I. INTRODUCTION

A. BACKGROUND AND METHODS

This data set consists of results from analyses made by a large number of scientists from various countries who applied a total of 60 different methods to clay mineral analyses.

These data were encoded at the Woods Hole Oceanographic Institution, under the direction of Dr. J. Mienert from the Initial Reports, and are intended as an extension of the x-ray mineralogy data compiled by the DSDP data management staff for Legs 1-37 of the DSDP. The data compiled at DSDP were from x-ray diffraction analyses made by the University of California at Riverside X-Ray Mineralogy Laboratory, and are contained in separate data sets.

Legs 38 through 96 data were digitized by WHOI completely from published articles of DSDP volumes, i.e. from a variety of different tables, bar logs, and columnar logs. The files contain both shipboard measurements and measurements made at onshore laboratories. The x-ray mineralogy data are usually presented with the relative proportions of clay minerals (%) normalized to 100%. Purely descriptive data analyses such as a division of the relative amount of clay components into traces, rare, and common are excluded from this study because of any lack of quality control of the data. The unevenness in quality and quantity of past measurements is due to the use of different size fractions, the inadequate treatment of samples, and the inconsistency in converting XRD peak intensities to absolute or relative concentrations of clay minerals. This results in a somewhat limited treatment of deep-sea clay mineralogy. However, the data are certainly of value for studies of areas where the same method has been applied and for regional compilations of clay mineralogy data in areas of similar sediment facies.

The analysis of clay minerals is organized according to grain size, in particular in three main size fractions as follows:

- Bulk grain sizes: > 20 microns
- Silt grain sizes: < 5, < 10, 1-10, 2-20, 2-37 microns
- Clay grain sizes: < 1, < 2 microns

The data set contains the clay minerals (%) organized in three files:

- xrw_bulk.dat
- xrw_silt.dat
- xrw_clay.dat
The format follows the general guidelines established by the University of California at Riverside X-Ray Mineralogy Laboratory which operated from Leg 1 through Leg 37 under DSDP contract, with the following exceptions:

1. A section depth (top and bottom) is given for some samples.
2. A BSF depth is given for some samples.
3. Depth to top and bottom of sample interval are omitted.
4. The fraction field may contain micron ranges rather than the original "B", "S", or "C" for Bulk, Silt, or Clay.
5. Mineral mnemonic/Weight % couplets for one sample are all on one record, rather than using multiple records combined with a record position field.

II. FORMAT AND FIELD DESCRIPTIONS

A. RECORD FORMATS

The data files have a logical record length of 191 characters. The data files are sorted in the following sequence by:

<table>
<thead>
<tr>
<th>Position</th>
<th>Format</th>
<th>Field Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>I2</td>
<td>Leg ID</td>
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<tr>
<td>3-5</td>
<td>I3</td>
<td>Site</td>
</tr>
<tr>
<td>6</td>
<td>A1</td>
<td>Hole</td>
</tr>
<tr>
<td>7-9</td>
<td>*A2</td>
<td>Section</td>
</tr>
<tr>
<td>10-11</td>
<td>**I3</td>
<td>Top Section Depth</td>
</tr>
<tr>
<td>12-14</td>
<td>**I3</td>
<td>Bottom Section Depth</td>
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<td>15</td>
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<tr>
<td>16-18</td>
<td>**I3</td>
<td>BSF Depth</td>
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<tr>
<td>19-25</td>
<td>**F7.2</td>
<td>Fraction</td>
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<td>26-29</td>
<td>A4</td>
<td>Number of Minerals in Sample</td>
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<tr>
<td>30-31</td>
<td>I2</td>
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</tr>
<tr>
<td>32-191</td>
<td>20(A4,**F4.1)</td>
<td>Couplets of mineral mnemonic followed by weight percent</td>
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</table>

*For some holes, no core or section is given, only BSF depth.
**These formats are >90% correct. In some cases, Top Section Depth may contain a decimal number. In some cases, weight percentages may be F4.0.

The couplets of mineral mnemonic identify the clay mineral followed by percentages. The percentages attached to the actual minerals are weight percents relative to the particular sample and fraction, but for some analyses these values have not been normalized to 100%. Despite the fact that percentages are sometimes written to 1/10 of 1 percent, the data must be viewed as semiquantitative.

