**Supplementary Table 1a.** 210Pb concentrations for MRR2.

|  |  |  |
| --- | --- | --- |
| Depth | Dry mass | 210Pb |
|  |  | Total | Supported | Unsupported |
| cm | g cm-2 | Bq kg-1 | $$\pm $$ | Bq kg-1 | $$\pm $$ | Bq kg-1 | $$\pm $$ |
| 0.5 | 0.06 | 367.61 | 33.06 | 102.86 | 7.28 | 264.75 | 33.85 |
| 4.5 | 0.78 | 393.38 | 27.13 | 102.86 | 5.97 | 290.52 | 27.78 |
| 8.5 | 1.68 | 341.28 | 34.52 | 97.79 | 7.79 | 243.49 | 35.39 |
| 10.5 | 2.13 | 341.85 | 27.17 | 111.43 | 6.26 | 230.42 | 27.88 |
| 15.5 | 3.22 | 331.44 | 25.62 | 117.62 | 6.41 | 213.82 | 26.41 |
| 20.5 | 4.39 | 348.3 | 24.48 | 113.95 | 5.76 | 234.35 | 25.15 |
| 25.5 | 5.63 | 244.11 | 24.22 | 115.94 | 6.10 | 128.17 | 24.98 |
| 31.5 | 7.14 | 209.69 | 23.68 | 121.84 | 6.22 | 87.85 | 24.48 |
| 36.5 | 8.63 | 179.23 | 19.78 | 117.52 | 5.22 | 61.71 | 20.46 |
| 41.5 | 10.46 | 157.87 | 11.33 | 115.58 | 3.11 | 42.29 | 11.75 |
| 47.5 | 12.83 | 155.15 | 19.61 | 110.8 | 5.10 | 44.35 | 20.26 |
| 53.5 | 15.35 | 149.85 | 20.6 | 120.73 | 5.38 | 29.12 | 21.29 |
| 60.5 | 18.16 | 144.62 | 21.16 | 118.01 | 5.78 | 26.61 | 21.94 |
| 67.5 | 20.79 | 142.85 | 11.81 | 120.8 | 3.47 | 22.05 | 12.31 |

**Supplementary Table 1b.** 137Cs concentrations for MRR2.

|  |  |
| --- | --- |
| Depth | 137Cs |
| cm | Bq kg-1 | $$\pm $$ |
| 0.5 | 0 | 0 |
| 4.5 | 0 | 0 |
| 8.5 | 0 | 0 |
| 10.5 | 0 | 0 |
| 15.5 | 0 | 0 |
| 20.5 | 0 | 0 |
| 25.5 | 4.89 | 3.01 |
| 31.5 | 0 | 0 |
| 36.5 | 0 | 0 |
| 41.5 | 0 | 0 |
| 47.5 | 0 | 0 |
| 53.5 | 0 | 0 |
| 60.5 | 5.26 | 2.56 |
| 67.5 | 0 | 0 |

**Supplementary Table 1c.** 210Pb chronology for MRR2.

|  |  |  |  |
| --- | --- | --- | --- |
| Depth | Dry mass | Chronology | Sedimentation Rate |
|  | Year | Age |  |  |  |  |
| cm | g cm-2 | AD | yr | $$\pm $$ | g cm-2 yr-1 | cm yr-1 | $\pm $% |
| 0 | 0 | 2017 | 0 |  |  |  |  |
| 0.5 | 0.06 | 2017 | 0 | 2 | 0.2412 | 1.391 | 14.5 |
| 4.5 | 0.78 | 2013 | 4 | 2 | 0.1984 | 0.98 | 12.1 |
| 8.5 | 1.68 | 2009 | 8 | 2 | 0.2061 | 0.918 | 16.8 |
| 10.5 | 2.13 | 2007 | 10 | 2 | 0.2034 | 0.926 | 15 |
| 15.5 | 3.22 | 2001 | 16 | 2 | 0.184 | 0.813 | 16 |
| 20.5 | 4.39 | 1994 | 23 | 3 | 0.1329 | 0.552 | 16.5 |
| 25.5 | 5.63 | 1986 | 31 | 4 | 0.1903 | 0.761 | 24.7 |
| 31.5 | 7.14 | 1978 | 39 | 5 | 0.2203 | 0.806 | 33.3 |
| 36.5 | 8.63 | 1972 | 45 | 6 | 0.2579 | 0.776 | 39.3 |
| 41.5 | 10.46 | 1966 | 51 | 7 | 0.3071 | 0.804 | 37.5 |
| 47.5 | 12.83 | 1957 | 60 | 9 | 0.2208 | 0.542 | 54.4 |
| 53.5 | 15.35 | 1946 | 71 | 11 | 0.2388 | 0.583 | 80.2 |
| 60.5 | 18.16 | 1932 | 85 | 11 | 0.1697 | 0.437 | 88.2 |
| 67.5 | 20.79 | 1913 | 104 | 16 | 0.1148 | 0.304 | 74.8 |

