Basaltic rocks are *excellent candidates* for CO_2 storage by *in situ* mineral trapping

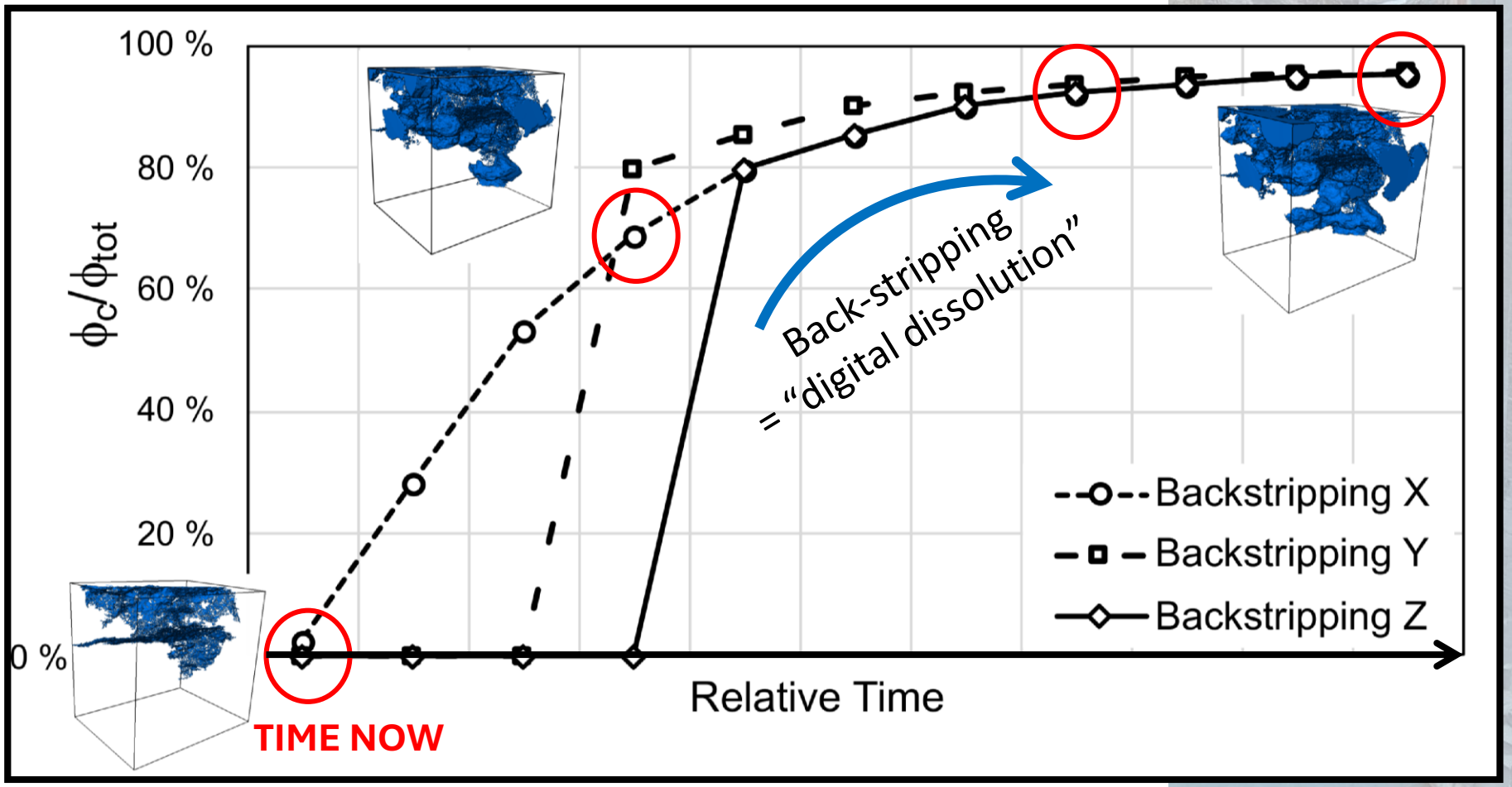
- They constitute up to 10% of Earth's continental surface and deep ocean floors
- They are often capped by *impermeable sediments*
- Up to 25% of *high reactive ions:* Mg^{2+}, Ca^{2+}, Fe^{2+}

Columnar basalts, Iceland (Wikipedia)

Results

1) Constant dissolution (n= 50)

Porosity was reconnected after 10 steps along the X direction



Porosity is more connected along the X direction, along which the fracture network develops.