C. REFERENCES

E. X-RAY MINERAL MNEMONIC LIST:

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Mnemonic</th>
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<tr>
<td>'diffuse scattering' measure</td>
<td>DIFF</td>
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<tr>
<td>'amorphous material' measure</td>
<td>AMOR</td>
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<tr>
<td>QUARTZ</td>
<td>QUAR</td>
</tr>
<tr>
<td>MICA &amp; MONTMORILLONITE</td>
<td>MICA</td>
</tr>
<tr>
<td>MONTMORILLONITE</td>
<td>MONT</td>
</tr>
<tr>
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<td>CHLO</td>
</tr>
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<td>CALCITE</td>
<td>CALC</td>
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<td>KAOL</td>
</tr>
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<td>K-FE</td>
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<td>CLIN</td>
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<td>PYRITE</td>
<td>PYRI</td>
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<td>BARI</td>
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<td>AMPH</td>
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<td>MGCA</td>
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<td>ANHYDRITE</td>
<td>ANHY</td>
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<td>&quot;variety of MONTMORILLONITE&quot;</td>
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<td>Itmontmorillonite &amp; Mica; Itmontmorillonite &amp; Smectite)</td>
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<td>ALKALINE FELDSPARS (K Feldspars; Sanidine)</td>
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<td>CLAY MINERALS</td>
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**Table 1. Summary of X-ray Mineralogical Studies Reported in DSDP Volumes 1 to 9**
*(Including the table from Heath, 1984)*

<table>
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<th>LEG (SITES)</th>
<th>LOCATION</th>
<th>FRACT (MICRONS)</th>
<th>DATA FORMAT IN IR</th>
<th>REFERENCES</th>
<th>NOTES</th>
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<tr>
<td>01</td>
<td>1- 7 Gulf Mexico</td>
<td>X</td>
<td>X</td>
<td>M1</td>
<td>Brief defn of methods at Riverside lab</td>
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<td>02</td>
<td>8- 12 N. Atlantic</td>
<td>X</td>
<td>X</td>
<td>M1</td>
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<td>13- 22 S. Atlantic</td>
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<td>X</td>
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<td>04</td>
<td>Atl, Carib.</td>
<td>X</td>
<td>X</td>
<td>M2</td>
<td>Rex and Murray, 1970</td>
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<td>05</td>
<td>32- 43 E N. Pacific</td>
<td>X</td>
<td>X</td>
<td>M2</td>
<td>Rex and Murray, 1970</td>
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<td>06</td>
<td>44- 60 W N. Pacific</td>
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<td>X</td>
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<td>Rex et al., 1971</td>
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<td>07</td>
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<td>X</td>
<td>M2</td>
<td>Lisitzin, 1971</td>
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<td>M2</td>
<td>Basov et al., 1979</td>
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<td>76- 84 E. Pacific</td>
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<td>X</td>
<td>M2</td>
<td>As Leg 8</td>
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<td>85- 97 Gulf Mexico</td>
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<td>X</td>
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<td>Beiersdorf et al., 1983</td>
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*LEG = LEG (SITES) | FRACT (MICRONS): X = >2 microns, X = <2 microns, X = 2-20 microns | DATA FORMAT IN IR: X = X-ray diffraction, X = Table, X = Barlog, X = Collog | REFERENCES: M1 = Rex, 1969, M2 = Rex and Murray, 1970, M3 = Lisitzin, 1971, M4 = Drever, 1971*
revised peak
intensity vs.
conc. factors

11  98-108  E N. Atlantic  X  X  X  X  X  M2  Zemmels, 1972
   As Leg 8; no data site 107;
   no methods for Hathaway samps
   (bulk & <2) *

12  109-119  N N. Atlantic  X  X  X  X  X  M5  Fan and Zemmels, 1972
   no data sites
   109-110; quant.
   all fractions

13  120-134  Mediterranean  X  X  X  X  X  M5  Zemmels and Cook, 1973
   Site 121 only**

14  135-144  N. Atlantic  X  X  X  X  X  M5  Fan and Rex, 1972
   No data Site 143
   new chl factor;
   no data 139,
   142, 143.

Table 1. Summary of X-ray Mineralogical Studies Reported in DSDP Volumes 1 to 9 (continued)
60 452-461 W. Pacific  X  M39
Desprairies, 1982  453-454

456,460-461

1982  452-454

61 462 W.Eq.Pacific  X  X  X  X  M32 Nagel &
Muller, 1981  462

Kurnosov & Shevchenko, 1981  462

62 463-466 N.Ce.Pacific  X  X  X  X  M32 Nagel &

et al., 1981  XRD-DRON-1 463-466 CuK alpha rad.

@2deg/min scan

speed. Verbal

list relative
dominance.

