

Mine tailings have short- and long-term effects on benthic communities in an Arctic fjord

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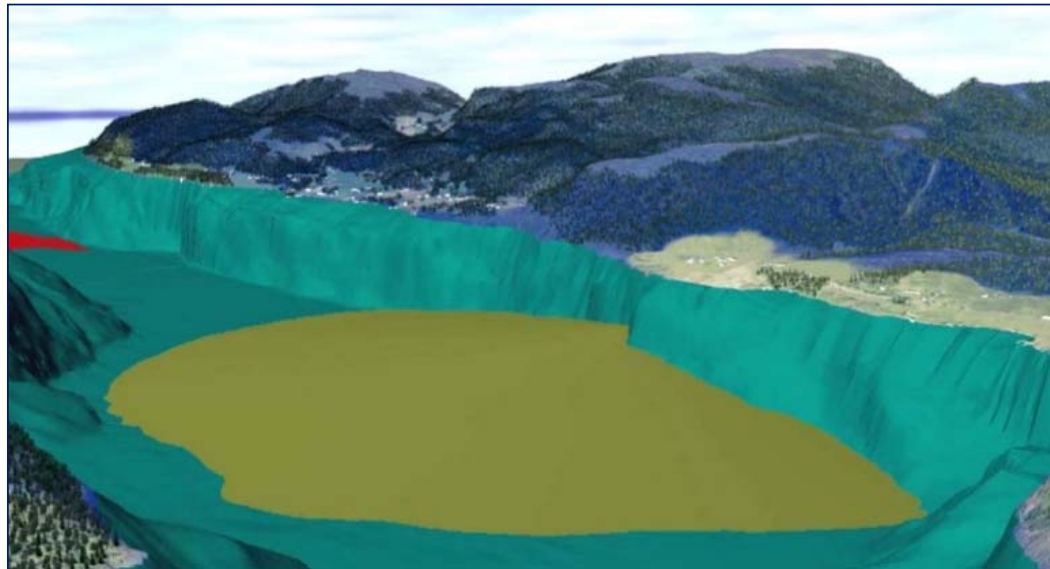


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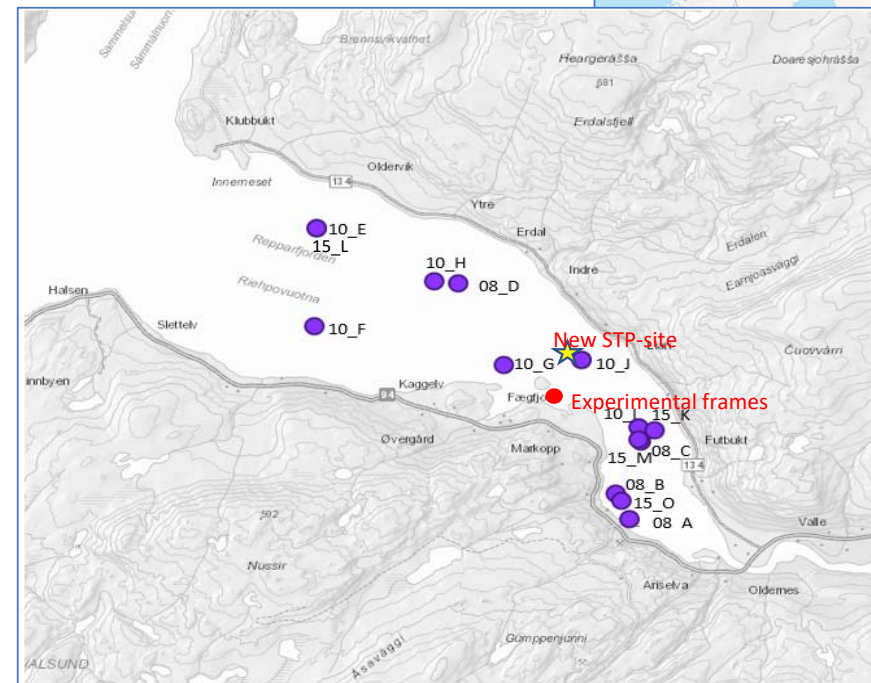
Mine tailings

- By-product produced during the separation of targeted metal(s) from the mined ore
- Crushed stone, minerals and metals, process chemicals
- Mine tailings in some cases disposed in sea deposit (submarine tailing disposal, STD)
- Large amounts!
 - Magnitude up to an order of million ton/year
- Extent of effects in space and time?



