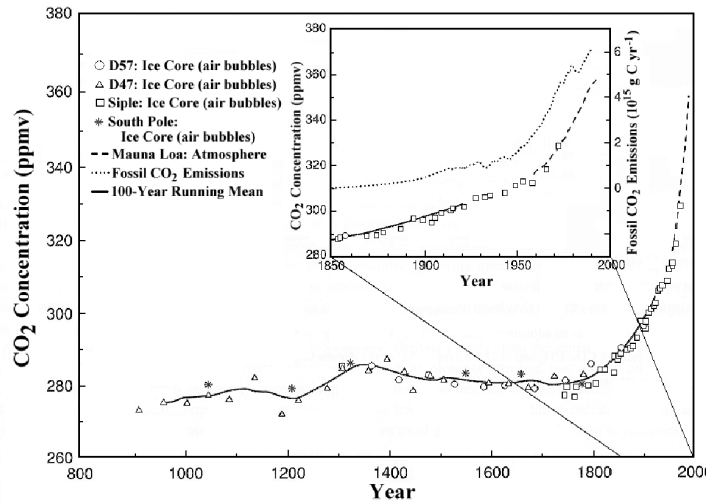
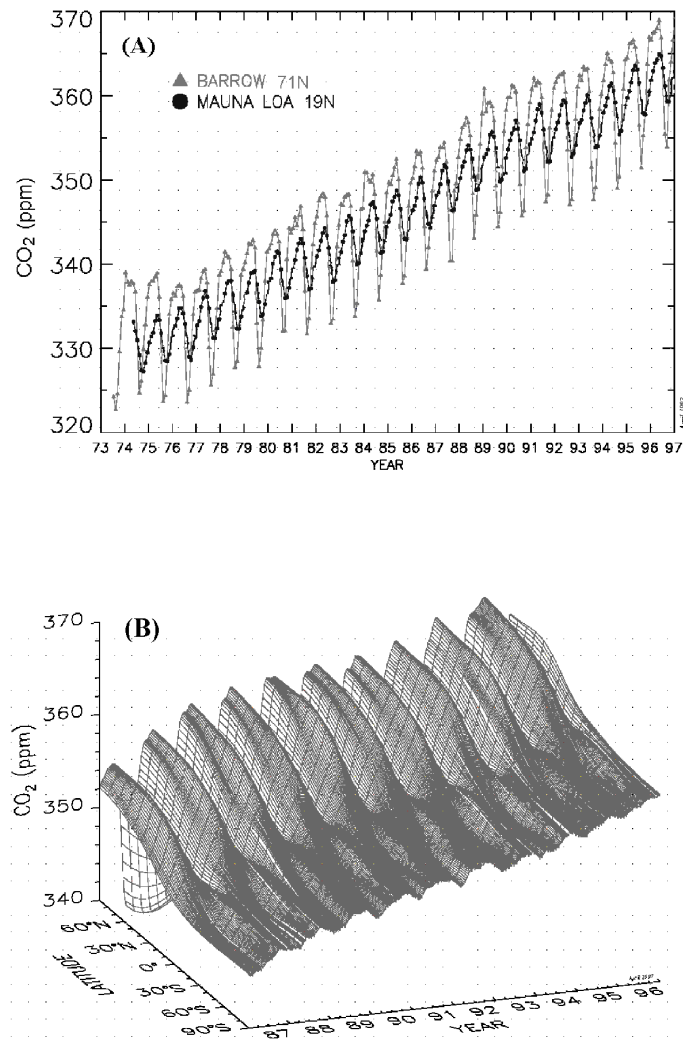