X  X, <1  X  M32,42 Hein &
Vanek, 1981  XRD-NORELCO 463-466 ditto except

verbal list.

63 467-473  <1  X  X  M41 Rateev
et al., 1981  XRD-DRON-1 467-473 ditto including

verbal list.

64 474-481 E. Pacific  X  X  X  M40
Schumann & Nagel, 1982  477,481,

477-479

65 482-485 E. Pacific/  ?X  M41 --- Timofeev
et al., 1983  482-485 Verbal list rel.

Gulf of
dominance.

California  X  X, <0.5, <1  X  M43 Rangin
et al., 1983  483,485

Schumann, 1983  482-485

>20  X  X  M32 Kurnosov
et al., 1983  482-485

66 486-493 E. Pacific  X  X  X  M32
Schumann & Nagel, 1982  486-493

67 494-500 E. Pacific/  X  X  M32
Heinemann & Fuchtbauer,  494-496,
Trench off

1982

499-500 Guatemala  X  X  X  X  M40 Kurnosov
et al., 1982  494-496,

499-500

X  X  X  M38 Latouche
& Maillet,  XRD-Philips 494-500 Verbal list rel.
Table 1. Summary of X-ray Mineralogical Studies Reported in DSDP Volumes 1 to 9 (continued)

<table>
<thead>
<tr>
<th>LEG (SITES)</th>
<th>LOCATION</th>
<th>BULK</th>
<th>&lt;2</th>
<th>2-20</th>
<th>DATA FORMAT IN IR</th>
<th>METH</th>
<th>NOTES</th>
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<td>FRACT (MICRONS)</td>
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<td>DEVICE</td>
<td>SITES</td>
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<tr>
<td>68</td>
<td>502-503</td>
<td>E. Eq.</td>
<td>X</td>
<td>2-37</td>
<td>XRD-7 G.E. 502</td>
<td>CuK alpha rad.</td>
<td>M44</td>
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<tr>
<td>Zimmermann, 1982</td>
<td>Pacific @2 deg/min scan speed</td>
<td></td>
<td>X</td>
<td>X</td>
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<td>Schumann&amp;Nagel, 1982</td>
<td>502,503 CuK alpha rad.</td>
<td></td>
<td>X</td>
<td>X</td>
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<td>69</td>
<td>501</td>
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<td>&gt;20</td>
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<td>XRD-Philips 504,505</td>
<td>CuK alpha rad.</td>
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<td>Beirsdorf&amp;Rosch,1983</td>
<td>Pacific/ADP 10</td>
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<td>70</td>
<td>506-510</td>
<td>E. Eq.</td>
<td>X</td>
<td>X</td>
<td>XRD-Philips 506,507</td>
<td>Verbal list rel.</td>
<td>M46</td>
</tr>
<tr>
<td>et al.,1983</td>
<td></td>
<td>Pacific</td>
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CuK alpha rad.

1deg 2theta/min scan speed


1,5 509
theta 60  330,511, @1 deg 2theta/
512,513, min scan speed
514
Varentsov et al., 1983  XRD-DRON-2  511,513, CuK alpha rad.
@2 deg/min &
@1 deg/min
scan speed
Verbal list rel.
dominance
Timofeev et al., 1983  XRD-DRON-1  511,513, CuK alpha rad.
@2 deg/min &
@1 deg/min
scan speed
Verbal list rel.
dominance
Zimmermann, 1983  XRD-7 G.E.  515,516, CuK alpha rad.
355,357  @2 deg/min
scan speed
Coulbourn, 1983  XRD-RIGAKu  515,516, CuK alpha rad.
Miniflex  517  @2.4 deg 2theta/
2005  scan speed
Verbal list rel.
dominance
Karpoff, 1984  XRD-CGR  519,520, CuK alpha rad.
Atlantic 521,522, @1 deg/min
523  scan speed
Table 1. Summary of X-ray Mineralogical Studies Reported in DSDP Volumes 1 to 9 (continued)

