

Improved and automated cell count system for rapid enumeration of microbial cells in deep seafloor sediments

YUKI MORONO¹, TAKESHI TERADA², NORIAKI MASUI¹
AND FUMIO INAGAKI¹

¹Geomicrobiology Group, Kochi Institute for Core Sample Research (KOCHI), JAMSTEC, B200 Monobe, Kochi, 783-8502 Japan (morono@jamstec.go.jp)

²Marine Works Japan, 2-16-32 5F Kamariyahigashi, Yokohama 236-0042 Japan

Direct count (DC) and quantification of prokaryotic population in sediments have provided fundamental information for understanding the life and biosphere in deep marine subsurface. We tried to improve the conventional method by decreasing the non-specific fluorescent backgrounds and to develop an automated system for acquiring fluorescence image and number of DNA-stained cells.

SYBR Green I is known to specifically bind to the double strand DNA; however, we still observed some auto-fluorescent objects in the superheated (450°C, 3 hours) control sediments. Newly developed acid-wash treatments successfully removed these background objects. However, we found that the centrifugation of sediment slurry caused serious loss of cell number in a control experiment using *E. coli* cells. To gain the cell recovery rate during the centrifugation steps, we used blocking reagents or EDTA in the slurry suspension.

To obtain statistically meaningful fluorescent images, we constructed a computer-assisted automated cell counting system. Using XY-stage and Z-motor equipped with an epifluorescence microscopy, which is controlled by image-scanning software, the system can automatically scan 1 mm x 0.5 mm filter area within 15 min. Using the newly developed method and system, we compared the cell populations in core sediments by SYBR Green I- and acridine orange-stain, resulted in the statistically meaningful, consistent number of the deep seafloor microbial population.

The structurally controlled Zn-Pb-Ag Blende deposit, Yukon, Canada: Geochemical constraints on sulphide mineralization

MICHEAL MOROSKAT¹, SARAH A. GLEESON¹
AND ROBERT J. SHARP²

¹Department of Earth and Atmospheric Sciences, University of Alberta, Edmonton AB, Canada (micheal@ualberta.ca, sgleeson@ualberta.ca)

²Transpolar Geological Consultants Inc., Calgary, AB, Canada (rjsharp@shaw.ca)

The Blende Zn-Pb-Ag deposit is located approximately 75km northeast of Keno Hill, Yukon, within the southern Wernecke Mountains. Epigenetic mineralization is hosted by dolomitic siltstone of the Paleoproterozoic Gillespie Lake Group, the uppermost unit of the Wernecke Supergroup. Sulphides are found as cements in breccias developed in an axial planar cleavage within the hinge zone of a kilometre scale anticline.

The sulphide paragenesis consists of three stages of growth. The earliest is pyrite veining with minor sphalerite which have $\delta^{34}\text{S}$ values of +9.4 to +58.1‰. This is crosscut by main stage mineralization consisting of sphalerite and galena with $\delta^{34}\text{S}$ data that ranges from +15.6 to +34.9‰ and a Pb-Pb age of 1.50 to 1.44 Ga, with some pyrite and minor tetrahedrite and chalcopyrite. Coarser euhedral sphalerite and galena make up the late stage of sulphide growth and have isotopic values of +16.3 to +32.8‰ and a Pb-Pb similar to that of the main stage galenas.

The gangue minerals consist of fine to coarse grained dolomite and quartz, and are present in five paragenetic stages. These include the host rock with $\delta^{13}\text{C}$ of 0.0 to +1.0‰ and $\delta^{18}\text{O}$ of +19.7 to +21.6‰. There are two vein sets that predate sulphide mineralization and these have $\delta^{13}\text{C}$ values of 0.0 to +0.5‰ and $\delta^{18}\text{O}$ values of +19.6 to +21.7‰. The main stage veining that accompanies the main stage sulphides has a range in $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ from 0.0 to +0.3‰ and +18.0 to +20.8‰, respectively. Finally, euhedral dolomite that occurs with the late stage sulphide has carbon isotopic data that ranges from -0.5 to +0.2‰ and $\delta^{18}\text{O}$ from +18.1 to +19.0‰.

Evidence suggests a Mesoproterozoic age of mineralization that postdates a Paleoproterozoic deformation event, involves circulation of seawater transporting metals and sulphur, and derived components for the gangue mineralogy from the host dolomitic siltstone.