**Supplementary material file 1**

**2. Sample location and description**

2.1 Sample 17GC1086 (Montauban group)

The quartzite sample 17GC1086C was detected within a package of garnet-sillimanite-biotite gneisses, metamorphosed wackes, garnetites, and amphibolites (i.e. metabasalts). The quartzite horizon has a thickness of ca. 1.5 m and is intercalated with metabasaltic bodies that form boudins within the adjacent lithologies. The quartzite has light grey colour and is characterised by the mineral assemblage: Qz-Grt-Kfls-Pl-Ccp-Py-Zrn. The metabasalts show commonly cm-scale banding defined by variations in the abundance of mafic minerals.

|  |  |
| --- | --- |
| Sample name | Coordinates |
| 17GC1086C | 47°45'14.20"N, 72°22'28.80"W |
| 18YD2075 | 48° 6'30.10"N, 72°14'19.00"W |
| 19FS7085 | 48°56'46.15"N, 72°48'50.18"W |
| 19AM02 | 48°58'57.50"N, 72°59'58.32"W |

Table 2.1. Coordinates of the quartzite samples

2.2 Sample 18YD2075 (Wabash Complex)

The sample 18YD2075 consists of a horizon of medium-grained, recrystallized quartzite characterised by the mineral assemblage: Qtz-Mc-Ms-Bt±Po. The quartzite is intermingled with gneisses of La Bostonnais complex.

2.3 Sample 19FS7085 (Barrois Complex)

The sample 19FS7085 is a meter-scale quartzite horizon with white colour characterised by the mineral assemblage: Qtz-Bt-Py-Gr. The quartzite is intermingled with calcosilicate rocks and paragneisses.

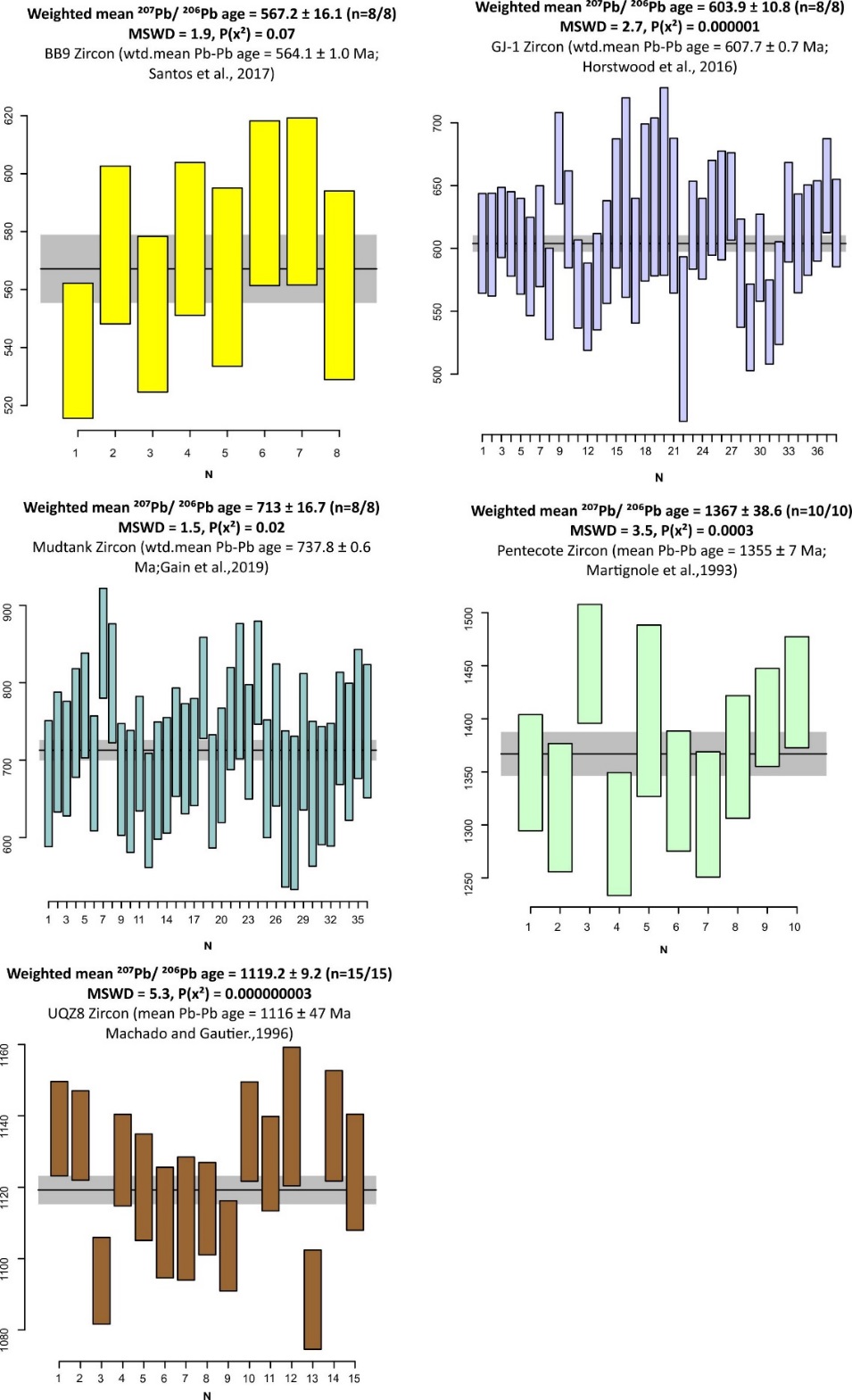
2.4 Sample 19AM02 (Barrois Complex)