<table>
<thead>
<tr>
<th>LEG (SITES)</th>
<th>LOCATION</th>
<th>BULK</th>
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<th>2-20</th>
<th>TABLE</th>
<th>BARLOG</th>
<th>COLLOG</th>
<th>METH</th>
<th>REFERENCES</th>
<th>DEVICE</th>
<th>SITES</th>
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<tr>
<td>75</td>
<td>S E Atlantic</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M48</td>
<td></td>
<td></td>
<td></td>
<td>Maillot &amp; Robert, 1984</td>
<td>XRD-CGR</td>
<td>530,532</td>
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<td>CuK alpha rad.</td>
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<td>Western N Atlantic/</td>
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<td>X</td>
<td>M52</td>
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<td></td>
<td></td>
<td>et al., 1983</td>
<td>XRD-Philips</td>
<td>534</td>
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<td></td>
<td>Blake Bahama</td>
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<td>77</td>
<td>Gulf of Mexico</td>
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<td>X</td>
<td>X</td>
<td>M48</td>
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<td>Debrabant et al, 1984</td>
<td>XRD-Philips</td>
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<td>CuK alpha rad.</td>
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<td>78</td>
<td>E Caribbean/ Lesser</td>
<td>X</td>
<td></td>
<td></td>
<td>M53</td>
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<td></td>
<td>Wright, 1984</td>
<td>XRD-Norelco</td>
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<td>CuK alpha rad.</td>
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<td>Antilles</td>
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<td>Only surface sed. samples</td>
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theta60   527,528, @1deg 2theta/

529       min scan speed
intraoceanic from piston island arc cores

<table>
<thead>
<tr>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>M54  Pudsey, 1984 541,542, CuK alpha rad.</th>
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<td>@2deg theta/ min scan speed</td>
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<td>X</td>
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<td>543</td>
<td>79</td>
<td>544-547  E N Atlantic/ X X</td>
<td>M51  Stein&amp;Sarnthein, 1984 544 N W African</td>
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<td>M32  Schumann, 1984 544,545,</td>
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<td>X</td>
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<td>M48  Chamley&amp;Debrabant, 1984 544,546,</td>
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<td>547</td>
<td>80</td>
<td>548-551  E N Atlantic X X X</td>
<td>M38  Chennaux et al.,1985 548,549, CuK alpha rad.</td>
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Table 1. Summary of X-ray Mineralogical Studies Reported in DSDP Volumes 1 to 9
(continued)

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A Stoffers and Muller, 1978, Zemmels et al., 1972. The Hathaway samples were analyzed at Woods Hole Oceanographic Institution. There is no information on sample preparation. Layer silicates are not differentiated in the bulk analyses. Clays (<2um) treated with ethylene glycol. Intensity vs. abundance factors not stated.
B Nesteroff (1972) refers to X-ray mineralogy done at the University of Paris, but includes no methodology or data plots or listings. Composition ranges are reported in the text, but their origin (Riverside of Paris) is unclear.

C Connelly and Nalli, 1973. No methodology or data listings given. Qualitative results discussed in text.

D Emelyanov et al., 1979. Carbonates, quartz, and feldspars determined for bulk sediment (using CaF2 internal standard?).

E Kossovakaya and Drits, 1978, Rateev et al., 1979, Rennergarten et al., 1979, Timofeev et al., 1979, Varentsov, 1979. None of Leg 38 Russian mineralogy includes adequate methodology. All sites are assumed to have used M16 treatments.

Table 2. X-ray mineralogy: Synopsis of treatments for Legs 1-96 (refers to Table 1)

M1 - Rex, 1969. Rex's initial paper summarizes the sample treatment, intensity to concentration conversion factors, and concept of data reduction used at Riverside. The Appendix (M5) is a direct descendent of M1.

M2 - Rex reviews the data-processing scheme at Riverside. Includes filter description, intensity to concentration conversion factors, and interference corrections. The Appendix (M5) describes the Riverside procedure that eventually evolved from M2.

M3 - Lisitzin et al., 1971. Grind to <1 micron (sic), add CaF2 standard. Compare to standards for quartz and carbonate estimates. Stokes-separate < 1 micron fraction, remove carbonate with 0.1N HCl, remove oxyhydroxides with dithionite-citrate-bicarbonate (DCB), saturate with 1N MgCl2, expand with glycerine. Also use Li saturation (Greene-Kelly, 1953). Use Biscaye (1965) peak-area ratios (M11).

M4 - Drever, 1971. No information on sample treatment. M1 factors used
for abundance estimates.

M5 - Cook et al., 1974. This is the "polished" Riverside Lab methodology (see Appendix).

M6 - de Segozac, 1973. Remove carbonate by 0.1N HCl, Stokes-separate (settle and centrifuge) <2 micron, Mg-saturate. Ethylene glycol solvate? Plots of peak character and montmorillonite/illite and chlorite/illite (4.7/5A) peak ratios.


M13 - Perry et al., 1976. Stokes-separate < 1 micron, < 1 micron, pipette on glass. Ethylene glycol solvate? Use relative peak intensities (no abundance conversion).