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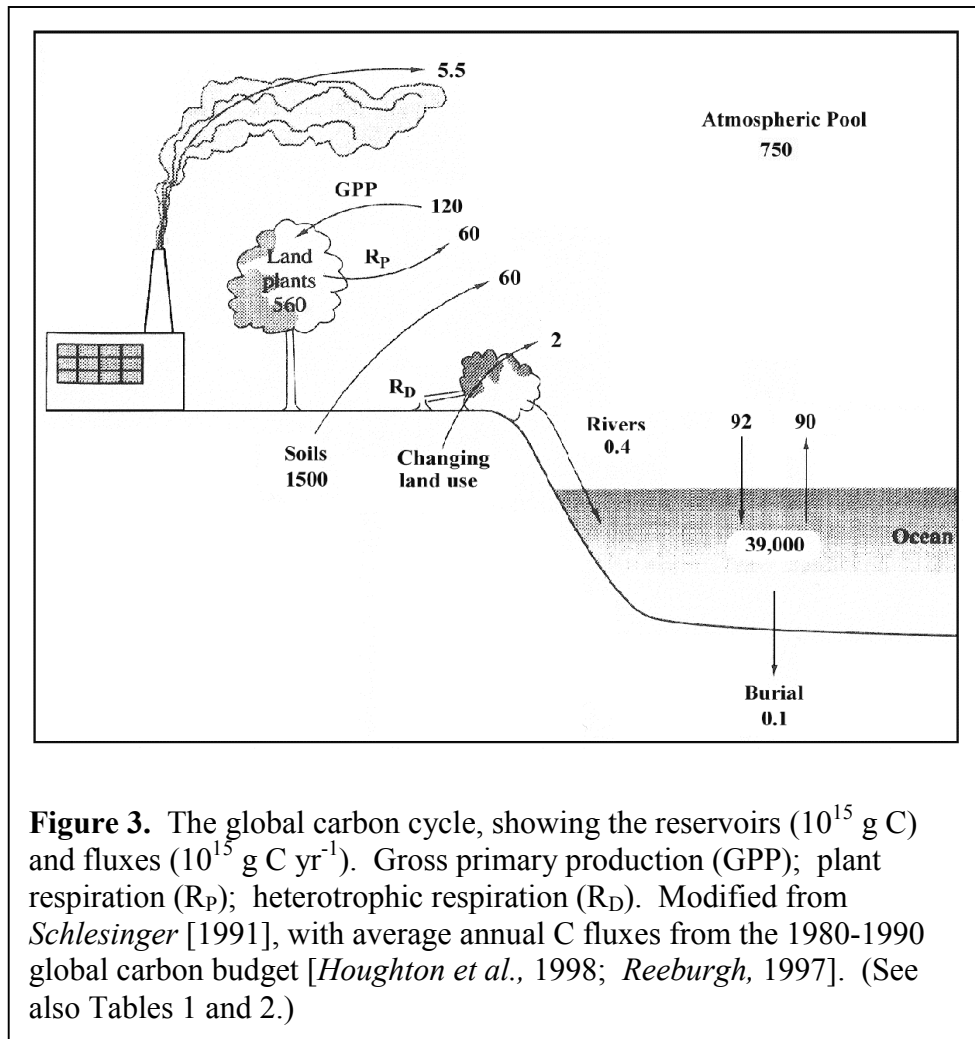
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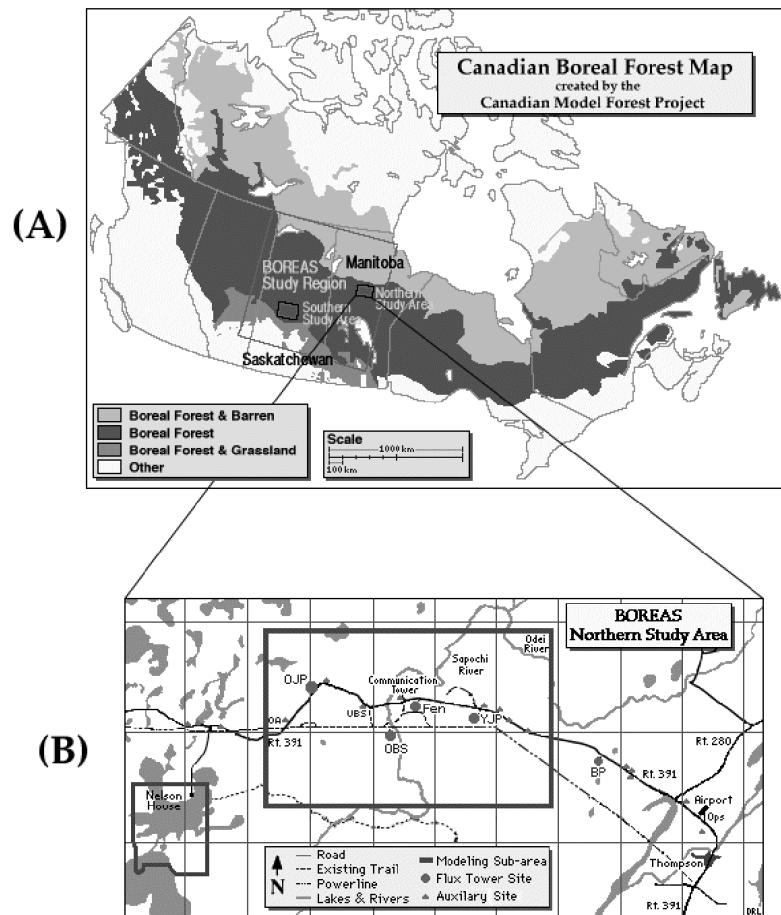