**Supplementary Table 2a.** 210Pb concentrations for MRR1.

|  |  |  |
| --- | --- | --- |
| Depth | Dry mass | 210Pb |
|  |  | Total | Supported | Unsupported |
| cm | g cm-2 | Bq kg-1 | $$\pm $$ | Bq kg-1 | $$\pm $$ | Bq kg-1 | $$\pm $$ |
| 0.5 | 0.16 | 390.52 | 24.03 | 98.71 | 6.26 | 291.81 | 24.83 |
| 2.5 | 0.77 | 362.26 | 25.4 | 105.76 | 5.66 | 256.5 | 26.02 |
| 4.5 | 1.37 | 338.4 | 15.19 | 96.87 | 4.3 | 241.53 | 15.79 |
| 6.5 | 1.94 | 286.84 | 19.09 | 95.42 | 5.58 | 191.42 | 19.89 |
| 8.5 | 2.61 | 200.33 | 14.39 | 101.65 | 4.18 | 98.68 | 14.98 |
| 9.5 | 3.01 | 192.02 | 17.87 | 100.87 | 5.89 | 91.15 | 18.82 |
| 10.5 | 3.42 | 167.45 | 11.26 | 111.52 | 3.36 | 55.93 | 11.75 |
| 11.5 | 3.81 | 176.61 | 12.17 | 101.27 | 3.49 | 75.34 | 12.66 |
| 12.5 | 4.21 | 150.94 | 14.8 | 100.41 | 4.12 | 50.53 | 15.36 |
| 13.5 | 4.61 | 167.98 | 11.72 | 109.25 | 3.44 | 58.73 | 12.21 |
| 16.5 | 5.68 | 117.65 | 10.12 | 95.64 | 3.64 | 22.01 | 10.75 |
| 19.5 | 6.82 | 96.96 | 8.8 | 92.93 | 3.03 | 4.03 | 9.31 |
| 22.5 | 8.16 | 101.6 | 9.49 | 93.32 | 3.29 | 8.28 | 10.04 |
| 26.5 | 10.28 | 93.37 | 7.57 | 87.52 | 2.63 | 5.85 | 8.01 |
| 29.5 | 12.11 | 84.29 | 6.71 | 82.76 | 2.36 | 1.53 | 7.11 |
| 32.5 | 13.84 | 77.54 | 7.82 | 76.6 | 2.7 | 0.94 | 8.27 |
| 35.5 | 15.06 | 88.34 | 7.73 | 76.18 | 2.66 | 12.16 | 8.17 |
| 38.5 | 15.99 | 79.75 | 8.95 | 71.51 | 2.48 | 8.24 | 9.29 |
| 42.5 | 17.23 | 74.17 | 8.6 | 65.68 | 2.54 | 8.49 | 8.97 |

**Supplementary Table 2b.** 137Cs concentrations for MRR1.

|  |  |
| --- | --- |
| Depth | 137Cs |
| cm | Bq kg-1 | $$\pm $$ |
| 0.5 | 0 | 0 |
| 2.5 | 0 | 0 |
| 4.5 | 0 | 0 |
| 6.5 | 0 | 0 |
| 8.5 | 0 | 0 |
| 9.5 | 0 | 0 |
| 10.5 | 0 | 0 |
| 11.5 | 0 | 0 |
| 12.5 | 0 | 0 |
| 13.5 | 0 | 0 |
| 16.5 | 0 | 0 |
| 19.5 | 0 | 0 |
| 22.5 | 0 | 0 |
| 26.5 | 0 | 0 |
| 29.5 | 0 | 0 |
| 32.5 | 0 | 0 |
| 35.5 | 0 | 0 |
| 38.5 | 0 | 0 |
| 42.5 | 0 | 0 |