M14 - Eslinger and Savin, 1976. Stokes-separate <0.3, 0.3-0.7, and >0.7 microns. Ethylene glycol solvate. Illite/smectite:illite:kaolinite:chlorite abundances given by I/S 003/005-1/2 I 001:I 001:K 002:C 004.


M17 - Perry et al., 1979. Stokes-separate <1 micron, pipette on glass,
Ethylene glycol solvate. Use Biscaye (1965) intensity to concentration factors (M11).


M24- Trimonis et al., 1978. For clays, Stokes-separate <2 micron, remove carbonate with 1N HCl, Mg-saturate, glycerine solvate. Abundance from Biscaye (1965) factors (M11).

M25- Koch and Rothe, 1979. Bulk plus <2 micron. Carbonate removed from clays with 10% HCl, pipette on glass (checked against smear mount). Clay ratios from Biscaye (1965) factors (M11). Bulk results comparable to Hathaway's (see footnote a, Table 1).

M26- Pastouret et al., 1978. No methodology or accessible reference. Qualitative data (abundant, common, present?) for 20-63 microns. Percentages (conversion factors not stated) for clay minerals.

M27- Timofeev et al., 1979. Carbonate removal by acetic acid. Clay minerals were studied in the fraction <10 microns. Treatment with glycerine solvate. Verbal listing of clay minerals.

M28- Chamley and d'Argoud, 1979. Carbonate removal by 5N hydrochloric acid. Decantation of <2 micron fraction by using Stokes law. Semiquantitative evaluations are based on the peak heights and areas (after Chamley, 1971). Relative error +/- 5%. Heights of 001 illite and chlorite peaks are taken as references.

M29- Latouche, G. and Maillet, 1979. Carbonate removal by N/10 hydrochloric acid. Ethylene glycol treatment before analysis. Semiquantitative estimates from the height (?) and areas in the diagrams of glycolated slides. The height of 001 peaks was used to determine the percentage of smectite (17A), illite (10A), and kaolinite + chlorite (7.1A).
M30- Timofeev et al., 1979. Carbonate removal by N/10 hydrochloric acid. Samples were measured natural, saturated with glycerine, and heated at 550 degrees C for identifying mixed-layer minerals of the Ch-M type.

M31- CEPM Laboratory, 1980. Carbonate-free fraction of < (? ) 5mm. The 1 day mineral content were estimated in relative percentages from the heights and the areas of the x-ray diffraction peaks. No further details.

M32- Mann and Muller, 1980. Clay minerals in the <2 micron fraction were x-rayed in an untreated state, glycolated state, and when necessary, after heating. Biscaye's method (1965) was used to determine the clay minerals by multiplying the peak (peak 2 ?? (in degrees): smectite + 5.2 (17A), chlorite = 12.3 (7.2A), illite = 8.8 (10A) kaolinite + 12.3 (7.2A), polygorskite = 8.4 (10.5A), talc = 3.4 (9.3A), sepiolite = 7.4 (12.0A) area by factors (smectite = 1, chlorite = 2, illite = 4, kaolinite = 2, polygorskite = 1, talc = 1, sepiolite = 1). The sum of the clay minerals was 100 percent. The kaolinite/chlorite peak at 2 ?? = 12.3 degrees was divided by peak splitting.

For the bulk mineralogy the peak heights are multiplied by factors (REF.101). When multiplied they add up to 100%. However, if the amount of amorphous material, i.e., volcanic glass, opal, and amorphous clay minerals, vary, the factors have to be redetermined. These factors apply only for minerals which are very similar to those from Site 502 and 503.

M33- Karpoff et al., 1980. Identification of clay minerals was made on three types of oriented aggregates: untreated, ethylene-glycol-treated, and heated (Mise au point collective, 1975).

M34- Mann and Muller, 1980c. Method of M11 slightly modified because of the high amount of amorphous constituents in the sediments. The amorphous constituents influence the (020) peak in such a way that its base line cannot be exactly traced. Thus, it is impossible to quantify the percentage of clay minerals by direct peak measurements. The method applied is to subtract all other constituents that can be determined by x-ray methods. The margin of the error of this method is all the larger the greater the amount of amorphous constituents.

M35- Kurnosov et al., 1980. Carbonate removal by N/10 hydrochloric acid. Decantation of <1 micron and 1-10 micron fraction. Samples were dried, treated with ethylene glycol, and heated at 500 to 550 degrees C. Some samples were K-saturated to test the nature of expanding minerals (Weaver, 1968). Relative proportions of clay minerals were analyzed by using Biscaye's method (1965). Ref. 125, 126, 127, 129.

