

Biogeochemical processes involved in Hells Bells formation

Suboxic
Anoxic

Minor aerobic and anaerobic heterotrophy

-nitrification (increase of NO_3^-)

Turbid layer/
redoxcline

Major anaerobic chemolithoautotrophy:

- S^{II} -oxidation (S^0 formation)
- CH_4 -oxidation (increasing $\delta^{13}\text{C-CH}_4$)
- NH_4^+ -oxidation?

ND- S^{II} -oxidation

(anoxic fate of S^{II})

CO_2 - assimilation

(increasing $\delta^{13}\text{C-DIC}$)

H^+ consumption

(increase of pH)

Hells Bells formation

(CaCO_3 with
high sulfur
concentrations)

Density boundary
Halocline

Upward diffusion of S^{II} ; CH_4 ; HCO_3^- ; P_{ortho} ; NH_4^+ ; Ca^{2+}

Sulfate-reducing bacteria
methanogenesis
ammonification

Debris-mound

Ca^{2+} -enriched salt water