Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.13161

IUGS Classification of Igneous Rocks revisited: Update from the new Task Group

MICHELE LUSTRINO[1], **PROF. SEBASTIAN TAPPE, PHD**[2], PROF. JAMES M.D. DAY[3], GEORG F. ZELLMER[4] AND ROGER MITCHELL[5]

[1]IUGS Subcommission on the Systematics of Igneous Rocks
[2]UiT The Arctic University of Norway
[3]Scripps Institution of Oceanography
[4]Massey University
[5]Lakehead University

Presenting Author: sebastian.tappe@uit.no

Magmatic processes are fundamental in the evolution of Earth and other terrestrial planets, and igneous petrologists were among the first to use geochemical data as routine tools. Igneous geochemistry helps to better understand melt formation, migration and differentiation, but it also serves – as an early step – for magma type identification. Igneous rock classification was unwieldy by the 1980s, riddled with type locality nomenclature that obstructed recognition of significant geological processes.

Concerted efforts by an IUGS Subcommission on the Systematics of Igneous Rocks led to unified classification that has been, to variable extents, adopted by the geoscientific community [1, 2]. These efforts reduced igneous rock nomenclature from over 1000 names to less than 350 endorsed terms of global significance. Despite these improvements, problems remain with classification schemes, and new issues emerge after decades of data collection. For example, the widely used TAS diagram is problematic because magma alkalinity is used without distinguishing between sodic and potassic lineages, which are known to be produced by different petrological processes, typically in different tectonic settings. In addition, the TAS diagram for plutonic rocks has fallen behind its volcanic counterpart in terms of 'sophistication', and requires an overhaul to make it useful for data-driven research in the 21st Century.

In 2021, a new IUGS Subcommission assembled to identify current problems with igneous rock classification systems and to work towards solutions in aid of petrogenetic studies. Extraterrestrial magmatic rocks will be included for the first time into classification schemes to capture progress made in planetary studies. Geochemical data platforms, such as GEOROC and PetDB, use the vocabularies recommended by disciplines that generate the data, but often new challenges are created along the way. Here we provide an update on the latest efforts to further improve igneous rock classification, to stimulate cross-disciplinary discussions about how to make magmatic petrology and geochemistry fit for the future, which will see the advance of 'big data science' and 'machine learning'.

[1] Le Maitre *et al.*, 1989. Blackwell Scientific Publications, Oxford, 193 pp.

[2] Le Maitre *et al.*, 2002. Cambridge University Press, Cambridge, 236 pp.