Datapaper + Supplements

1) The authors should also explain exactly what they mean by geochemical validation-to show the composition of the samples, or to show a relationship between composition and absorption minima?

The hyperspectral spectra are presented for different surface materials without any interpretation. The geochemical analyses are there to support the characterization of the samples and not to validate the spectra. We do not aim to present the relationship between composition and absorption minima we only aim at providing hyperspectral datasets of minerals and mixed surface materials that area also geochemically characterized.
Geochemistry and spectra of e.g. Apliki can be used separately in order to characterize the area with the provided GPS data.

2) These data sets should be available as the spectral library was made available, or somewhere there should be a note as to how to access the files as a guest.

The data is openly available on the GFZ data service website. There might be issues with the firewall of the user's computer.

3) "elemental" from a hyperspectral viewpoint, I would see Fe as the main element observed (i.e., in gossans), as REE-bearing minerals tend to be in trace amounts, very small, hence seeing the NIR signature may be masked by other minerals such as clays or carbonates etc.

This is just meant as a basic introduction for hyperspectral data uses and not tailored to outcrops or weathered surfaces. The mapping meant here, is not only for rock outcrop scan or satellite imagery but also in laboratory scans and in these scans, we do have REE mineral specimen that need to be mapped. Here, the spectrum depends on the element content and is not covered by clay etc. as if found in the field. You are right, in field imagery, the major element mapped is Fe but in laboratory scans, other elements like Nd embedded in monazite can be mapped.

4) Line 46: should references be in chronological order from oldest to youngest? + Turner et al 2014a is out of order in the ref list.

This is based on the template of the ESSD citation, which is in alphabetical order

5) Fig. 1: This is very good and provides a good image of what your paper is about. Suggest that the spectral pattern for chalcopyrite be a darker colour, cannot see the yellow; also the malachite should be a continuous line like the other three.

I changed the malachite to a continuous, the color coding is based on the mapping colors in fig. A+B, therefor I only changed the line thickness so that the spectrum is well visible in yellow.

6) Line 84-88: Delete, as this is repeating what noted earlier. Add the last sentence to the end of the previous paragraph. "The spectral libraries...." after the url address.

This does not seem a repetition for us, as it just least through the chapters of the manuscript and aims to explain the structure. The previous paragraph explains which is provided in the scope of this datapaper + data publications.

7) Table 1 is not really necessary-you can summarize that info in the text.

The table is supposed to give a quick overview of the included supplements and is easier to read.

8) Table 2-4 Suggest combining Tables 2, 3 and 4 into 1 as many parameters are common. So you can have more columns relative to each of the different mineral groups.

As these tables relate to measurements of three different sets of samples and three different data description reports, these tables should stay separated. The measurement parameters are also provided separately in Excel TM files in the data.

9) Table 5: The header "Concentration level determination" does not relate to what you have placed in the rows. What are they? All you do is re-reference the data sets. Likely this Table is not critical to the paper.

We changed tis geochemical analysis. Again, this table should only give an easy to read overview of the different geochemical analyses used for the different sample types

10) Line 227-233: This is repeated in the data set paper, why include this detail here. If this is the preferred place, then shorten that in the data set paper. Principles of XRF analysis are not really needed, can refer to a paper on this subject

As we explained all instruments used, e.g HySpex, we aimed to explain every analysis method shortly in order to save the reader from cross referencing too many papers. The data set papers are only "technical reports" on the gfz data services website. The data should be understandable by just accessing this website without knowledge of the datapaper.

11) Table 6: What about adding in the probable interferences for analysing the LREE with a hand- held XRF instrument. This provides very little information to the reader.

The XRF analysis is based on Bösche, 2015 dissertation with more informations on the XRF measurements. We've now added the citation.

12) List background count times on EPMA, especially for the trace elements.

The REE EPMA method is based on Lorenz et al. 2019 and was developed by her at the university as part of her Ph.D. we are not able to forward the method before her Ph.D. is finished.

13) Line 254: Measuring F in fluorapatite is problematic using EPMA. At a minimum, the Area-Peak Factors method should be used otherwise result is usually spuriously-high values.

see Lorenz et al., 2019 "Fluorine, as one of the least-stable components in apatite, was measured first during the analytical scheme. To reduce halogen migration, counting times for F were reduced to 6 s on peaks and 3 s on backgrounds. The EMPA data were reduced with the PRZ-XXP correction routine.

14) Line 268-274: delete, and any additional information incorporate with the EPMA section.

EMPA explanation is done for the two different sample groups with different parameters and correction routines (copper and REE).

15) Line 290: why was one sample analysed using "aquatic" What is so different about it-this is worth explaining. The code info is better placed in the data sheets information.

We deleted the tables from the data paper and instead added them in the data description of the technical report. The info for the aquatic analysis is also added in there. "Sample 1a belongs to a group of samples where only the weathered crust was extracted for analysis. Only sample 1a is provided here. The aquatic analysis has a very low detection limit and was chosen due to the expected depleted element content."

16) Table 8 and 9: Is this really important? You have not noted any samples numbers in the text so there is information for the reader in table 8. This should be in an Appendix if deemed critical. Describe the analyses and how they are done –that is more important.

The tables were deleted from the paper.

17) References Turner et al, 2014a is out of order, Turner 2015 should be first (single author). Leave a space between Tong et al and the turner reference.

this is based on the ESSD template and resulting reference list from mendeley desktop

18) Line 310-314: Only certificate info provided as validation for the REO powders For REE minerals, there is no table comparing the results from the XRF vs. EPMA and indicating if the

results are actually comparable. For the geochem analyses by BVM there is no information on how good the data is, no comparison of duplicates, no CRM's, unless this is also held in the University site.

REO powders are only characterized by the certificates which can be found in the supplements. XRF and EPMA will not be compared as the scope of this paper is only to provide data and not to interpret/compare them. The standards measured by BVM are provided in the Excel TM files, apparently the standard measurements reached the expected results therefor no information on the quality of the analysis was given by BVM/ is necessary.

Sample	decimal latitu	decimal long	Method	WGHT	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300
			Analyte	Wgt	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5
			Unit	KG	%	%	%	%	%	%	%	%	%
			MDL	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01
			Type										
AP/1-A - 1f	35,077	32,84275	Soil	0.07	45.44	15.86	12.79	5.11	7.65	2.37	1.01	1.00	0.07
AP/1-A - 2a	35,076867	32,84275	Soil	0.11	40.72	8.00	31.22	2.67	0.75	0.31	0.67	0.38	0.20
AP/1-A - 3a	35,076983	32,843083	Soil	0.11	44.66	14.20	15.25	4.87	3.74	1.15	0.86	0.74	0.05
AP/1-A - 3b	35,077	32,84305	Soil	0.08	49.15	11.83	13.91	5.40	3.59	0.85	0.51	0.58	0.05
AP/1-A - 4a	35,076967	32,843067	Soil	0.03	33.97	10.29	10.62	9.96	8.00	0.22	0.02	0.24	0.01
AP/1-A - 4b	35,077	32,843033	Soil	0.06	42.68	16.01	13.35	8.08	2.80	0.83	0.42	0.50	0.02
AP/1-A - 6a	35,076967	32,8431	Soil	0.09	44.32	12.76	19.85	4.44	0.99	0.65	1.77	0.42	0.03
AP/1-A - 6b	35,07695	32,8432	Soil	0.13	45.93	14.81	14.24	5.49	5.43	1.63	0.85	0.79	0.07
AP/1-A - 6c	not available	not available	Soil	0.11	43.27	8.94	25.45	4.54	0.79	0.31	0.48	0.27	0.02
AP/1-A - 6d	not available	not available	Soil	0.11	39.93	12.47	24.96	4.30	1.19	0.53	1.24	0.41	0.06
AP/1-A - 13b	35,076117	32,8434	Soil	0.12	57.20	13.23	14.08	3.77	0.71	0.35	0.08	0.82	0.03
Pulp Duplicates													
AP/1-A - 6d	not available	not available	Soil	0.11	39.93	12.47	24.96	4.30	1.19	0.53	1.24	0.41	0.06
AP/1-A - 6d	not available	not available	REP										
AP/1-A - 4a	35,076967	32,843067	Soil	0.03	33.97	10.29	10.62	9.96	8.00	0.22	0.02	0.24	0.01
AP/1-A - 4a	35,076967	32,843067	REP		34.28	10.20	10.53	9.92	7.93	0.22	0.02	0.24	<0.01
Preparation Duplicates													
AP/1-A - 4b	35,076967	32,843067	Soil	0.06	42.68	16.01	13.35	8.08	2.80	0.83	0.42	0.50	0.02
AP/1-A - 4b	35,076967	32,843067	DUP		42.54	16.09	13.35	8.12	2.81	0.83	0.43	0.50	0.02
Reference Materials													
STD GS311-1			STD										
STD GS910-4			STD										
STD SO-19			STD		60.47	13.98	7.38	2.94	5.95	4.07	1.31	0.70	0.31
STD SO-19			STD		60.60	13.91	7.47	2.90	5.92	4.02	1.30	0.70	0.32
STD SO-19			STD		60.23	14.03	7.60	2.95	5.99	3.98	1.29	0.70	0.31
STD SO-19			STD		60.51	13.95	7.47	2.92	5.96	4.02	1.29	0.70	0.30
BLK			BLK										
BLK			BLK		0.03	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BLK			BLK		0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Prep Wash													
QUARTZ_KRA			Prep Blank		98.24	0.52	0.76	0.03	<0.01	<0.01	0.12	0.09	<0.01

19) Line 337: provide information on how to obtain easy access to this geochemical data.

This based on the firewall on your computer (?) and not the accessibility of the repository.

Technical Report REE:

1) What is really needed, is to identify which REE corresponds to which reflection-as in Turner's 2015 thesis (and published papers 2014). This is the test for validation.
The scope of the data publication is not to identify distinct peaks of different rare earth elements. We only want to provide full spectra for the VNIR and SWIR range in form of a spectral library. The spectrum of each mineral is unique.

2) I do not see REO analyses in any table, certainly not in Table 5.
The sample analyses are the purity certificates in table 4.

3) I could not access geochemical data by XRF nor EPMA.
Again, this should be in the open access gfz data-service repository

Copper-bearing mineral report

1) I believe this is the place where that should be held, and maybe the Supplement does not need to be so extensive with images.
We believe the images should be in both reports. We have a complete data paper describing all samples, therefor it makes sense that these samples are at least shown in the supplements.

2) For this set of data, I was able to open the EPMA results as well as the SEM images and EDS analyses. I assumed that the EPMA of the 25 analyses match the samples depicted in the SEM file, however that was not the case. It would be very useful in the EPMA files to indicate the sample name using the abbreviations provided (A1, A2, A3, etc.) for cross-reference. Also, as you have several samples of one mineral, averaging their mineral chemistry and calculating an actual mineral formula would be most useful. This can be also calculated for the individual samples.
We did not average the three measurements of the EPMA as the data publication is supposed to provide raw, unchanged data. We did however provide 3 EPMA measurements of each sample seen the SEM images if the user wants to average the analysis he can do so. In the SEM PDF, the averaged EPMA is provided in comparison with the SEM.

3) What is the XRD trace of this mineral?
XRD trace is not provided for any of the samples in the datapaper. It is not a new mineral but based on our measurements we do not feel confident to notate it. Instead we provide the geochemistry and spectrum.

4) No issues with the spectral data; can open the data files. What validation has been done between the spectral signature of a samples and its geochemistry?
None, we only provide the data

5)Why not summarize the chemistry in a table and indicate calculated formula for each mineral? What are the ore minerals?

Because the EPMA analysis was done in two programs for the oxides and sulphides + native copper separately. Therefor the analysis will be given separately. The ore minerals are the sulphides and native copper.

Apliki samples

1) Table 2: we added the missing information

2) Table 3 and Table 4 were also in the main paper-they are not really important here; provide a web address. I think a description of the method is more valuable to the reader. Also, need to provide accuracy and precision information, there is no mention of duplicate or CRMs being analysed. Geochem data could not be accessed.
We cut the tables from the main paper and provided them here. As each analysis group has different steps of analysis but some of them are similar it makes sense to us to provide the analysis methods in a table format. The data has to be accessible.

3) What validation has been done between the spectral signature of a samples and its geochemistry? None, in this paper we only describe the data that is accessible, no interpretation whatsoever is provided either here or in the data datapaper.