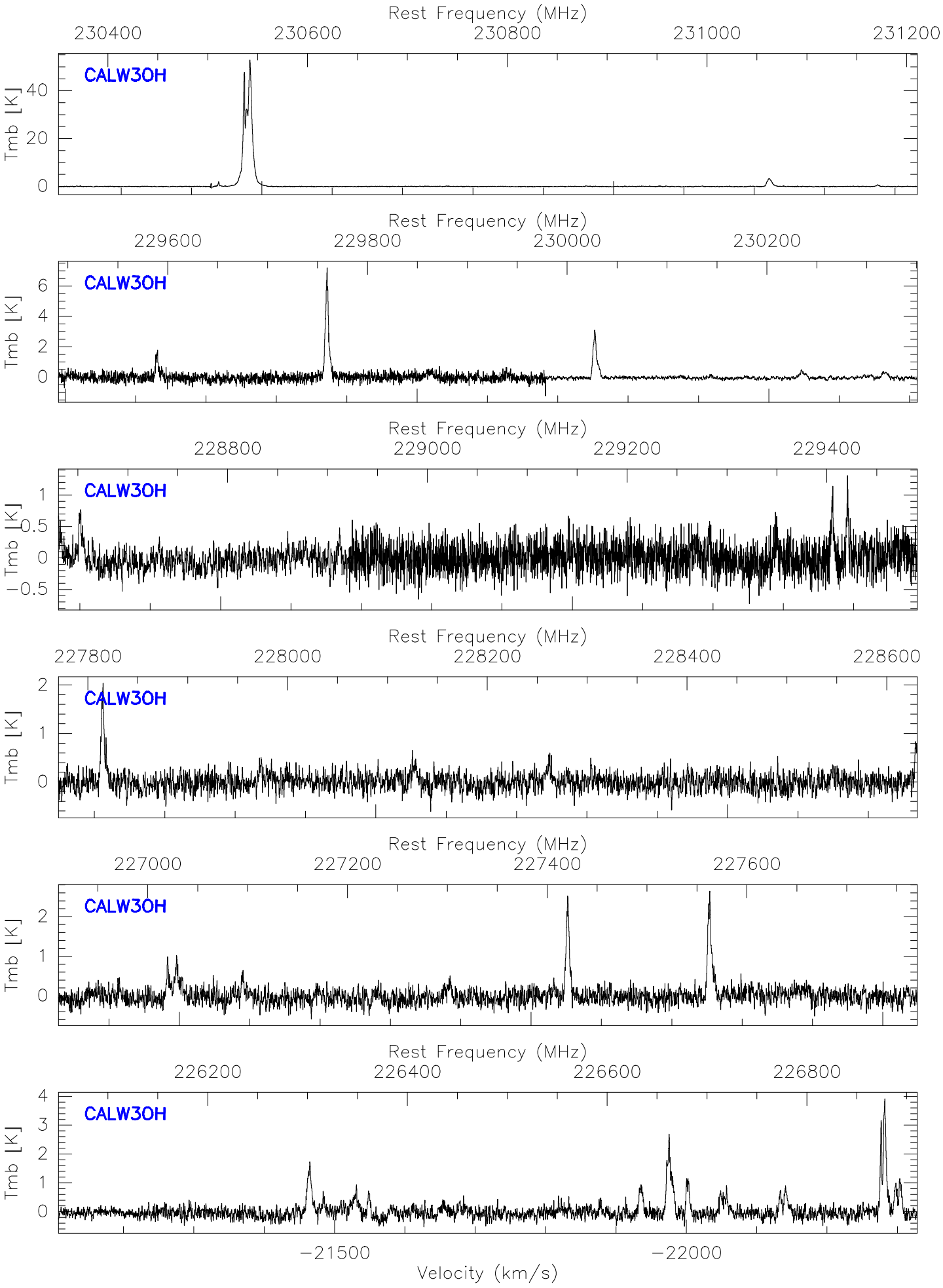
Rest Frequency (MHz)
230400
230600
230800
231000
231200
CALW3OH
Tmb [K]
40
20
0
Rest Frequency (MHz)
229600
229800
230000
230200
CALW3OH
Tmb [K]
6
4
2
0
Rest Frequency (MHz)
228800
229000
229200
229400
CALW3OH
Tmb [K]
1
0.5
0
−0.5
Rest Frequency (MHz)
227800
228000
228200
228400
228600
CALW3OH
Tmb [K]
2
1
0
Rest Frequency (MHz)
227000
227200
227400
227600
CALW3OH
Tmb [K]
2
1
0
Rest Frequency (MHz)
226200
226400
226600
226800
CALW3OH
Tmb [K]
4
3
2
1
0
−21500
−22000
Velocity (km/s)

Figure 4:

