Zircon U-Pb and Maximum Depositional Age Results for the Wanship 7.5' Quadrangle, Summit and Morgan Counties, Utah

by

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INTRODUCTION

This Open-File Report makes available raw analytical data and preliminary interpretations from laboratory procedures completed to determine the U-Pb ages of zircon grains from sandstone samples collected during geologic mapping funded by the U.S. Geological Survey (USGS) National Cooperative Geologic Mapping Program (STATEMAP) and the Utah Geological Survey (UGS). References listed in table 1 provide additional information such as the geologic setting of the samples and a discussion of the methodology used for age calculations.

The analytical data can be accessed electronically as an Excel document attached to the PDF file of this report and available at https://ugspub.nr.utah.gov/publications/open_file_reports/ofr-725/ofr-725.xlsx.

Table 1. *Sample number, location, and maximum depositional age.*

Sample	Map Unit	Easting (UTM NAD 83)	Northing (UTM NAD 83)	N	YSG Age [2,3]	YC1σ Age[2,3]	YC2σ Age[2,3]	Notes
Wan_DZ_02	Toc – Older Conglomerate[1]	458447	4514488	20	92.0±1.37	1054.8±7.08	577.0±5.86	Suggested age from other sources is Eocene[1]
Wan_DZ_03	Kkc Conglom. unit of Kelvin Fm.[1]	466899	4513377	0	NA	NA	NA	Insufficient zircon recovery
Wan_DZ_14	Kfl – Lower mems. of Frontier Fm.[1]	465171	4516174	175	384.2±5.64	385.6±5.61	431.8±2.91	Age from other sources is Cretaceous[1]

Notes:
Errors are 1σ
N – Number of zircon grains analyzed.
YSG – Youngest single grain. YC1σ – Youngest cluster of ≥2 grains overlapping at 1σ. YC2σ – Youngest cluster of ≥3 grains overlapping at 2σ.
[1]Anderson, in preparation
[2]Sharman and others, 2018
[3]Sharman and Malkowski, 2020

MATERIALS AND METHODS

Sample Crushing and Mineral Separation

Sample preparation was performed at Westminster College and the University of Utah by McKenna Holliday under the guidance of Dr. Tiffany Rivera and Dr. Diego Fernandez. Workflow included standard crushing, milling, sieving, and washing procedures. During this workflow, contamination was mitigated through cleaning the machines with bristle brushes, and the grinding plates with a bristle polisher mounted on a drill, along with the use of compressed air. Samples were sieved at 500 µm and stored in clean, labeled containers. The crushed and sieved material was then separated by density using a water table. The densest fraction was processed through a Frantz magnetic separator (1.6–1.8 ampere with a 20° tilt). The non-magnetic fraction was immersed in sodium polytungstate (SPT; $\rho = 2.89$ g/cm^3) and methylene iodide (MEI; $\rho = 3.32$ g/cm^3) heavy liquids. The resulting heavy fraction was then processed through magnetic separation again (1.6–1.8 ampere with a 20° tilt) to better purify the mineral separate.

Mineral Mounts and LA-ICP-MS Procedures

Zircon grains were mounted using EpoThin™ epoxy (Buehler, Lake Bluff, Illinois, USA) in a 1-inch diameter cylindrical mount, and polished using CarbiMet™ silicon carbide grinding paper (Buehler, Lake Bluff, Ilinois, USA) to expose the mesial sections of each grain. Isotopic values were measured at the University of Utah on a Thermo-Fisher Scientific Neptune Plus multicollector mass spectrometer. Each grain was ablated using a Teledyne-Photon Machines® 193 nm excimer laser with a 24-µm-diameter spot which ablated for 30 seconds at 10 Hz. Zircon 91500 (Wiedenbeck and others, 1995, 2004) was employed as the primary reference material and analyzed along with Plesovice zircon (Slama and others, 2008) as a secondary reference after every 10th unknown in a standard-sample bracket. Results from the primary reference material were used to characterize mass bias and laser-induced elemental fractionation which were corrected for using the Iolite v2.31 software package (Patton

and others, 2010) and VizualAge (Petrus and Kamber, 2012). Instrument drift and accuracy were characterized by the Plesovice zircon. The Isoplot v. 4.15 Excel plugin (Ludwig, 2012) was used to propagate additional uncertainty (1–2%) into each analysis as required to make the secondary reference zircon a single population (MSWD = 1).

DATA ANALYSIS

The Isoplot v. 4.15 Excel plugin (Ludwig, 2012) was used to create concordia diagrams and probability density function plots. DetritalPy v. 1.3.1 Python code functions were used to calculate three types of maximum depositional ages (MDAs): youngest single grain (YSG), youngest cluster of 2+ grains with 1σ overlap (YC1σ), and youngest cluster of 3+ grains with 2σ overlap (YC2σ) (Sharman and others, 2018; Sharman and Malkoski, 2020). All errors reported in the data table are 2σ uncertainty unless stated otherwise.

DISCLAIMER

This open-file release is intended as a data repository for information gathered in support of various UGS projects. The data do not necessarily conform to UGS technical, editorial, or policy standards; this should be considered by an individual or group planning to take action based on the contents of this report. The Utah Department of Natural Resources, Utah Geological Survey, makes no warranty, expressed or implied, regarding the suitability of this product for a particular use. The Utah Department of Natural Resources, Utah Geological Survey, shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to claims by users of this product. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

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