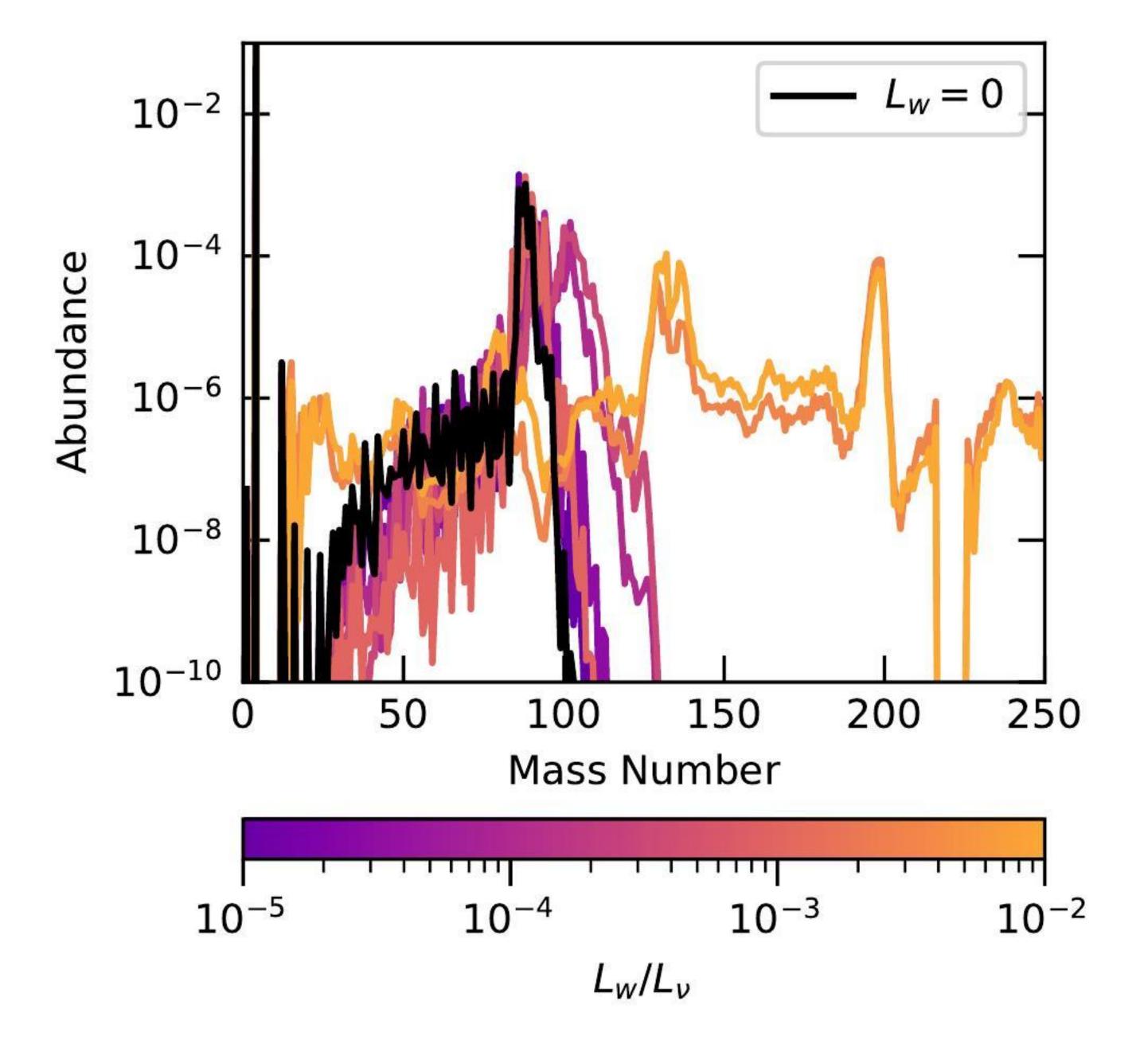
