

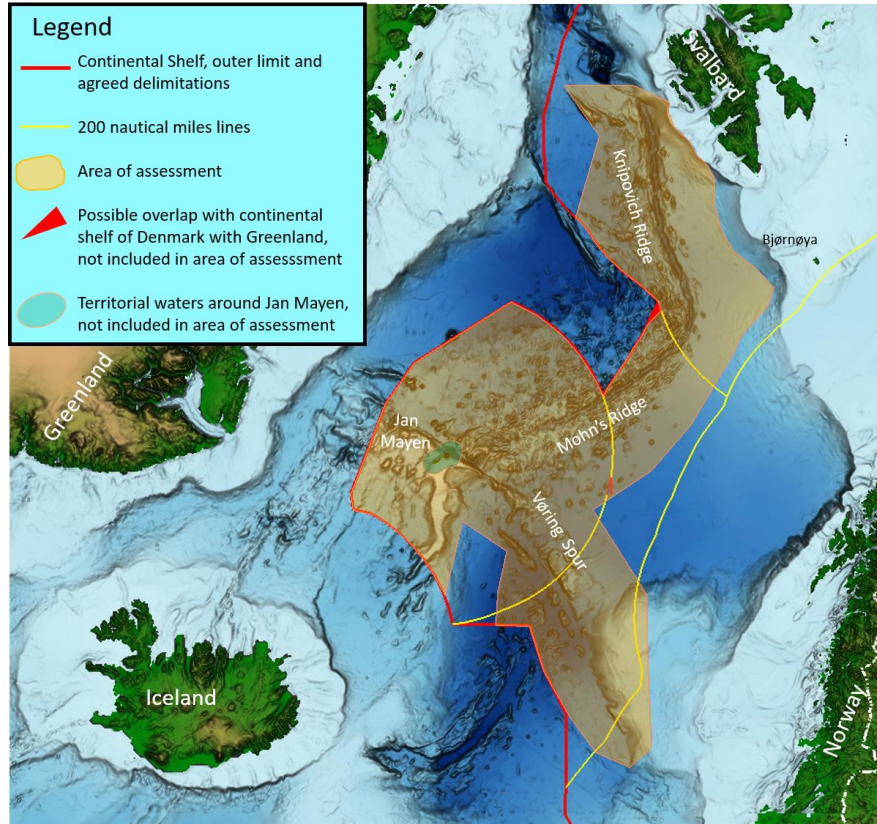


# Status Resource Mapping on the Norwegian Continental shelf

Marine minerals

Sissel H Eriksen, NPD

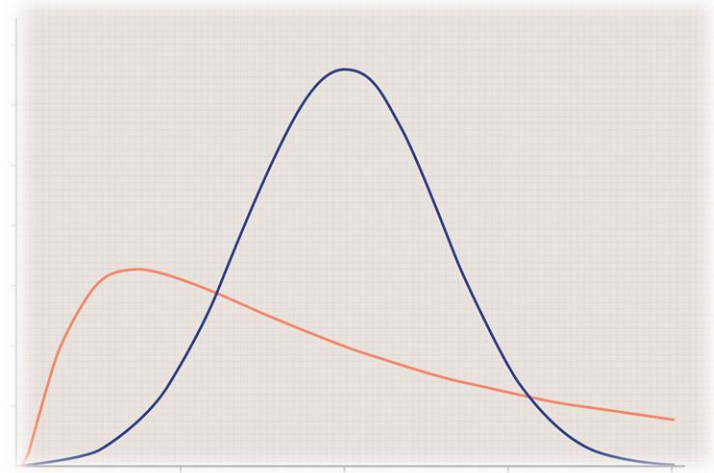
# Opening process – assessment study area



- The Subsea Minerals Act: 1 July 2019
- Competence lies with the Ministry of Petroleum and Energy (MPE)
- The NPD is the expert agency of the MPE
- The MPE has initiated the opening process as stipulated in the Act
- The NPD is tasked with the
  - Impact Assessment study, as well as
  - mapping and estimation of the resources

# Resource Assessment Seabed Minerals

- NPD shall map the most prospective mineral deposits, and based on the mapping to give an assessment of the resource potential on the NCS.
- Data acquired during cruises the last four years will be applied.
- The NPD is in the process of establishing methods and testing software for viable assessments. Deposit modelling and probabilistic distribution need to be set; results from software such as GeoX and @RISK needs to be evaluated. We also keep an eye on international work on resource assessment



