

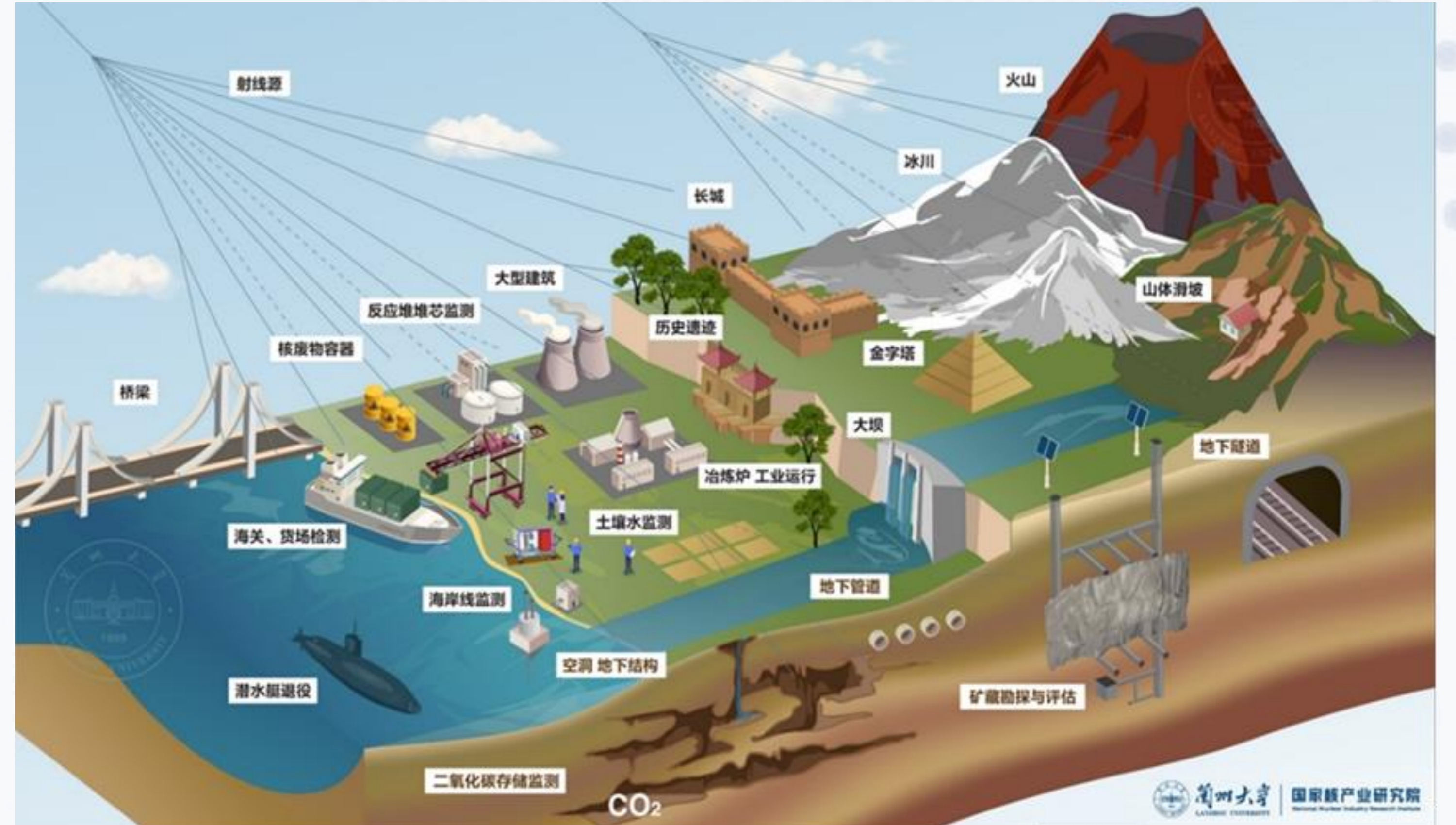
A New Transmission-based Muon Imaging Algorithm

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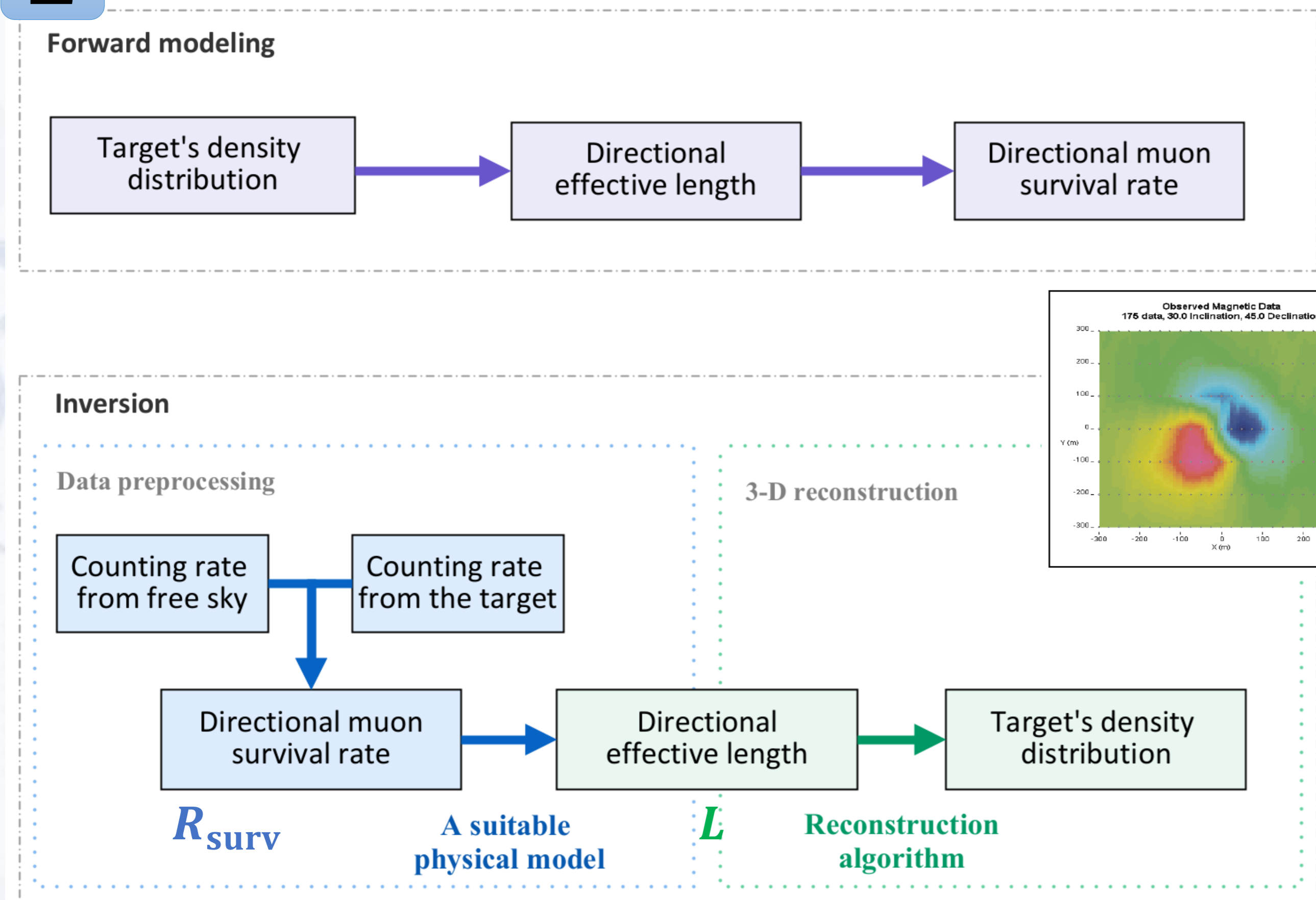


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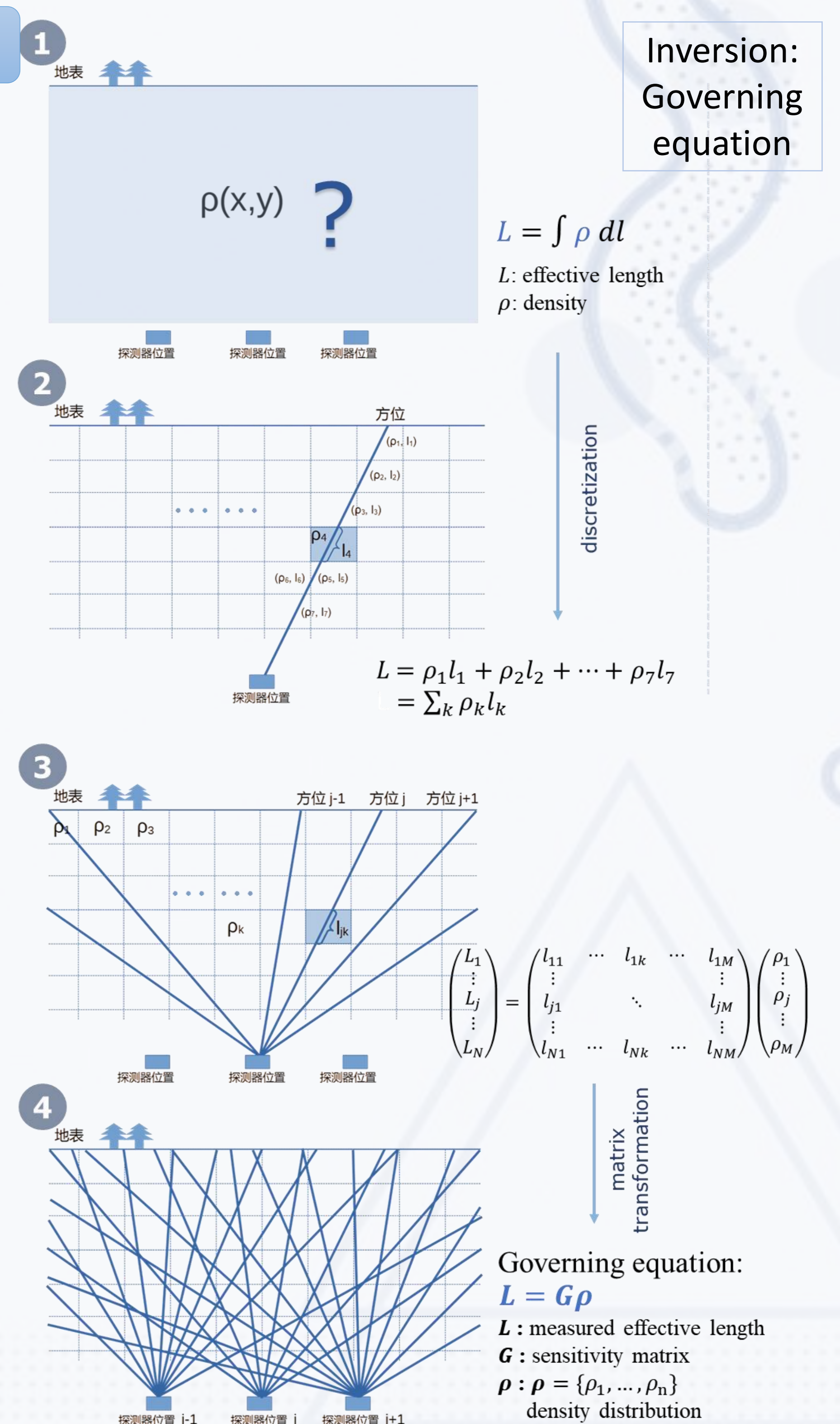
Cosmic ray muons are secondary ray particles generated by the interaction of primary cosmic rays particles with atomic nuclei in the Earth's atmosphere, which are characterized by a wide energy domain and high penetrability, making them a free source of rays gifted by nature. It is possible to perform density imaging of large-scale objects based on the directional muon flux attenuation. This technology, known as muon imaging, has found applications in diverse fields such as archaeological site investigation, mineral exploration, volcanic research, and imaging of glacier bedrock interfaces, among others.