Repparfjorden: Benthic colonisation and recovery

- Community recovery in an old sea deposit (70ties)
- Colonisation of sediments treated with fresh tailings





Repparfjorden colonisation experiment: setup



From seabed to defaunation
and manipulation to seabed



Location: Repparfjorden, Finnmark (16-18 m depth)

Method: Experimental trays, Repparfjorden tailings

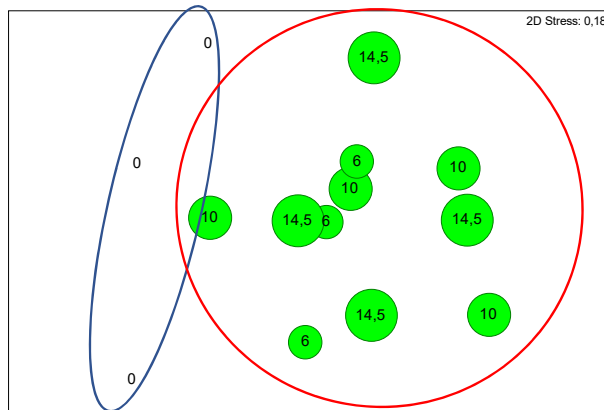
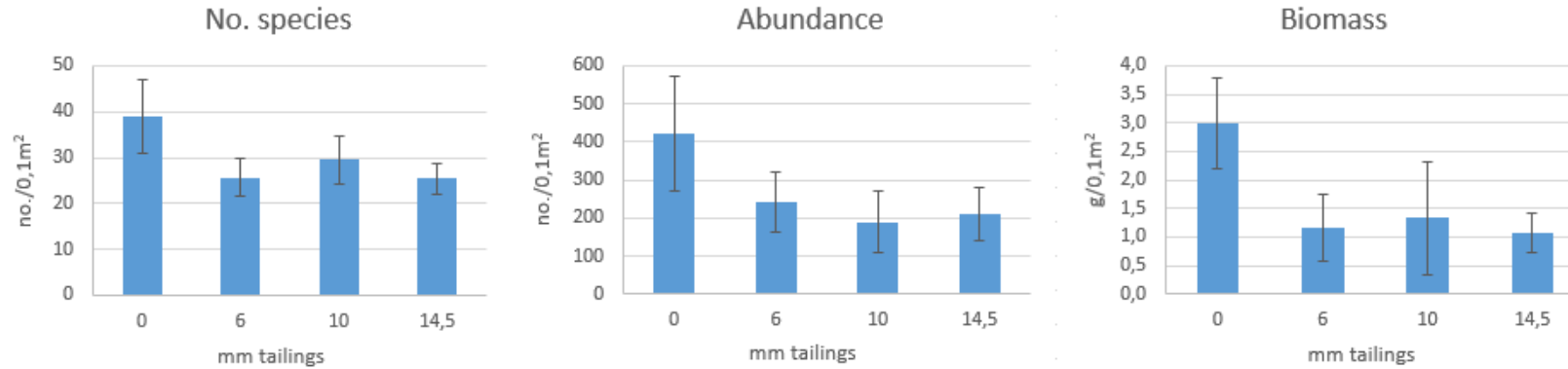
Treatments:

- Control
- 6 mm tailings
- 10 mm tailings
- 14.5 mm tailings

Duration: 15 months

Samples: Macrofauna, sediment parameters, trace metal concentrations

Mine tailings negatively affected benthic recolonization



Main findings:

- Reduced colonization at a scale of mm
- Response independent of layer thickness
- Toxic response (particularly copper) and/or effect of grain size?