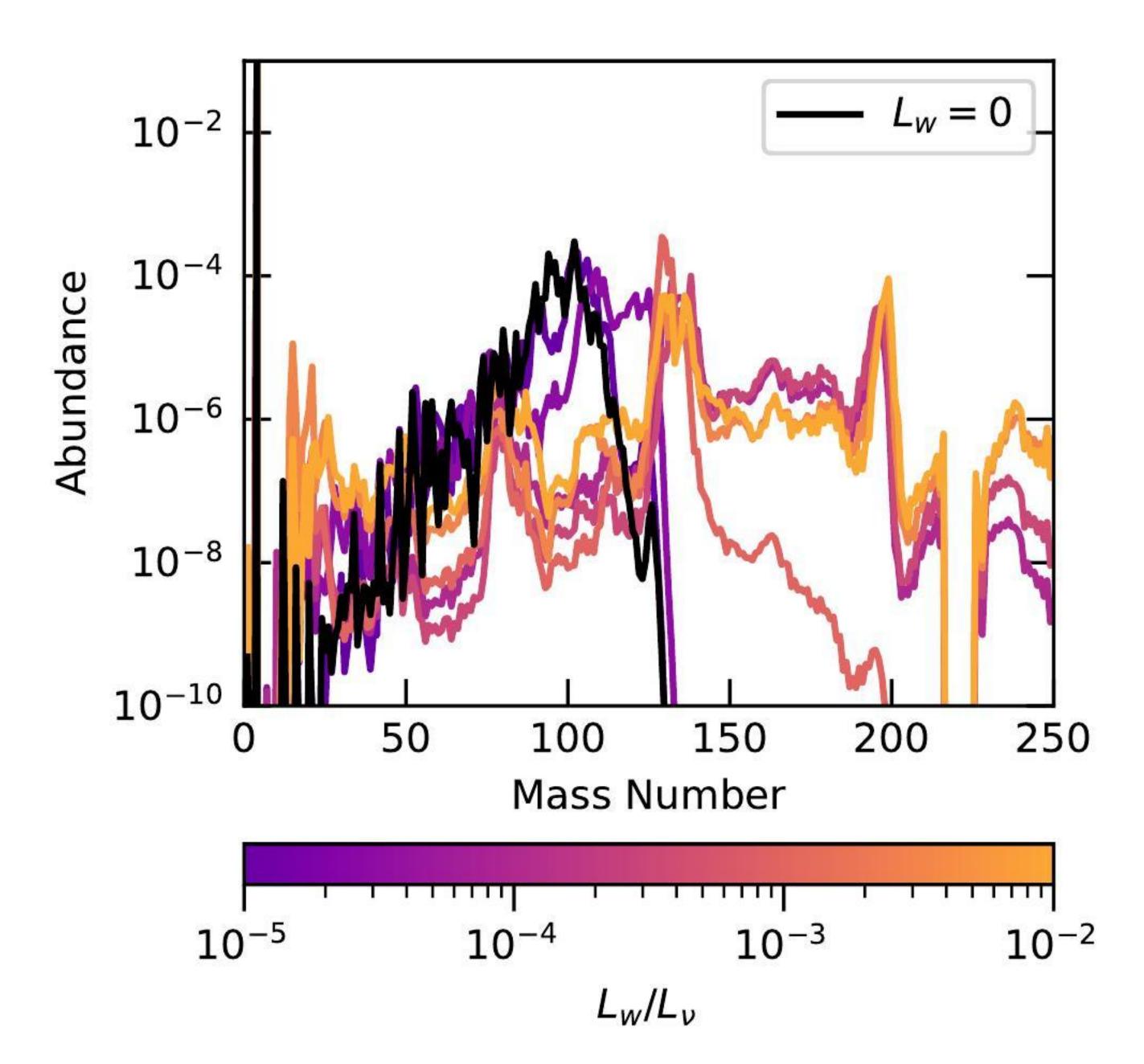


