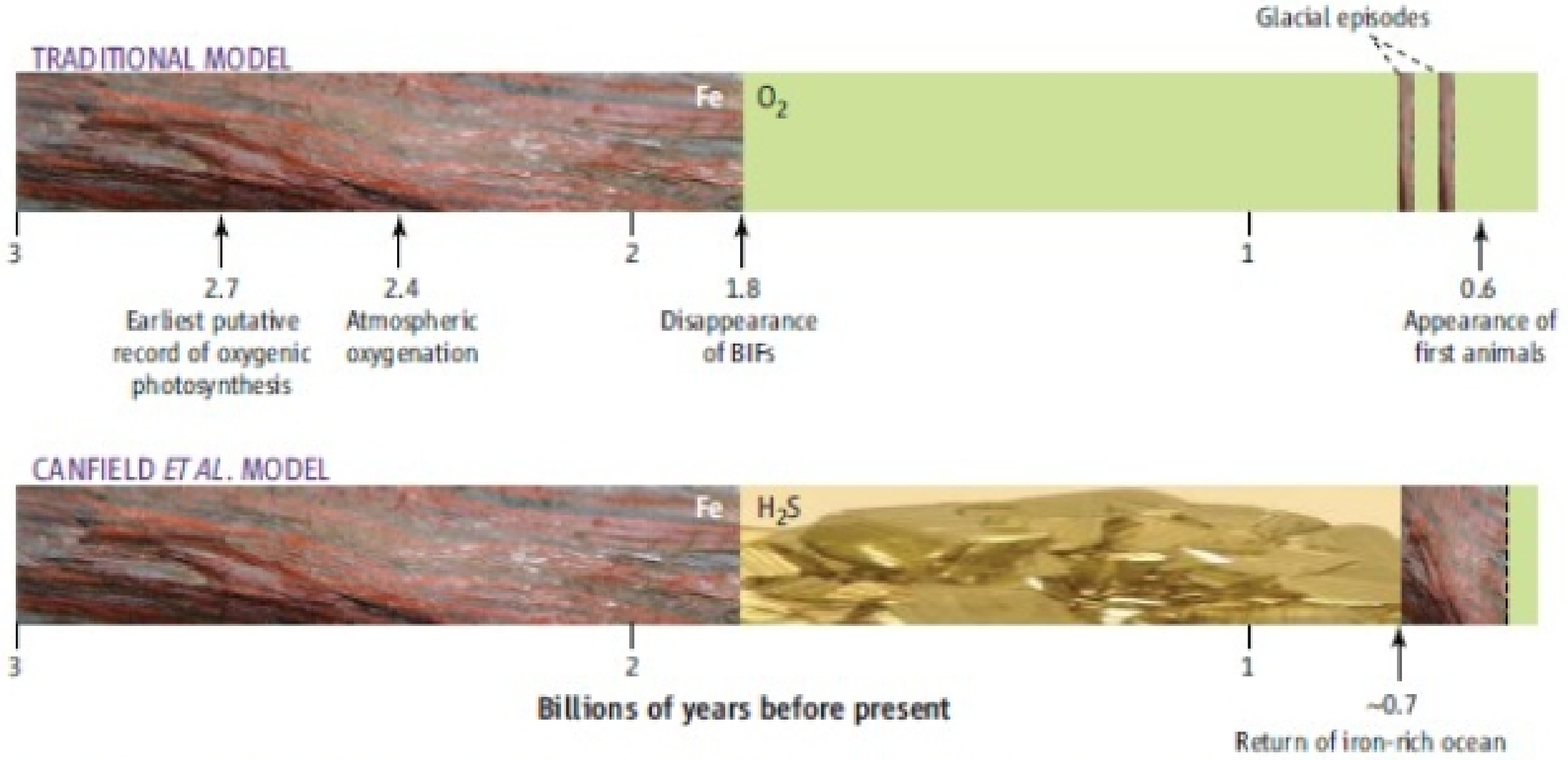
Ocean-atmosphere through time



The evolving deep ocean. In the traditional model, oxygenation of the ocean occurred 1.8 billion years ago, with only brief recurrence of ferruginous conditions during later global glaciations (*11*). Canfield *et al.* now suggest that widespread deep-ocean anoxia lasted to 540 million years ago and perhaps a little longer. Instead of early oxygenation, after 1.8 billion years ago the deep ocean was dominated by H_2S, followed by a repeat of widespread iron conditions (*1*).

Lyons, 2008, Science 321, p. 923-924.

