Electronic Appendix E. Geochemical characteristics: estimated provenance and tectonic setting of the studied samples

The provenance and tectonic setting of the metasedimentary rocks were estimated based on geochemical data using specific diagrams. These diagrams contain uncertainties due to e.g., recycling of sedimentary material and we consider them only as suggestive. The data for selected samples from the Rock Geochemical Database of Finland (Rasilainen et al. 2007) were used for comparison; see **Fig. 1b** in the manuscript for the location of these samples.

Provenance

The provenance of the samples was evaluated using a discrimination diagram based on Roser and Korch (1988; **Fig. E-1a**) and a TiO_2/Zr diagram (fields according to Hayashi et al. 1997; **Fig. E-1b**). Based on them, most of the samples of our study and the Rock Geochemical Database would have had an intermediate or a felsic igneous provenance. In the discrimination diagram, samples from SS 1, 8 and 9 and some samples of the Rock Geochemical Database plot in the field of "quartzose sediments of a mature continental provenance", but Ryan & Williams (2007) noted that the boundary between the fields for "felsic igneous provenance" and "quartzose sediments of mature continental provenance" should be seen as gradational. The discrimination diagram indicates possibly more mafic provenance for samples from SS 4 and SS 5 and some samples of the Rock Geochemical Database. The sample from SS 4 may actually have a mafic nature or a notable restite component. Mafic igneous provenance is unlikely for the clinopyroxene-bearing quartz-feldspar paragneiss from SS 5, and in fact, the TiO_2/Zr diagram indicates felsic igneous rock as the provenance for this rock.

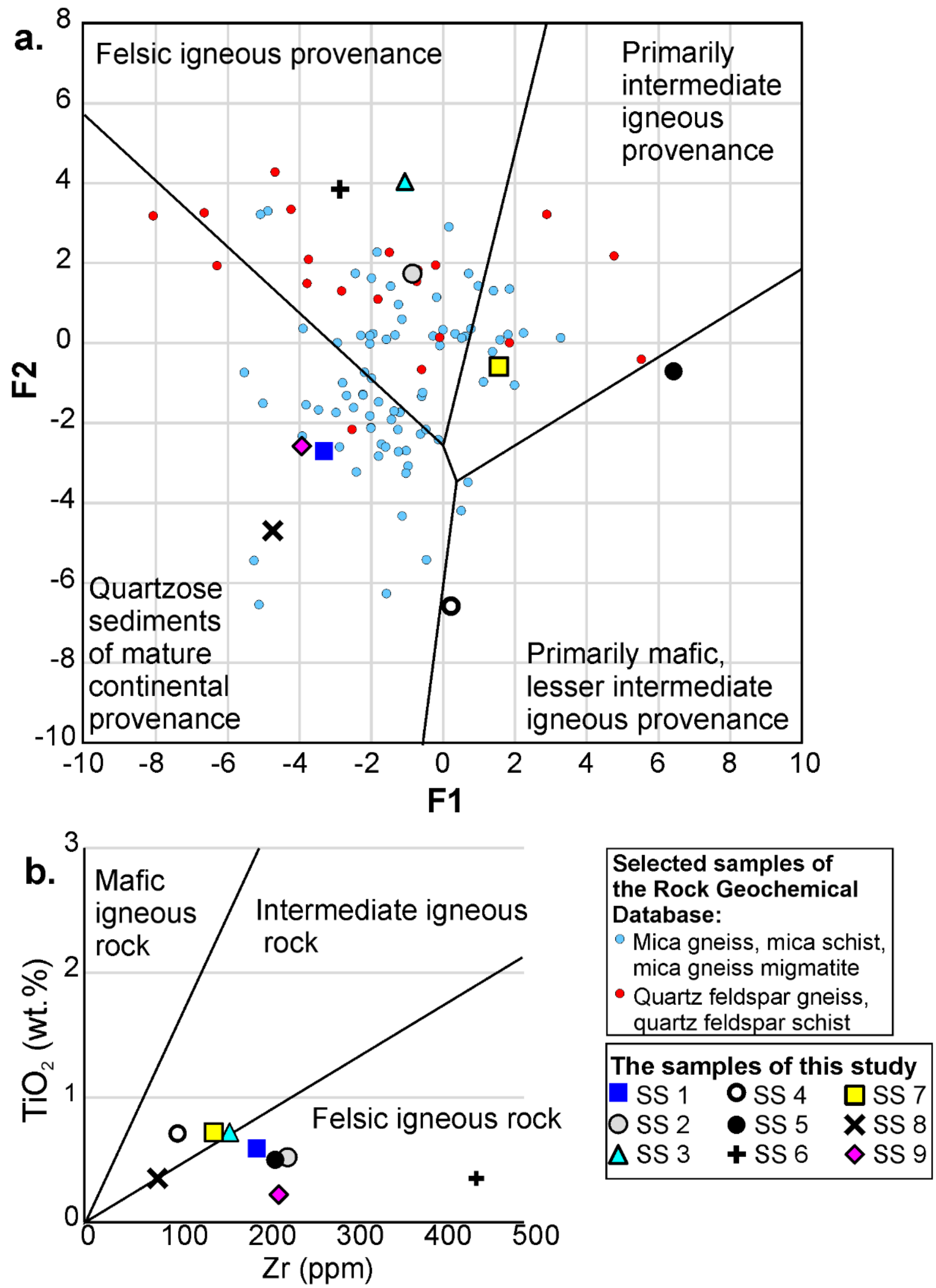

Figure E-1. (a) a discrimination diagram for the provenance. The discriminant functions F1 and F2 are according to Table II in Roser and Korsch (1988). The fields have also been sketched according to Roser and Korsch (1988). Data for some samples of Rock Geochemical Database of Finland (Rasilainen et al. 2007) were used for comparison; the locations of these samples are shown in **Fig. 1b** in the manuscript. (b) a bivariate diagram for TiO_2 and Zr (the fields are according to Hayashi et al. 1997).