# Types of mineral deposits on the NCS



Sulphides

03 June 2021

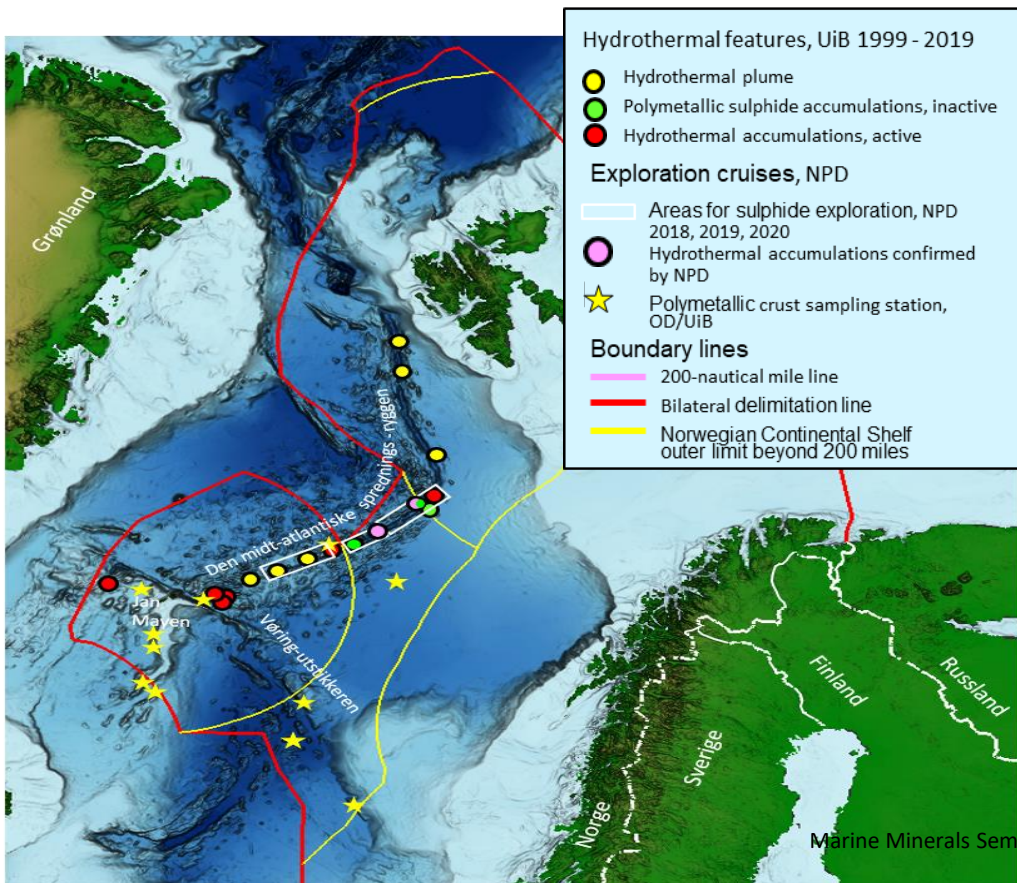


Crusts

Marine Minerals Seminar, NPD



# Exploration Sea-bed minerals 1999-2020

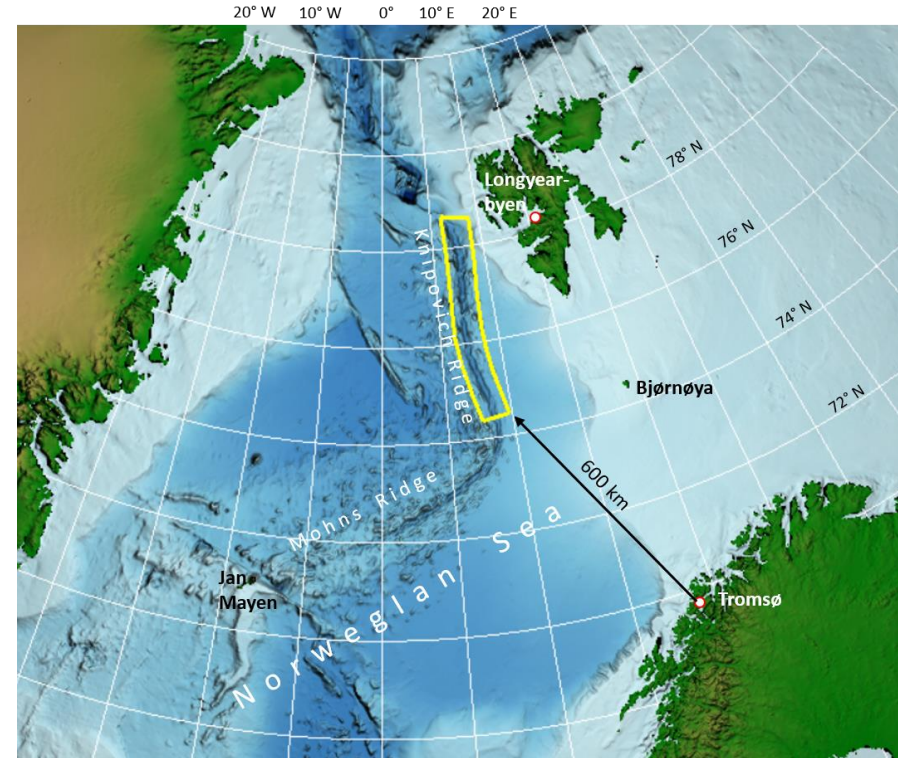


## Database, Sulphides and Mn-crusts

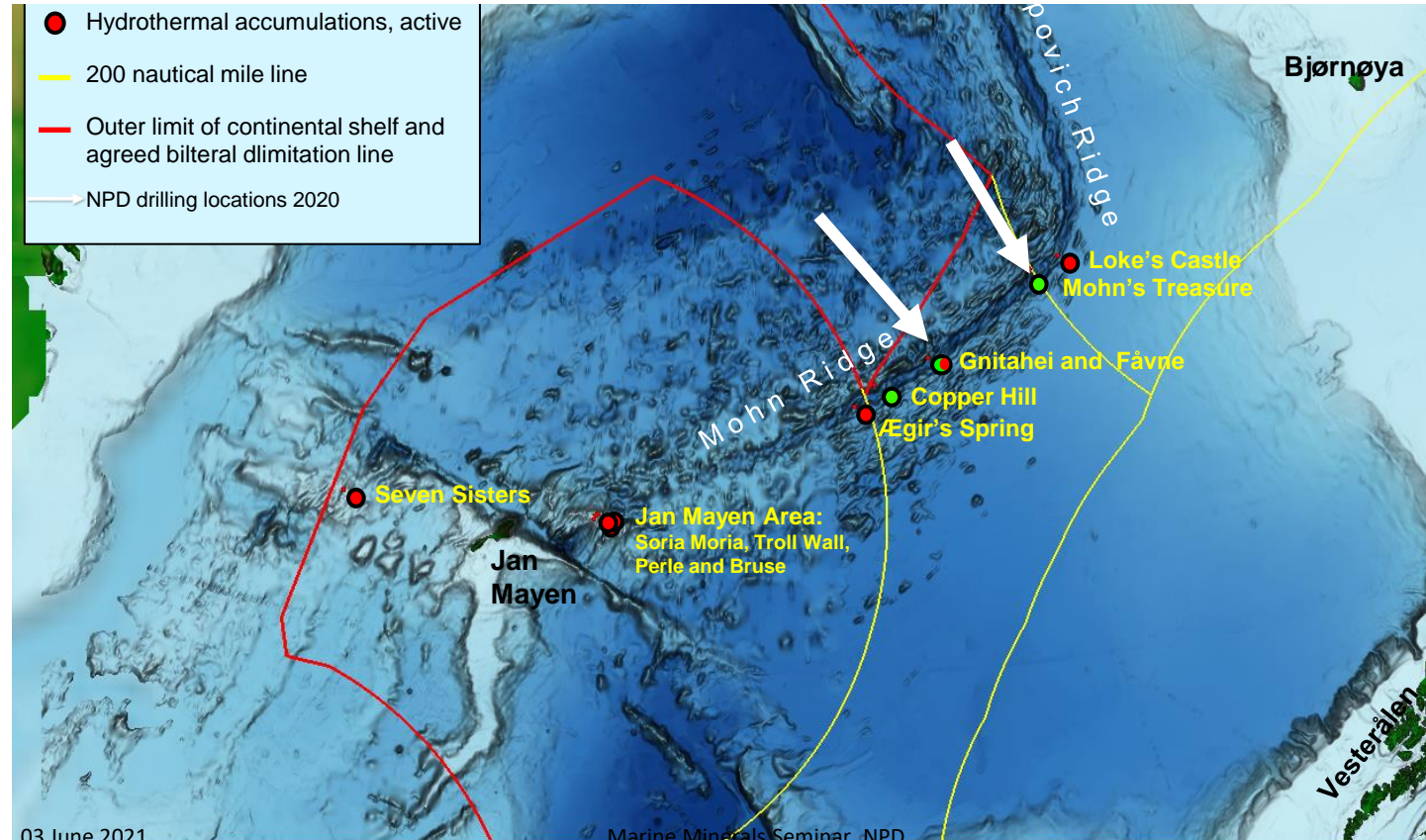
- 1999 – 2020: UiB, annual scientific research cruises
- 2011 – 2020: NPD-UiB joint annual scientific research cruises
- 2016: NTNU, scientific research cruise (MARMINE)
- 2020: NPD – UiT joint scientific research cruise
- **2018 - 2020: NPD, annual cruises for exploration and data acquisition based on commercial tenders – Mohns Ridge**
- **2021: Geophysical cruise,**
  - Knipovich ridge

# NPD Cruise 2021 – southern part of the Knipovich-ridge

- Detailed mapping of southern part of the Knipovich-ridge by ROV & AUV
- Focus:
  - 2 possible Hydrothermal plumes
- Announcement (Merrell og Doffin)  
<https://www.merrell.com/en/tender/148393965/innsamling-av-geodata-for-kartlegging-av-sulfidforekomster-i-norskehavet---prekvalifisering-tender.aspx>
- Plan to sign contract June 2021