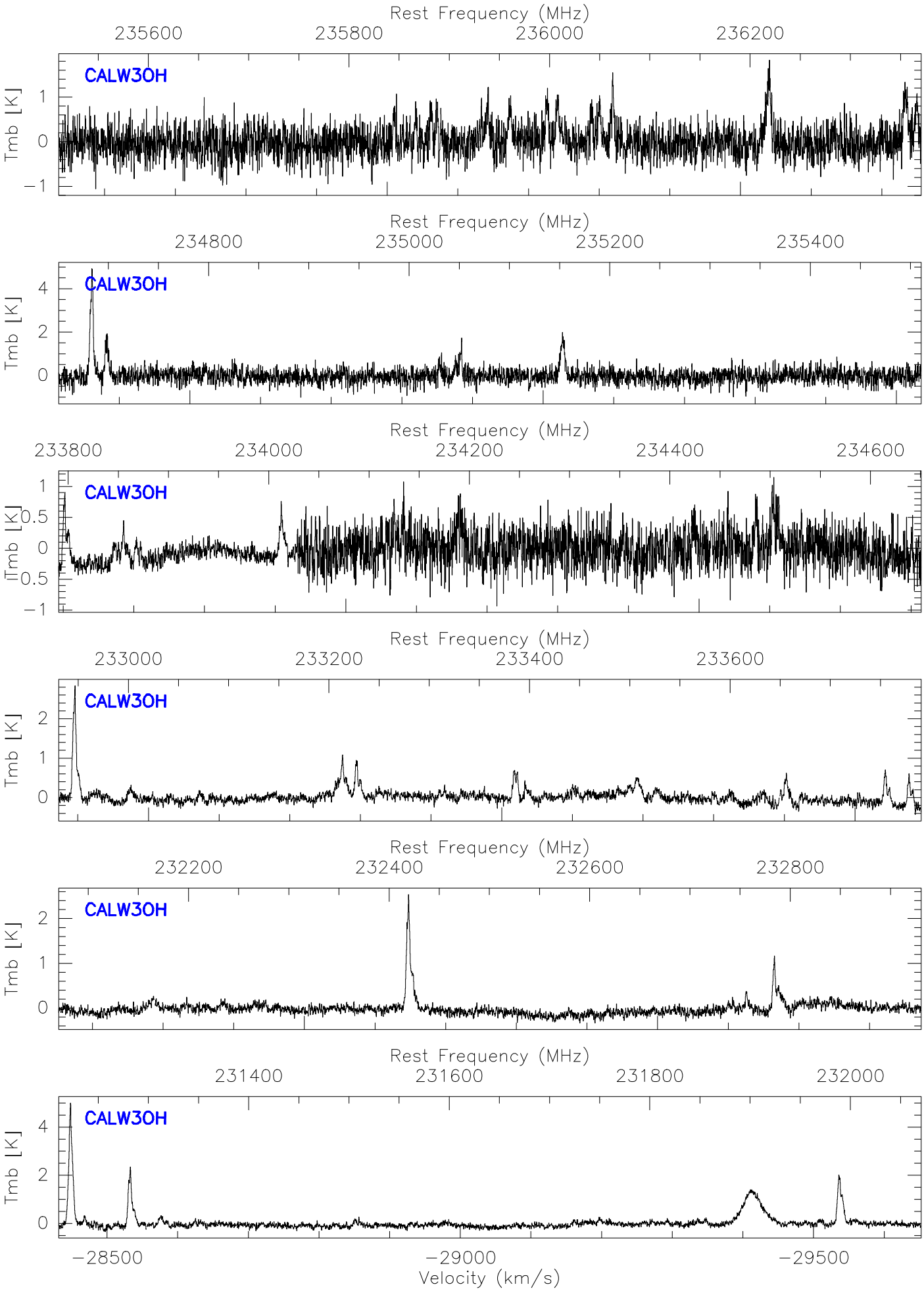
Rest Frequency (MHz)
235600
235800
236000
236200
CALW3OH
Tmb [K]
1
0
−1
Rest Frequency (MHz)
234800
235000
235200
235400
CALW3OH
Tmb [K]
4
2
0
Rest Frequency (MHz)
233800
234000
234200
234400
234600
CALW3OH
Tmb [K]
1
0.5
0
0.5
−1
Rest Frequency (MHz)
233000
233200
233400
233600
CALW3OH
Tmb [K]
2
1
0
Rest Frequency (MHz)
232200
232400
232600
232800
CALW3OH
Tmb [K]
2
1
0
Rest Frequency (MHz)
231400
231600
231800
232000
CALW3OH
Tmb [K]
4
2
0
−28500
−29000
−29500
Velocity (km/s)

Figure 5:

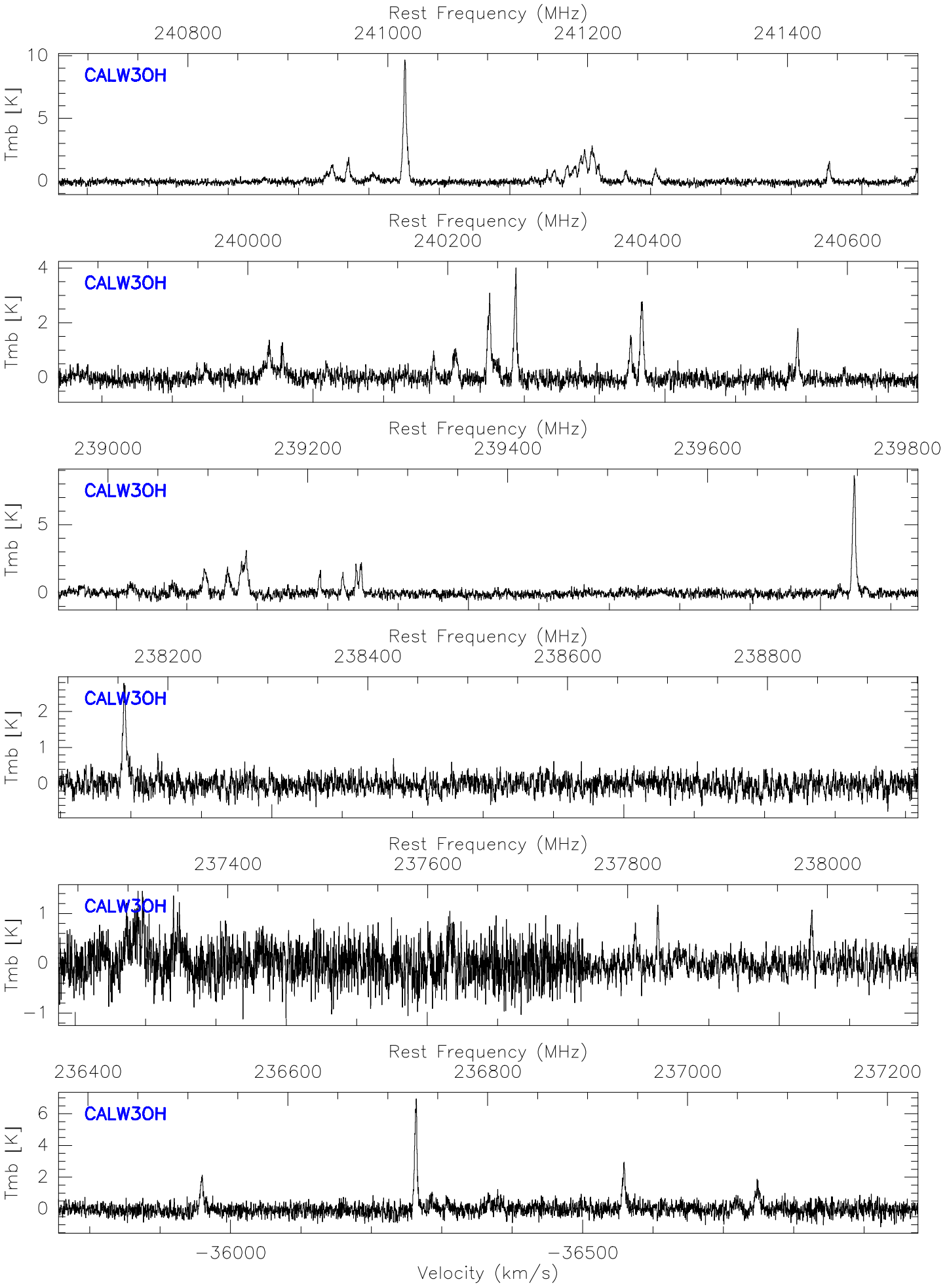
Rest Frequency (MHz)
240800
241000
241200
241400
CALW3OH
Tmb [K]
10
5
0
Rest Frequency (MHz)
240000
240200
240400
240600
CALW3OH
Tmb [K]
4
2
0
Rest Frequency (MHz)
239000
239200
239400
239600
239800
CALW3OH
Tmb [K]
5
0
Rest Frequency (MHz)
238200
238400
238600
238800
CALW3OH
Tmb [K]
2
1
0
Rest Frequency (MHz)
237400
237600
237800
238000
CALW3OH
Tmb [K]
1
0
−1
Rest Frequency (MHz)
236400
236600
236800
237000
237200
CALW3OH
Tmb [K]
6
4
2
0
−36000
−36500
Velocity (km/s)

Figure 6:

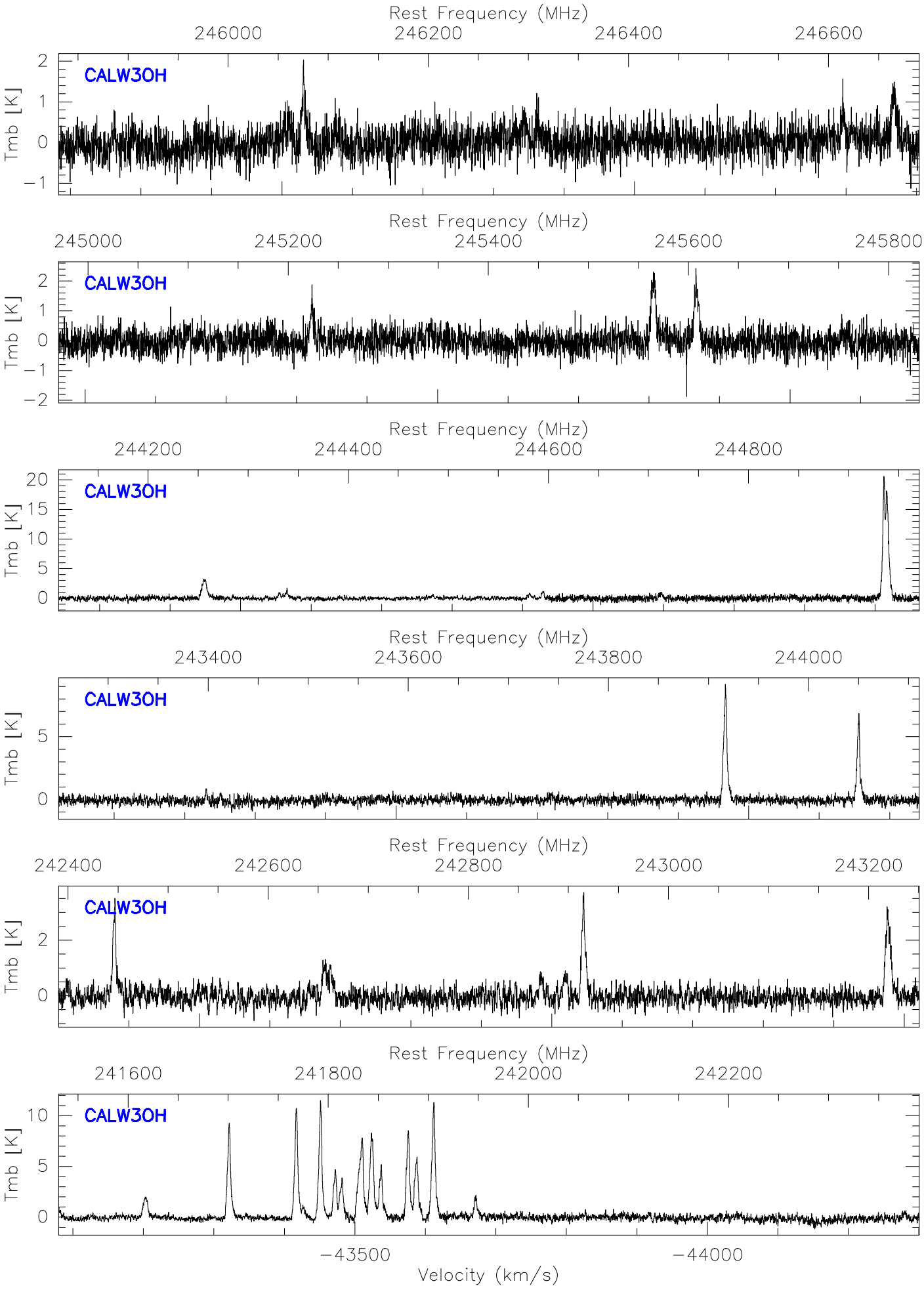
Rest Frequency (MHz)
246000
246200
246400
246600
CALW3OH
Tmb [K]
2
1
0
−1
Rest Frequency (MHz)
245000
245200
245400
245600
245800
CALW3OH
Tmb [K]
2
1
0
−1
−2
Rest Frequency (MHz)
244200
244400
244600
244800
CALW3OH
Tmb [K]
20
15
10
5
0
Rest Frequency (MHz)
243400
243600
243800
244000
CALW3OH
Tmb [K]
5
0
Rest Frequency (MHz)
242400
242600
242800
243000
243200
CALW3OH
Tmb [K]
2
0
Rest Frequency (MHz)
241600
241800
242000
242200
CALW3OH
Tmb [K]
10
5
0
−43500
−44000
Velocity (km/s)

Figure 7:

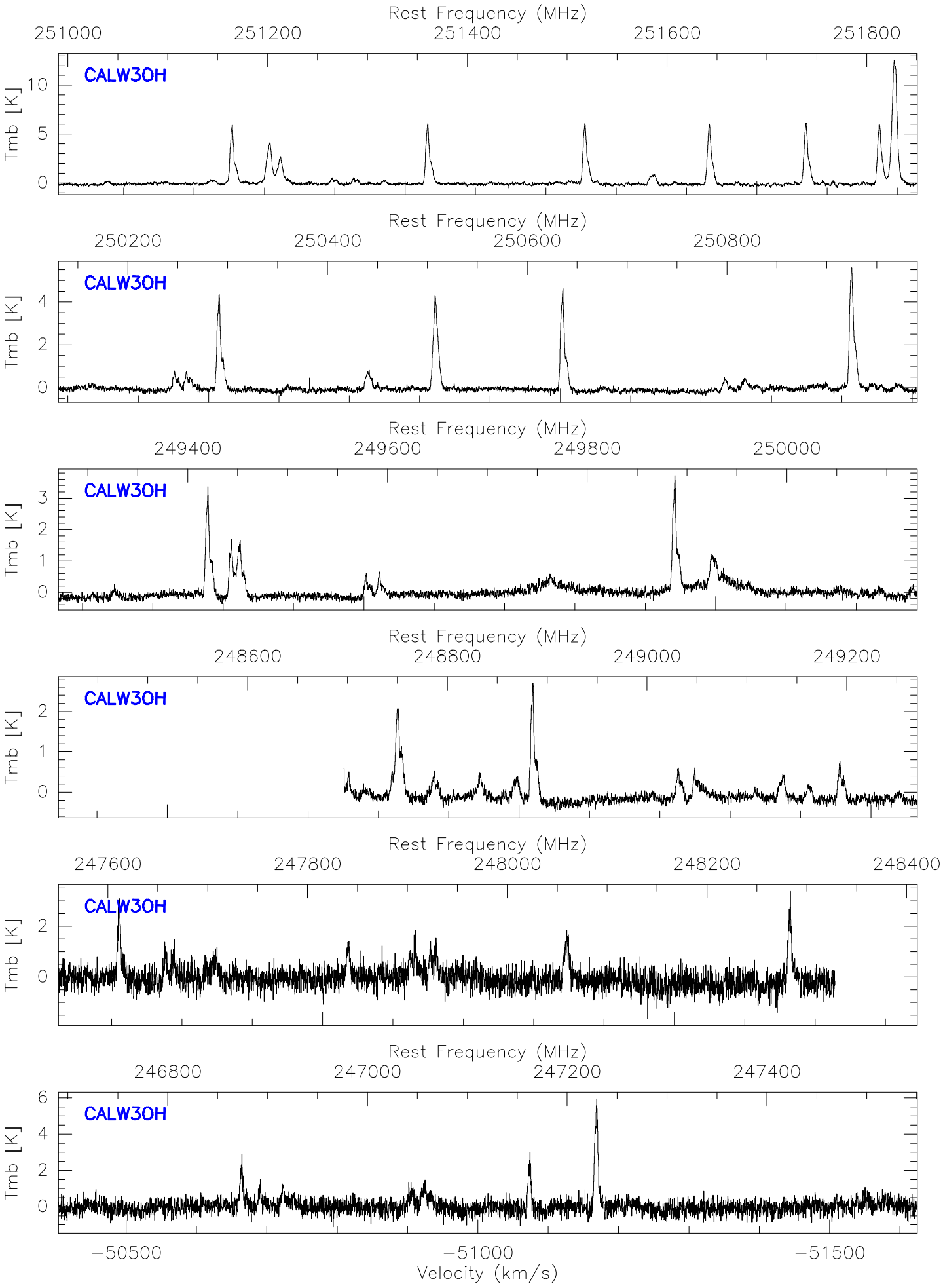
Rest Frequency (MHz)
251000
251200
251400
251600
251800
CALW3OH
Tmb [K]
10
5
0
Rest Frequency (MHz)
250200
250400
250600
250800
CALW3OH
Tmb [K]
4
2
0
Rest Frequency (MHz)
249400
249600
249800
250000
CALW3OH
Tmb [K]
3
2
1
0
Rest Frequency (MHz)
248600
248800
249000
249200
CALW3OH
Tmb [K]
2
1
0
Rest Frequency (MHz)
247600
247800
248000
248200
248400
CALW3OH
Tmb [K]
2
0
Rest Frequency (MHz)
246800
247000
247200
247400
CALW3OH
Tmb [K]
6
4
2
0
−50500
−51000
−51500
Velocity (km/s)

