

T&S Variations in the Persian Gulf

(A computer study)

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Abstract— The Persian Gulf is a semi-enclosed sea which connects to the Oman sea and surface waters on the earth through the Strait of Hormuz[7]. Variations of temperature and salinity in this water basin are due to some forcing such as wind and evaporation. The patterns of the two parameters are different with each other there. In this research, we pay attention to this point exactly.

Keywords—component; Persian Gulf; Analysis; Temperature; Salinity

I. INTRODUCTION

The Persian Gulf is a strategic water basin which is important as a regard as fisheries, shipping and biology. Then study and research there is very important applied work scientifically [1]. Temperature and salinity are two physical parameters that appoint physics of sea water so chemical and biological properties of it are influenced due to them [6]. Studied T&S (Temperature and Salinity) contours in the PG¹ during summer and winter and showed that their regimes differ with each other overlay in these hot and cold seasons of year [4]. Studied physical parameters such as internal waves as phenomena produced from T&S variations and their overall different in the PG in summer and winter [3]. Simulated these two parameters in the PG by a computer code in FORTRAN and studied their variation during one year [2].

II. MATERIALS AND METHODS

Researches and scientific studies are ways to know about phenomena and fact underwater [5]. The Persian Gulf in south of Iran are coasts in Arabian countries like Emirates, Kuwait and Oman. Fig (1) shows an aero picture of the Persian Gulf.



Figure 1. An aero picture of the Persian Gulf

Measurements of T&S (temperature and salinity) used in this research are the data collected in 1992 through Mt. Mitchell measurements. The analysis of the data in summer and winter was done by the POM and drawing curves and contours by Matlab, some important results were gotten that would be expressed in the following sections of this paper.

III. FIELDS ANALYSIS

Variations of temperature and salinity in the summer and winter are variously in the case zone that is shown in fig.2. This computer study is done in 11 layers in each season.

As we could see in the above contours, T&S regime in each season is separately special, this is related to meteorological and density in two hot and cold seasons different from each other.

After much studies and consideration, the contours of T&S were gotten through the axis of the PG. Fig.3 shows contours in summer and winter including special regimes of T&S in each season.

