Quantifying marine emissions of volatile organic compounds using laboratory and field measurements from North Carolina Estuarine system

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Isoprene and monoterpenes are some of the most important biogenic volatile organic compounds (VOC) emitted by vegetation. Once emitted, they can be oxidized in the atmosphere and contribute to tropospheric ozone production and secondary organic aerosol (SOA) formation. While isoprene and other monoterpenes (e.g. α-pinene, β-pinene, limonene, and camphene) are suggested to be primarily emitted by terrestrial vegetation, there is a growing interest to quantify VOC fluxes from productive areas of remote oceans, coastal upwelling regions, lakes and wetlands. Another possible aquatic source of VOCs is the photo-degradation of colored dissolved organic matter (CDOM), leading to the production of lower molecular weight hydrocarbon species. In this work we attempt to quantify emission rates of VOCs from phytoplankton samples and CDOM, using ambient samples of algae and surface water collected in the Pamlico-Neuse Estuary, NC (see Figure 1).

To analyze VOCs in water and air samples a multi-step cryogenic collection system was built and used in conjunction with a gas chromatography/mass spectrometry system (GC/MS) [Varian Inc., CA]. Phytoplankton species collected in the Pamlico-Neuse Estuary as well as different monocultures were subjected to different light and temperature regimes. To evaluate the VOC fluxes due to photo-degradation of CDOM, surface water samples were photo-bleached using ultraviolet (UV) light. The different regimes are used to assess differences between normal VOC emissions and the emissions due to physiological stress-induced effects that may be observed in dynamic ecosystems like estuaries. Results of laboratory measurements for VOC emissions and the correlations between laboratory results, field measurements and remotely sensed data will be presented.

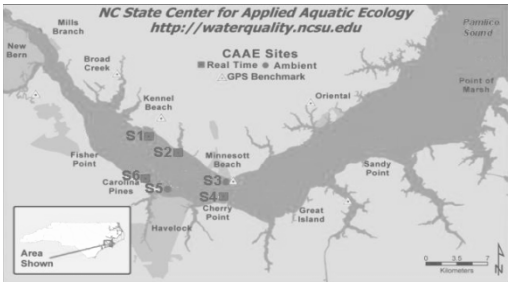

Figure 1: Locations of sampling sites (S1 to S6) in the Neuse River, NC.

Leveling and analysis of till geochemical data: Case study in the Skellefte district (Sweden)

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The Skellefte district is a loosely defined area, roughly 120 km by 30 km in size, in the Fennoscandinavian region in northern Sweden. Understanding the Quaternary geology and till geochemistry is a key to gold and base metal exploration in the Fennoscandinavian region, because bedrock is covered mostly by moronic overburden [1]. The objectives of this study are to (a) evaluate and analysis till geochemistry data set, (b) demonstrate application of some GIS-based statistical methods for analyzing, interpreting and visualizing till geochemistry data in the Skellefte district and (c) identify, quantify and interpret till geochemistry patterns in relation to VMS mineralization within the study area.

By leveling of the SGU's till geochemistry databases, a coherent geochemical data set was formed to make sampling density uniform at one sample per 5 km^2 compared to the sampling densities of the individual data sets of one per 7 km^2 and one per 16 km^2. It was decided to test a leveled data set for this study. Till geochemical anomalies were modeled initially through data leveling whereby lithological controls on till element contents were removed, geochemical residual were corrected for till dilution and the dilution-corrected residuals were used for interpolation to identify an alteration geochemical signature.

The result show that the VMS deposits in the Skellefte district have strong positive spatial association with intermediate to high Cu concentration in till. The value of studentized MgO show strong positive spatial association with VMS deposits. This study shows the hydrothermal alteration associated with VMS deposits in the Skellefte district might be mappable at regional scale using till geochemical data.

[1] Sarala & Rossi (2000) *J. Geoch. Expl.* **68**, 87–104.