Figure 8:

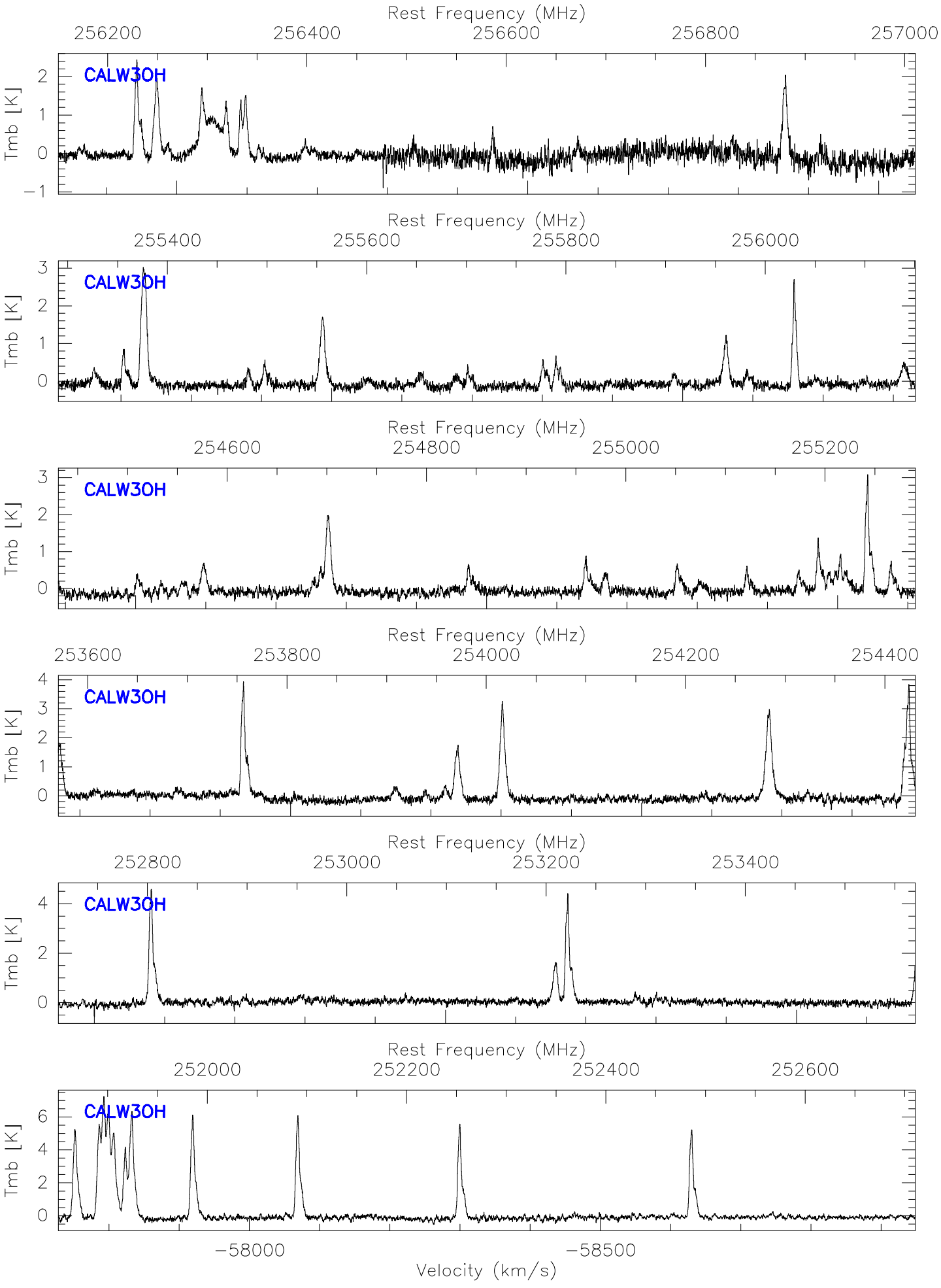
Rest Frequency (MHz)
256200
256400
256600
256800
257000
CALW3OH
Tmb [K]
2
1
0
−1
Rest Frequency (MHz)
255400
255600
255800
256000
CALW3OH
Tmb [K]
3
2
1
0
Rest Frequency (MHz)
254600
254800
255000
255200
CALW3OH
Tmb [K]
3
2
1
0
Rest Frequency (MHz)
253600
253800
254000
254200
254400
CALW3OH
Tmb [K]
4
3
2
1
0
Rest Frequency (MHz)
252800
253000
253200
253400
CALW3OH
Tmb [K]
4
2
0
Rest Frequency (MHz)
252000
252200
252400
252600
CALW3OH
Tmb [K]
6
4
2
0
−58000
−58500
Velocity (km/s)