¹ Persian Golf

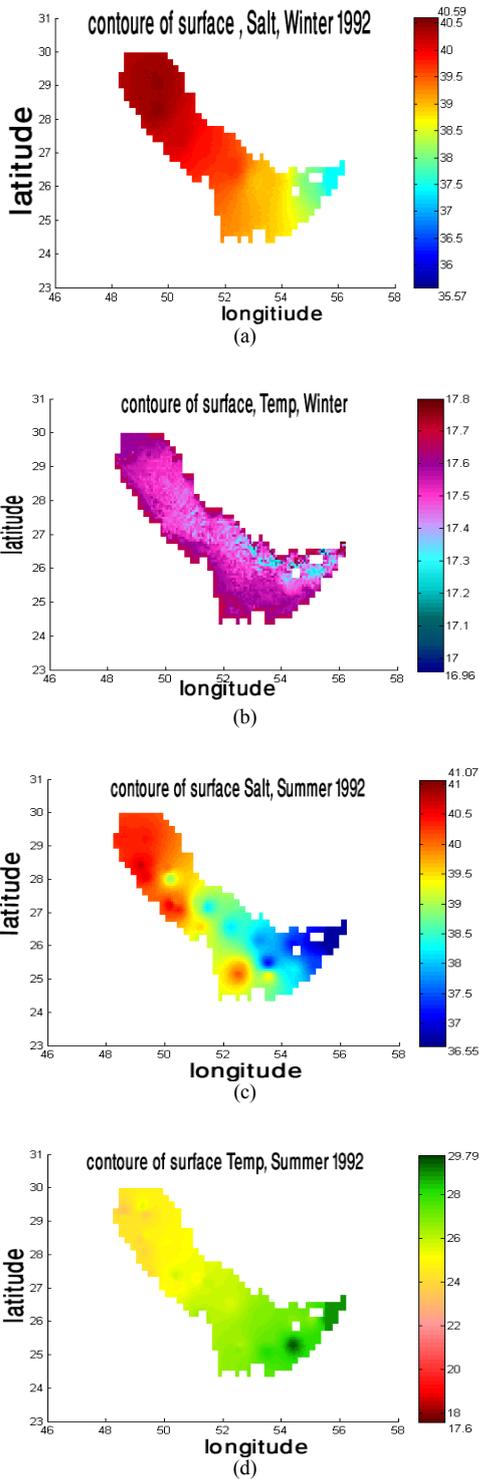


Figure 2. T&S contours surface layers in the Persian Gulf

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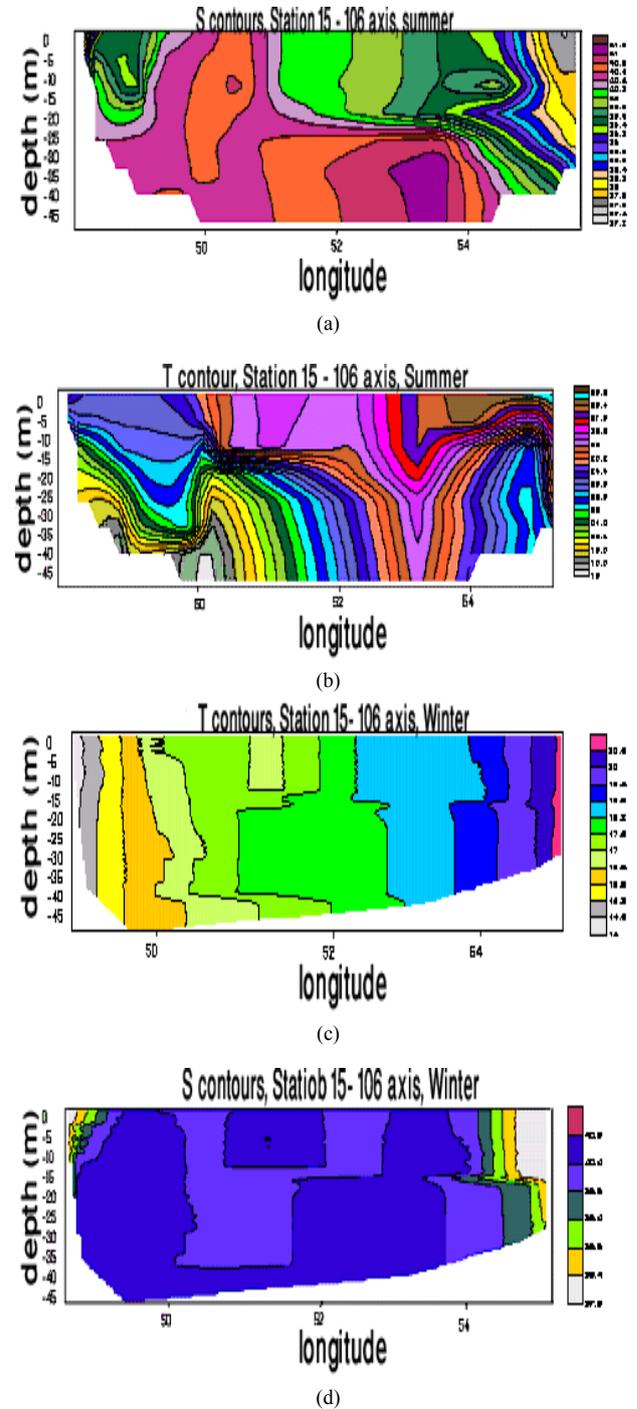


Figure 3. T&S contours through the main PG axis

So, physical environmental and meteorological conditions around the PG are variously different in summer and winter.

