INTRODUCTION

Sediments recovered from the Amazon Fan often are stained black by iron sulfide minerals including hydrotroilite (FeS\(n\)H\(_2\)O). Other iron minerals, including gregite, mackinawite, and marcasite, are also present (Flood, Piper, Klaus, et al., 1995). Black staining is particularly common at sub-bottom depths greater than 1 m but less than 10 to 40 m, depending on the site. The black staining in the Ocean Drilling Program (ODP) Leg 155 cores rapidly oxidized on exposure to air, leaving a gray sediment. Shipboard descriptions referred to this black mineral as hydrotroilite following Ericson et al. (1961).

METHODS

Because of the ephemeral nature of this iron sulfide and its potential importance to geochemical and physical processes, sediment samples were collected for FeS analysis at sub-bottom depths of about every 1.5 m at Sites 939 and 944, where detailed pore-water studies were undertaken (Table 1; see also “Site 939” and “Site 944” chapters of Flood, Piper, Klaus, et al., 1995). Thirty-eight samples in 5-cm-long whole-round sections of core liner were cut out of the 10-m core liner immediately after the core was retrieved. The samples were frozen into N\(_2\)-purged food-grade gas-tight bags and immediately frozen. Frozen subsamples were taken from 22 of the frozen samples for analysis. Only some of the samples could be analyzed for this study because of limited laboratory time, but these analyses are sufficient to characterize FeS distribution patterns. However, we list all available samples in Table 1 because these samples are available for additional analyses. Acid volatile S was determined following Goldhaber et al. (1977), which includes distillation under 6 N HCl at 22°C, diamine reagent colorimetric analysis of sulfate, and if so, what its proper name is. Our results show that FeS is still present in the deepest samples analyzed (40.89 mbsf). This FeS pattern appears consistent with the formation from SO\(_4\) reduction during early diagenesis of organic matter.

RESULTS AND DISCUSSION

In most sediments, acid volatile S is in the form of amorphous FeS minerals, and our results are reported as micromoles FeS per gram dry sediment (Table 1). Additional studies will be needed to determine whether the iron sulfide measured here has a distinct crystal structure, and if so, what its proper name is. Our results show that FeS is present in all samples analyzed in concentrations up to 40 µmol/g dry sediment. Maximum concentrations are observed at about 12 and 3 mbsf at Sites 939 and 944, respectively, in or slightly below the region where pore-water sulfate is decreasing and where pore-water phosphate is high (Site 939 and Site 944 chapters, Flood, Piper, Klaus, et al., 1995). FeS concentrations decrease downcore, but FeS is still present in the deepest samples analyzed (40.89 mbsf). This FeS pattern appears consistent with the formation from SO\(_4\) reduction during early diagenesis of organic matter.

REFERENCES