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## 海水物性对地震反射系数的相对贡献

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### Relative contribution of seawater physical property to seismic reflection coefficient

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摘要

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### 摘要

地震剖面与海水物性之间的关系是地震海洋学亟待研究的关键问题之一. 本文选取地中海涡旋、各大洋不同纬度和南海东北部不同月份的三组CTD资料,按海域、季节和深度对法向相对贡献进行计算和分析,并从地中海涡旋CTD资料中选取典型温盐界面进行非法向相对贡献的研究. 结果表明声速和温度的平均法向相对贡献随着海域、季节和深度呈相似性变化,其变化范围主要由相邻海水团之间的物性差异决定,分别为78%~94%和74%~98%. 声速和温度(密度和盐度)的非法向相对贡献随着入射角的增加而增大(减小). 用于反演的叠前地震数据应尽量包含较宽入射角范围的道集,特别是对于相对贡献较小的密度和盐度,包含小入射角的地震道对提高反演结果的精度尤为重要. 通过对比地中海涡旋的Turner角剖面法和相对贡献结果,发现Turner角对相对贡献具有很好的指示作用,其密度和盐度相对贡献较大的区域对应于Turner角为-45°的双稳定区域与扩散对流区域的边界附近,在此区域的密度比为零或较小. 南北极附近海域的密度比较小,从而导致高纬度站位出现声速和温度相对贡献偏小的现象. 南海东北部冬季表层海水的温度和声速相对贡献偏大则可能是由于黑潮侵入导致海水层温度差异及密度比变大引起.

关键词 地震海洋学, 相对贡献, 南海, 地中海涡旋

### Abstract:

The relation between seismic profile and seawater physical property is one of the key problems urgent to be studied in seismic oceanography. This paper choose three groups of CTD data, including the section of Meddy, ten stations at different latitudes of the oceans, monthly data in the northeastern South China Sea, to study the normal and non-normal relative contribution according to the sea area, season and depth of water. The results show that the average normal relative contributions of sound speed and temperature similarly vary with sea area, season and water depth in a range of 78%~94% and 74%~98% respectively, mainly determined by the physical differences between adjacent water masses. The non-normal relative contributions of sound speed and temperature are enhanced with the increasing incidence angle, but the relative contributions of density and salinity are opposite. The prestack seismic data for inversion should contain gathers with a wide range of incidence angles. It is especially important to contain seismic traces with small incidence angle to improve the accuracy of density and salinity inversion which have smaller relative contribution. Through comparing the relative contribution of Meddy with the Turner angle section, it is found that Turner angle has an excellent indicative function to relative contribution. The zone, where the relative contributions of density and salinity are larger, well corresponds to the boundary between double stable region and diffusive region, where Turner angle is about -45°. The density ratios are relatively small at high latitude stations which result in small relative contribution of sound speed and temperature. The relative contributions of sound speed and temperature are slightly larger in the surface seawater in the northeastern South China Sea. This may be caused by temperature difference and density ratio increasing due to the Kuroshio intrusion.

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