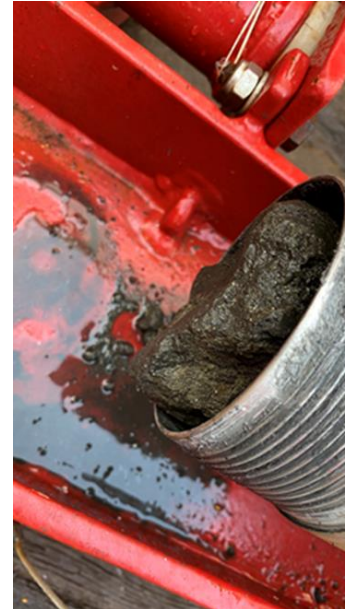


# Known hydrothermal accumulations within the NCS





# NPD - cruise 2020 – Riserless Coiled Tubing core drilling





## Sulphide cores from MS2 & MS4

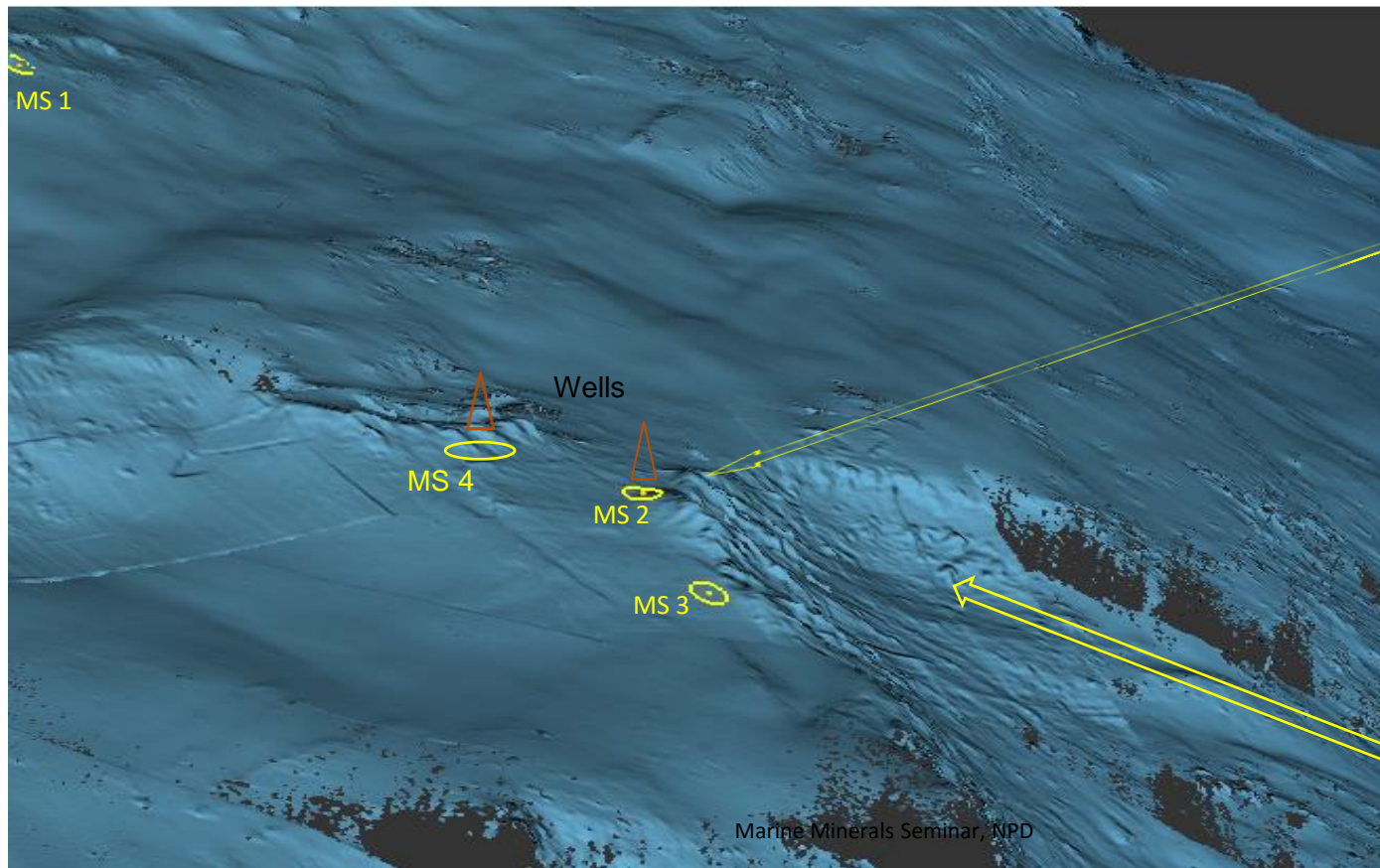


03 June 2021

Marine Minerals Seminar, NPD

# NPD 2020

## Drilling locations Mohns treasure, & ROV sampling

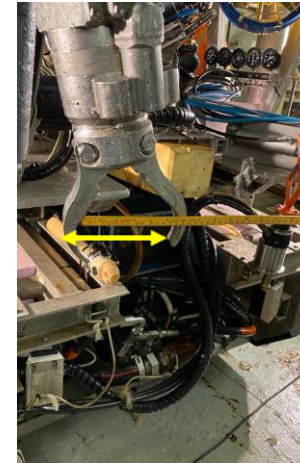
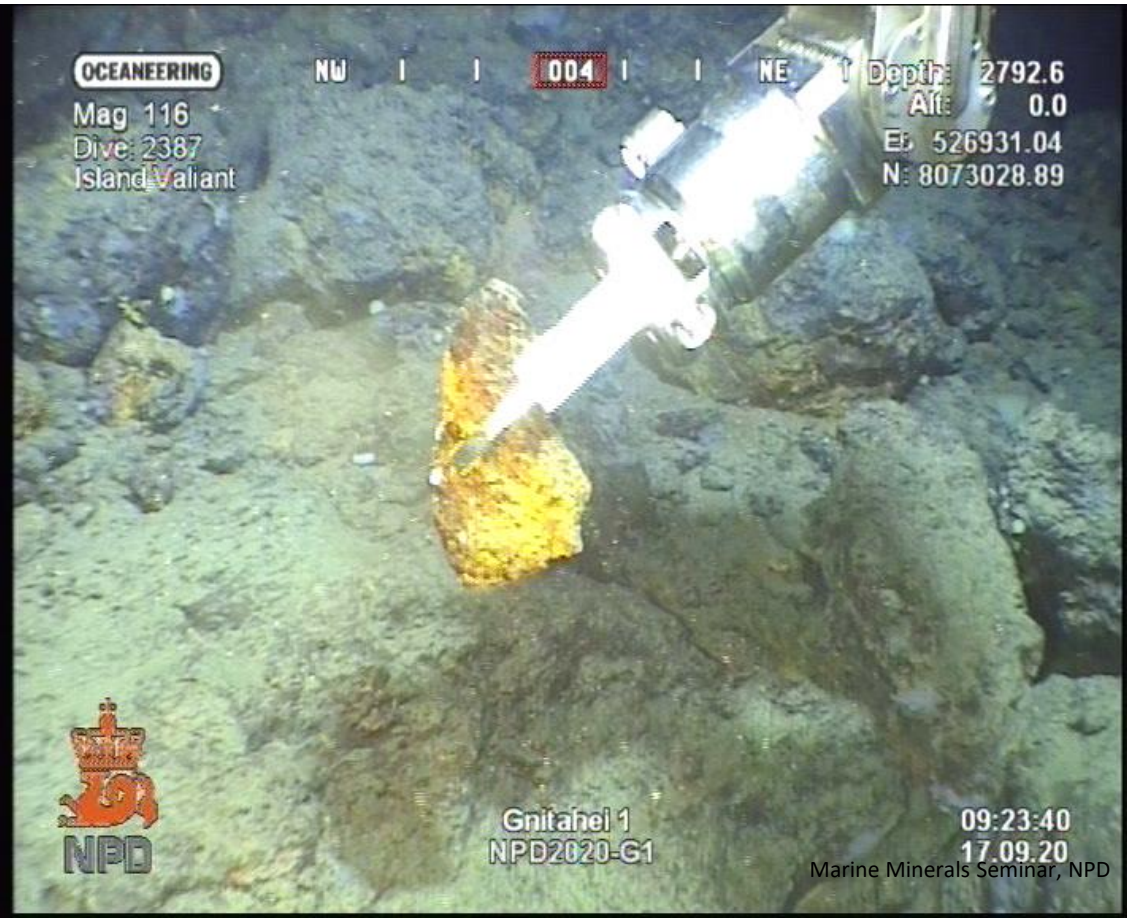