**Supplementary Table 2c.** 210Pb chronology for MRR1.

|  |  |  |  |
| --- | --- | --- | --- |
| Depth | Dry mass | Chronology | Sedimentation Rate |
|  | Year | Age |  |  |  |  |
| cm | g cm-2 | AD | yr | $$\pm $$ | g cm-2 yr-1 | cm yr-1 | $\pm $% |
| 0 | 0 | 2017 | 0 |  |  |  |  |
| 0.5 | 0.16 | 2015 | 2 | 2 | 0.0846 | 0.274 | 8.4 |
| 2.5 | 0.77 | 2007 | 10 | 2 | 0.0759 | 0.25 | 10.1 |
| 4.5 | 1.37 | 1999 | 18 | 2 | 0.0614 | 0.21 | 11.2 |
| 6.5 | 1.94 | 1989 | 28 | 3 | 0.0574 | 0.186 | 15.6 |
| 8.5 | 2.61 | 1979 | 38 | 4 | 0.0821 | 0.23 | 21.6 |
| 9.5 | 3.01 | 1974 | 43 | 5 | 0.0757 | 0.187 | 27.2 |
| 10.5 | 3.42 | 1970 | 47 | 6 | 0.1071 | 0.267 | 29.2 |
| 11.5 | 3.81 | 1965 | 52 | 7 | 0.0689 | 0.174 | 28.7 |
| 12.5 | 4.21 | 1960 | 57 | 8 | 0.0875 | 0.221 | 40.6 |
| 13.5 | 4.61 | 1955 | 62 | 9 | 0.0638 | 0.174 | 37.4 |
| 16.5 | 5.68 | 1942 | 75 | 13 | 0.1134 | 0.307 | 65.6 |
| 19.5 | 6.82 | 1937 | 80 | 15 | 0.2364 | 0.572 | 87.2 |
| 22.5 | 8.16 | 1936 | 81 | 16 | 1.3345 | 2.703 | 113.3 |
| 26.5 | 10.28 | 1936 | 81 | 17 | 14.5819 | 25.798 | 158 |
| 29.5 | 12.11 | 1935 | 82 | 17 | 6.2782 | 10.565 | 194.9 |
| 32.5 | 13.84 | 1928 | 89 | 17 | 0.2442 | 0.497 | 230.3 |
| 35.5 | 15.06 | 1912 | 105 | 17 | 0.082 | 0.229 | 78.5 |

**Supplementary Table 3.** List of all diatom species and their authorities identified in this study. Species codes are specific to this research.

