### Table S1 Core Geophysics and Age Control Methods

#### Core Geophysics

The 144 cores collected offshore Sumatra (Fig. S6) were scanned at sea with a GEOTEK Multi Sensor Core Logger (MSCL), obtaining P-wave velocity, gamma ray density, resistivity, and loop magnetic susceptibility (MS) at 0.5 cm spaced intervals in 1.5-m length sections. Split cores were imaged with a high resolution line-scan digital camera and the lithostratigraphy was described. High resolution point MS data were collected using a Bartling MS2E point sensor at 0.5 cm spacing. The cores were imaged with the Oregon State University Aquilion 64 slice X-ray Computed Tomography (CT) system with a nominal voxel size of 0.5 mm.

#### Age Control Methods

Age control for stratigraphy is provided by Accelerator Mass Spectrometer (AMS) 14C and 210Pb radiometric techniques. 14C data is based on decay with a half-life of 5,730 years and is useful for strata between ~300 - ~35,000 years old79. 210Pb data, based on a shorter half-life of 22 years79, provides information about the most recently deposited sediments.

To estimate ages of the turbidites using radiocarbon, we extract the calcium carbonate shells of planktic foraminifers preserved in the hemipelagic sediment below each turbidite to provide a maximum limiting age. We utilized planktic foraminifer species as they most closely represent the age of the youngest sea water, the surface water that is most closely in equilibrium with the atmosphere. We sample below each turbidite because this is the sediment closest in age to the turbidite. We do not use the age of the sediment above the turbidite because the boundary between the top of the turbidite tail and the hemipelagic sediment is difficult to identify reliably and bioturbation is concentrated at this boundary. These methods are outlined in Goldfinger et al.12.

Trench core sites were deeper than the Carbonate Compensation Depth (CCD), the depth below which foraminiferid CaCO₃ tests dissolve faster than they are deposited. Therefore foraminiferid abundance was nil in trench core sediments, so 14C age control applies only to the slope cores.

Sediment samples were removed from the cores while avoiding the 0.5 cm of material nearest the core walls to avoid visible or undetected deformation and friction drag along the core walls. In some cases, highly irregular turbidite bases resulted in sampling an interval below the basal irregularities, and applying a correction to...
the hemipelagic thickness called “gap.” Hemipelagic sediment samples were freeze dried to separate clay particles to improve rinsing through a sieve, washed in a dilute Calgon (sodium hexametaphosphate) solution to keep the fine particles in suspension, sieved through a 125 μm stainless steel sieve, then dried in a warm oven. Typically 25-50 individual planktic foraminifera (depending on size/weight) were identified then removed from this dried > 125 μm size fraction using a fine sable brush moistened with distilled water. Foraminiferal sample ages were determined using Accelerator Mass Spectrometry (AMS) methods at the Keck AMS facility at University of California, Irvine in collaboration with John Southon.

The primary sources of radiocarbon error include variation of the age in surface and near surface sea water, the sedimentation rate, the level of atmospheric radiocarbon in the atmosphere, and the basal erosion during turbidite emplacement. There does not yet exist sufficient prehistoric benthic-planktic age pairs with which to construct an age model in this region, so the reservoir correction is probably the largest source of error in this study and we have no way to evaluate this source of epistemic error. While we can evaluate basal visually to some extent, and differential erosion can be inferred between nearby cores from differences in hemipelagic thickness and the 13C ages15, there will likely be undetected erosion in these data. Sedimentation rates are calculated using 14C age estimates and thickness of hemipelagic sediment. Sedimentation rates are used to calculate ages for turbidites that have no direct age.

The radiocarbon ages are reported in years before present (BP, measured from 1950) with a 2 standard deviation lab error80. 14C ages are calibrated81 and a marine reservoir correction of 16±11 years is made using the INTCAL09 database82. Only two delta R values are available for the Sumatra area, and while constraints are few on this correction, we here are correlating marine sites to other nearby marine sites, thus the local correlations are valid while absolute ages may contain additional uncertainty. One additional correction we make to the calibrated age is the sediment gap thickness correction (thickness of sediment between the turbidite and the sample; see OxCal code below). For individual ages, we propagate these uncertainties using RMS (root mean square) calculations using estimates of the uncertainties at each step. This calculation includes the lab uncertainties and results in the final reported 2σ range for each radiocarbon age. In later sections of the paper, we calculate region wide mean event ages. For these, we average the ages (using the combine function in OxCal), and again apply RMS calculations to the averaged error ranges to produce the 2σ RMS ranges for each averaged age. No lab multipliers were applied to the data.

Interpreted ages for turbidites are given in Fig. 3 (Fig. S1). Four turbidite ages are based on hemipelagic sedimentation rate estimates, T-4, 15, 17 and 20. We calculate the age of these turbidites to be 450±140, 4,510±350, 4,950±90, and 6,150±310 years Before Present (BP = calendar years before 1950).

OxCal Code for the calibration of ages displayed in Table S4.

Options()
{
    Plot()
    BCAD=FALSE;
    Curve("Marine09","Marine09.14c");
    Delta_R("LocalMarine",16,11);
    {
        {
            R_Date("RR0705_104TC_011_013_SUM_176", 705, 20)+N(55,6);
        }
        {
            R_Date("RR0705_104PC_047.5_049.5_SUM_175", 1220, 20)+N(0,0);
        }
        {
            R_Date("RR0705_104PC_067.5_069.5_SUM_062", 1265, 15)+N(10,1);
        }
        {
            R_Date("RR0705_104TC_047.5_049.5_SUM_175", 1220, 20)+N(0,0);
        }
        {
            R_Date("RR0705_103PC_020_022_SUM_084", 1225, 20)+N(5,0);
        }
        {
            R_Date("RR0705_96PC_287.5_289.5_SUM_089", 1490, 15)+N(4,0);
        }
        {
            R_Date("RR0705_104PC_122_124_SUM_061", 1630, 45)+N(19,2);
        }
        {
            R_Date("RR0705_103PC_111_113_SUM_055", 2985, 20)+N(27,3);
        }
        {
            R_Date("RR0705_103TC_079_081_SUM_180", 2985, 20)+N(0,0);
        }
    }
}