

2004 Fall Meeting
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[Oxygen Isotopic Composition and U-Pb Discordance in Zircon](#)

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Zircon discordance is a common phenomenon in U-Pb geochronology, leading to difficulty in age assignment and uncertainties regarding geologic interpretation. Commonly invoked explanations for discordant zircon analyses include episodic lead loss and continuous lead diffusion. A likely mechanism for lead loss is via a fluid phase. In this study, we attempt to document fluid interaction with zircon through the use of high-spatial resolution oxygen isotopic measurements performed by ion microprobe. $\delta^{18}\text{O}$ was analyzed in both concordant and discordant zircon grains, thus providing an indication of the relationship between discordance and $\delta^{18}\text{O}$. Results indicate that three characteristics of zircon appear to be interrelated: (1) U-Pb systematics and the associated age discordance; (2) $\delta^{18}\text{O}$ and water-rock interactions that are implied therein; and (3) zircon texture as revealed by cathodoluminescence and BSE imaging. The key observation is that U-Pb disturbed zircons are often also depleted to various degrees in $\delta^{18}\text{O}$. However, the relationship between discordance and $\delta^{18}\text{O}$ is not systematic, as $\delta^{18}\text{O}$ values of discordant zircons are lower, but irregular in their distribution. Textural differences between zircon grains also correlate with both U-Pb discordance and $\delta^{18}\text{O}$. Discordant grains exhibit either a recrystallized, fractured or strongly-zoned CL texture, possibly resulting from metamictization, and are characteristic of a lowered $\delta^{18}\text{O}$ value. Concordant grains, in contrast, have less-expressed zoning and a smoother CL texture, and exhibit higher $\delta^{18}\text{O}$ values. We interpret this to mean that various stages of water rock interaction, as evidenced by $\delta^{18}\text{O}$ analyses, have the ability to leave their imprint on both the texture and U-Pb systematics of a zircon.

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