Real-time air mercury response from sediment-covered, volcanogenic massive sulphide mineralization on southern Vancouver Island, British Columbia, Canada

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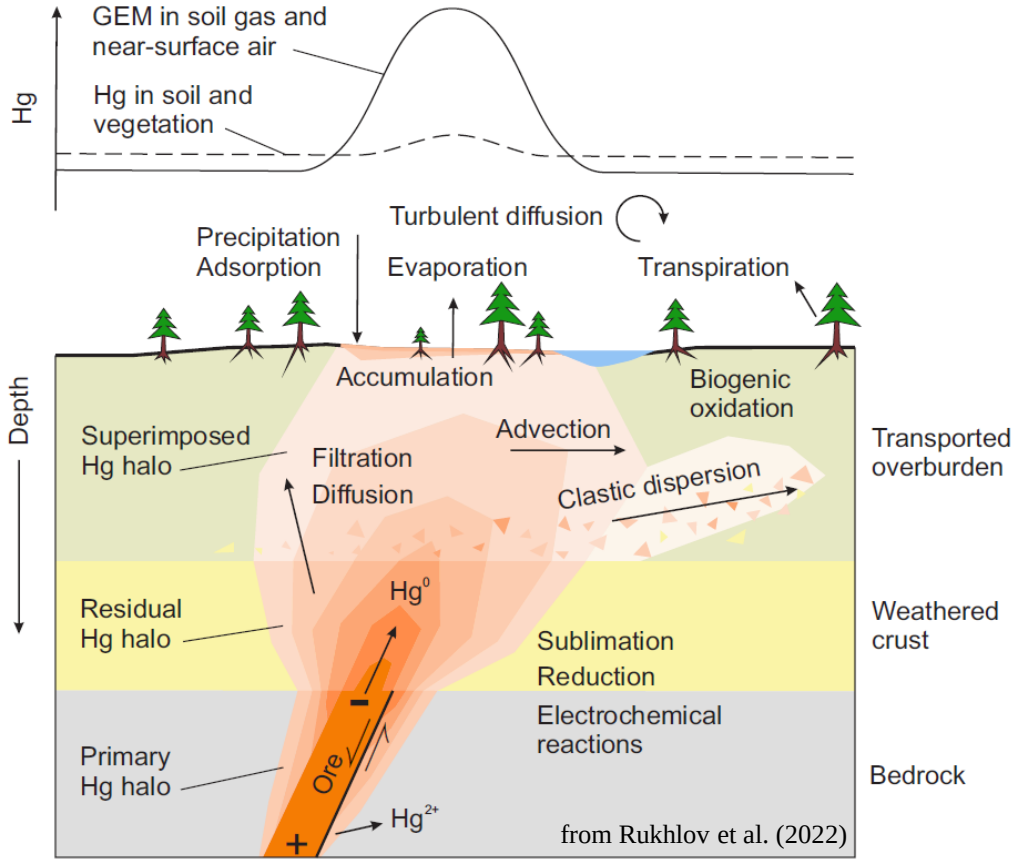
Overview

- Problem and basics of Hg dispersal in surficial environment
- Geology of the Lara-Coronation polymetallic VMS occurrence on southern Vancouver Island
- Methodology
- Highlights of this study

Mercury dispersal

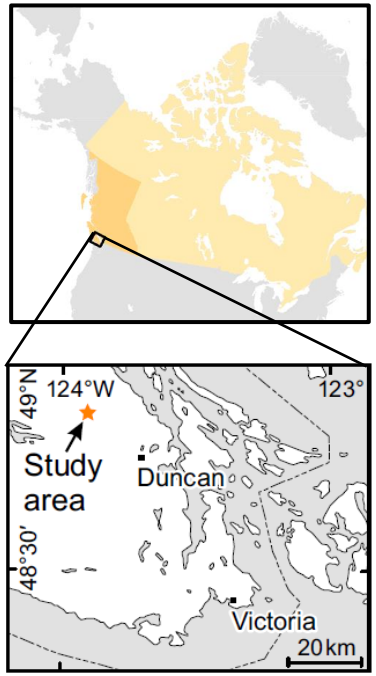
Mercury is particularly informative for mineral exploration, because it:

- is highly mobile
- is common in many ore deposits
- forms haloes directly above mineralization
- is a trace metal, with the ultra-low background concentrations in the Earth's crust (30 to 80 ppb) and atmosphere (<1.5 ng·m^{-3}).



Polymetallic VMS deposit

Location: Vancouver Island, B.C., Canada



LATE CRETACEOUS

Nanaimo Group

- Conglomerate, sandstone

MIDDLE TO LATE TRIASSIC

Mount Hall gabbro

- Gabbro, diorite

MIDDLE TO LATE DEVONIAN

Sicker Group

McLaughlin Ridge Formation

- Altered mafic rock
- Intermediate volcanic rock
- Felsic volcanic rock, minor black argillite, mudstone