IV. TEMPERATURE AND SALINITY PROFILES

Temperature and salinity values on surface of sea water are affected of wind, evaporation and other forcing and stresses in atmosphere; and their values are affected of bottom friction as a stress more[8]. However temperature values from surface to bottom are decreasing in spite of salinity in summer and winter. In computer simulation of T&S and digital code, there are sentences about wind, evaporation and bottom stress applying on water body in water column to demonstrate variations through surface to bottom of the physical properties. In fact, density of seawater including temperature and salinity is related to these to parameters T&S directly of course it is related to temperature with a bigger percentage. For understanding the above points in this section, the following curves in Fig.4 show how T and S depth variation from surface to bottom through water column.

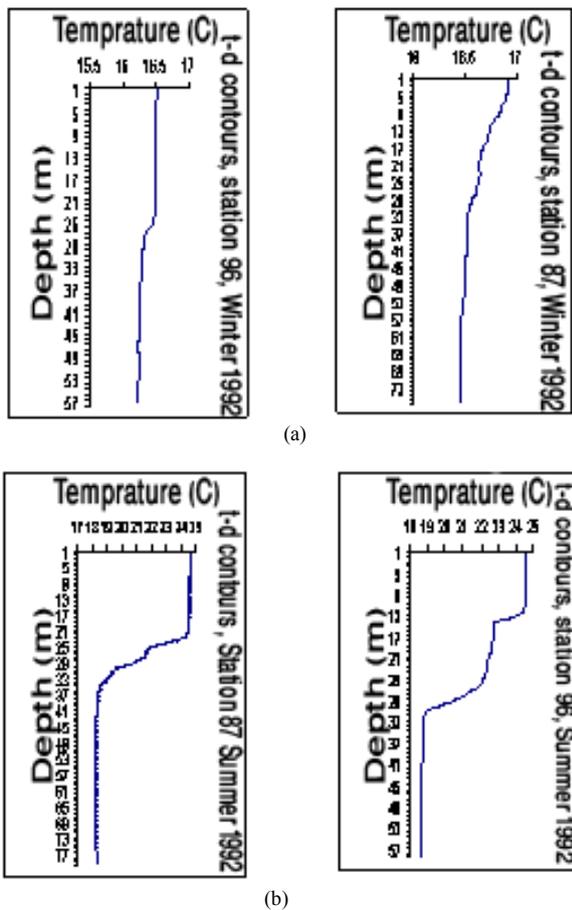


Figure 4. Depth variation of T in some stations in the PG in summer and winter

The correct physical decreasing or increasing varying of temperature and salinity in water column would be formed by advection and diffusion terms in computer codes and simulation which cause to transfer heat-cold and salty through water body.

In fact, 3-dimensional simulation by computer codes for T, S or each physical-chemical property variation would be more complete. In this view, each 2-D picture of the parameter in different transection will be possible.

V. CONCLUSION AND DISCUSSION

There are different water basin on the earth like rivers, seas and oceans. We should do more studies and researches digitally, computer, monitoring and measuring during cruises. Whatever scientists and post graduates do such studies, research problem would decrease more. Computer science and numerical studied by codes and digital models help to be successful in this field. Finding and applying initial and boundary conditions are the main tools to do computer studying. Winds, evaporation and water currents from the Oman sea to the PG are different in summer and winter, that is, variously physical conditions in the PG and observing physical properties there is due to unfixed lateral and influencing forcing about the case zone.

VI. RESULTS

Some important results physically are gotten as below.

- 1) *Temperature and salinity are much different in summer and winter due to different forcing such as wind in the Persian Gulf.*
- 2) *Salinity is decreased from winter to summer in spite of temperature; because salts don't attend in evaporation.*
- 3) *Bottom layer of sea water column has lower temperature but upper salinity.*
- 4) *As a result of variously temperature and salinity regimes in each season, internal wave from and propagate through water column in the Persian Gulf.*
- 5) *T&S variations are in inverse relation with each other and their values are related physically.*

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