|  |  |  |
| --- | --- | --- |
| Code | Species Name | Authority |
| AUL001 | *Aulacoseira granulata*  | (Ehrenberg) Simonsen |
| BRA001 | *Brachysira brebissonii*  | R. Ross |
| BRA002 | *Brachysira vitrea* | (Grunow) R. Ross |
| BRA003 | *Brachysira neoacuta* | Lange-Bertalot |
| BRA004 | *Brachysira neoexilis*  | Lange-Bertalot |
| CAL001 | *Caloneis* sp.1 |  |
| CRA002 | *Craticula ambigua*  | (Ehrenberg) D.G. Mann |
| CRA003 | *Craticula buderi*  | (Hustedt) Lange-Bertalot |
| CYM001 | *Cymbella* cf. *affinis* | Kützing |
| CYM002 | *Cymbella* sp.1 |  |
| DIA002 | *Diatoma vulgaris* | Bory |
| DIS001 | *Discostella pseudostelligera*  | (Hustedt) Houk & Klee |
| DIS002 | *Discostella stelligera*  | (Cleve & Grunow) Houk & Klee |
| ENC001 | *Encyonema silesiacum*  | (Bleisch) D.G. Mann |
| ENC002 | *Encyonopsis subminuta* | Krammer & E. Reichardt |
| EUN001 | *Eunotia incisa*  | Gregory |
| EUN002 | *Eunotia subarcuatoides* | Alles, Nörpel & Lange-Bertalot |
| EUN003 | *Eunotia rhomboidea*  | Hustedt |
| EUN004 | *Eunotia zygodon* var. *elongata*  | Hustedt |
| EUN005 | *Eunotia intermedia*  | (Krasske ex Hustedt) Nörpel & Lange-Bertalot |
| EUN006 | *Eunotia indica* | Grunow |
| EUN007 | *Eunotia soleirolii*  | (Kützing) Rabenhorst |
| EUN008 | *Eunotia arcus* | Ehrenberg |
| EUN009 | *Eunotia faba*  | Ehrenberg |
| EUN010 | *Eunotia boreoalpina*  | Lange-Bertalot & Nörpel |
| EUN011 | *Eunotia* sp.1 |  |
| EUN012 | *Eunotia tenella* | (Grunow) Hustedt |
| EUN013 | *Eunotia genuflexa*  | Nörpel |
| EUN014 | *Eunotia* cf. *julii* | Lange-Bertalot & Tagliaventi |
| EUN015 | *Eunotia camelus* | Ehrenberg |
| EUN016 | *Eunotia denticulata* | (Brébisson ex Kützing) Rabenhorst |
| EUN017 | *Eunotia fennica* | (Hustedt) Lange-Bertalot |
| EUN018 | *Eunotia cf. tropica* | Hustedt |
| EUN019 | *Eunotia* sp.2 |  |
| EUN020 | *Eunotia* cf. *compactarcus* | Lange-Bertalot, Pavlov & Kevkov |
| EUN021 | *Eunotia* cf. *ursamaioris* | Lange-Bertalot & Nörpel |
| EUN022 | *Eunotia* cf. *crassula* | Metzeltin & Lange-Bertalot |
| EUN023 | *Eunotia paludosa* | Grunow |
| EUN024 | *Eunotia bidens* | Ehrenberg |
| EUN025 | *Eunotia bigibba* | Kützing |
| FRA001 | *Fragilariforma telum* | (J.R. Carter & P. Denny) P.D. Almeida, C.E. Wetzel & E. Morales |
| FRU001 | *Frustulia saxonica*  | Rabenhorst |
| FRU002 | *Frustulia* sp.1 |  |
| GOM001 | *Gomphonema cf. gracile*  | Ehrenberg |
| HAN001 | *Hantzschia amphioxys* | (Ehrenberg) Grunow |
| KKR001 | *Kurtkrammeria lacusglacialis*  | (L. Bahls) |
| LUT001 | *Luticola muticoides* | (Hustedt) D.G. Mann |
| LUT003 | *Luticola intermedia* | (Hustedt) Levkov, Metzeltin & A. Pavlov |
| LUT004 | *Luticola mutica* | (Kützing) D.G. Mann |
| LUT005 | *Luticola acidoclinata* | Lange-Bertalot |
| LUT006 | *Luticola hustedtii* | Levkov, Metzeltin & A. Pavlov |
| MAY001 | *Mayamaea* cf. *atomus*  | (Kützing) Lange-Bertalot |
| NAV001 | *Navicula leptostriata*  | Jørgensen |
| NEI001 | *Neidium* cf. *ampliatum*  | (Ehrenberg) Krammer |
| NIT001 | *Nitzschia gracilis*  | Hantzsch |
| PIN001 | *Pinnularia viridiformis*  | Krammer |
| PIN002 | *Pinnularia brauniana*  | (Grunow) Studnicka |
| PIN003 | *Pinnularia socialis*  | (Palmer) Hustedt |
| PIN004 | *Pinnularia microstauron*  | (Ehrenberg) Cleve |
| PIN005 | *Pinnularia gibba*  | (Ehrenberg) Ehrenberg |
| PIN007 | *Pinnularia brandelii*  | Cleve |
| PIN008 | *Pinnularia inconstans* | Mayer |
| PIN009 | *Pinnularia* sp.2 |  |
| PIN010 | *Pinnularia* sp.3 |  |
| PIN011 | *Pinnularia* sp.4 |  |
| PIN012 | *Pinnularia* sp.5 |  |
| PIN013 | *Pinnularia borealis* | Ehrenberg  |
| PIN014 | *Pinnularia* sp.6 |  |
| PIN016 | *Pinnularia divergens* | W. Smith |
| PIN017 | *Pinnularia divergentissima*  | (Grunow) Cleve |
| RHO001 | *Rhopalodia* cf. *operculata* | (C.Agardh) Håkanasson |
| SEL001 | *Sellaphora pupula*  | (Kützing) Mereschkovsky |
| SEL002 | *Sellaphora* cf. *schadei*  | (Krasske) C.E. Wetzel, L. Ector, B. Van de Vijver, Compère & D.G. Mann |
| STAU001 | *Stauroneis phoenicenteron*  | (Nitzsch) Ehrenberg |
| STAU002 | *Stauroneis anceps*  | Ehrenberg |
| UNK001 | Unknown sp.1  |  |