Tectonic setting

E.g., Verma & Armstrong-Altrin (2013) noted the weakness of the traditional discrimination diagrams for estimation of the tectonic setting of the clastic sedimentary rocks based on chemical data. They proposed diagrams for that kind of classification based on new discriminant-functions, which we use in our study. Functions are different for high silica (63 wt.% or more SiO_2) and low silica (<63 wt.% of SiO_2) samples.

We estimated the tectonic setting of the metasedimentary rocks at the time of deposition according to the discrimination diagrams of Verma & Armstrong-Altrin (2013). In these discrimination diagrams, our samples as well as most of the samples of the Rock Geochemical Database plot in the fields of a volcanic arc or a rift setting (**Fig. E-2**). Some samples of the Rock Geochemical Database also plot in the field for a collisional setting (**Fig. E-2**).

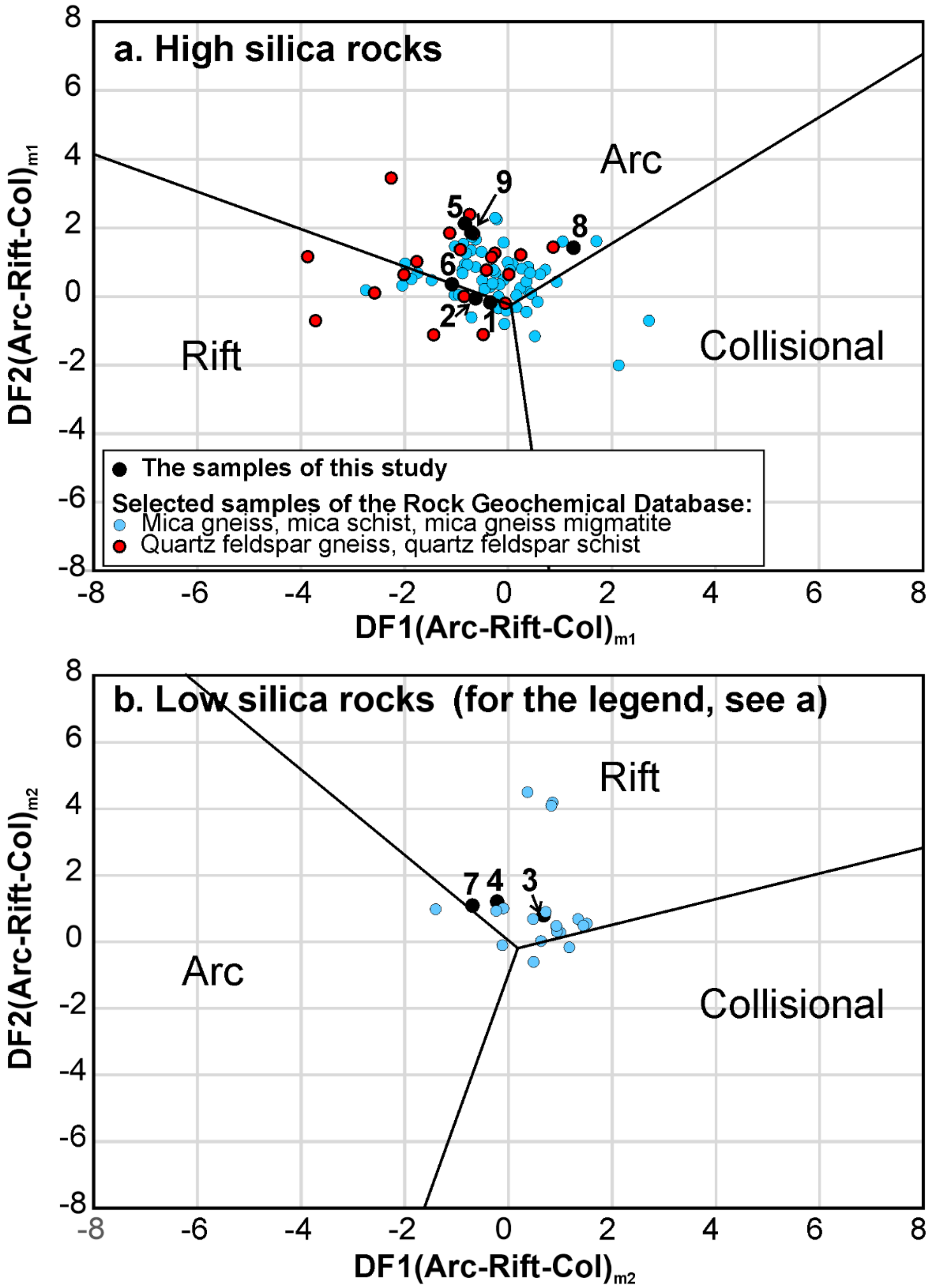

Figure E-2. Discrimination diagrams for the tectonic setting of the metasedimentary rocks: (a) high-silica rocks (the sampling sites 1, 2, 5, 6, 8 and 9), (b) low-silica rocks (the sampling sites 3, 4 and 7). The numbers in the diagrams refer to the numbers of the sampling sites. The discriminant functions (DF1 and DF2) are according to Verma & Armstrong-Altrin (2013). The fields of the diagrams were also sketched according to Verma & Armstrong-Altrin (2013). Data for some samples of Rock Geochemical Database of Finland (Rasilainen et al. 2007) were used for comparison; the locations of these samples are shown in **Fig. 1b** in the manuscript.

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