M36- Aoyagi and Kazama, 1980. Method of analysis is explained in detail by Oinuma and Kobayashi (1966) and Aoyagi (1967). X-ray diffraction peaks of each mineral of powdered sample measured are 001 for montmorillonite, illite, and kaolinite, 002 for chlorite and plagioclase, 020 for clinoptilolite and gypsum, 101 for quartz, 104 for calcite, dolomite, and siderite, 110 for hornblende, and 200 for pyrite and halite. Existence of illite-montmorillonite mixed-layer minerals is inferred from the width of the 17A peak of glycolated samples.

M37- Balshaw, 1981. Carbonate removal by 0.1N (pH 5) sodium acetate and acetic acid. 0.2M ammonium oxalate and 0.2M oxalic acid were used to dissolve amorphous Fe-hydroxides and oxyhydroxides. The <2 micron fraction was separated by settling using Stoke's law. Deionized water and Calgon were used to minimize flocculation of the clay particles. The resulting clay was treated with a 1.0M solution of Mg Cl to
saturate the clay exchanges with Mg ions and finally washed. The
slides were x-rayed after air drying and again after treatment with
ethylene glycol. The glycolation caused a shift of the smectite peak
from 12-14.0A to 18.0A. The illite peak at 10.0A, and the chlorite and
kaolinite peaks which are coincident at 7.0A are not affected by
glycolation. The relative percentages of the clay minerals were
calculated by using techniques outlined by Biscaye (1965).

M38- Latouche et al., 1982. Pulverized sediments of bulk samples were
analyzed according to the powder diffractogram method. Semiquantitative
analysis of the content of quartz, calcite, and feldspars is based on
their diffraction peak height which is compared with peaks of mixed
synthetic reference samples. Carbonate removal of the clay fraction
(<2 micron) by N/10 HCl. The <2 micron fractions were separated by
gravity settling. The slides were x-rayed after air drying and then after
heating at 550 degrees C for one hour. The second was scanned after
treatment with ethylene glycol. Identification of clay minerals after
Brown (1961) and Thores (1975). Ref. 167 slightly changed method by:
(A) using 10N HCl. The clay fraction abundance, evaluated on the basis
of peak heights, has an estimated experimental error of +/- 10%.

M39- Desprairies, 1982. Clay minerals in the carbonate free <2 micron
fraction were determined by various treatments (heating, glycol,
hydrazine). The relative abundances of the principal clay minerals
were estimated by the percentage of the basal peak intensities rather
than by the percentage of the basal peak areas.

M40- Kurnosov and Shevchenko, 1981. Identification of clay minerals in
the wire fraction <2 micron and 2-20 micron using the method of Biscaye
(1964) (see also M11). Conversion factors montmorillonite:illite:
kaolinite:chlorite = 1:4:2:2.

M41- Rateev et al., 1981. Samples (? carbonate free) were prepared for the
<1 micron and partly for the <10 micron fraction in three states: air
dried, ethylene-glycol-treated, and heated at 550 degrees C. Kaolinite is
identified by standard peaks at 7.15 and 3.57A, which are disappearing
after heating at 550 degrees C and preserved after treatment with 10% HCl.
Montmorillonite has peaks from 14.1 to 14.7A in an air dried state which
expand to 17.9A after saturation with glycerine. Montmorillonite-illite
mineral mixed layer clay is characterized by an asymmetrical peak at
14.7A in an air dried state, and at 18.8 to 19.6A after saturation
with glycerine.

sodium acetate and acetic acid. The <2 micron fraction was separated by
centrifugation. The fraction was x-rayed after Mg saturation and
glycolation. Peak areas were used to calculate relative amounts of clay
minerals (after Biscaye, 1965).

M43- Rangin et al., 1983. The <2 micron, <0.5 micron, and <0.1 micron
fractions were separated by centrifugation. The ratio of the areas under
the main phyllosilicate peaks indicate the clay mineralogy (? no
abundance conversion).

M44- Zimmerman, 1982. Carbonate removal by 0.6N acetic acid. Separation
of the 2-37 micron and <2 micron by calculated settling times. Slides
were x-rayed before and after glycol solvation. Chlorite and kaolinite
abundance is indicated by the area under the 7.1A peak. The separation
of these two minerals is based on the slow-scan method of Biscaye
(1964). Illite has a well defined peak at 10A that was unaffected by
ethylene glycol solvation. A broad peak at 17A after solvation is
assigned to smectite (montmorillonite). The conversion factors of
Biscaye (1965) (see M11) are used: montmorillonite:illite:kaolinite:
chlorite = 1:4:2:2.