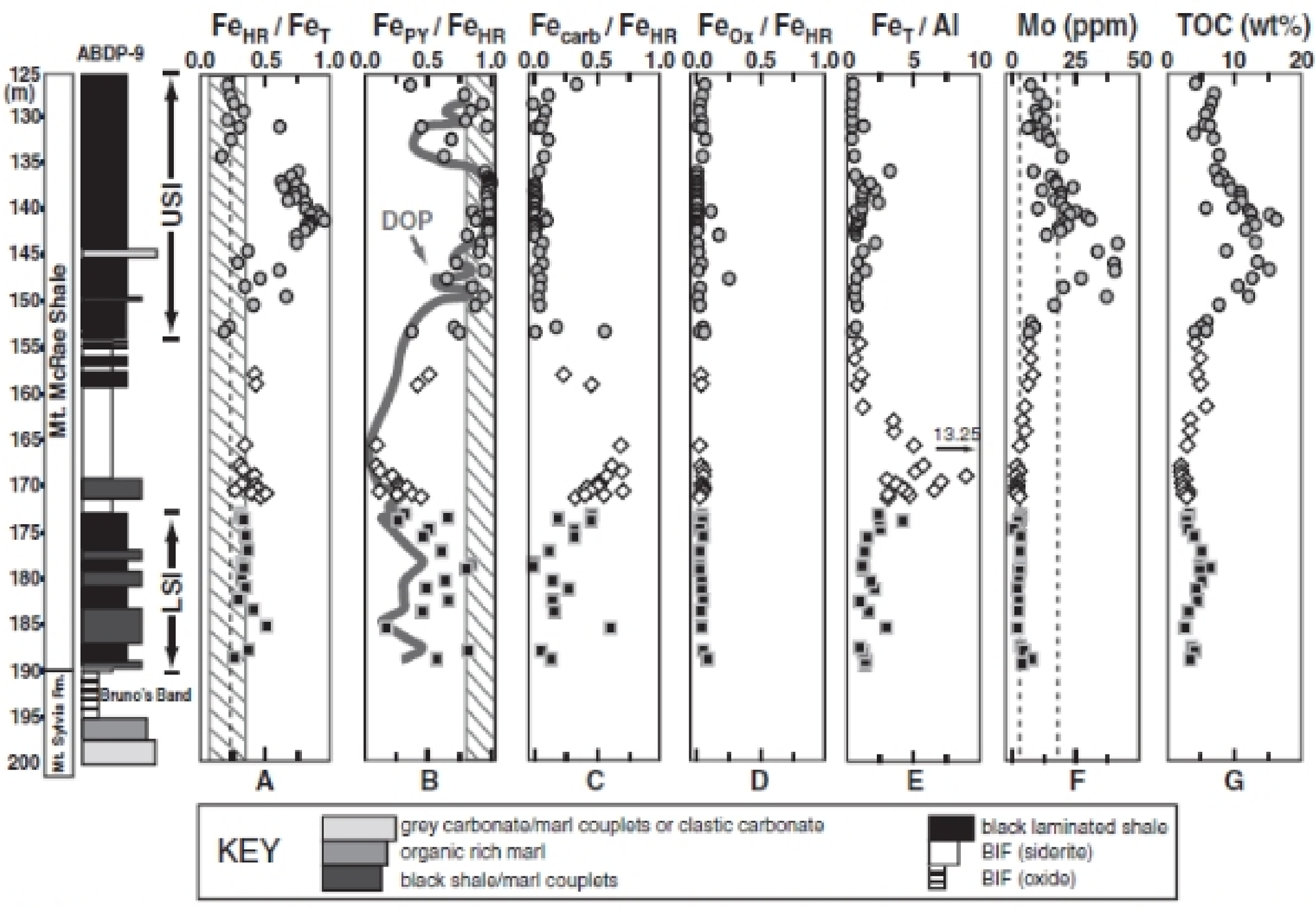
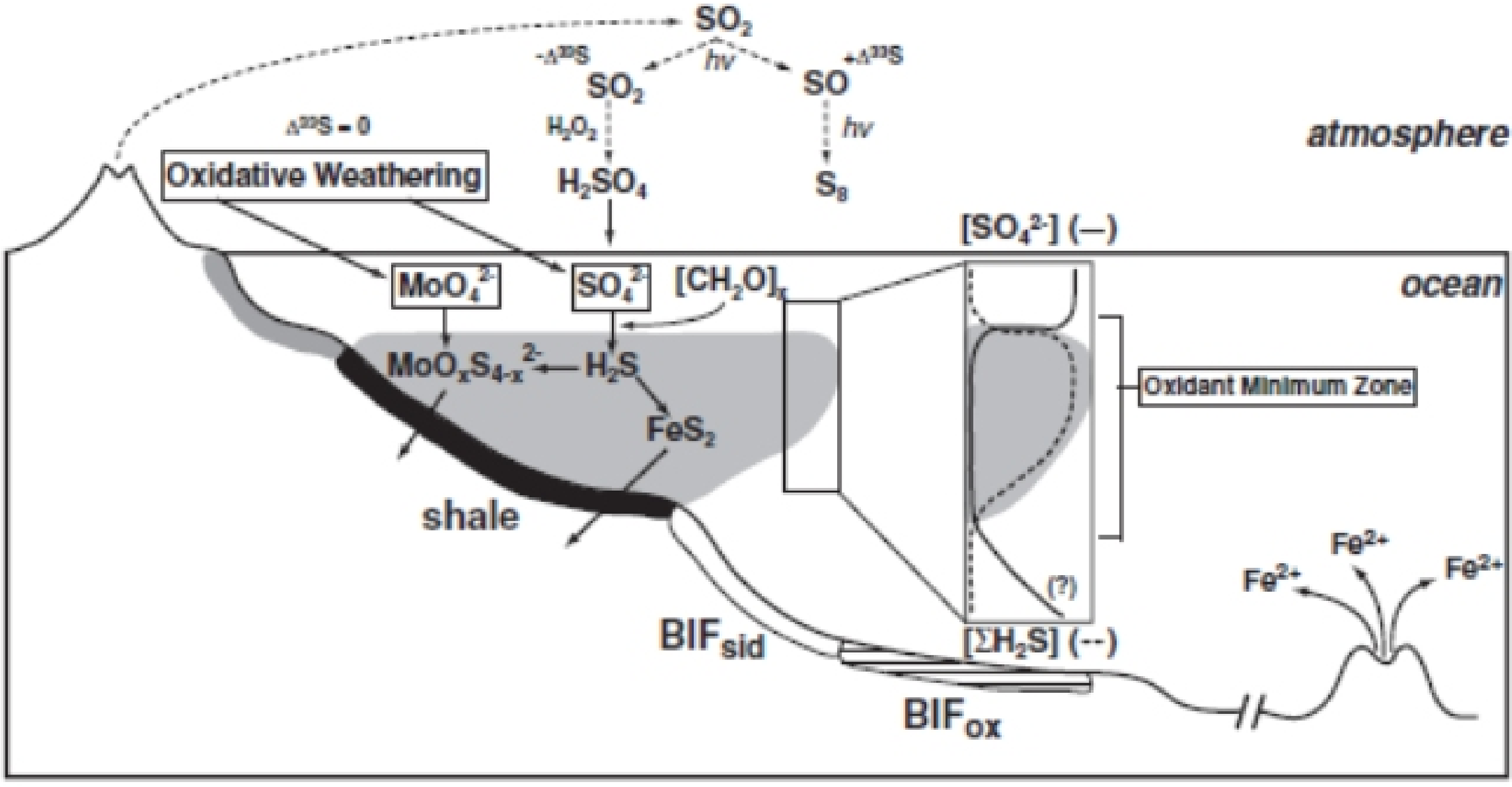


Fig. 1. (**A** to **G**) Stratigraphic profiles for iron speciation data from the ADBP-9 core. Squares, diamonds, and circles represent the LSI, siderite-facies BIF, and USI, respectively. The striped box in (A) represents the range of Fe_{HR}/Fe_T values seen in modern oxic continental margin and deep-sea sediments (*13*). The dotted line in (A) represents the mean Fe_{HR}/Fe_T value (0.26) for normal (oxic) marine settings (*13*). The striped box in (B) represents Fe_{PY}/Fe_{HR} values that are above 0.8. Euxinia is implied when both of these thresholds are exceeded and Fe_T/Al values exceed 0.5. The dark line in (B) is the best fit through DOP values (not shown). The two dotted lines in (E) reflect average bulk Mo enrichments for the Archean [3 parts per million (ppm)] and Proterozoic (18 ppm) (*21*). Data for (E) and (F) from (*10*).

From Reinhard et al., 2009, Science Vol.326, p. 713

Earth's Oceans @ 2.5 Ga



From Reinhard et al., 2009, Science Vol.326, p. 713