

Figure 10.6. Gas transfer rates

normalized to a Schmidt number of 600, G_{600} , from global ^{14}C and localized ^{222}Rn measurements in the ocean as a function of wind speed measured at 10 m above the air–water interface, U_{10} . $^{14}\text{C}_{\text{nat}}$ and $^{14}\text{C}_{\text{bomb}}$ are the gas exchange rates determined from natural and bomb-produced ^{14}C discussed in the text. The box labeled Rn_{GEO} represents the average result from over 100 ^{222}Rn measurements in the oceans during the GEOSECS program (Peng *et al.*, 1979). P and S are the results of repeated ^{222}Rn profiles measured in the subarctic Pacific (Peng *et al.*, 1974 and Emerson *et al.*, 1991, respectively). B is the result of repeated profiles in the subtropical Atlantic (Broecker and Peng, 1971). F and J are the results of “continuous” ^{222}Rn measurements in the North Atlantic (Kromer and Roether, 1983). The solid lines are the proposed gas exchange – wind speed relations of Liss and Merlivat (1986) (L+M) (for $U < 3.6 \text{ m s}^{-1}$, $G(\text{cm h}^{-1}) = 0.17 \times (\text{Sc}/600)^{-2/3}$; for $3.6 > U_{10} < 13$, $G(\text{cm h}^{-1}) = 2.8 \times (U - 3.6) \times (\text{Sc}/600)^{-1/2}$; for $U > 13$, $G(\text{cm h}^{-1}) = 5.9 \times (U - 8.4) \times (\text{Sc}/600)^{-1/2}$) and Wanninkhof (1992) (W) (for short-term average winds, $G(\text{cm h}^{-1}) = 0.31 \times U^2 \times (\text{Sc}/600)^{-1/2}$).