M45- Beiersdorf and Rosch, 1983. Clay minerals of the non-CaCO3 components in the grain size fraction <2 microns, 2 to 20 microns, and >20 microns were determined qualitatively from glycolated powder samples. The concentration was estimated from peak height measurements which were compared with those of pure standards.

The concentration of all other components - especially feldspar and smectite, together with the amorphous scatter - were empirically estimated and balanced to 100%.

M46- Honnorez et al., 1983. Samples of air dried, ethylene-glycol treated, and heated smear slides of the <2 micron and bulk sediment fraction were x-rayed. Some samples were analyzed by subdividing the <2 micron fraction in arbitrary fractions between 2 and 0.4 microns. The XRD measurements did not indicate any difference and their clay mineralogies were similar to that of the bulk sample.

M47- Kurnosov et al., 1983. Samples of air dried, ethylene-glycol treated, and heated (500 to 550 degrees C for 1 hour) smear slides of the <2 micron, 2-20 micron, and bulk sediment fraction were x-rayed.

M48- Robert and Maillot, 1983. Carbonate removal by 0.2N hydrochloric acid in the <63 micron sediment fraction. The <2 micron fraction was separated by settling using Stokes's law. Oriented aggregates were made on glass slides. The untreated sample, the glycolated sample, and the sample heated for 2 hours at 490 degrees C were x-rayed. Semiquantitative evaluations were based on the peak heights and areas (after Chamley, 1971). The height of the 001 illite peak of the glycolated sample was taken as a reference. Compared to this value, smectite, attapulgite, and irregular mixed-layer clays were corrected by multiplying their peak height by a factor of 1.5 to 2.5. Well-crystallized kaolinite was corrected using a factor of 0.5. The relative error is +/- 5%. (comparable to M28).

M49- Varentsov et al., 1983. The fraction < 1 micron had been air dried, treated with glycerine, and heated at 550 degrees C. The interpretation of these x-rayed samples are based on comparison of the experimental data with corresponding models of Drits and Sakharov (1976).

M50- Coulbourn, 1983. Bulk samples have been x-rayed. Diffractograms of standards were compared with diffractograms of core samples. Samples were not treated with ethylene-glycol and run a second time to distinguish chlorite from montmorillonite. The quantification of diffractograms attempted is an approximate version of a method of mutual standards (Rex, 1970).

M51- Stow and Miller, 1984. The <2 micron fraction was separated by ultrasonic treatment and settling and x-rayed for untreated and glycolated samples. Semiquantitative analysis of the clay mineral diffractograms are based on the peak areas of glycolated samples (after Biscaye, 1965). The weighting factors are: 2 (kaolinite-chlorite), 4 (illite), 1 (smectite), and 1 (mixed layers). REF. 168: Carbonate free <2 micron fraction was analyzed (Lenge, 1982).

M52- Kagami et al., 1983. The <2 micron fraction was collected by sedimentation (no further details) and x-rayed. Quantitative and qualitative estimations are based on the method by Sudo et al. (1961) and Oinuma (1968).

M53- Chamley et al., 1983. Preparation and analysis of the samples after the method by Hein et al. (1976). Clay percentages were determined on the diffractogram of the glycolated samples by the peak area method and
weighted by the conversion factors after Biscaye (1965).

M54—Pudsey, 1984. Bulk samples and the <2 micron sediment fraction have been x-rayed. The <2 micron fraction was settled in sodium hexametaphosphate suspension to prevent flocculation of sediments. Each sample of the <2 micron fraction was x-rayed after (1) saturation with ethylene glycol and (2) after heating to 500 degrees C. Peak heights and areas are measured in diffractograms and are used to obtain a semiquantitative estimate of the mineralogy. The estimation of the mineralogy in percent is based on the measured peak heights and areas times a combination of weighting factors given by Rex and Murray (1970), Biscaye (1965), and Mann and Muller (1980).

M55—Thiry and Pascal, 1985. Bulk samples were treated with 1/10N HCl. The <2 micron fraction was separated by settling, dried, saturated with ethylene glycol and hydrazine hydrate, and later heated at 490 degrees C. Clay minerals and mixed layers (%) were determined by their peak areas in the diffractogram of the samples treated with ethylene glycol.