Sulphide chimneys





# ROV-sampling

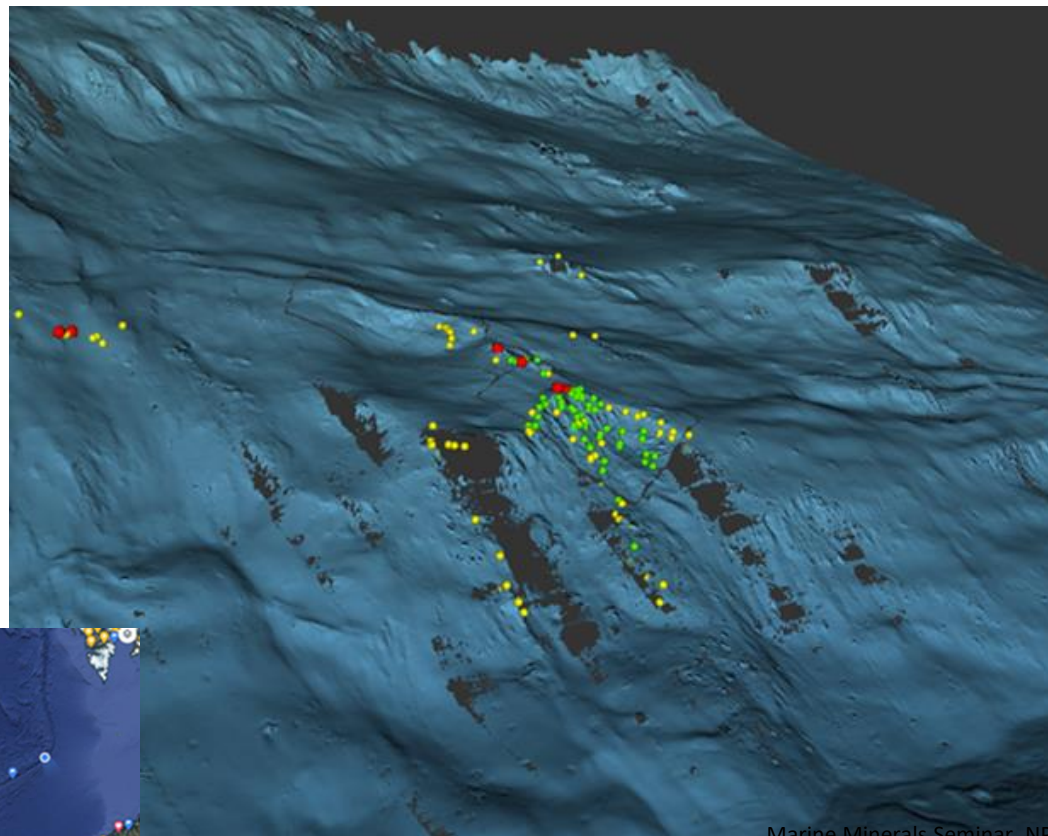


15cm





# ROV-sampling, Mohns Treasure

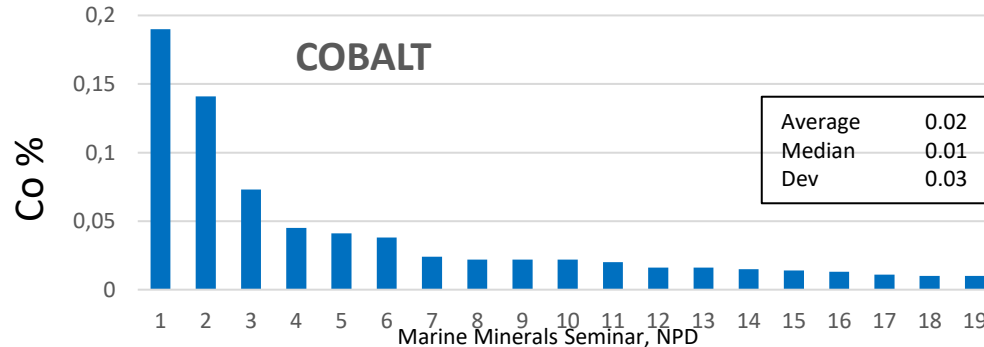
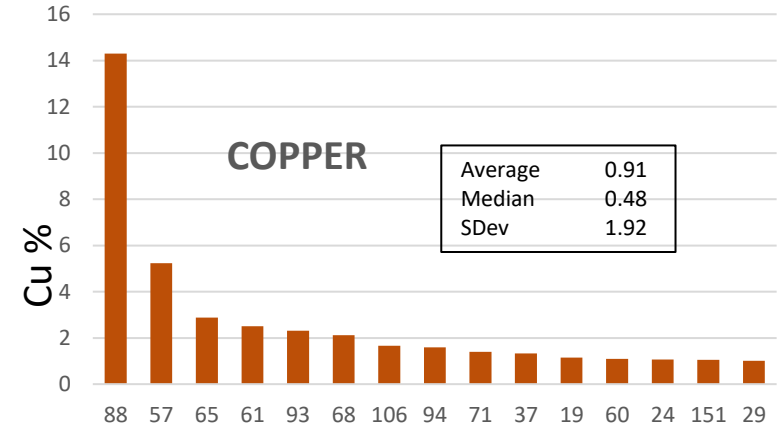
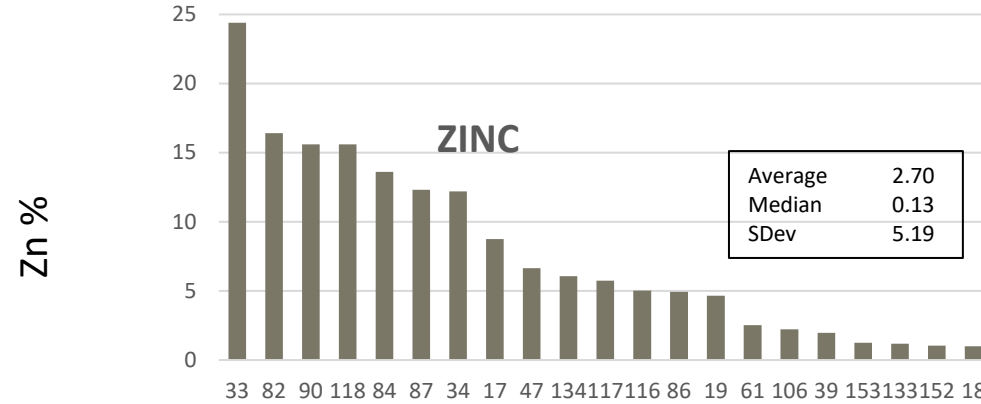


