AGB

This test is to show a 1.93 $M_\odot$ thermally pulsing AGB star. The thermal pulses dredge up heavier elements into the convective envelope. Therefore, this test should be cut off when the mass fraction of carbon at the surface reaches 0.0013 (`xa_surface_upper_limit_species(1) = 'c12' ; xa_surface_upper_limit(1) = 0.0013`).

The inlist for this test sets the nuclear reaction network (`new_net_name = 'o18_and_ne22.net'`), and some mesh, overshooting, and opacity controls.

The plot of the radius (figure 1) shows the effects of the thermal pulses on the size of star. The helium luminosity plot (figure 2) shows that the the thermal pulses are being driven by helium burning.

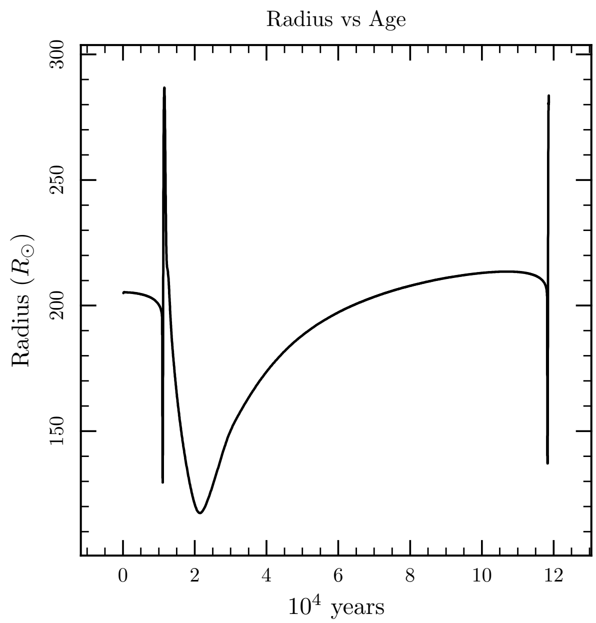

Figure 1: Thermal pulses drive expansion of star

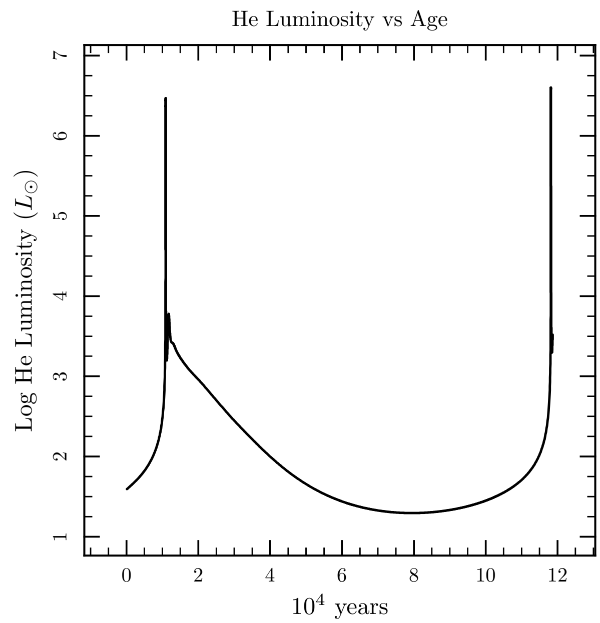

Figure 2: Thermal pulses driven by helium burning

To the right is a burning rate profile from between the thermal pulses, at about 90,000 years (figure 3), showing that burning is dominated by the thin hydrogen burning shell. To the left is a burning rate profile from the second pulse, at about 118,000 years (figure 4), showing a large increase is helium burning.

