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[Cosmochronology and the age of the galaxy]Thresholds on star formation and the chemical evolution of galactic discs: cosmochronology and the age of the galaxy

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abstract In this paper we analyse different chronometers based on the models of chemical evolution developed in Chamcham, Pitts & Tayler (1993; hereafter CPT) and Chamcham & Tayler (1994; hereafter CT). In those papers we discussed the ability of our models to reproduce the observed G-dwarf distribution in the solar neighbourhood, age-metallicity relation and radial chemical abundance gradients. We now examine their response to the predictions of cosmochronology. We use the recent production ratios of the actinide pairs $^{235}U/^{238}U$ and $^{232}Th/^{238}U$ provided by Cowan, Thielemann & Truran (1991) and the observed abundance ratios from Anders & Grevesse (1989) to determine the duration of nucleosynthesis in the solar neighbourhood, and thus to determine maximum likelihood estimates and confidence intervals for the infall parameter, β, which controls the growth rate of the disc in our models. We compare our predictions for the age of the disc with the age of the galaxy estimated from models of white dwarf cooling and from the age of globular clusters. From our statistical analysis we find that these three methods of age prediction appear to be consistent for a range of maximum likelihood values of β which is in good agreement with the values considered in CPT and CT, which were found to give a good fit to the observational data examined in those papers. We also briefly consider the consistency of our results with the age of the universe predicted in different cosmological models – a topic which we will investigate more fully in future work.