**Supplementary Figure 1:** A comparison of simulated reaction kinetics data with both uniform $T_1$s and non-uniform individual $T_1$s following normalization to the initial signal. For simulations with uniform $T_1$s, each species was assigned a $T_1$ of 55 seconds. For simulations with individual $T_1$s, pyruvate and intermediate were assigned a $T_1$ of 55 seconds, and CO$_2$, bicarbonate, and peroxymonocarbonate were assigned $T_1$s of 40 seconds. Because the $T_1$s of intermediate and peroxymonocarbonate have not been previously measured, they are assigned $T_1$s equal to the $T_1$s of the species with which they are in rapid exchange. It is apparent from the figure that after being normalized, differences in $T_1$ do not lead to significantly different apparent kinetics.