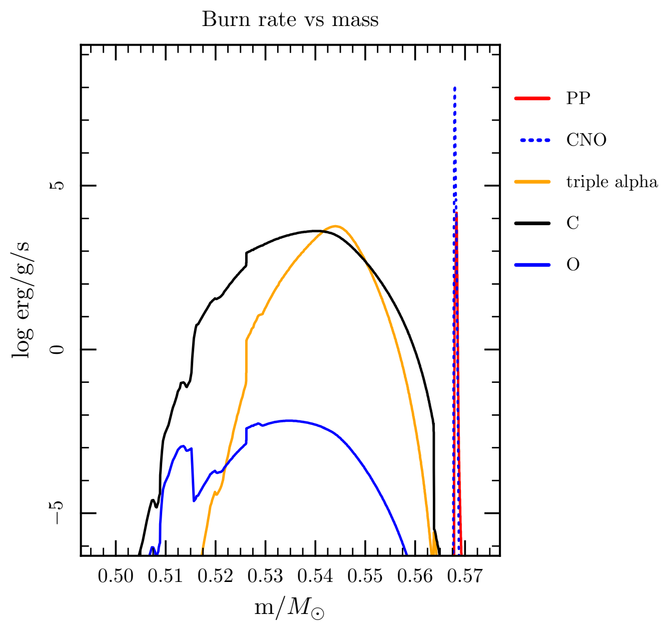

Figure 3: Burning rates between pulses

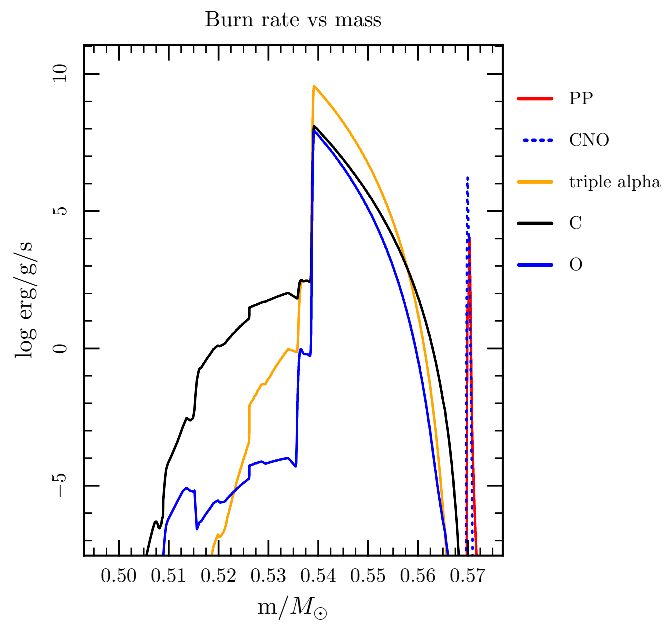

Figure 4: Burning rate at second pulse

Below is an abundance profile from the end of the run (figure 5).

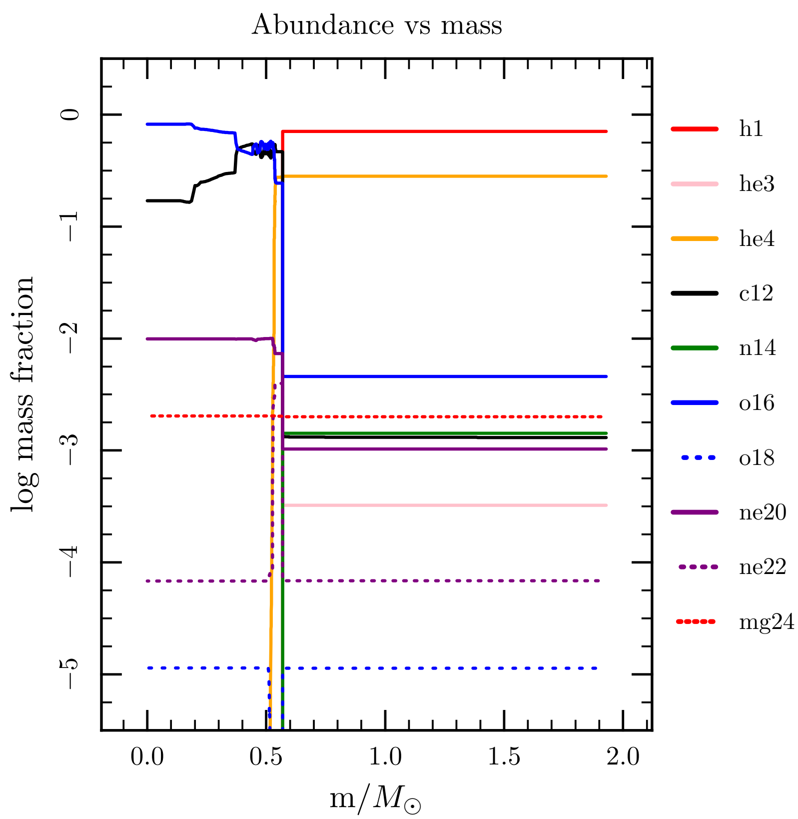

Figure 5: Abundance profile from end of run

This final plot (figure 6) shows a few internal MESA variables, such as the size of the time-step, the number of zones, and the number of retries against the model number in order to give some understanding of how hard MESA is working throughout the run and where some areas of problems/interest might be.

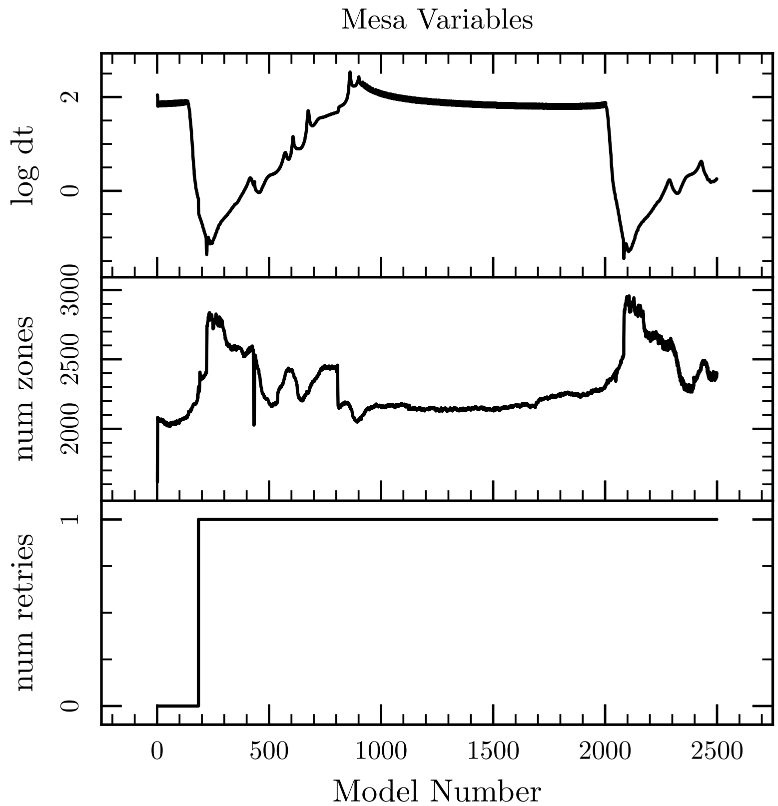

Figure 6: MESA variables plotted against model number show how hard MESA is working