

ANNEALING OF FISSION TRACKS IN TITANITE

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Previous studies of fission tracks in titanite (CaTiSiO_5) suggested that variations in composition might affect the annealing behavior, similar to compositional effects observed with apatite. The composition of titanite is quite variable with significant substitutions occurring for Ca (Y, Mn, REEs, Fe^{2+}), Ti (Fe^{3+} , Al, Nb, Ta), and O (F, OH). Fe and Al are the most common elements involved in substitution into the titanite structure; therefore, we obtained titanites with a wide range of Fe and Al contents and ran them through a series of one-hour annealing experiments to determine if there was a predictable difference in the total annealing temperatures obtained. We used titanite from 14 localities, including samples from Magnet Cove, Arkansas and Mount Painter, Australia previously shown to have quite different total annealing temperatures (625 C and 750 C, respectively). In all of our samples except one, total annealing of fission tracks occurred at near 750 C for one hour of heating and seemed to have no correlation to Fe and Al content. The one titanite sample that was different came from an alaskite from Ontario, Canada. It had a one-hour total annealing temperature of about 800 C. Although this sample did have the highest total Fe+Al content, it was not significantly different in this regard from several other samples. It was unusual, however, in that it had twice as much Y+Mn+LREEs replacing Ca as any other sample we studied. Future work will focus on locating and studying the annealing behavior of additional titanites with variable amounts of substitution into the Ca-site.