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The properties of the Western Mediterranean Deep Water in a wide area located at the western boundary of the Mediterranean Sea, including the Balearic Sea, have revealed intense changes when observed in summer 2005. Between February and June 2005, a temperature drop of 0.14°C reverted dramatically the progressive warming trend of 0.011°C yr−1 that had been observed since 1996, in the waters below 600 dbar north of the Balearic channels. A similar temperature drop has been observed east of the Minorca Island, below the Levantine Intermediate Water and down to 1500 dbar. In the deepest levels, a complex thermohaline structure, which implies different waters masses as sources, was tracked more than 400 km along the western boundary of the Mediterranean Sea, from Barcelona to the Algerian Basin. It is suggested that the changes may be linked to the severe 2004/2005 winter occurred at the northwestern Mediterranean Sea.