

Liu, L., and Stockli, D.F., 2019, U-Pb ages of detrital zircons in Lower Permian sandstone and siltstone of the Permian Basin, west Texas, USA: Evidence of dominant Gondwanan and peri-Gondwanan sediment input to Laurentia: GSA Bulletin, <https://doi.org/10.1130/B35119.1>.

## **Data Repository**

Data Repository File 1

Data Repository File 2

## 1. METHOD

### 1.1. MINERAL SEPERATION

About 1.0-to 1.5-kg core material was obtained for each sample. Each sample was crushed and grinded. Leonardian very-fine-grained sandstone and siltstone samples were pulverized to powder to guarantee that detrital zircons are completely detached from quartz and other minerals. Gemini water table was used for preliminary density separation. For Leonardian samples, the pulverized samples were mixed with water at first and then manually and gradually load to the water table.

Hand magnet was used before the heavy liquid. Bromoform (2.84 g/cc) was used and it is followed by Frantz magnetic susceptibility separations. After the Frantz, methyl iodide (3.3 g/cc) was used as the final step to further separate minerals. Notice that for some samples with low zircon fertility, especially Leonardian mixed siliciclastic and carbonate rock on the shelf, the Frantz and methyl iodide were skipped and we directly and randomly picked the zircons to avoid potential loss of detrital zircons. Detrital zircons were sprinkled onto double-sized tape before being analyzed on LA-ICP-MS.

### 1.2. LA-ICP-MS

LA-ICP-MS analyses were conducted using a PhotonMachine Analyte G.2 Excimer laser employing a 30- $\mu\text{m}$  laser spot size for Wolfcampian zircons and 20- $\mu\text{m}$  laser spot size for Leonardian zircons at 10 Hz in a large-volume Helex sample cell and a Thermo Element2 ICP-MS. Laser energy density is  $2\text{J}/\text{cm}^2$ . Helium was the carrier gas and was mixed with Argon before entering the ICP-MS. GJ1 was used as the primary reference standard ( $^{206}\text{Pb}/^{238}\text{U}$  age of  $601.7 \pm 1.3$  Ma; Jackson et al., 2004) and Plesovice as a secondary zircon standard ( $^{206}\text{Pb}/^{238}\text{U}$  age of  $337.1 \pm 0.4$  Ma; Slama et al., 2008).

For detrital zircons in Wolfcampian samples, zircon analysis consisted of 4 cleaning shots, 25 seconds of baseline data collection, 30 seconds of laser ablation time, and 30 seconds of washout. For detrital zircons in Leonardian samples, zircon analysis consisted of 4 cleaning shots, 20 seconds of baseline data collection, 25 seconds of laser ablation time, and 30 seconds of washout. The ablation rate is about 0.5  $\mu\text{m}/\text{second}$ .

### 1.3. DATA REDUCTION

Interspersed analysis of GJ1 was used to correct the elemental and isotopic fractionation of Pb/U and Pb isotopes. Sample to primary standard (GJ1) measurement ratio is 5:1. Uncertainty from calibration correction of both  $^{206}\text{Pb}/^{207}\text{Pb}$  and  $^{206}\text{Pb}/^{238}\text{U}$  is about 1-2%. Iolite (Igor Pro) and VizualAge (Petrus and Kamber, 2012) were used for age calculation, which is based on ISOPLOT V4 formulas (Ludwig, 2003) from baseline-subtracted intensities.

## REFERENCE CITED

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## 2. SAMPLE INFORMATION

TABLE DR1. SUBSURFACE DETRITAL ZIRCON SAMPLES API NUMBER, LEASE NAME, SAMPLE DEPTH, AND LOCATION.

Sample ID	API number	Lease name	Depth (ft)	Latitude	Longitude
L1	42219336710000	HOBGOOD-LOPER UNIT #1	5952.5-5955	33.8154618	-102.2760731
L2	30025309130000	NORTH EAST DRINKARD UNIT #514	8633.8-8635	32.4915516	-103.1569383
L3	30025309130000	NORTH EAST DRINKARD UNIT #514	8607-8608.5	32.4915516	-103.1569383
L4	42317003000000	FD CAVE B	8610-8613.5	32.4988442	-101.7722208
L5	42317001300000	GW GLASS B	9222-9225	32.1652975	-102.0929409
L6	42329303110000	MIDKIFF J T	8918-8928	31.6643864	-101.9418637
L7	42383105750000	GREER OIL #2	7624.5-7627.5	31.5110470	-101.5700495
L8	42475321570000	EAST VERMEJO #1	10708-10714	31.6446873	-103.4980142
L9	42475321570000	EAST VERMEJO #1	10884-10890	31.6446873	-103.4980142
W1	42227353260000	POWELL RANCH #3	7568-7560.2	32.2156661	-101.2882843
W2	42227353260000	POWELL RANCH #3	7613-7615.2	32.2156661	-101.2882843
W3	42431314200000	STERLING G FEE	7691.9-7695.5	31.7205044	-101.2128181
W4	42431314200000	STERLING G FEE	7977.6-7980.5	31.7205044	-101.2128181
W5	42235322460000	ROCKER B #3031-3	7723-7727	31.4186846	-101.1726391
W6	42235317840000	STATE UNIVERSITY EM	7028-7030.8	31.0869056	-100.9065683
W7	42105102710000	BAGGETT #29	6530-6540.2	30.7616246	-101.2252101