**Figure 1.** Long-term atmospheric CO<sub>2</sub> concentration. Data are from ice core records in Antarctica (D57, D47, Siple, and South Pole) and (since 1958) from the Mauna Loa Observatory, Hawaii. The smooth curve is based on a 100-year running mean. Inset shows CO<sub>2</sub> concentration from 1850 to present. Modified from *Houghton et al.* [1996].

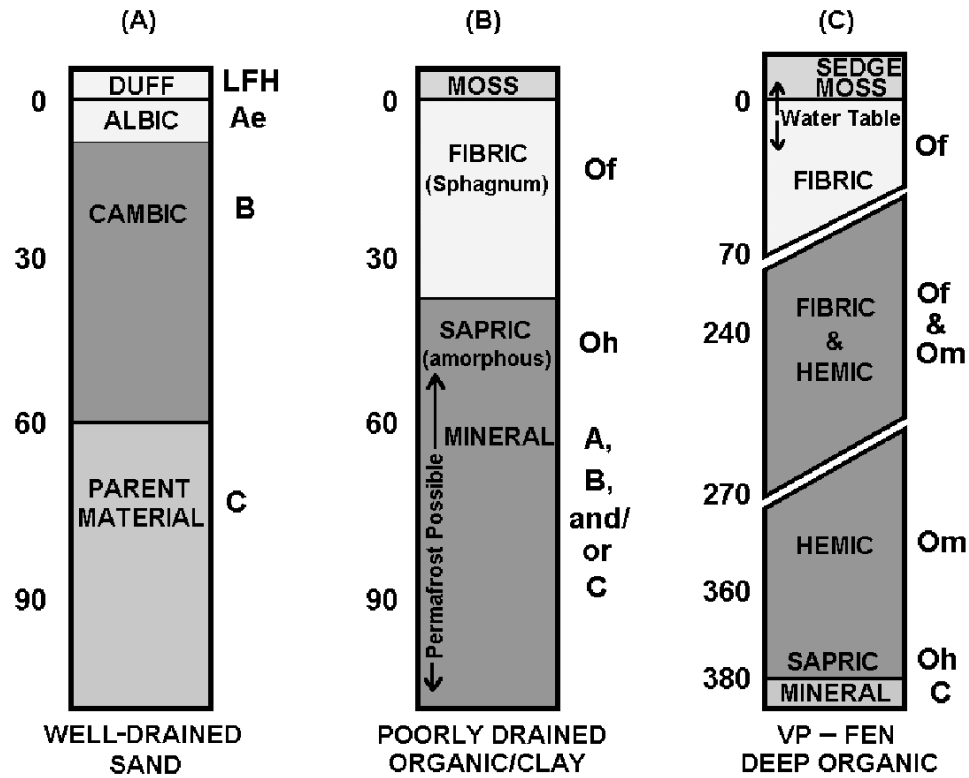


**Figure 2.** (A) Monthly observations of atmospheric CO<sub>2</sub> concentration from the continuous monitoring stations at Barrow, Alaska, and Mauna Loa Observatory, Hawaii. 1973-1997. Modified from *Tans* [1997]. (B) Latitudinal distribution of atmospheric CO<sub>2</sub> in the marine boundary. 1987-1996. The surface represents data smoothed in time and latitude. Modified from *Tans and Conway* [1997]. Source data for A and B are from the NOAA CMDL cooperative air sampling network.