Results

1) Constant dissolution

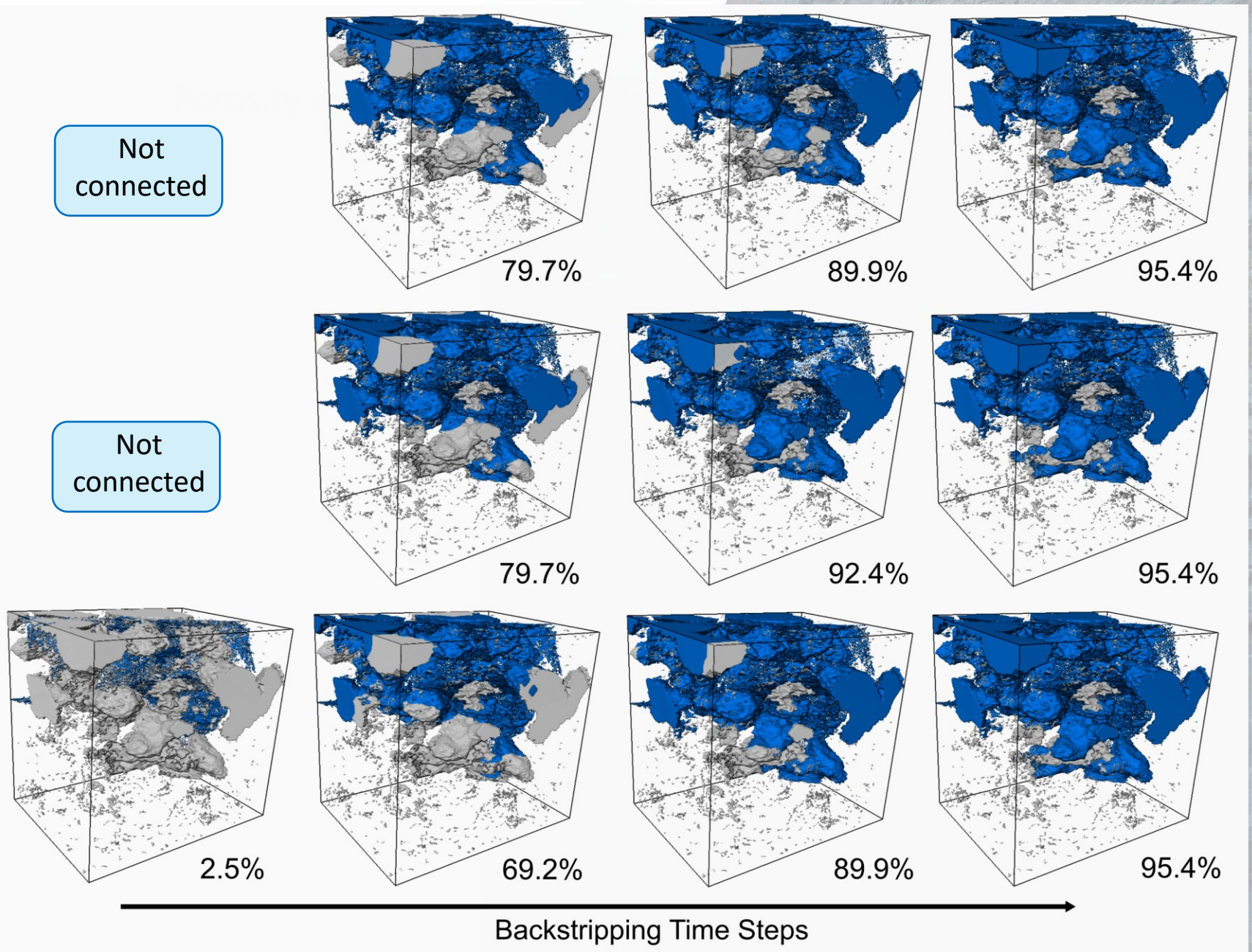
Z

Not connected

Y

Not connected

Micro-fracture network ⇨ X



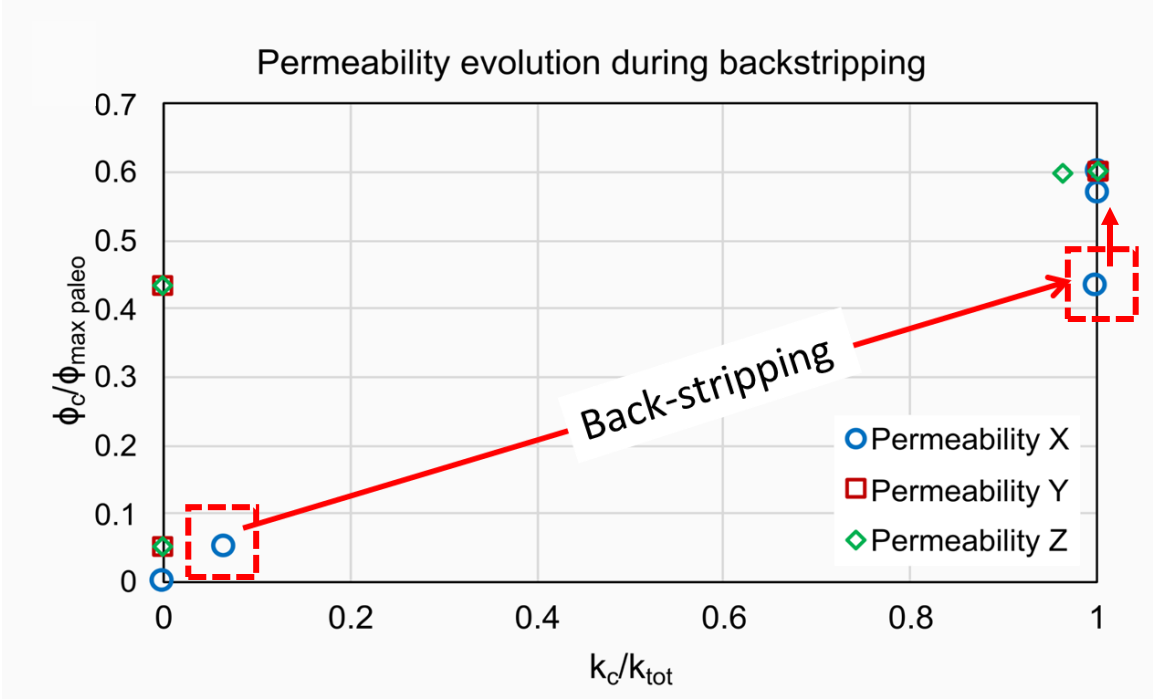
TIME NOW

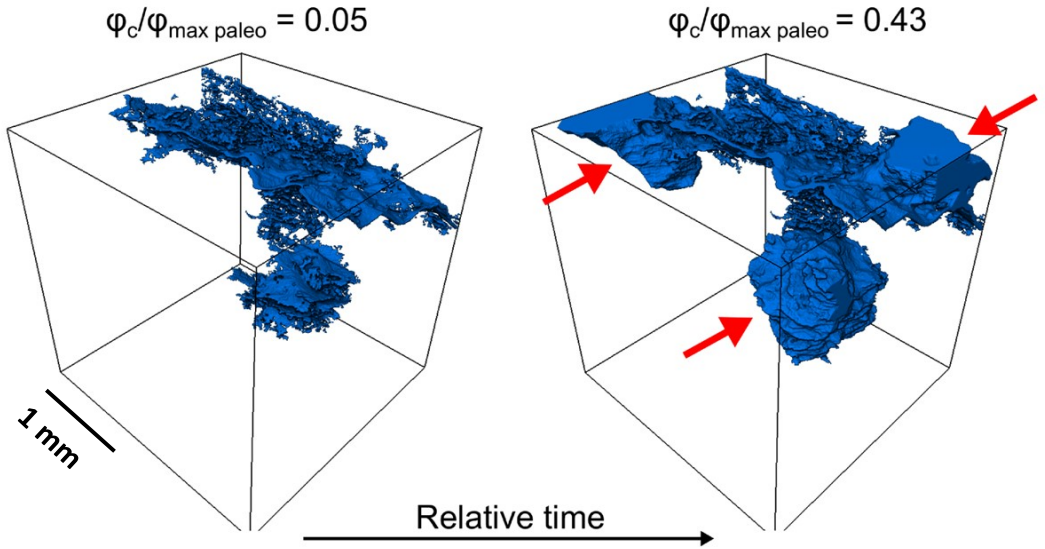
BEFORE PRECIPITATION

Results

2) Evolution of permeability

- Permeability along the X direction increases (from 2 mD to 32 mD) as soon as pores are opened.





Results

2) Evolution of permeability

- Permeability along the X direction increases (from 2 mD to 32 mD) as soon as pores are opened.
- The critical change in permeability during precipitation is caused by **pore closing** and eventually **snapping-off**
- This means that ***permeability during the final stages of precipitation is controlled by the micro fracture network.***
- ***This highlights the importance of further studies into the CO_2 potential of basalt formations, with a particular focus on the presence of micro-fractures.***