Patten, C.G.C., et al., 2020, Gold mobilization during metamorphic devolatilization of Archean and Paleoproterozoic metavolcanic rocks: Geology, v. 48, https://doi.org/10.1130/G47658.1

GSA data repository

I-Metavolcanic rock classification:

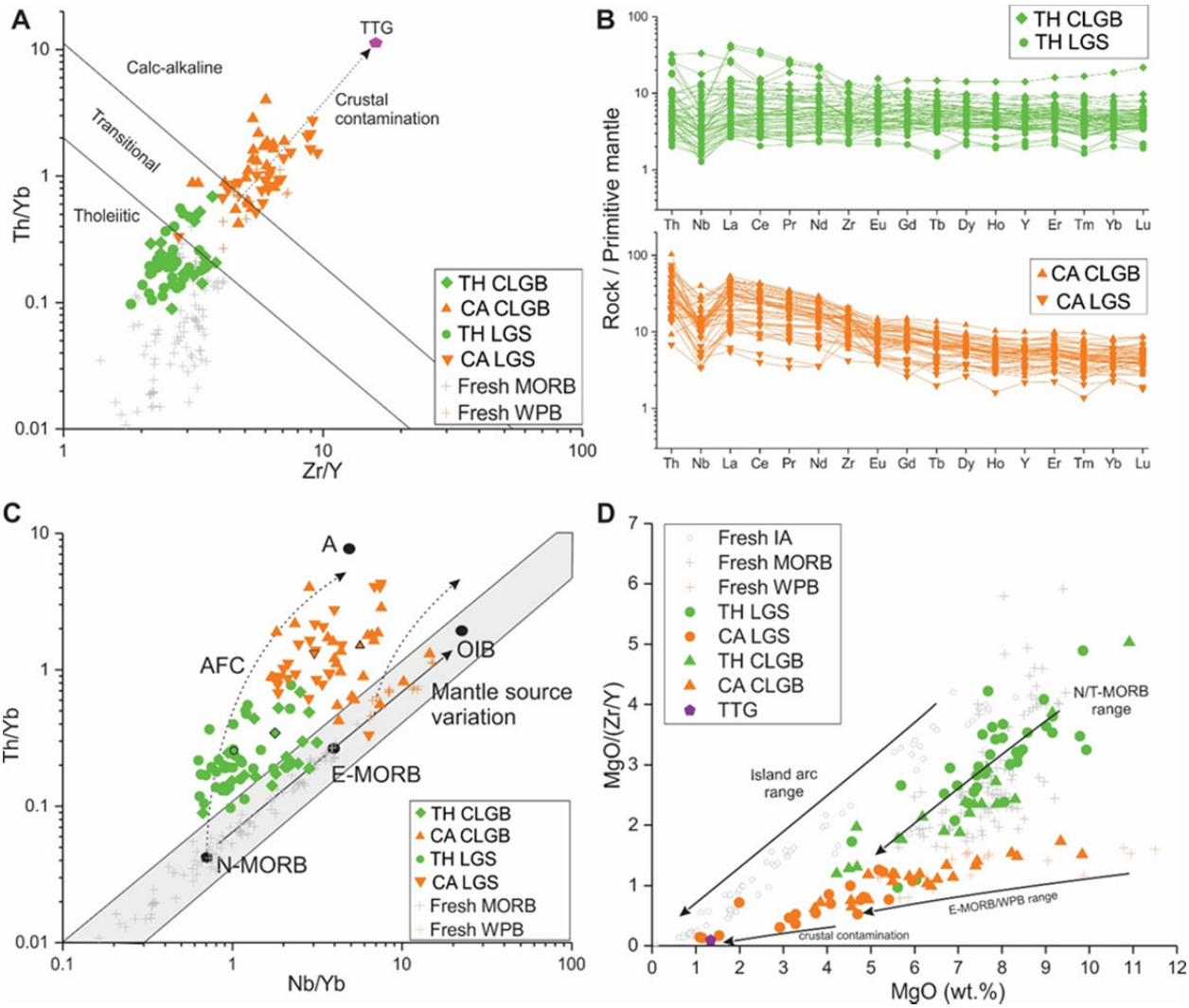

Figure DR1. Discrimination diagrams of the metavolcanic rocks sampled from La Grande subprovince (LGS) and Central Lapland greenstone belt (CLGB). A) Th/Yb-Zr/Y, TH = tholeiitic; CA = calc-alkaline, WPB = within plate basalt, modified from Ross and Bédard (2009). TTG = tonalite-trondhjemite-granodiorite. B) REE profiles normalize to primitive mantle values from Sun and McDonough (1989). C) Nb/Yb-Th/Yb, the variations are due to differences in mantle source and in degree of assimilation and fractional crystallization. A = Archean crust; black-bordered symbols are average values of each group; AFC = assimilation-fractionation-crystallization; modified from Pearce et al. (2008). D) MgO-MgO/(Zr/Y), IA= island arc, TTG data from Chekulaev and Glebovitsky (2017). All fresh MORB, WPB and IA data from Jenner and O'Neill (2012), Tatsumi et al. (1999), Regelous et al. (2014), Park et al. (2010). The La Grande tholeiitic series correspond to the mafic sub-group I and II of the Yasinsky, Guyer and Laforge groups (Sappin et al., 2018). They are the erupted volcanic products of primitive mantle-derived Mg-rich magmas which underwent limited crustal contamination while the La Grande calc-alkaline series, dominantly present in the Yasinsky and Guyer groups, are not arc-related and most likely formed from advanced crustal contamination of plume-derived melt through assimilation-fractionation-crystallization processes. The Lapland tholeiitic series from the Kittilä suite correspond to the Vesmajärvi formation, a

