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NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

Nuclear Waste Industry Perspective

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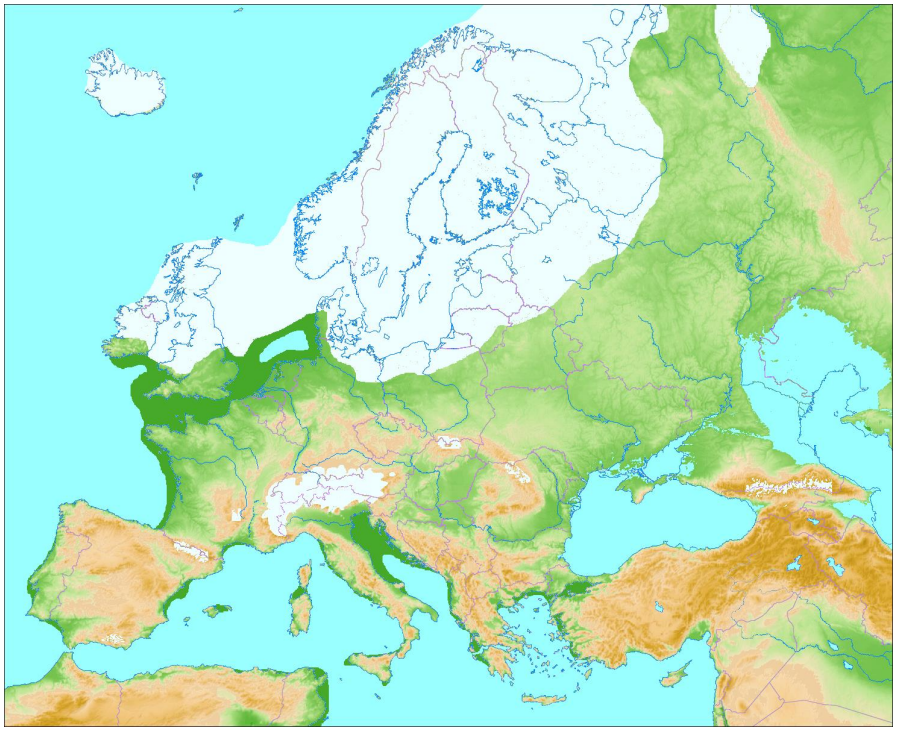
Last Glaciation Maximum

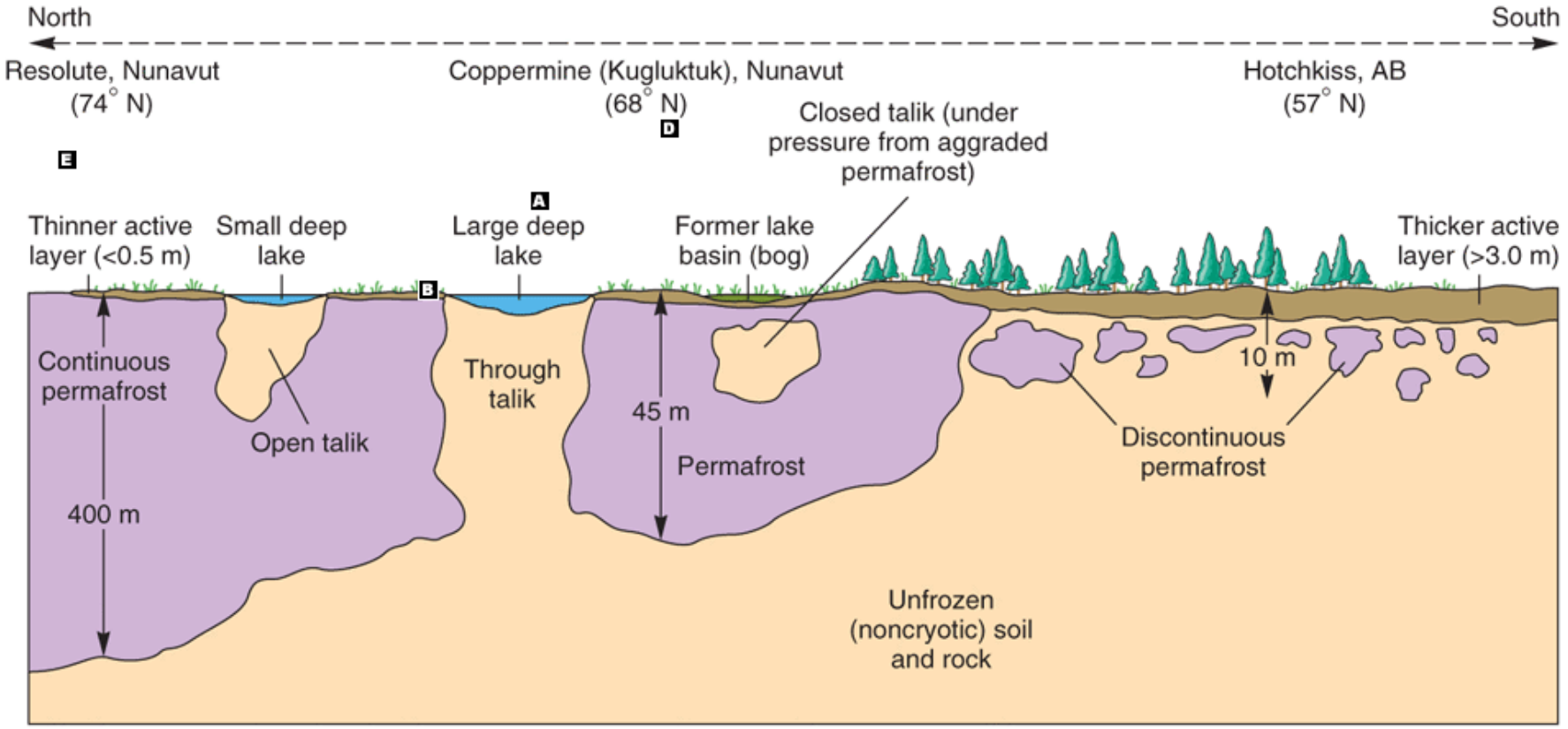
- Glaciation represents one of the most significant external perturbations to a DGR for countries in the north
- Stress, Erosion, Isostasy, Sea Level Change