**Supplementary Table 4.** Supporting information for Figure 8. List of all operating coal and oil-fired power stations in Malaysia and Indonesia (Sumatra, Java, Kalimantan).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ID | Facility name | Country | Fuel type | Capacity (MW) | Year(s) of commissioning |
| 1 | Jimah  | Malaysia | Coal | 1400 | 2009 |
| 2 | Manjung  | Malaysia | Coal | 3180 | 2002–2015 |
| 3 | Mukah  | Malaysia | Coal | 270 | 2008–2009 |
| 4 | PPLS | Malaysia | Coal | 110 | 2006 |
| 5 | Sejingkat  | Malaysia | Coal | 200 | 1997 |
| 6 | Kapar  | Malaysia | Coal | 2420 | 1985–1994 |
| 7 | Tanjung Bin  | Malaysia | Coal | 2100 | 2006–2007 |
| 8 | Gelugor  | Malaysia | Oil | 398 | 2001 |
| 9 | Melawa  | Malaysia | Oil | 50 | 1995 |
| 10 | Sandakan  | Malaysia | Oil | 34 | 1999 |
| 11 | Stratavest  | Malaysia | Oil | 60 | 1998 |
| 12 | Tawau  | Malaysia | Oil | 36 | 1990 |
| 13 | Bukit Asam  | Indonesia | Coal | 260 | 1989–1995 |
| 14 | Paiton Baru | Indonesia | Coal | 660 | 2012 |
| 15 | Paiton I | Indonesia | Coal | 1340 | 1999–2000 |
| 16 | Paiton II | Indonesia | Coal | 1320 | 1999–2000 |
| 17 | Paiton III | Indonesia | Coal | 815 | 2012 |
| 18 | Paiton PLN | Indonesia | Coal | 800 | 1993–1994 |
| 19 | Ombilin | Indonesia | Coal | 200 | 1996–1997 |
| 20 | Suralaya | Indonesia | Coal | 4025 | 1984–1997, 2011  |
| 21 | Tanjung Awar Awar | Indonesia | Coal | 700 | 2012–2013 |
| 22 | Tanjung Jati-B | Indonesia | Coal | 2640 | 2006, 2011-2012 |
| 23 | Cirebon | Indonesia | Coal | 660 | 2012 |
| 24 | Cilacap Adipala | Indonesia | Coal | 660 | 2014 |
| 25 | Indramayu | Indonesia | Coal | 990 | 2011 |
| 26 | Pacitan | Indonesia | Coal | 630 | 2013 |
| 27 | Tarahan | Indonesia | Coal | 200 | 2007–2008 |
| 28 | Banten-Labuan | Indonesia | Coal | 630 | 2009–2010 |
| 29 | Banten-Lontar | Indonesia | Coal | 945 | 2011–2012 |
| 30 | Labuhan Angin | Indonesia | Coal | 230 | 2008 |
| 31 | Pelabuhan Ratu | Indonesia | Coal | 1050 | 2013 |
| 32 | Rembang | Indonesia | Coal | 630 | 2011 |
| 33 | Tambak Lorok  | Indonesia | Oil | 300 | 1970, 1983 |
| 34 | Gresik | Indonesia | Oil | 600 | 1986–1988 |
| 35 | Gilimanuk | Indonesia | Oil | 130 |  |
| 36 | Asam Asam | Indonesia | Coal | 260 | 2000 |
| 37 | Banjarsari | Indonesia | Coal | 270 | 2015 |
| 38 | Embalut | Indonesia | Coal | 95 | 2014 |
| 39 | Lati | Indonesia | Coal | 14 |  |
| 40 | Tanjung Kasam | Indonesia | Coal | 130 | 2012 |
| 41 | Cikarang Listrindo | Indonesia | Coal | 280 | 2017 |
| 42 | Nagan Raya | Indonesia | Coal | 220 | 2013–2014 |
| 43 | Pangkalan Susu | Indonesia | Coal | 440 | 2015 |
| 44 | Sanggau | Indonesia | Coal | 14 |  |
| 45 | Simpang Belimbing | Indonesia | Coal | 300 | 2011 |
| 46 | Teluk Sirih | Indonesia | Coal | 224 | 2013 |