05 June 2021

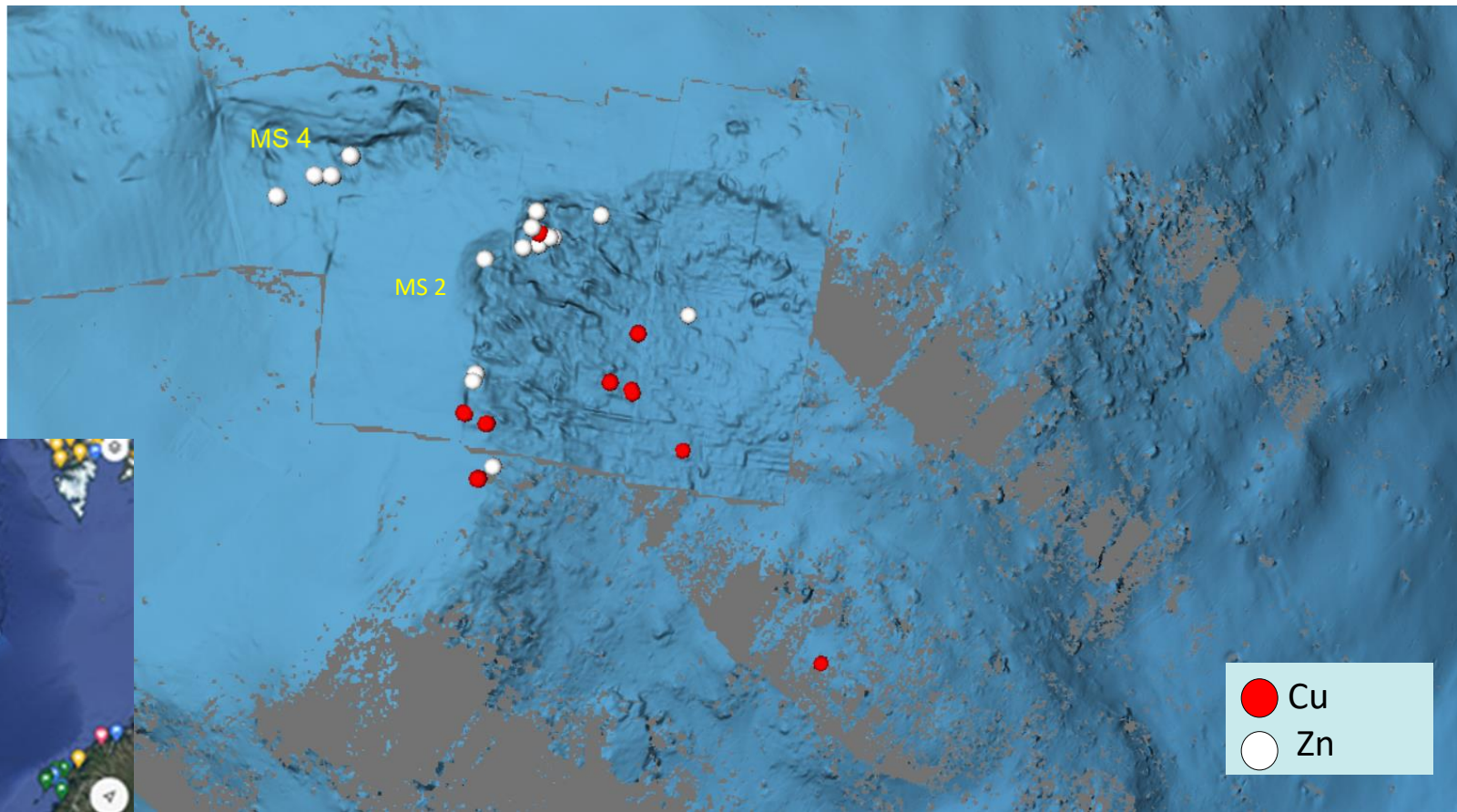
Marine Minerals Seminar, NPD



# 2020-cruise, Zn, Cu, Co analyses (FUS-MS<sub>method</sub>)

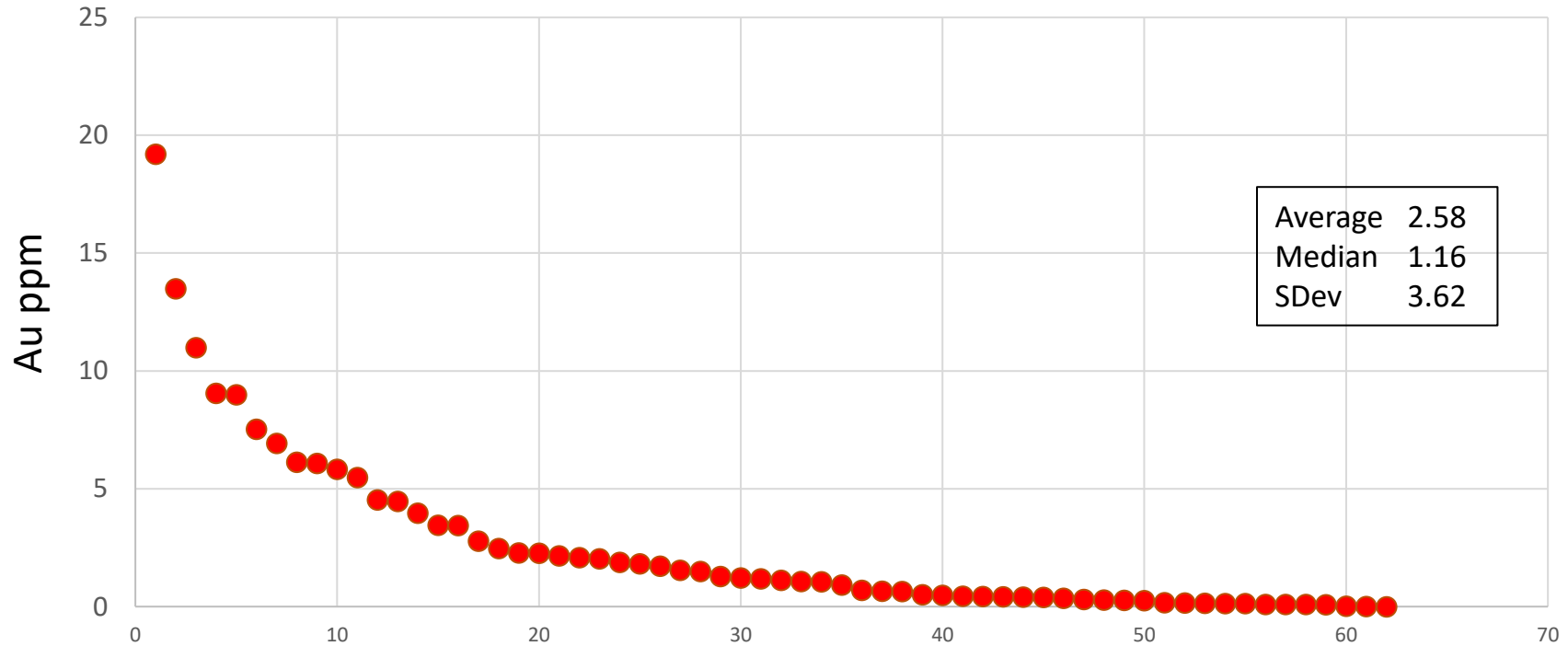