Mine tailings were associated with decreased faunal abundance in mesocosm

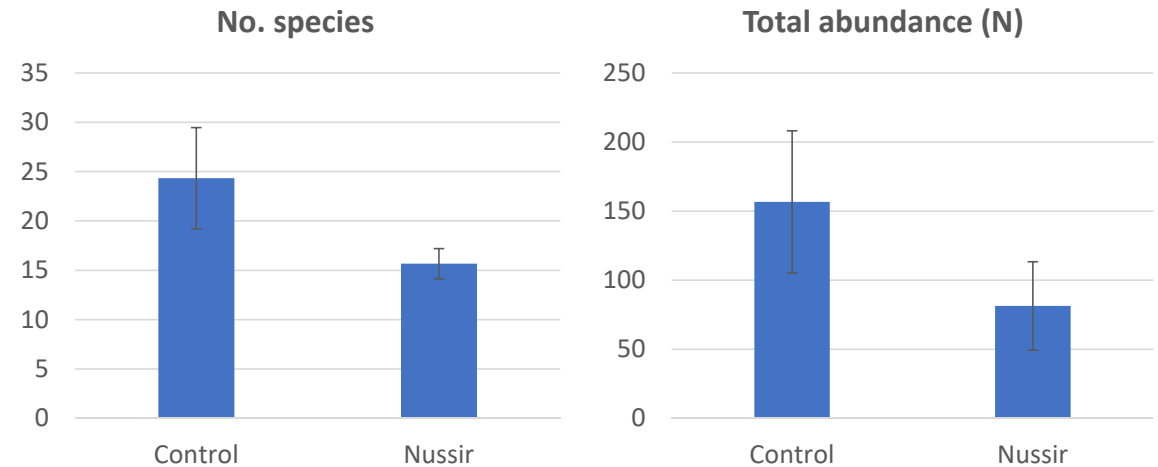
Method: Solbergstrand mesocosm

Treatments:

