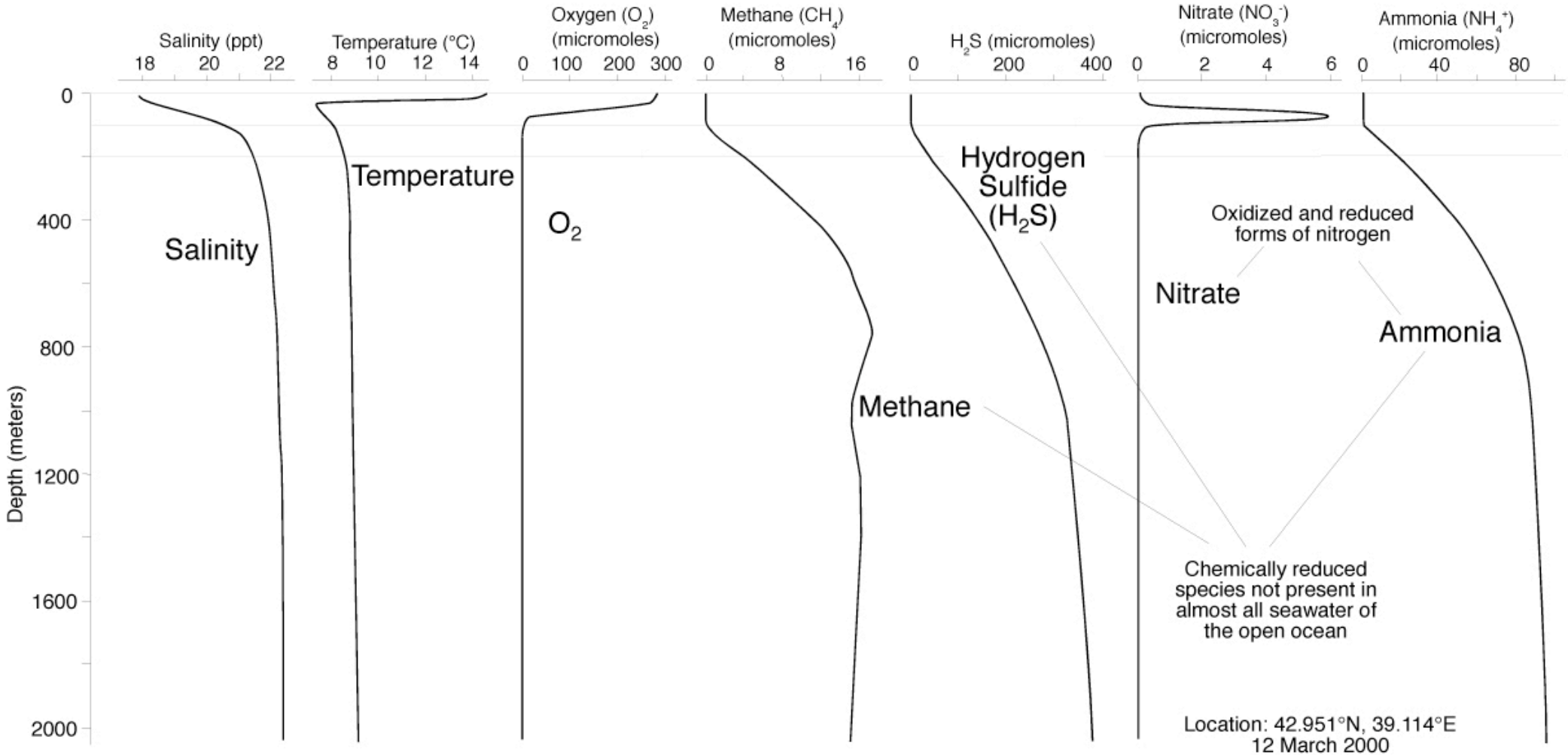
# The Black Sea IIIb: Chemical variation with depth

The Black Sea is a strongly stratified body of water because its deep water is much more saline than its surface water. The difference in density between surface and deep waters precludes significant vertical mixing to transport $O_2$ to the deep water, and decay of sinking organic matter consumes all available $O_2$. As a result, the Black Sea's deep waters are anoxic, allowing the presence of chemically reduced species such as methane, hydrogen sulfide, and ammonia in the deep waters. This makes the Black Sea very different from most of the world's ocean, where at least some dissolved $O_2$ precludes the presence of those chemically reduced species.

Another chemical entity affected by the anoxia of the Black Sea's deep water is iron (Fe). In the oxidizing conditions typical of Earth's oceans, Fe exists in its 3+ state and forms oxides and hydroxides. In reducing conditions, however, it enters its more soluble 2+ state and, in the presence of reduced sulfur like $H_2S$, can form iron sulfides like greigite, mackinawite, and ultimately pyrite ($FeS_2$). Thus the sediments of Black Sea's depths are unusual both in containing much organic matter and in containing abundant pyrite.

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Source of data shown: Yakushev, E.V., et al., 2008, Vertical hydrochemical structure of the Black Sea, in Kostianoy, A.G., and Kosarev, A.N., *The Black Sea Environment:* Springer Handbook of Environmental Chemistry v 5Q, p. 277-307.