Flood, R.D., Piper, D.J.W., Klaus, A., and Peterson, L.C. (Eds.), 1997
Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 155

37. *DATA REPORT:* ANALYSIS OF FeS (ACID VOLATILE S) AT SITES 939 AND 944, AMAZON FAN[1]

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INTRODUCTION

Sediments recovered from the Amazon Fan often are stained black by iron sulfide minerals including hydrotroilite ($FeS{\cdot}nH_2O$). 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 heat-sealed 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 N_2 with 6 N HCl at 22°C, diamine reagent colormetric analysis of sulfide from a Zn-acetate trap series, and reference to a curve generated by analysis of standards.

Table 1. Iron sulfide (acid volatile S) at Sites 939 and 944, Amazon Fan.

Core, section, interval (cm)	Depth (mbsf)	Micromole FeS per gram dry sediment
155-939C-		
1H-1, 145–150	1.45	—
1H-2, 145–150	2.95	—
1H-3, 145–150	4.45	28
1H-4, 145–150	5.95	—
1H-5, 141–146	7.41	—
2H-1, 145–150	9.05	—
2H-2, 145–150	10.55	—
2H-3, 145–150	12.05	37
2H-4, 145–150	13.55	19
2H-5, 145–150	15.05	11
2H-6, 145–150	16.55	13
2H-7, 65–70	17.25	4.2
3H-1, 145–150	18.55	—
3H-3, 145–150	21.15	8.8
3H-5, 145–150	24.15	22
4H-1, 145–150	28.05	—
4H-3, 145–150	31.05	—
4H-5, 145–150	34.05	—
4H-7, 71–76	36.31	—
155-944D-		
1H-1, 145–150	1.45	13
1H-2, 145-150	2.95	26
1H-3, 145–150	4.45	—
1H-4, 145–150	5.95	—
2H-1, 145–150	8.05	2.8
2H-2, 145–150	9.55	4.2
2H-3, 145–150	11.05	14
2H-4, 145–150	12.55	—
2H-5, 145–150	14.05	—
2H-6, 113–118	15.23	—
3H-1, 145–150	17.55	4.5
3H-2, 115–120	18.75	10
3H-4, 137–142	21.56	9.6
3H-6, 65–70	23.67	5.8
4H-2, 145–150	27.89	2.2
4H-4, 137–142	30.81	7.6
4H-6, 137–142	33.54	7.2
5H-2, 145–150	37.89	7.7
5H-4, 145–150	40.89	11

Note: — = sample not analyzed.

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.

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Date of initial receipt: 4 December 1995
Date of acceptance: 17 May 1996
Ms 155SR-244

[1]Flood, R.D., Piper, D.J.W., Klaus, A., and Peterson, L.C. (Eds.), 1997. *Proc. ODP, Sci. Results*, 155: College Station, TX (Ocean Drilling Program).

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