

This file contains our answers to the two Reviewers' reports for the manuscript *essd-2022-26* entitled "A new digital Lithological Map of Italy at 1:100.000 scale for geo-mechanical modelling". Reviewer's comments are reported in regular text, not indented. Responses are reported in regular text, indented. Quoted text is in italics. **RC** stands for Reviewer Comment, **AC** stands for Author Comment.

REVIEWER 1

RC: The authors provide a Lithological map of Italy, fully available for download, which represents a synthesis of a huge database of maps and previous geological information. The map is the result of an enormous, complete and very reasoned work, especially in the homogenization of the input data and in the evaluation of possible errors in the databases consulted.

It is a very useful product for addressing scientific and territorial management issues, at the scale of the entire national territory. To date there was no such product in Italy. Another very appreciable element is the versatility of the map which can be updated and reclassified in the light of new information or additional criteria. In my opinion the work can be published in the present form.

I would add, however, that I am not a native English speaker and therefore, although I have not noticed any particular problems in the written language used, my opinion on the matter cannot be considered an expert judgment.

AC: We thank R1 for the appreciation of our work. In fact, the points highlighted by R1 have been the most time-consuming steps of the entire work. They required a long and painstaking work of documentation and consultation of databases, maps and articles, spanning from international to very local scale. We are pleased to know that this long work has produced a result that is considered innovative and very useful for the scientific community and for territorial management.

REVIEWER 2

RC: This paper presents the results of the compilation of the first Lithological Map of Italy (LMI). This is achieved through a detailed and genuinely multidisciplinary approach, that integrates field mapping, stratigraphic investigation and structural analysis, coupled with a wealth of data from a wide literature in the considered region. The topic dealt with in the study is of prime aid to anyone that has an interest in understanding the geological evolution of Italy and the resulting distribution of lithological formations or formational groups. Moreover, the study illustrates an example of applicability of universal concepts of the role of lithological distribution in the analysis of geomorphological hazard and land management. The study is based on a sound and comprehensive database that may be implemented through time, thus providing a very useful tool to the geological community. The compilation approach relies on grouping of polygons that contain information on the most representative lithologies cropping out in the investigated area. Not only the advantages, but also the limits imposed by grouping of lithologies are listed and discussed. The Authors' interpretations are consistent with the data presented, and the resulting Lithological Map of Italy (LMI) is a very well-conceived and convincing product.

AC: We thank Enrico Tavarnelli for the appreciation of our work. In his report he underlines the importance of a detailed cartographic representation of lithology, recognizing the fundamental role of lithological distribution in the analysis of geomorphological hazard and land management. We are pleased to know that our work is considered a valuable example of the applicability of this universal concept.

RC: The manuscript is well written and well organised, with English and presentation forms that are overall very good. The illustrations and tables are all clear, legible and very much informative. The quality of the contribution, in all its parts, is overall high-to-very high. Good credit is given to the existing literature, both

methodological and regional. However, I believe that the manuscript would benefit from a slight extension of the reference list, with citation of a few papers that are listed separately in this review report. Unfortunately, the suggested missing references happen to arise from my own research, and in general I am reluctant to self-advertise my work. But the submitted manuscript refers to topics where my collaborators and I have long worked and published; thus I believe that a slight extension of the reference list with inclusion of the mentioned contributions would be highly beneficial for the reader. I found this an extremely stimulating contribution and believe that it will make a very interesting title for a genuinely international and multidisciplinary audience. It is my opinion that the manuscript may be accepted for publication almost as it stands, with only the incorporation of a few sentences (with related references listed below), and the insertion of minor alterations to the text for the sake of an improved legibility. Therefore, I recommend without reservations that this manuscript is accepted for publication on Earth System Science Data only pending on minor suggested revisions, that are listed separately.

AC: We are pleased to know that our study is considered of prime aid to anyone that has an interest in understanding the geological evolution of Italy and the resulting distribution of lithological formations. We are grateful for this specific appreciation because we have paid special attention to the reclassification of geological classes in lithological ones, trying - as far as possible - not to impact the original regional difference in the representation of the lithology.

RC: I require no anonymity and wish that all my comments are forwarded to the Authors. I hope that my review is received as a constructive and supportive indication, that may assist the Authors to achieve an even more suitable paper, and the Editor in formulating a final, positive decision in the interest of Earth System Science Data and of its wide, international readership.

AC: We thank Enrico Tavarnelli for the minor revision suggested, which will be entirely incorporated in the final version of the manuscript.