The sample 19AM02 is a decimetre-scale, medium-grained, whitish quartzite horizon characterised by the mineral assemblage: Qtz-Gr-Afs-Bt-Py. The sample is intermingled with biotite-bearing paragneisses.

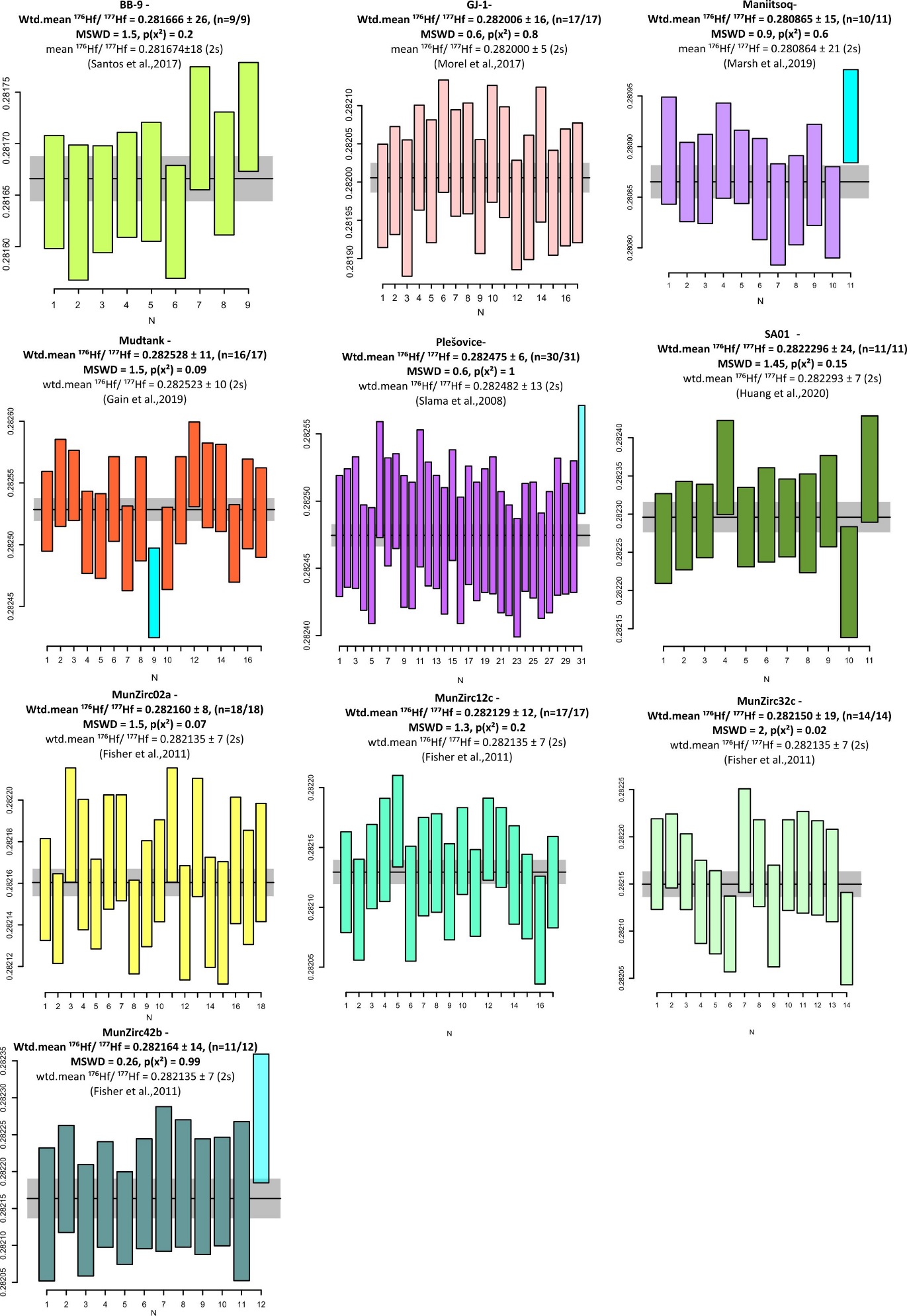
**2. Analytical settings (U-Pb and Lu-Hf sessions)**