Figure 9:

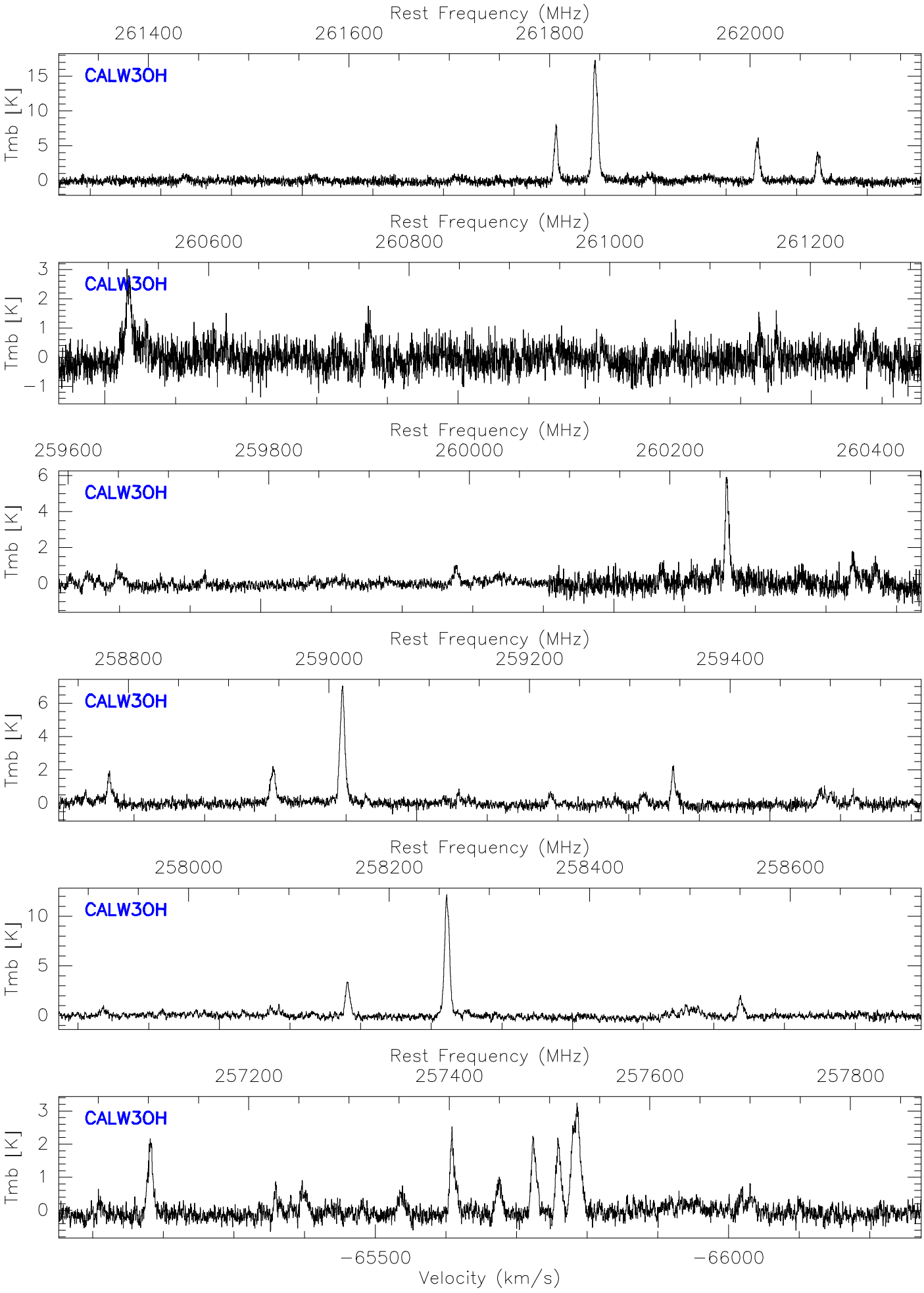
Rest Frequency (MHz)
261400
261600
261800
262000
CALW3OH
Tmb [K]
15
10
5
0
Rest Frequency (MHz)
260600
260800
261000
261200
CALW3OH
Tmb [K]
3
2
1
0
−1
Rest Frequency (MHz)
259600
259800
260000
260200
260400
CALW3OH
Tmb [K]
6
4
2
0
Rest Frequency (MHz)
258800
259000
259200
259400
CALW3OH
Tmb [K]
6
4
2
0
Rest Frequency (MHz)
258000
258200
258400
258600
CALW3OH
Tmb [K]
10
5
0
Rest Frequency (MHz)
257200
257400
257600
257800
CALW3OH
Tmb [K]
3
2
1
0
−65500
−66000
Velocity (km/s)