sub-marine N-MORB to E-MORB volcanic rock sequence with limited Archean crustal contamination, and those from the Savukoski group to the Matarakoski and Linkupalo formations which are mafic volcanic units with limited crustal contamination (Hanski and Huhma, 2005). The Lapland calc-alkaline series correspond to the Kautoselkä formation, a plume-related within plate basalt volcanic sequence with moderate Archean crustal contamination (Hanski and Huhma, 2005).

II-Protolith power law regression curves:

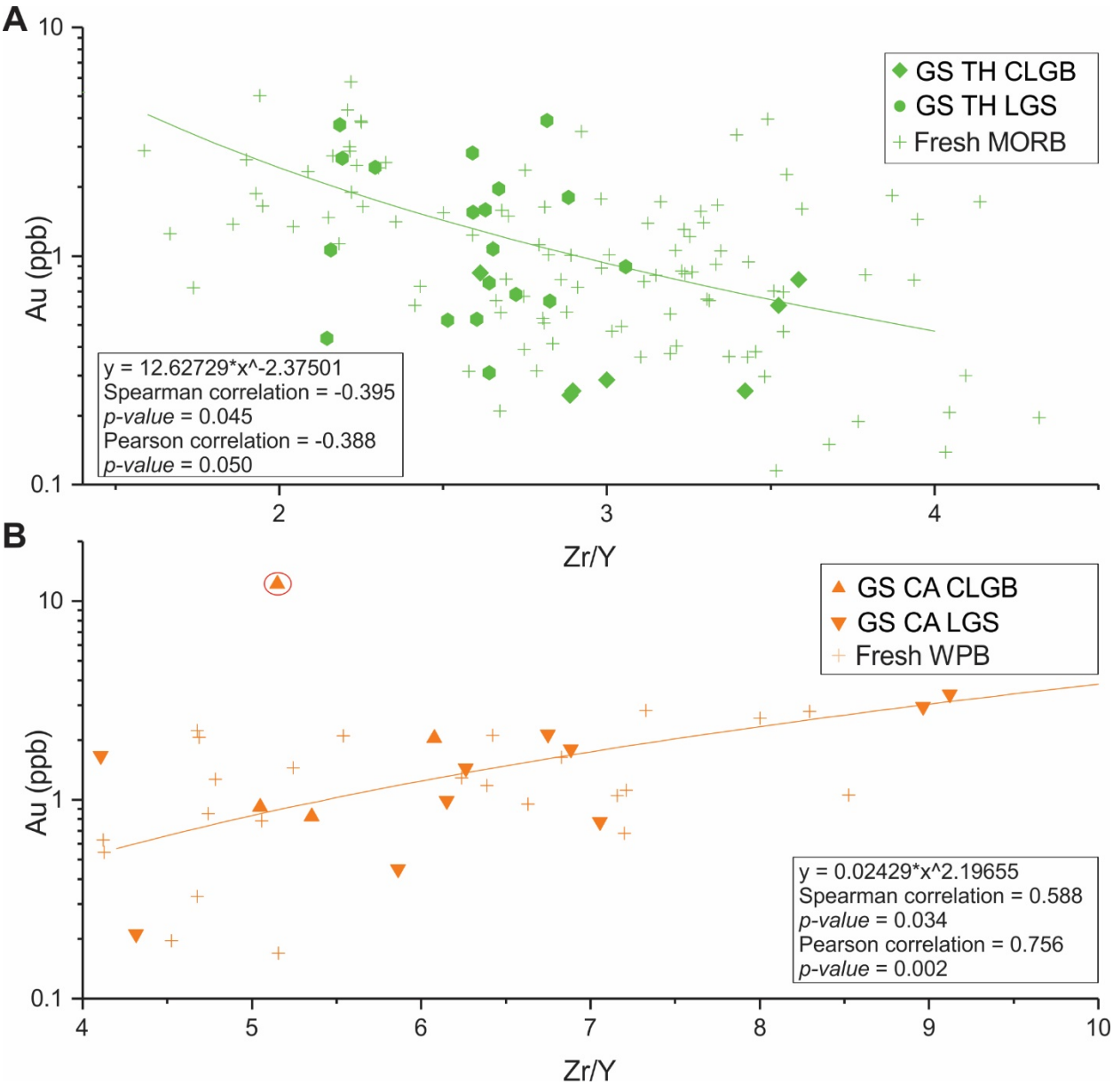

Figure DR2. Au-Zr/Y of greenschist facies samples from La Grande subprovince (LGS) and Central Lapland greenstone belt (CLGB) for A) tholeiitic and B) calc-alkaline magmatic series. The lines are the power law regression curves calculated from the greenschist facies samples and depict the protolith Au composition. The scatter in the greenschist tholeiitic samples is due to the primary magmatic scattered distribution of Au as shown by the fresh glass distribution. One sample in the calc-alkaline magmatic series is defined as an outlier (circled, 12.2 ppb Au, Fig. 1) and is not used for power law regression

curves calculation. Fresh MORB and WPB (within plate basalt) glass data are from Jenner and O'Neill (2012) and Tatsumi et al. (1999).