# Samples of Cu and Zn contents >1%

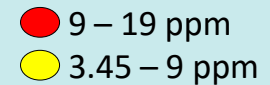
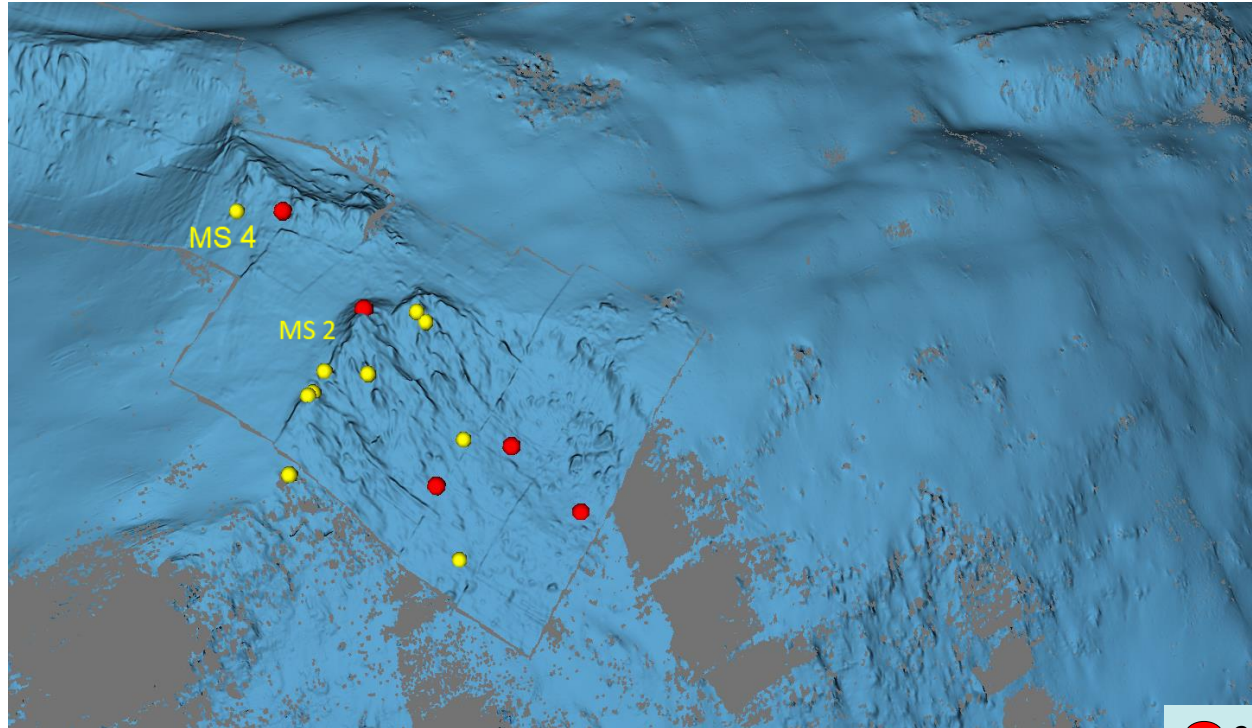




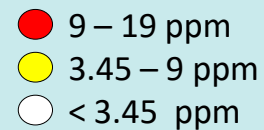
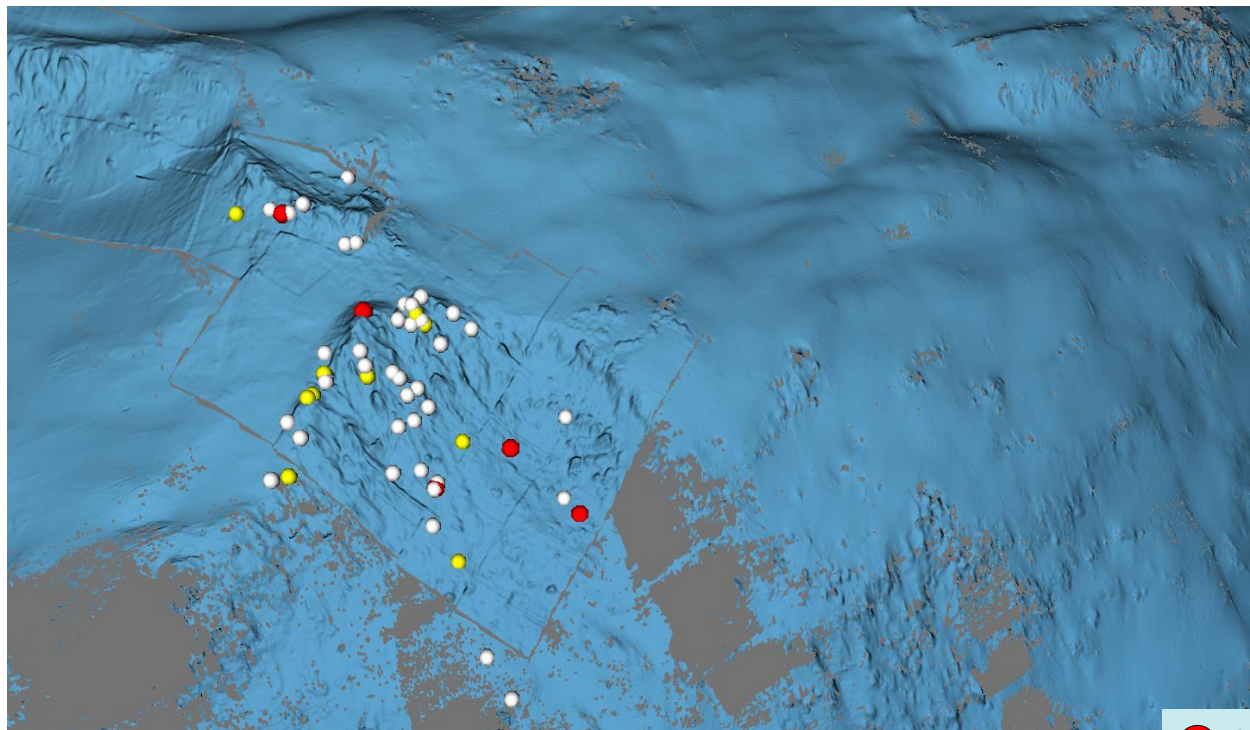
# 2020-cruise, gold analyses (INAA)