Figure 10:

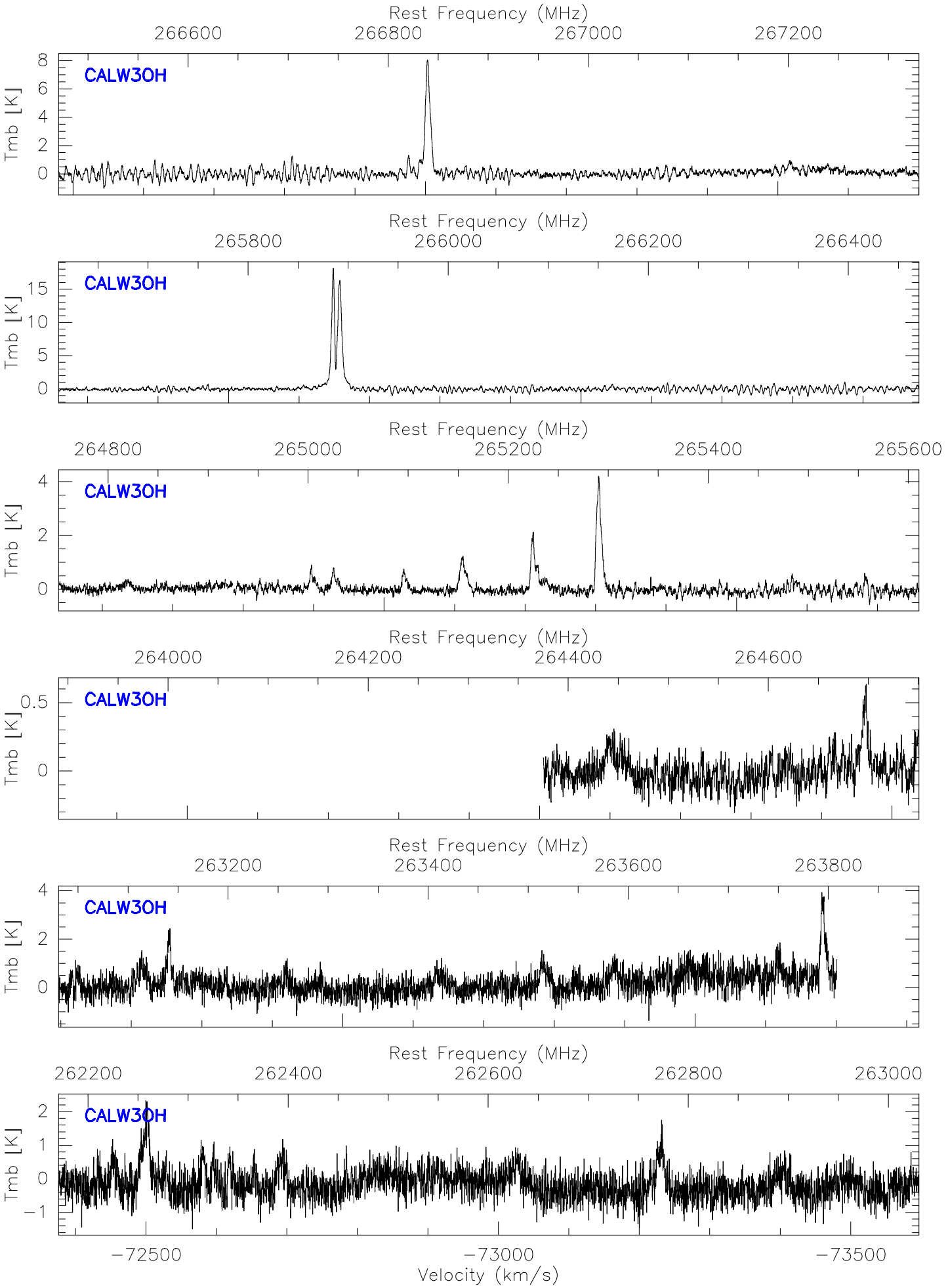
Rest Frequency (MHz)
266600
266800
267000
267200
CALW3OH
Tmb [K]
8
6
4
2
0
Rest Frequency (MHz)
265800
266000
266200
266400
CALW3OH
Tmb [K]
15
10
5
0
Rest Frequency (MHz)
264800
265000
265200
265400
265600
CALW3OH
Tmb [K]
4
2
0
Rest Frequency (MHz)
264000
264200
264400
264600
CALW3OH
Tmb [K]
0.5
0
Rest Frequency (MHz)
263200
263400
263600
263800
CALW3OH
Tmb [K]
4
2
0
Rest Frequency (MHz)
262200
262400
262600
262800
263000
CALW3OH
Tmb [K]
2
1
0
−1
−72500
−73000
−73500
Velocity (km/s)