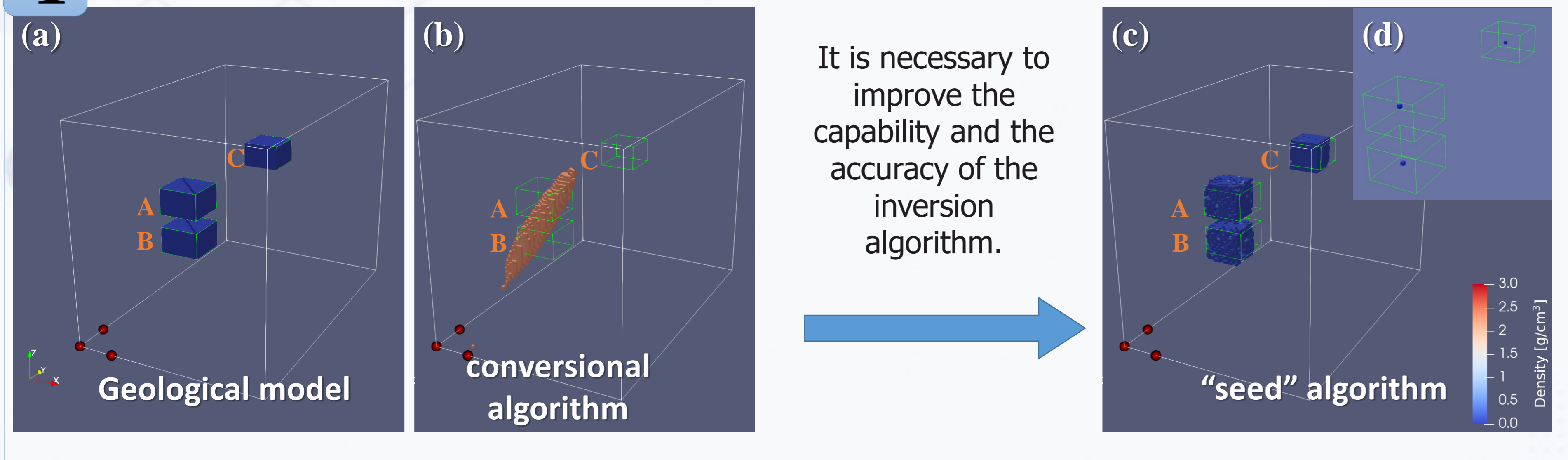
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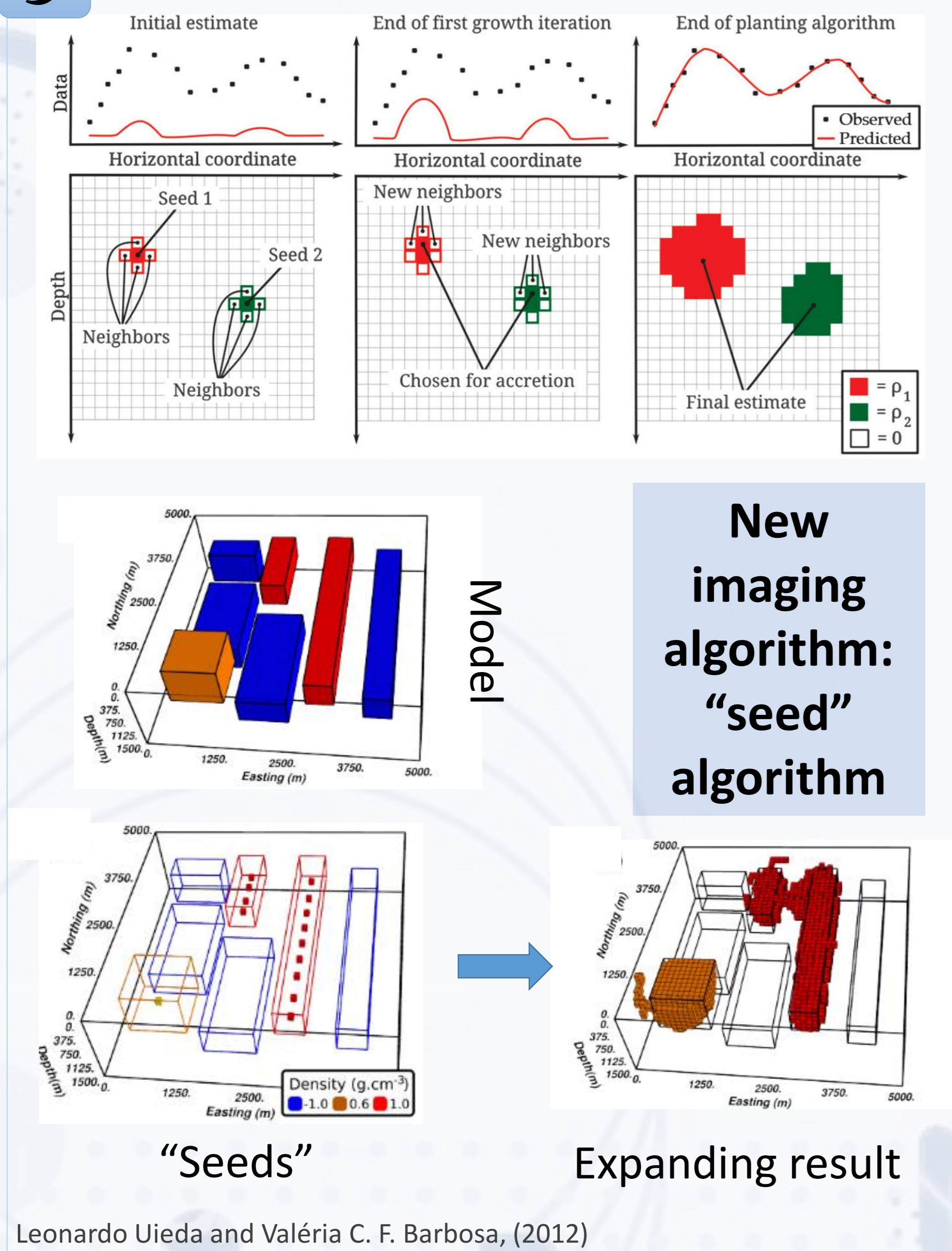
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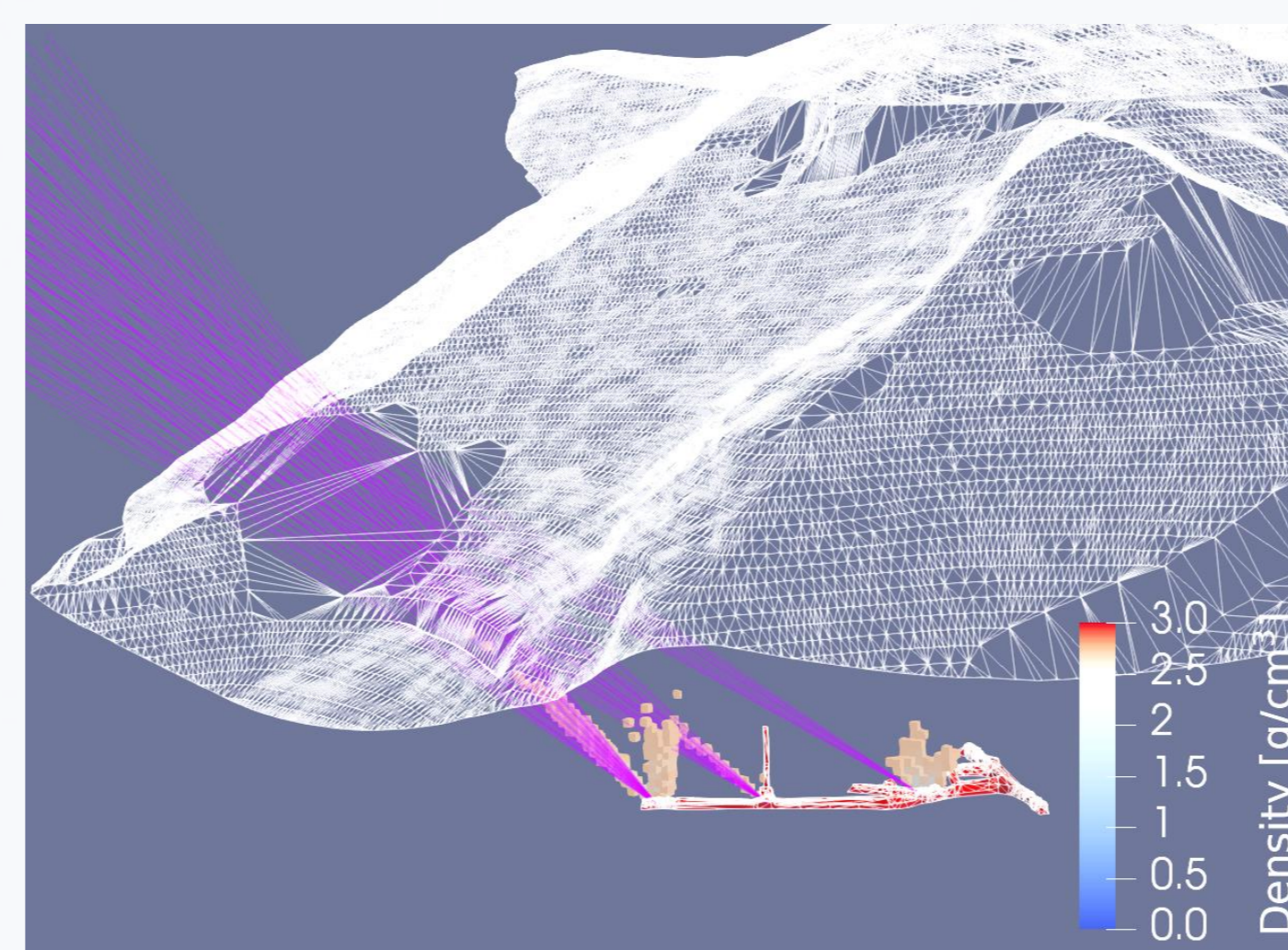


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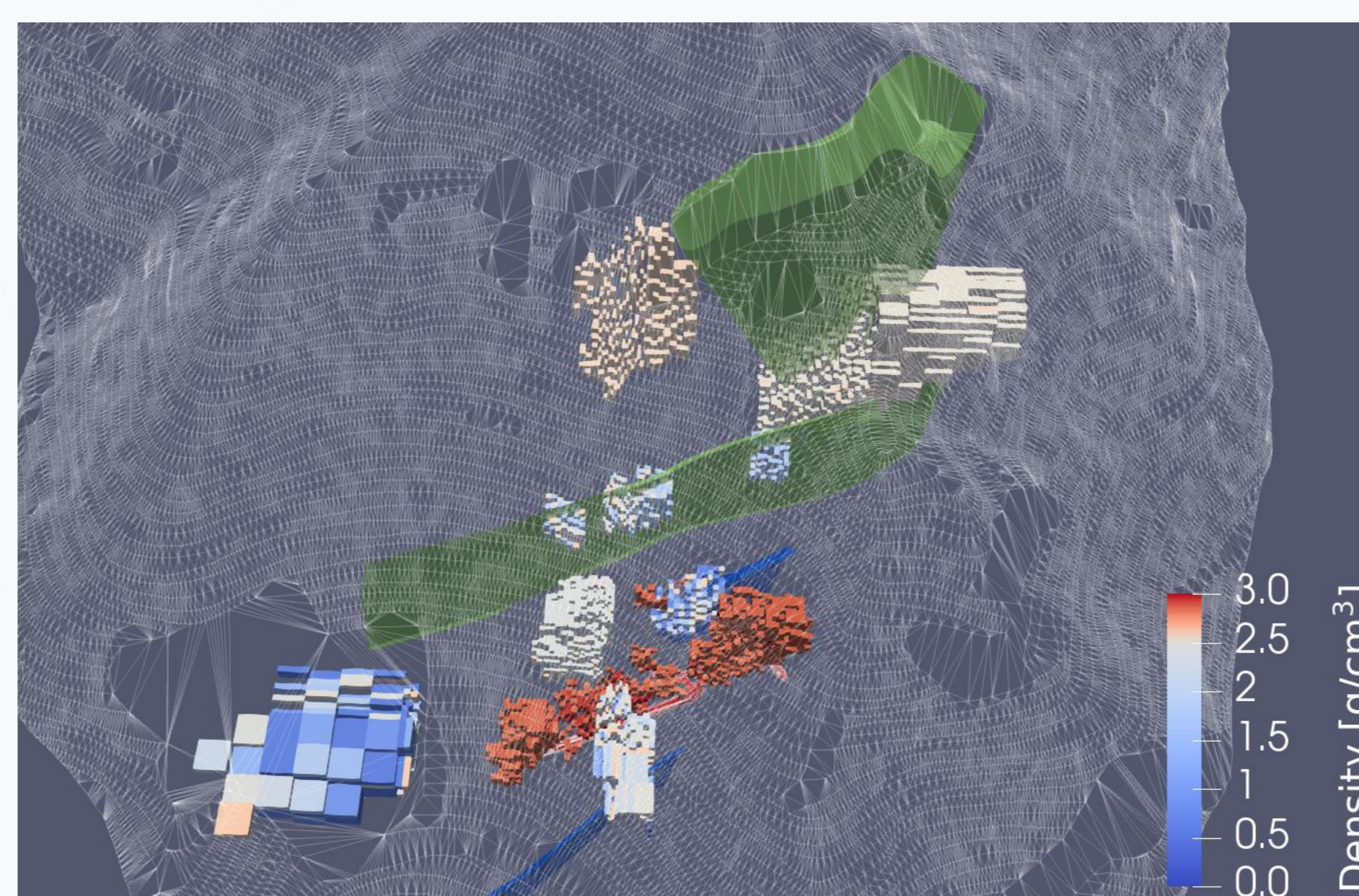


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On-site experiment at the Zaozigou deposit



Grids: low-density anomalies reconstructed by the common method; Rays: abnormal directions. Long cavities seem to be indicated along these lines. However, as the existence of the stope was already known, we considered them as 'fake anomalies', an erroneous reconstruction of the stope by the algorithm.



Survey results at a gold deposit using the new algorithm. Green and blue surfaces: ore body models. The surface in B5: the model of a slate.

- Discovered four mined-out areas; half of them are confirmed by the documentation.
- Reconstructed the slate whose density are slightly different from the bulk density.

- The on-site experiment proves the effectiveness and the accuracy of this algorithm.