

# Temperature and Salinity Profiling Analysis off Sarawak Waters, Malaysia

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**ABSTRACT** Prime Scientific Sailing Expedition (EPSP 2009), was carried out in the South China Sea (SCS) along Sarawak waters for nine days from 20 to 29 June 2009. The main objective was to enhance physical oceanography data to support the management of marine ecosystem and other marine resources off Sarawak waters. The main purpose of this present study is to construct vertical temperature and salinity structures off Sarawak waters and to define the water properties based on differ water depths. The temperature and salinity data were obtained using Conductivity-Temperature-Depth (CTD) from sea surface down to 523 m water depth. The measurement was done along the transect line that consists of 60 sampling stations involved with furthest distance offshore at ~471 km. Vertical profiles of temperature, salinity and temperature-salinity (T-S) diagrams of each station were plotted and analyzed based on location and water depth. Offshore sampling stations at water depth greater than 50 m are known as deep waters while near shore sampling station at water depth less than 50m is known as shallow waters. The constructed vertical profiles showed that as water depth increases, salinity increases whereas temperature decreases. Comparison of minimum and maximum temperature range of shallow and deep waters is 15°C and 1°C respectively. However, there is only 0.71°C difference of salinity between minimum salinity of shallow waters and deep waters. The seawater variable of Sarawak waters are impacted by the distance from mainland and its geographical location as well as the rivers influx into the SCS. Constant climate change due to seasonal monsoon and high rainfall as it is located in the tropical region contribute to the spatial temperature and salinity in this area. High rivers runoff into the SCS can reduce the salinity of the water at coastal area. Salinity increases as sampling location further offshore. High rainfall may decreases water temperature and salinity at water surface.

**KEYWORDS:** South China Sea; Sarawak Waters; vertical structures; temperature-salinity diagram

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## INTRODUCTION

Malaysian waters are known to be one of the most diverse marine ecosystem and high diversity of marine resources (Mazlan *et al.*, 2005). Lack of physical oceanographic information has inspired the Prime Scientific Sailing Expedition in 2009 (PMSP'09) to be conducted at offshore area of Malaysian waters. Among the very few oceanographic cruises that has been done before on Malaysian waters were the South East Asian Fisheries Development Centre (SEAFDEC) cruise done in 1999 (Saadon *et al.*, 1999) at the east coast of peninsular Malaysia and the oceanographic cruises conducted by Institute of Oceanography (INOS), Universiti Malaysia Terengganu (UMT) in 2003 and 2004 respectively (Roseli & Akhir, 2014). PMSP '09 was organized by the National Oceanography Directorate, Ministry of Science and Technology and Innovation (MOSTI) to support the conservation of marine ecosystem and marine resources within Malaysia waters.

Common seawater variable measured in any marine expedition including this particular study are water temperature and salinity (Tomczak & Godfrey, 1994). High temperature variation in the upper layer of the sea in the study area are due to external environmental factors such as energy transfer process, external and internal forces that render water movement without heat transfer to or from the atmosphere (Reddy, 2001). The temperature change layers may occur at certain depth of the water column known as thermocline (Thurman & Trujillo, 2003). Salinity is defined as