# Gold analyses (Au) - high to medium contents

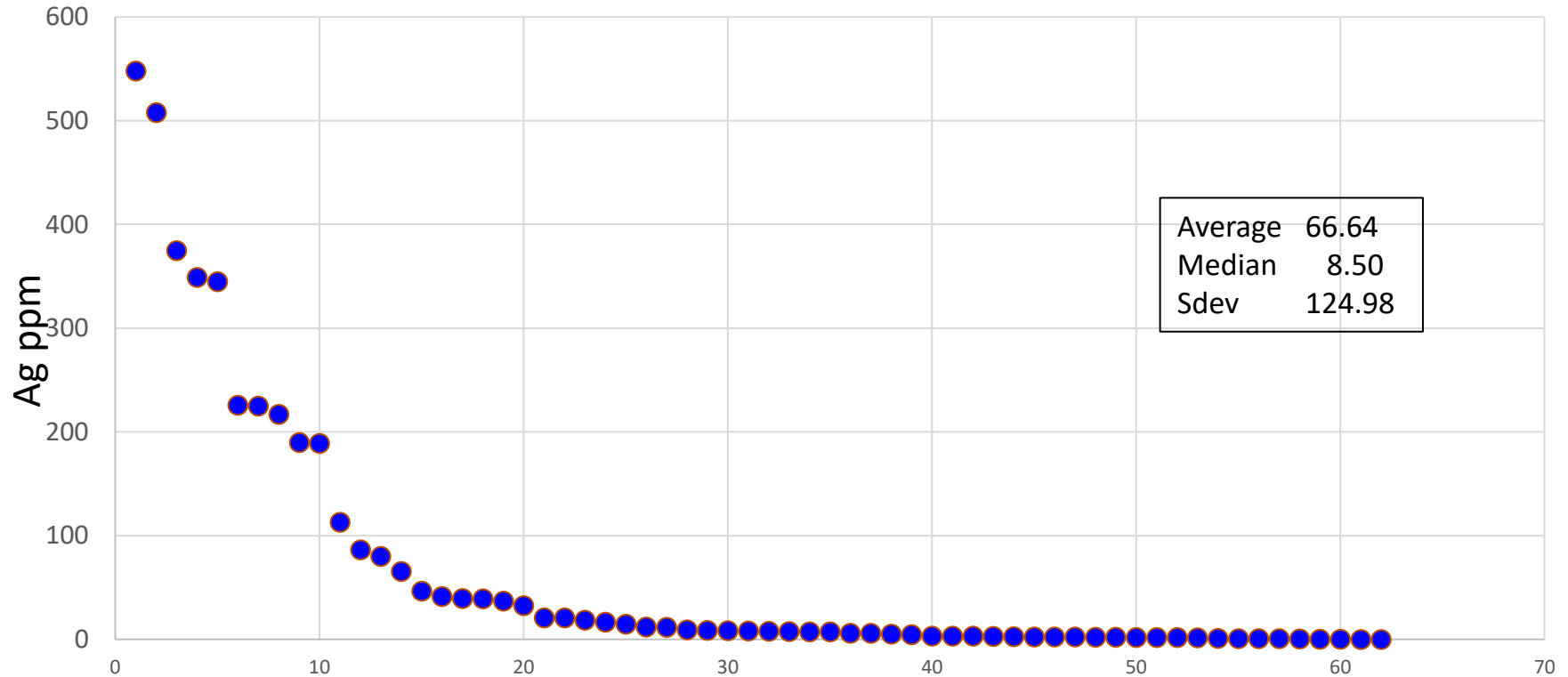


# Gold analyses 2020

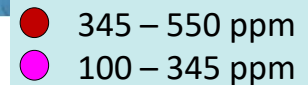
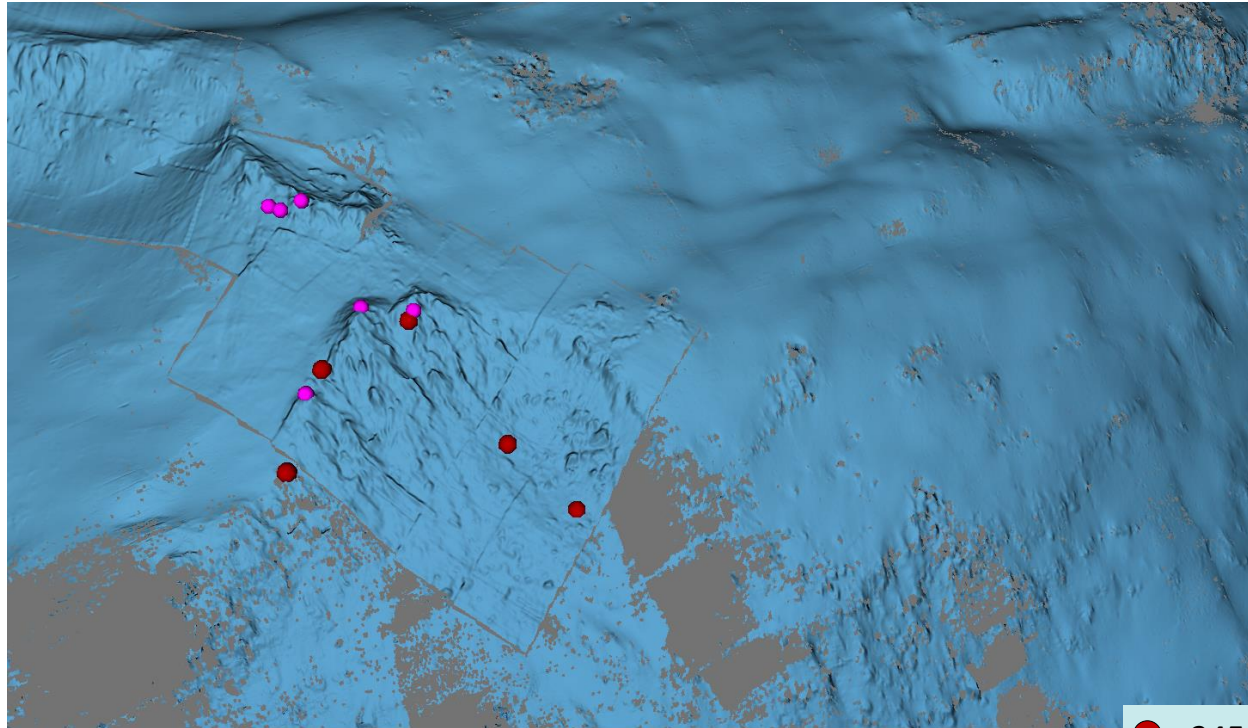




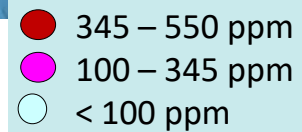
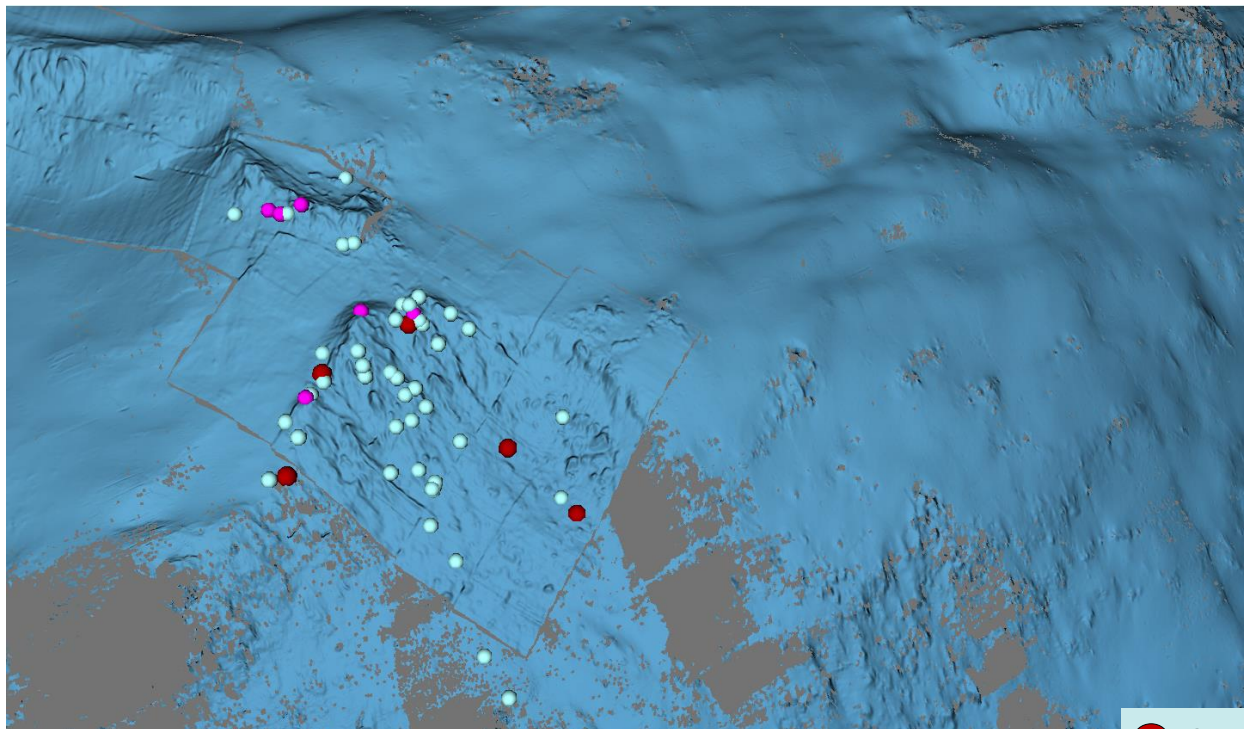
# 2020-cruise, silver analyses (INAA)