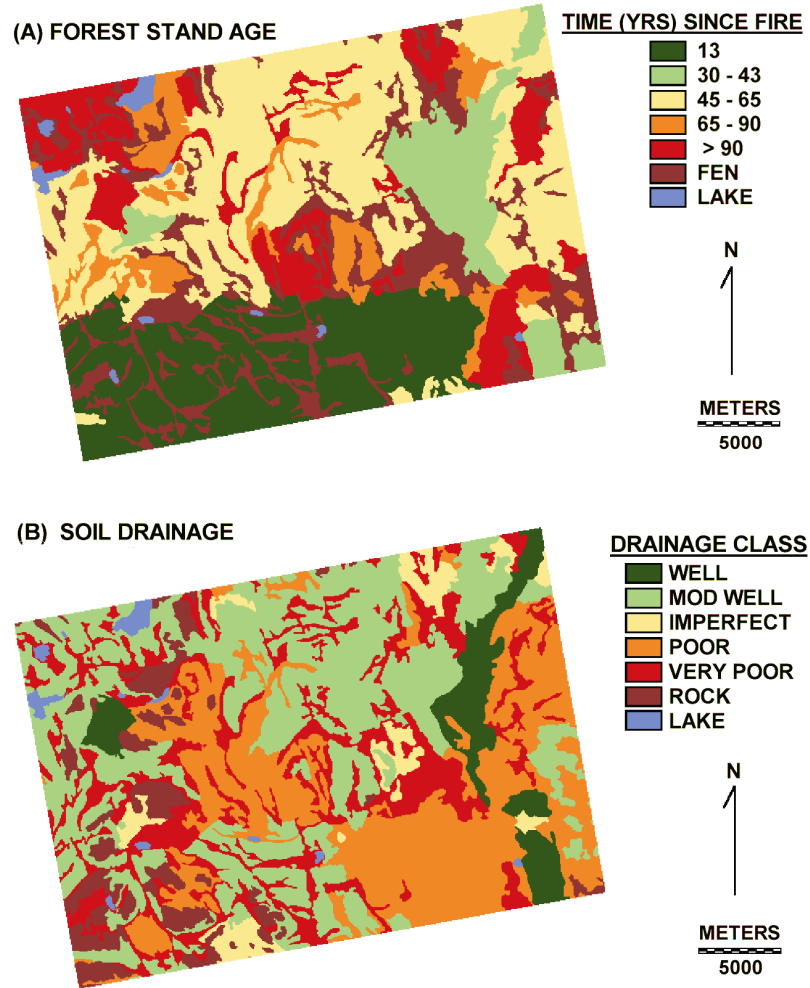




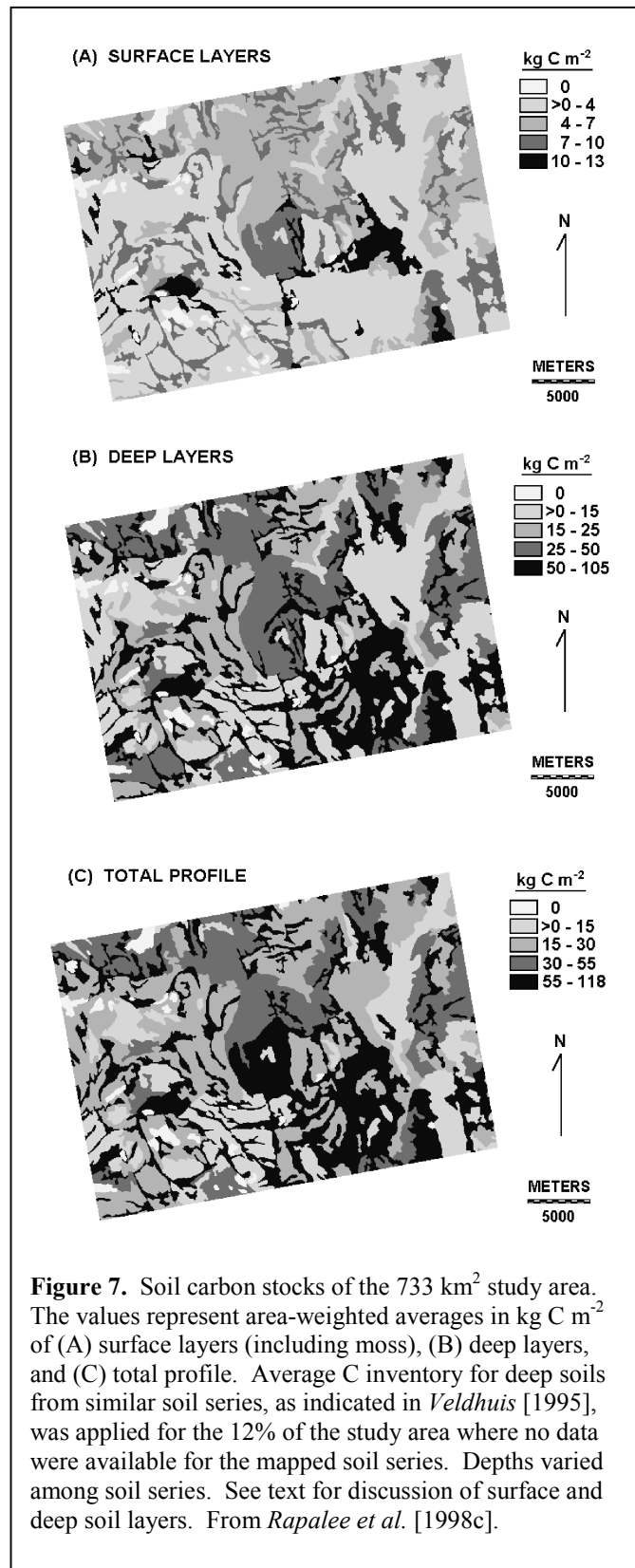
**Figure 4.** (A) Map of Canadian boreal forests showing the BOREAS study region and the northern and southern sites; (B) Map of BOREAS Northern Study Area. The 733 km<sup>2</sup> study area is drawn in black. The eddy flux tower sites are: Old Jack Pine (OJP), Old Black Spruce (OBS), Fen (FEN), Young Jack Pine (YJP), and Beaver Pond (BP). The canopy access towers at the auxiliary sites are: Upland Black Spruce (UBS) and Old Aspen (OA). These maps were modified from those publicly available courtesy of BOREAS, [http://daacl.esd.ornl.gov/BOREAS/bhs/BOREAS\\_Home.html](http://daacl.esd.ornl.gov/BOREAS/bhs/BOREAS_Home.html).



