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title: 'FindAge, a Python program for model ages calculation based on Pb isotopes'

tags:

- Python

- Geology

- Lead isotopes

- Model ages

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# https://blog.joss.theoj.org/2018/12/a-new-collaboration-with-aas-publishing

aas-doi: 10.3847/xxxxx <- update this with the DOI from AAS once you know it.

aas-journal: Astrophysical Journal <- The name of the AAS journal.

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# Summary

Metals are present in our everyday life and geologists try to identify their provenance. Some minerals contain clues of their history, such as galena, a lead sulphide (PbS). Lead isotopes in lead-rich minerals are one of the tools to determine the number of metal source(s) and their model age(s). `FindAge` is an iterative Python code that can calculate rapidly different model ages thanks to lead isotope ratios, based on the equations for different lead evolution models. In addition to be compatible with the two most used global models of lead isotope evolution, it also fit to the model developed for XXX Australia. This program is user-friendly thanks to an interface, and can be easily modified by the user for other models that could better suit the studied area. It has already been used in A scientific publication [@Gigon:2020]*.*

#Introduction

Lead isotopes are wildly used on sulphides (galena, pyrite, pyrrhotite, sphalerite, chalcopyrite, magnetite, hematite, arsenopyrite…) and whole rock to get information about the model age of the sulphides minerals. For some minerals, this method is the only way to estimate their age. Lead isotopic ratios can be measured by TIMS (acronyme), SIMS (acronyme) or MC-ICP-MS (acronyme). One of the most used method for model age estimations is the one of [Stacey:1975] which implies two stages: in the first one, the mantle evolves until 3.7 Ga, where crust formation leads to a second stage with different parameters. Another method was developed by [Cumming:1975] in which a parameter increases linearly over the history of the Earth. However, this last model is not well appropriate for the Northern part of Australia and [Sun:1996] modified it to better fit the Australian data. This new Python program aims to quickly calculate the model ages thanks to the Sun et al. (1996) and [Stacey:1975] models as it was designed for Proterozoic samples of the North Australian Craton. However, as the [Sun:1996] model is adapted from the [Cumming:1975] one only by changing one parameter value, this algorithm can be easily used for both models.

# Acknowledgements

David Huston (Geoscience Australia) is thanked to have given the Excelsheet developed by AGSO-CSIRO actually used instead of this program, and to have supported this project since the beginning.

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