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| --- | --- |
| **Laboratory & Sample Preparation** |  |
| Laboratory name | Geotop; Université du Québec à Montréal |
| Sample type/mineral | Zircon |
| Sample preparation | Conventional mineral separation, 1 inch resin mount, 1m polish to finish and thin section |
| Imaging | Centorus CL imager on a Hitachi S3400N SEM |
| **Laser ablation system** |  |
| Make, Model & type | Photon-Machines G2 |
| Ablation cell | Helix two-volume cell |
| Laser wavelength (nm) | 193 nm |
| Pulse width (ns) | 4 ns |
| Fluence (J.cm-2) | 3 Jcm-2 (U-Pb)/ 9Jcm-2 (Lu-Hf) |
| Repetition rate (Hz) | 5 Hz (U-Pb)/15 Hz (Lu-Hf) |
| Ablation duration (secs) | 30 secs (U-Pb)/ 20 secs (Lu-Hf) |
| Ablation pit depth / ablation rate | *Not available* |
| Spot diameter (m) nominal/actual | 25 m U-Pb/ 50 μm Lu-Hf |
| Sampling mode / pattern | Static spot ablation |
| Carrier gas | 100% He in ablation cell, Ar make-up gas combined using a Y-piece 35% along the sample transport line to the torch. |
| Cell carrier gas flow (l/min) | 0.7 l/min in first volume cell  0.5 l/min in second volume cell |
| **ICP-MS Instruments** |  |
| Make, Model & type | Nu Instruments, Nu Attom HR-ICP-MS and NuPlasma II MC-ICP-MS |
| Sample introduction | Ablation aerosol |
| RF power (W) | 1300W |
| Make-up gas flow (l/min) | Ar (ca. 0.75 l/min, optimized daily) |
| Detection system | Attom: Ion counter; full size discrete dynode type  NuPlasmaII : Faraday cups, 10^11 ohms resistors |
| Masses measured | 202, 204, 206, 207, 208, 232, 235, 238 for Attom  171 to 182 (Hf, Lu, Yb, Ta) for NPII |
| Integration time per peak/dwell times (µs) | 500µs per isotope, 20 sweeps per cycle for Attom  0.2 sec for NPII |
| Total integration time per output datapoint (secs) | * 1. seconds   2. seconds |
| ‘Sensitivity’ as useful yield (%, element) | 0.4%U (NIST 610 = 500ppm, #atoms sampled:  500ppm\*85um\*5hz\*3J/cm2: >20Mcps 238U) for Attom  Ca. 550 V/ppm Hf with Aridu II for NPII |
| IC Dead time (ns) | 12 ns |
| **Data Processing** |  |
| Gas blank | 30 second on-peak zero subtracted |
| Calibration strategy | 91500 used as primary reference material, in-house secondary |
| Reference Material info | 91500 (Wiedenbeck et al. 1995) |
| Data processing package used / Correction for LIEF | Nu Instruments TRA and Iolite (Paton et al., 2011) for data normalization, uncertainty propagation and age calculation. LIEF correction assumes reference material and samples behave identically. |
| Mass discrimination | Down-hole correction and standard bracketing (Iolite) |
| Common-Pb correction, composition and uncertainty | No common-Pb correction applied to the data. |
| Uncertainty level & propagation | Ages are quoted at 2*s* absolute, error propagation is by Iolite. |
| Quality control / Validation | Different zircon secondary reference materials (see below) |
| **Other information** |  |

**3. Secondary reference materials (U-Pb and Lu-Hf)**

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**Figure 3.1** Weighted mean 207Pb/206Pb ages of secondary zircon reference materials

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**Figure 3.2**. Weighted mean 176Hf/177Hf ratios of secondary reference materials