Conceptualising geological systems in 3D: loop, the next generation 3D geological modelling open source package

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With the current need for critical metals (including Cu), the ability to be predictive undercover and to improve mining of known resources, requires the ability to better predict sub-surface geology at multiple scales. Geologically consistent mine models should equate to better resource models and consequently a more economic way of producing the required resources for a greener future with increased recovery rates and reduced amount of resources required and waste produced. In exploration, the ability to predict sub-surface 3D geology and its uncertainty helps to optimise exploration programs, making them more efficient and more economical (financially and environmentally). We present the current state of "Loop" a new, multi-scale, open source, 3D geological and geophysical modelling platform that will enable field geologists to build geophysically and geologically integrated 3D geological models and assess and characterise the associated geological uncertainty.

To do this, we must enable:

- Easy data retrieval and input
- Better structural modelling, including all aspects of structural geology in poly-deformed terranes
- Better integration with geophysical inversions
- Characterise and mitigate uncertainty in geological models

We will present the overall modelling workflow with an emphasis on the structural modelling module as other talks at this conference will present the other steps of the workflow: Jessel et al.: data massaging and input; Grose et al., fault kinematics modelling; Giraud et al., Integration with geophysical inversions.

The outcomes of the project will be an open-source platform, available to the public, academia, industry and decision & policy makers; enhancing our societal capability in resources assessment, management and exploitation as well as geologically related environmental issues management.