- Multiple glacial cycles have occurred over the last million years
- Glacial cycles are expected to repeat in the future

Present Day Permafrost Distribution

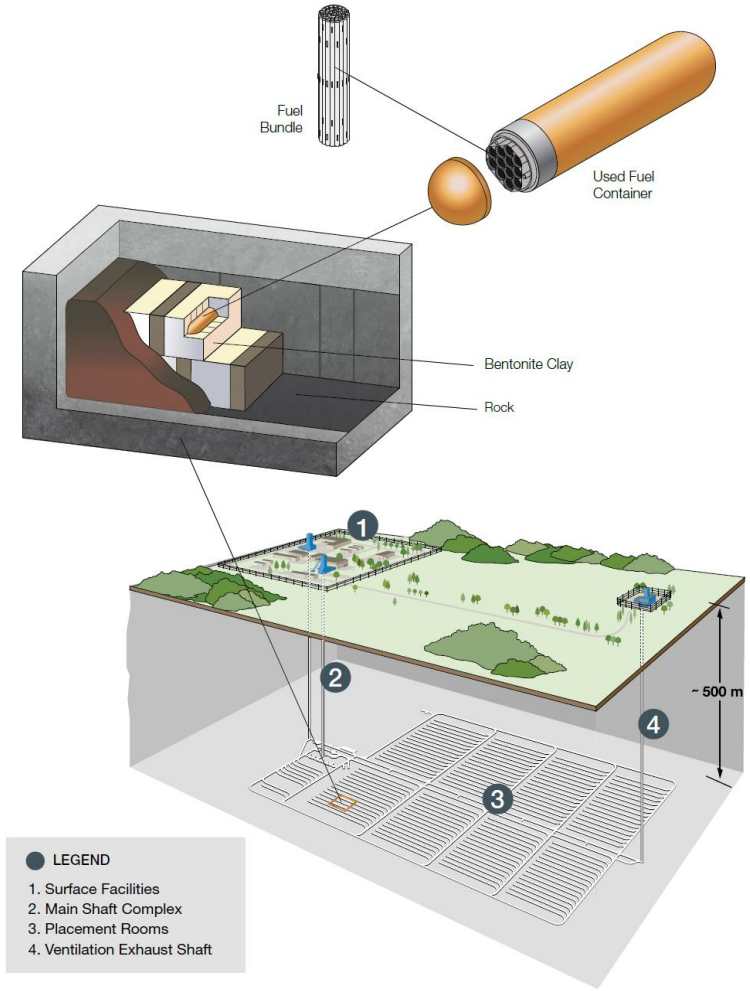
Periglacial Environment



- Permafrost is expected to occur at the DGR site sooner or later for several countries in the north
- Permafrost may significantly affect surface and deep subsurface flow systems

Long Term Safety & Performance of DGR

- Need to demonstrate the long term safety & performance of the used fuel repository to the regulator and public
- We are looking at a very long time frame, 100 Ka ~ 1.0 Ma ~ 10 Ma
- Conclusions and decisions should be based on a sound scientific basis
- A few knowledge gaps in cryo-hydrology need to be filled



Example Uncertainties and Knowledge Gaps

- When will glacial or periglacial climate start at the DGR site?
- How thick will the ice-sheets and the permafrost be?
- What will happen if the permafrost reaches the repository?
- Will the glacier basal be wet or dry? What kind of hydraulic boundary condition should be applied at ground surface?
- How the sub-glacial hydrological system connects to the periglacial hydrological system?
- Are permafrost formation and thaw a linear smooth transition? Or there are distinct points when the system changes quickly?
- Will fractures behave similarly as porous media when frozen?
- How will a talik impact the flow system and transport at depth?