**Figure 5.** Early entropy profiles for a 1.5  $M_{\odot}$  neutron star with  $L_{\nu} = 3 \times 10^{52}$  erg s<sup>-1</sup> and  $L_{w} = 10^{-3}L_{\nu}$  with varied wave frequencies. For higher frequencies, the shock heating begins to increase the entropy in the wind earlier and has a larger impact where seed nuclei are formed. The impact of the shock prescription is illustrated by the black line, which shows the evolution of the entropy if the waves (with  $\omega = 2 \times 10^3$  rad s<sup>-1</sup>) shock immediately instead of when equation 13 dictates.



**Figure 6.** Final nucleosynthesis results, using temperature and density profiles for a 1.5  $M_{\odot}$  neutron star, with  $L_{\nu} = 3 \times 10^{52}$  erg s<sup>-1</sup> and using a wave frequency of  $2 \times 10^3$  rad s<sup>-1</sup>. A clear peak around mass 200 is indicative of a strong r-process taking place.



**Figure 7.** Final nucleosynthesis results, using temperature and density profiles for a 1.9  $M_{\odot}$  neutron star, with  $L_{\nu} = 6 \times 10^{52}$  erg s<sup>-1</sup> and using a wave frequency of  $2 \times 10^3$  rad s<sup>-1</sup>. A clear peak around mass 200 is indicative of a strong r-process taking place.

and is far from the conditions necessary for producing the third r-process peak. Increasing  $L_w$ , we find that the peak of the abundance distribution increases in mass until  $L_w/L_\nu\approx 10^{-4}$ . Further increase of  $L_w$  from this point briefly reduces the mass of the peak of the abundance distribution, but above  $L_w/L_\nu\approx 10^{-3}$  a strong r-process emerges. The final abundances for NDW models with  $M_{\rm NS}=1.9M_\odot$  and  $L_\nu=6\times 10^{52}$  are shown in figure 7. Between  $L_w/L_\nu=10^{-5}$  and  $L_w/L_\nu=10^{-4}$ , these models produce both the second and third r-process peaks, but between  $L_w/L_\nu\approx 10^{-4}$  and  $L_w/L_\nu\approx 10^{-3}$  production of the third peak is again cutoff and the peak of the abundance distribution is pushed down to lower mass. As  $L_w/L_\nu$  is increased above  $10^{-3}$ , a strong r-process re-emerges.

For both sets of parameters, we find the interesting behavior that r-process nucleosynthesis is inhibited for  $L_w/L_v$  in the approximate range of  $10^{-4}$  -  $10^{-3}$ . This turnover in the maximum mass number is due to the competition between the decreasing dynamical timescale  $(\tau_d)$  with  $L_w$ , which inhibits seed formation, and the decreasing entropy (s) with  $L_w$ , which facilitates seed production by increasing the density at which alpha recombination occurs (Hoffman et al. 1997). Figure 8 illustrates the correlation between the quantity  $s^3/Y_e^3\tau_d$  and the total abundance above mass 150. Despite entropy no longer being constant during seed formation, we do observe a fairly strong correlation between r-process strength and this quantity. We find that as the wave luminosity is increased,  $\tau_d$  decreases slightly faster than the entropy, but eventually asymptotes to a minimum value of a few times  $10^{-4}$  s. The entropy continues to steadily decrease, which creates the trough in  $s^3/Y_e^3\tau_d$  as a function of  $L_w$  and gives rise to the window of inhibited r-processing we observe around  $L_w/L_v = 10^{-3}$ . At higher  $L_w$ , shock heating begins prior to alpha recombination, drastically increasing the entropy. This, coupled with the reduced electron fraction at high  $L_w$ , reinvigorates a strong r-process.

Second, we consider the impact of varying  $\omega$  on gravito-acoustic NDW nucleosynthesis. As was noted above, increasing  $\omega$  results in an earlier activation of shock heating. In figure 9, we show the