III-Effect of alteration before metamorphism:

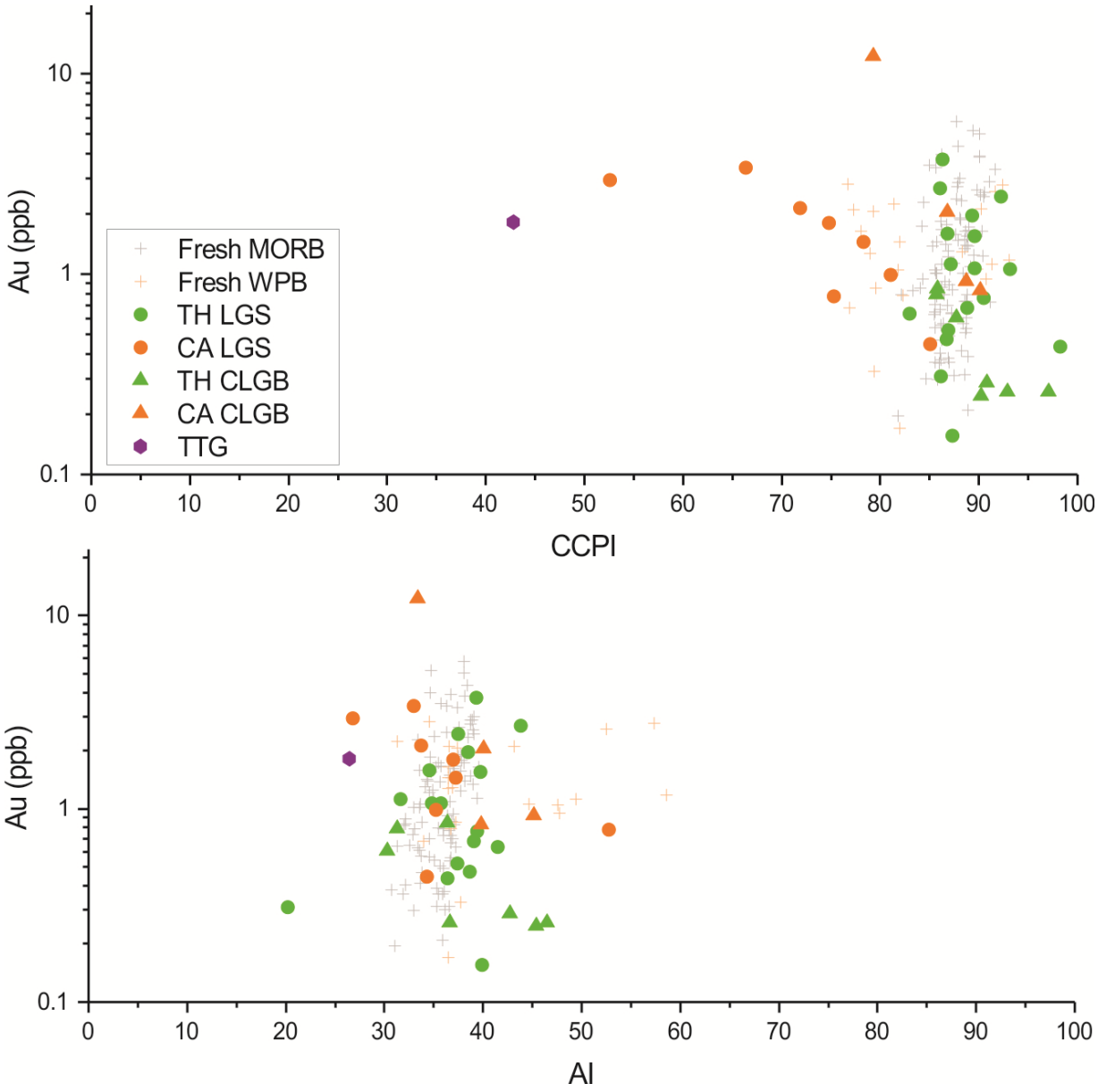

Figure DR3. A) Au-CCPI (chlorite-carbonate-pyrite index) and B) Au-Al (Ishakawa alteration) diagrams for greenschist facies samples from La Grande subprovince (LGS) and Central Lapland greenstone belt (CLGB). The lack of correlation between Au and the alteration indexes implies limited Au mobilization during seafloor alteration. The shift of CCPI values for the CA samples from La Grande are due to crustal contamination (addition of Na_2O and K_2O). Adapted from Large et al. (2001). Fresh MORB and WPB glass data from Jenner and O'Neill (2012) and Tatsumi et al. (1999).

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