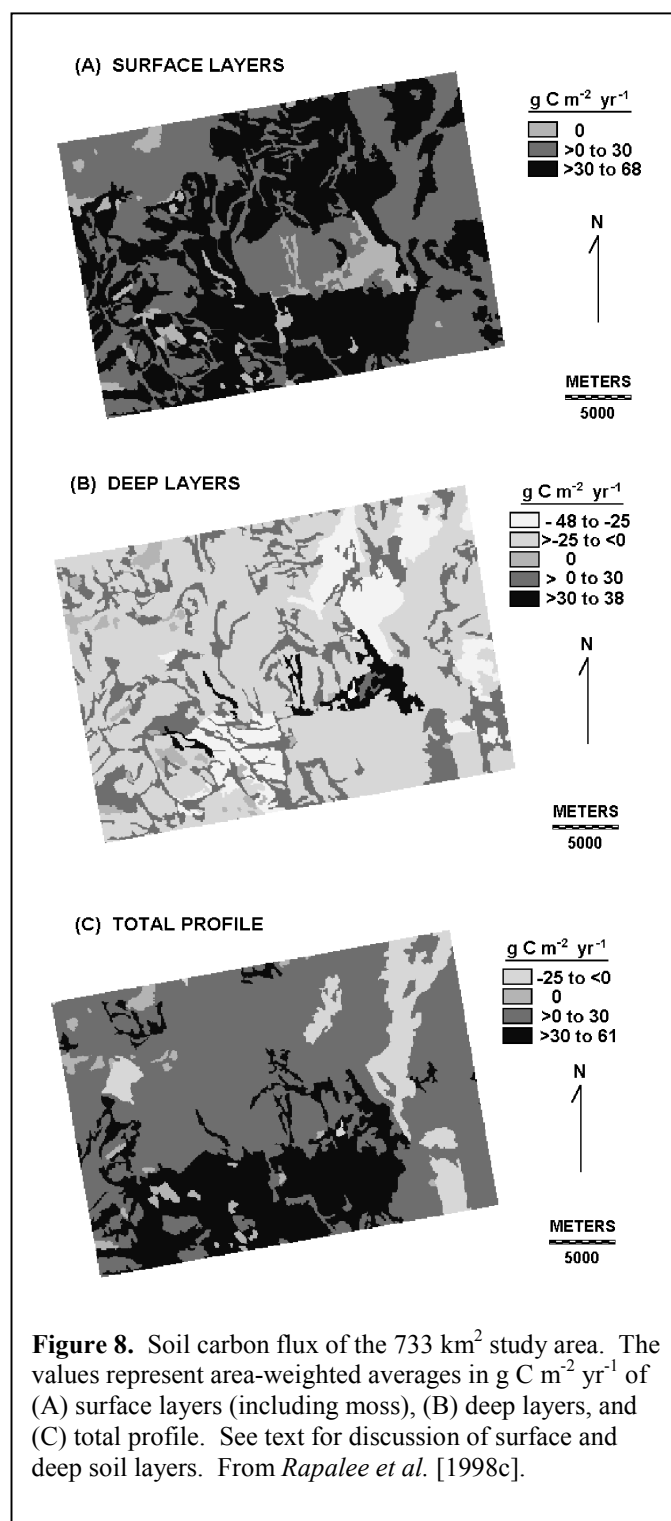
**Figure 5.** Typical boreal forest soil profiles from three sites: (A) well-drained sand, (B) poorly drained organic materials and clay soil, and (C) very poorly drained fen with deep organic material. Profile depths are in centimeters. Soil profile nomenclature is from the Canadian system [Soil Classification Working Group, 1998] and the U.S. soil classification [Soil Survey Staff, 1975 and 1998]. (See Appendix B for detailed descriptions of the soil horizons depicted in these profiles.) From Rapalee *et al.* [1998c].

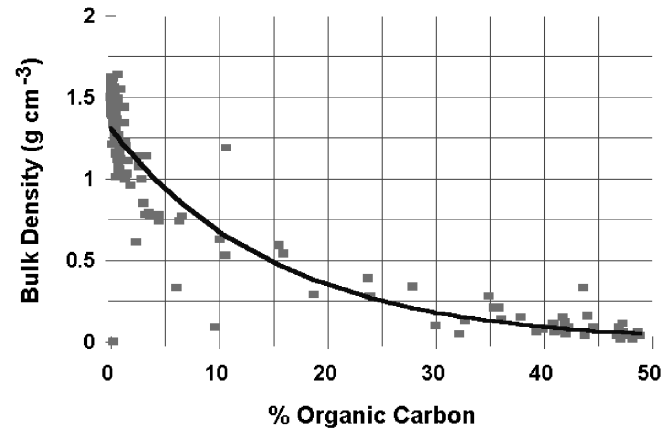


**Figure 6.** (A) Forest stand age map of the 733 km<sup>2</sup> study area compiled from satellite images, fire history maps, forest inventory, and tree core data. Age ranges represent time since last fire. The reference year is 1994. Fens are those soil polygons from the *Veldhuis and Knapp* [1998] soil survey for which 50% or more of the area is classified as fen and/or collapse scar bog and is assumed not to have burned. (B) Soil drainage map of the 733 km<sup>2</sup> study area. The map represents soil drainage by the dominant mapped soil series of soil polygons based on field observations of the *Veldhuis and Knapp* [1998] soil survey. Drainage classes are those from the Canadian soil classification and described in *Veldhuis* [1995]. Areas mapped as “rock” represent bedrock and exposed rock outcrops. From *Rapalee et al.* [1998c].