- Control
- Nussir tailings: 2 cm

Duration: 4.5 months

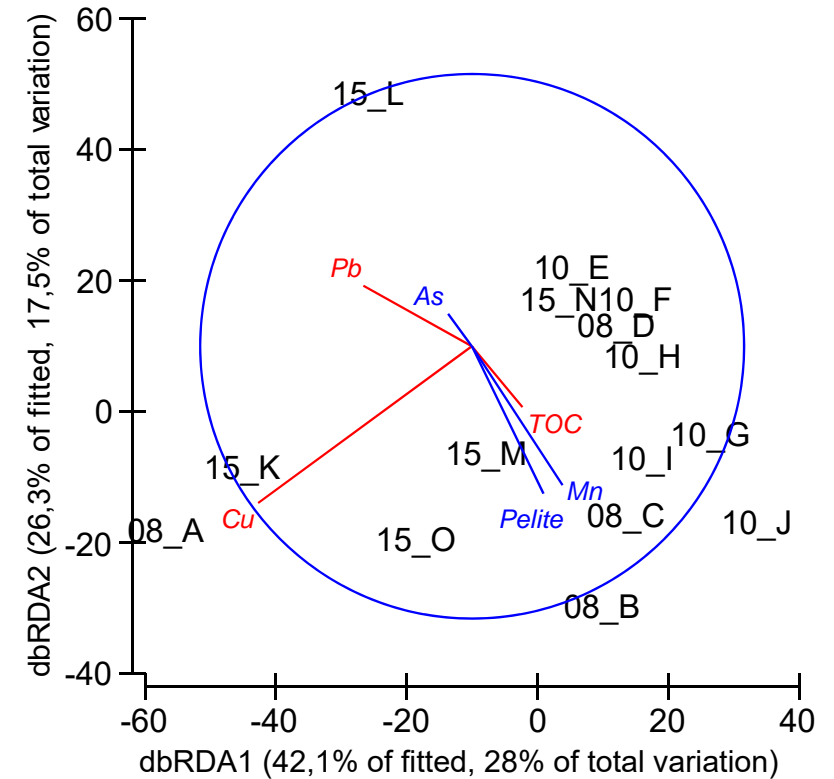
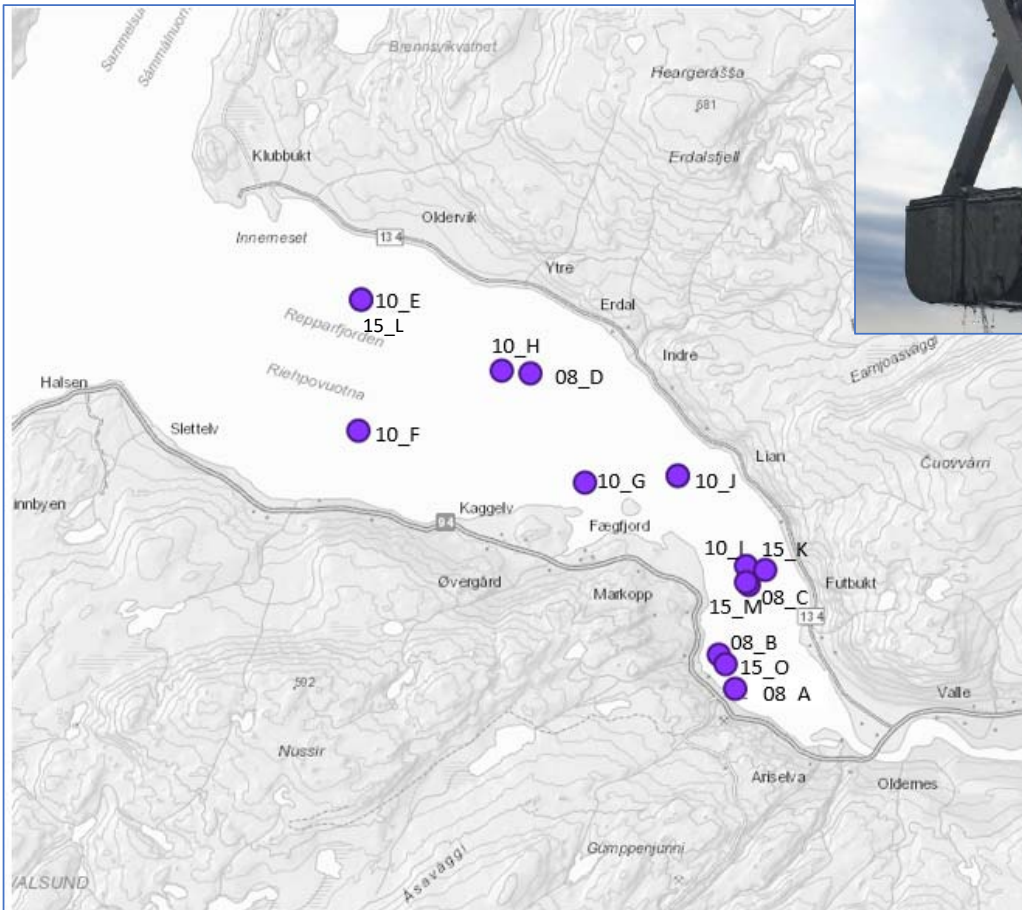
Samples: Macrofauna, electrode measurements, sediment parameters, trace metal concentrations



Main findings:

- Relatively similar grain size between control and tailings
- High copper-concentration in tailings-boxes

In situ faunal communities affected by the old deposit



Main findings:

- Copper ranged as significant and the most important factor for the faunal composition
- Tailings from the old deposit still present and enriched in metals

CONCLUSION

- Fresh mine tailings were associated with reduced colonization and faunal mortality in a mesocosm setup
- Tailings from the old deposit still present, where they seem to affect benthic communities

Future research needs:

- More research on the actual response mechanisms
- Are Arctic communities more vulnerable?



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