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Data Repository

U-Pb raw data

ANALYTICAL TECHNIQUE

In situ U-Pb zircon data was collected using laser ablation multi collector inductively coupled mass spectrometry (LA-MC-ICP-MS) at the Canadian Center for Isotopic Micro-analysis (CCIM) at the University of Alberta. A detailed description of the analytical approach is reported in Simonetti et al. (2005), so only a brief description is provided here.

The analytical setup consists of a New Wave UP-213 laser ablation system interfaced with a Nu plasma MC-ICPMS equipped with three ion counters. We operated the laser at 4 Hz pulse rate and a beam diameter of 30 mm which yielded a fluence of ~3 J/cm^2. Ablations were conducted in a He atmosphere at a flow rate of 1 L/min through the cell. Output from the cell was joined to the output from a standard Nu plasma desolvating nebulizer (DSN). On peak gas + acid blanks (30s) were measured prior to a set of 10–20 analyses. Data was collected statically, consisting of 30 1s integrations. Before and after each set of analyses, we analyzed zircon reference materials, GJ-1 (Jackson et al., 2004), and LH9415 (Ashton et al., 1999, Heaman, Unpublished data) to monitor U-Pb fractionation, reproducibility, and instrument drift. Mass bias for Pb isotopes was corrected by simultaneously measuring $^{205}Tl/^{203}Tl$ from an aspirated 0.5ppb Tl solution (NIST SRM 997) using an exponential mass fractionation law and assuming a natural $^{205}Tl/^{203}Tl$ of 2.3871.

All data were reduced offline using an Excel-based spreadsheet. Unknowns were normalized to the zircon reference material GJ-1 and the uncertainties reported are a quadratic combination of: 1) the standard error of the measured isotope ratio and 2) the standard deviation of the standard means. Reproducibility of the zircon reference material is estimated to be ~1% for $^{207}Pb/^{206}Pb$ and 3% for $^{206}Pb/^{238}U$. Data points were discarded if it was obvious that an inclusion contributed to analysis, there was extreme common Pb component, or the grain was in fact not zircon. For plotting purposes data were filtered using a 10% disconcordance filter with the following criteria: for ages less than 500 Ma, concordance as assessed by comparing the $^{206}Pb/^{238}U$ and $^{207}Pb/^{206}Pb$ ages, for ages less than 500 Ma, concordance was assessed by comparing the $^{207}Pb/^{235}U$ and $^{206}Pb/^{238}U$ ages. All plots were generated using the Isoplot software of Ludwig (2003).

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Plate I. Microphotographs of the analyzed detrital zircons from selected exposures (red squares) in the stratigraphic units discussed in text.

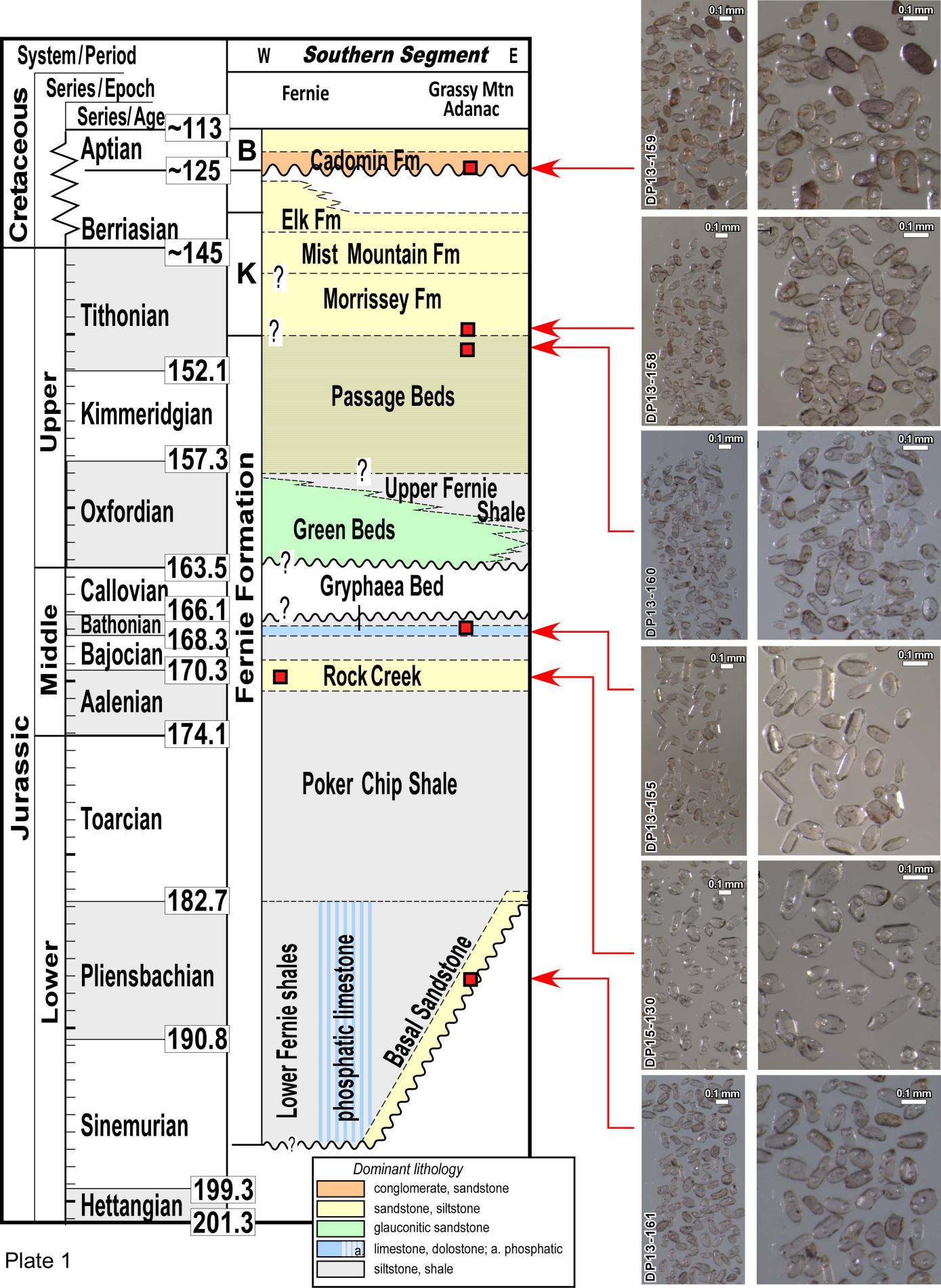
System/Period
Series/Epoch
Series/Age
W
Southern Segment
E
Fernie
Grassy Mtn
Adanac
Cretaceous
Aptian
~113
~125
Berriasian
~145
B
K
Cadomin Fm
Elk Fm
Mist Mountain Fm
Morrissey Fm
Passage Beds
Upper Fernie Shale
Green Beds
Gryphaea Bed
Rock Creek
Poker Chip Shale
Lower Fernie shales
phosphatic limestone
Basal Sandstone
Fernie Formation
Jurassic
Upper
Middle
Lower
Tithonian
152.1
Kimmeridgian
157.3
Oxfordian
163.5
Callovian
166.1
Bathonian
168.3
Bajocian
170.3
Aalenian
174.1
Toarcian
182.7
Pliensbachian
190.8
Sinemurian
199.3
Hettangian
201.3
Dominant lithology
conglomerate, sandstone
sandstone, siltstone
glauconitic sandstone
a
limestone, dolostone; a. phosphatic
siltstone, shale
DP13-159
DP13-158
DP13-160
DP13-155
DP15-130
DP13-161
0.1 mm

Plate 1