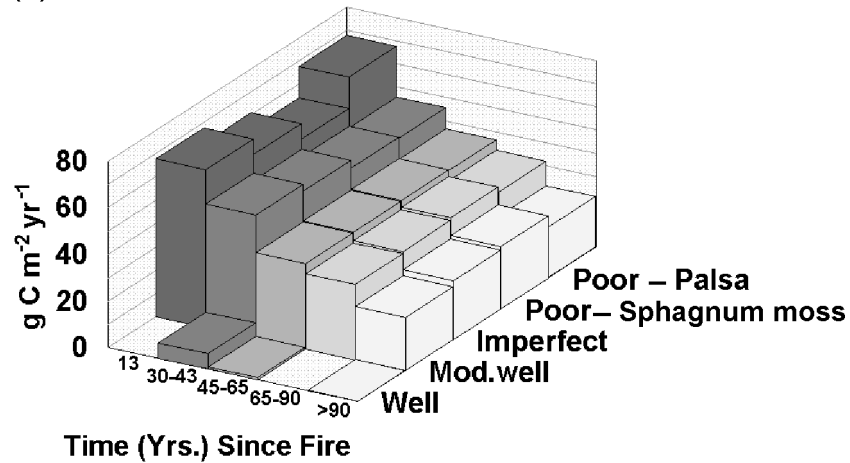




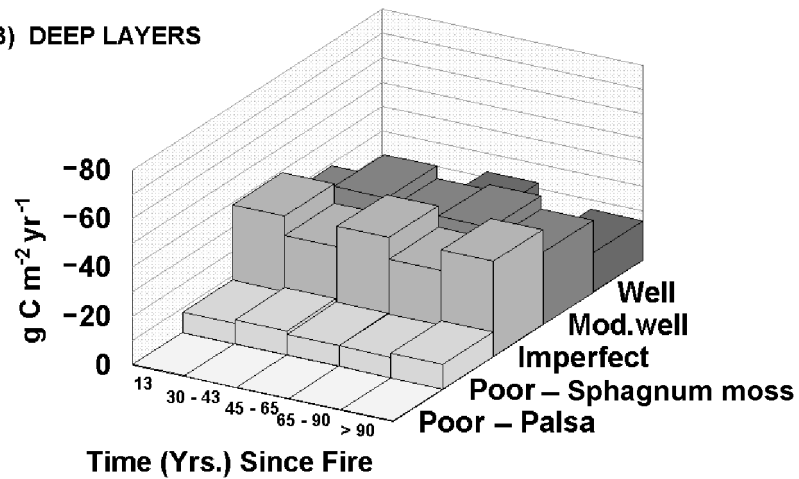


**Figure 9.** Bulk density (BD) versus percentage of organic carbon for all soil horizons of the *Veldhuis* [1998] data, where:  $\ln(\text{BD}) = 0.271 - 0.066 \times \% \text{ C}$ .  $R^2 = 0.91$ . Curve for *Trumbore et al.* [1998] data [ $\ln(\text{BD}) = 0.132 - 0.072 \times \% \text{ C}$ .  $R^2 = 0.77$ ] is similar. From *Rapalee et al.* [1998c].

(A) SURFACE LAYERS



(B) DEEP LAYERS



**Figure 10.** (A) Rates of C accumulation (positive values) in surface layers (including moss) for drainage class and time since fire (forest stand age). (B) Rates of C loss (negative values) from deep organic layers (below moss) and mineral soil as a function of soil drainage and time since fire. Fens and collapse scar bogs (not shown) are gaining an estimated 29 and 12 g C m<sup>-2</sup> yr<sup>-1</sup>, respectively, in the deep layers. From *Rapalee et al.* [1998c].