# Silver analyses (Ag) - high to medium contents

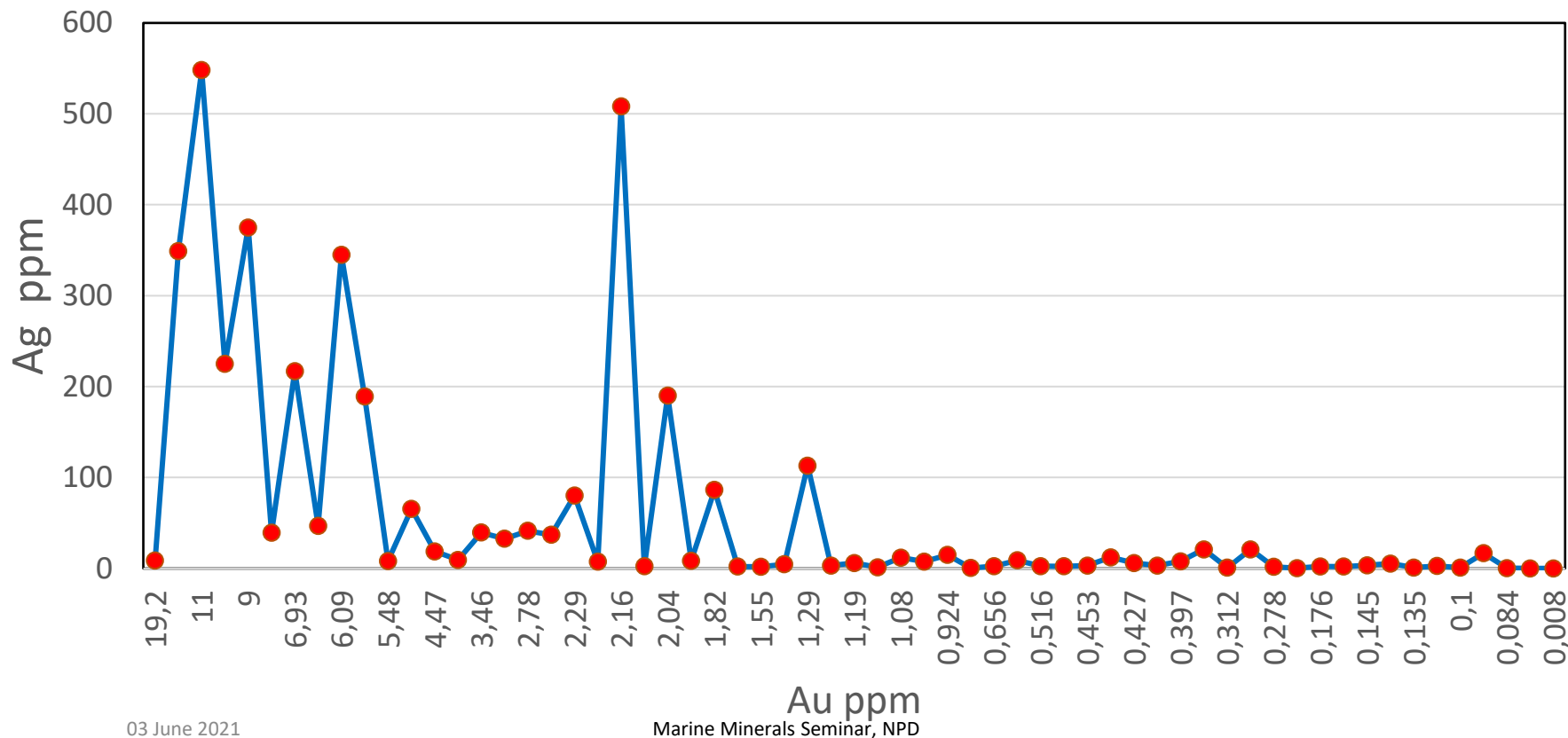


# Silver analyses 2020

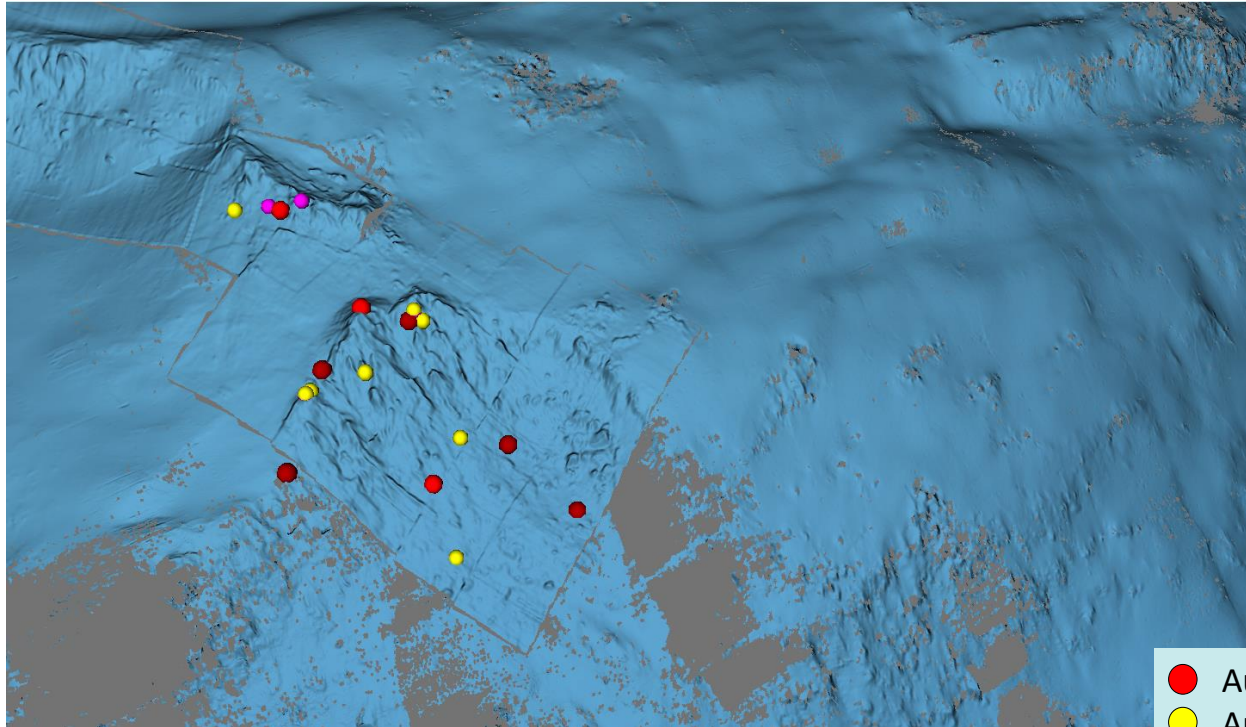




# Content of Ag vs content of Au for individual samples analyzed



# High to medium Au and Ag



- Au high
- Au medium
- Ag high
- Ag medium

# Summary

- Opening process, Impact Assessment and Resource Assessment is ongoing
- Annual NPD cruises increases the database and the geological understanding
- Analysis from the 2020 drilling cruise shows interesting values for minerals,
  - Especially the observation that analysis of Gold and Silver have returned high values distributed all over the area on the Mohns Treasure.
- Further data acquisition and studies will be carried out in order to improve our knowledge and expand the database:
  - Better understand the geological setting and distribution of the seabed minerals
  - Make better estimates of the resource potential