Figure 11:

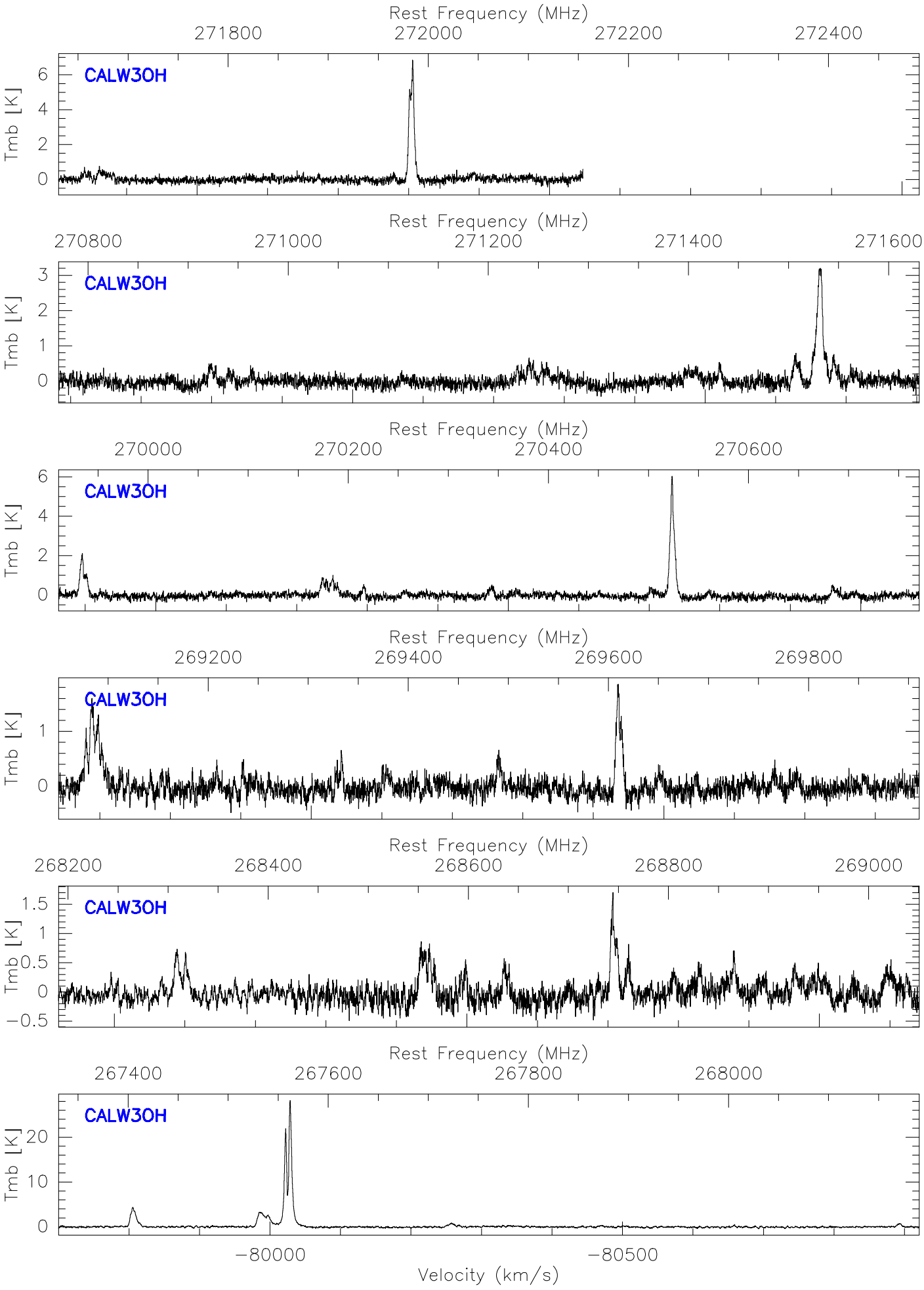
Rest Frequency (MHz)
271800
272000
272200
272400
CALW3OH
Tmb [K]
6
4
2
0
Rest Frequency (MHz)
270800
271000
271200
271400
271600
CALW3OH
Tmb [K]
3
2
1
0
Rest Frequency (MHz)
270000
270200
270400
270600
CALW3OH
Tmb [K]
6
4
2
0
Rest Frequency (MHz)
269200
269400
269600
269800
CALW3OH
Tmb [K]
1
0
Rest Frequency (MHz)
268200
268400
268600
268800
269000
CALW3OH
Tmb [K]
1.5
1
0.5
0
−0.5
Rest Frequency (MHz)
267400
267600
267800
268000
CALW3OH
Tmb [K]
20
10
0
−80000
−80500
Velocity (km/s)

Figure 12: