



16TH BIENNIAL MEETING
SGA 2022

16th SGA BIENNIAL MEETING KEYNOTE SPEAKER

In concurrent session:
Hot spring deposits and epithermal environments



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Subaerial hot springs and near-surface hydrothermal mineral systems past and present, and possible extraterrestrial analogues

The principal features, geotectonic settings and association with near-surface hydrothermal mineral systems of ancient and present subaerial hot springs, fumaroles and geysers are herein reviewed. Fumaroles and geysers usually occur in volcanic craters and are in most cases, part and parcel of hot spring environments. Subaerial hot springs are characterised by siliceous- and carbonate-rich chemical sediments, such as sinters and travertines, respectively. Sinters are commonly enriched in various metalliferous elements. Hot springs surface discharges are also characterised by pools, which exhibit bright colours due to the presence of microorganisms. Present-day examples include the fumaroles and hot springs of the White Island volcano (New Zealand), the world-renowned Yellowstone caldera (USA) and the Afar region of the East African Rift System. The Afar triangle, in the northern part of East African Rift System, provides a good example of hot springs associated with evaporative deposits. The Tuli-Sabi-Lebombo triple junction rifts were formed during the ~ 180 Ma Karoo igneous event in southern Africa, of which the Tuli arm is the failed rift (aulacogen), as is the Afar region. The Tuli rift is effectively an unusual, if not unique, tectono-thermal setting, because it comprises Karoo-age hot springs systems and associated vein stockworks and breccias, which includes the Messina Cu deposit as well as currently active hot springs with sinter deposits probably due to post-Karoo uplift. Fumarolic pipes in ignimbrites of the Erongo Volcano-Plutonic Complex in Namibia are discussed. This is followed by an example of banded chert rocks in the Killara Formation of the Palaeoproterozoic Capricorn Orogen (Western Australia), interpreted as hot spring chemical sediments, which also show evidence of “fossil” microbial filaments. The presentation ends with a brief overview of possible analogues of hot springs on planet Mars.



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Franco has considerable experience in tectonics, ore deposit geology and mineral exploration in many parts of the world. In the last 25 years he has worked extensively in Western Australia's Proterozoic terranes and was instrumental in the discovery of a new large igneous province in Australia. Franco was appointed Editor-in-Chief of *Ore Geology Reviews* in March 2012 and Series Editor of *Solid Earth Sciences* (Springer) in November 2012. He has 243 published peer-reviewed papers, is sole-author of 4 books and 6 edited book chapters, and has authored 69 unpublished industry-related papers. He conducted special courses for the Korean Institute of Mineral Resources (KIGAM) in South Korea between 2010 and 2018.