Saltspring intrusive suite

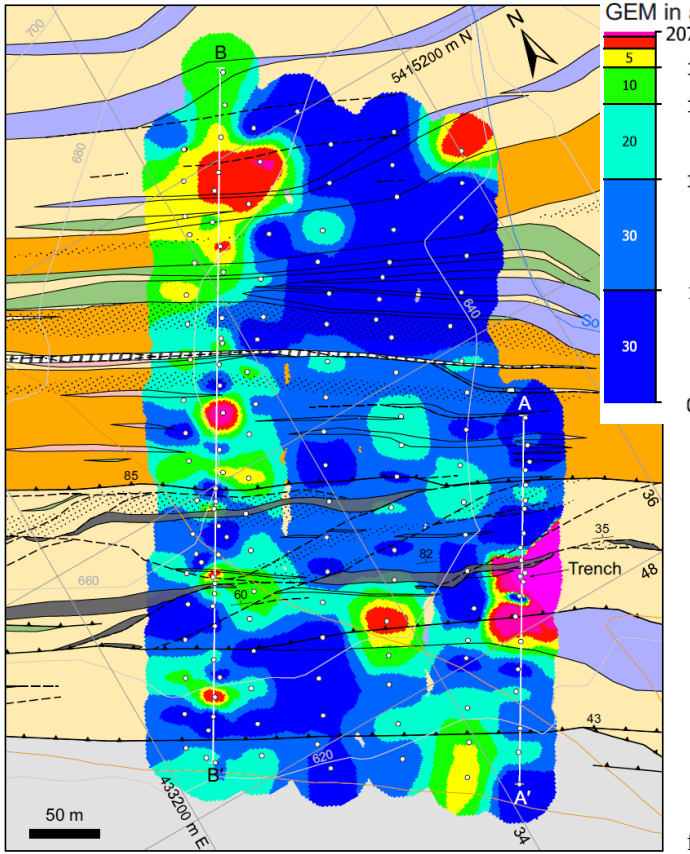
- Felsic dike
- Polymetallic VMS mineralization
- Silicified shear-hosted pyrite and chalcopyrite
- Pyrite ± arsenopyrite-bearing rock
- Shear zone
- Thrust fault
- Forest road

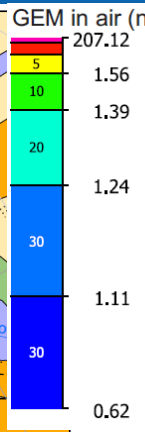
from Rukhlov et al. (2022)

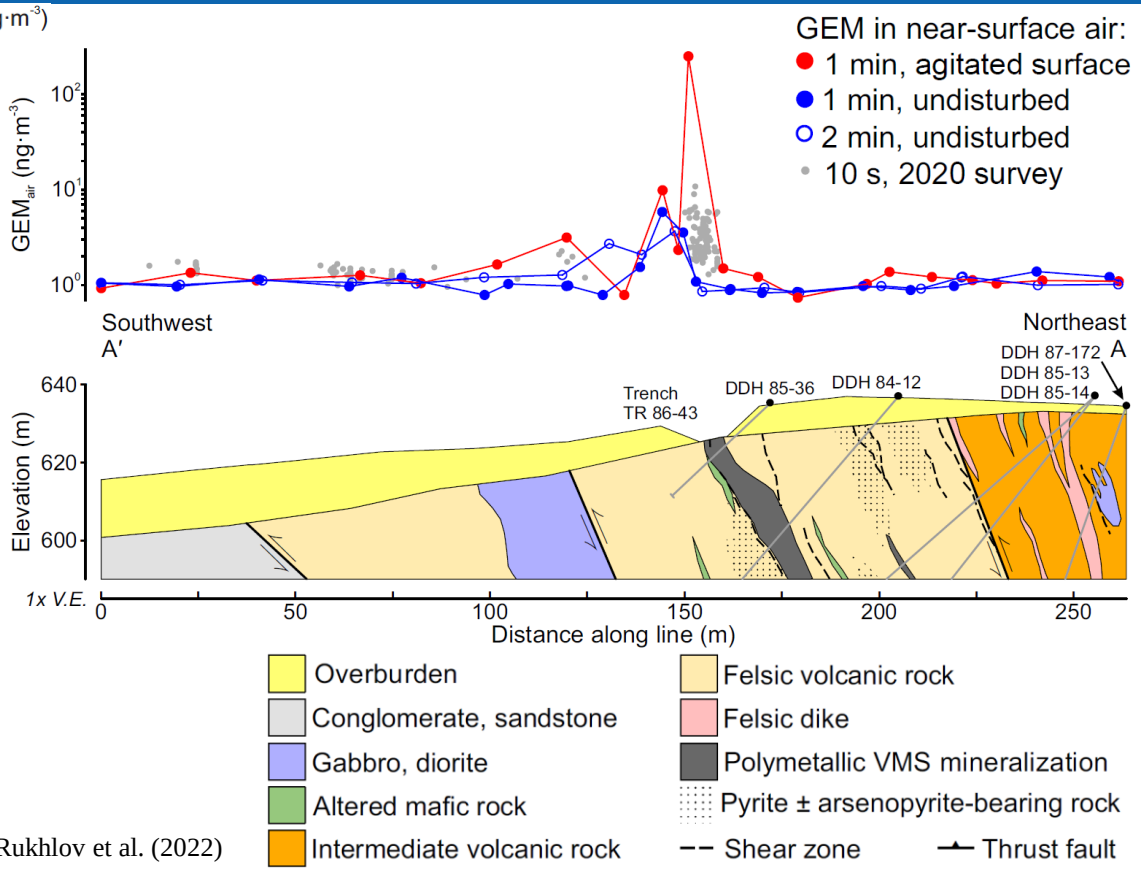
Methodology

- Real-time analysis of Hg in air 1 cm above ground
- Average of 60 to 120 readings (1 second each) per station
- Mechanically disturbed surface immediately before sampling

Air Hg haloes above mineralization







from Rukhlov et al. (2022)

Conclusion

- Real-time Hg vapour sampling of near-surface air can instantly delineate mineralization buried beneath overburden.
- Mechanically induced release of Hg^0 adsorbed in overburden enhances anomaly contrast.
- Grid survey reveals a pattern of air Hg haloes above the mineralized zones that reflect the bedrock structure.
- Real-time air Hg sampling is a simple and effective technique for mineral exploration in overburden-covered areas.

Download full paper, free of charge, from the British Columbia Geological Survey website:
https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/british-columbia-geological-survey/publications