M56—Helin, 1985. No carbonate removal. The fraction <63 microns was washed several times using 0.01N NH4OH. The fractions <2 microns, 2 to 6.3 microns, 6.3 to 20 microns, and 20 to 63 microns were collected by Atterberg separation after Stoke's law (Muller, 1964). The <2 micron fraction of the air dried samples, the heated samples at 500 degrees C, and the glycolated samples were analyzed. The clay mineral distribution in percent (<2 micron) was determined by using Biscaye's method (1965). The percentages of nonexpandable layers in smectites were calculated by using Reynolds and Hower (1970) and Brindley and Brown's (1980) methods. The partial destruction of the 7-A peak after heating was interpreted as indicating the presence of chlorite. The crystallinity of smectites was investigated in untreated and glycolated samples by measuring the peak height/width at half height ratio.

M57—Schoonmaker et al., 1985. Organic matter was removed by treatment of bulk samples with 5% sodium hypochlorite buffered to pH 9.5 with HCl (after Anderson, 1963). The <2 micron fraction was then separated by centrifugation. Samples were dried at room temperature, treated with ethylene glycol, and an additional aliquot of the <2 micron fraction was treated with Na citrate-Na dithionite to remove amorphous Fe-oxyhydroxides (after Mehra and Jackson, 1960). Clay-mineral abundances were calculated from peak areas by using the "triangle method" (Mann and Fischer, 1982). The percentages of the clay minerals were determined by using weighting factors (Biscaye, 1965), Mann and Muller (1980) for the peak areas. In contrast, the abundance of mixed layers is determined by using peak heights instead of areas (after Hoffman, 1976).

M58—Kastner, 1986. The <2 micron fraction of the bulk sample and that of the >2 micron fraction of the insoluble residue were determined by the Stoke's law settling method. XRD analyses were used to establish a crystallinity index for goethite.

M59—Stow, 1986. The <4 micron fraction was separated by settling. Peak heights were measured for all minerals and normalized to 100% without any application of weighting factors.

M60—Thayer et al., 1986. The bulk sample and the <2 micron fraction were x-rayed. XRD measurements for bulk sediments utilized the technique of Roberts (1982), while the <2 micron fraction was analyzed in a commercial laboratory (without further details).


Maillot, H. and Robert, C., 1984. Paleoenvironmental evolution of the Walvis Ridge deduced from inorganic geochemical and clay mineralogical data,


__________, 1970. X-ray mineralogy studies -- Deep Sea Drilling Project,


Weaver, C.E., 1968. The effects of geologic significance of potassium "fixation" by expandable clay minerals derived from muscovite, biotite, chlorite and volcanic materials. Am. Mineralogist, 43 (No. 9-10), 839.


NGDC Notes:
This data set was received from the Woods Hole Oceanographic Institution combined with a copy of the x-ray mineralogy data set compiled by the DSDP for Legs 1-37. The two sets of data contained too many differences to be left as a combined set, and so were split into the original DSDP files and into the new WHOI files.

Some differences included:
1) Original DSDP data contain relative terms rather than percentages in some cases (trace, abundant, etc.), 2) The fields giving depth to sample, section, or BSF did not overlap between the two data sets, 3) The DSDP data were generated under fairly uniform conditions, all by the University of California at Riverside X-Ray Mineralogy Laboratory, and retain more of their uniform value when separable from the additional analyses (Note that some data prior to Leg 38 were encoded by WHOI).

Some modifications were made to the WHOI data by NGDC:
1) Leg ID was shortened from 3 to 2 digits to provide uniformity with all of the other DSDP sediment and hardrock data sets.
2) Duplicate 4-digit site and hole fields were reduced to a single 3-digit site and 1-digit hole (blank, A, B, etc.) to provide uniformity with all of the other DSDP sediment and hardrock data sets.
3) An alpha 7-digit Section Depth was justified into 2 separate depth fields separated by a "-" to allow numeric searching on the field.
4) When "CC" was found in the Section Depth field sporadically, it was moved to the section field to be consistent with labelling in other parts of the WHOI data set and with other DSDP data sets.
5) Hole assignments conflicting with the DSDP Coredepths file were checked against the Initial Reports and changed where necessary. We advise caution, however, in assuming that all holes cited are now correct, because only those conditions (i.e. out of range core # for a hole) which caused a mis-match with the Coredepths file were corrected. Other errors which did not cause a mis-match may still exist. These data have not undergone the thorough quality control that data sets compiled by the DSDP data group have been through.