# New Analysis of All Seas Water Parameters for All February Months from 2005 to 2017 using Real Time Data

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**Abstract:**

In this research article we used practical data of salinity and temperatures for all February months ranges from 2005 to 2017, this data are taken from National centers for environmental information also called National oceanic and atmospheric administration, in past age scientists used data as an assumption to discover sea water parameters, which is not achievable in real life because the sea water parameters altered with each depth, latitude and longitude. At this data base the data is accessible at each depth, latitudes and longitudes of sea in analyzed and in statistical form. In this research article we analyzed mean conductivity, mean permittivity, mean salinity and mean temperatures for all February months from 2005 to 2017, from surface of sea to deepness of 5500 m, using this practical data from National centers for environmental information. We used Mat lab as a simulation apparatus to locate these sea water parameters from this real time data. We used 2 to 40 GHz frequency of electromagnetic waves to get these sea water parameters, we also use Ellison et al. Model 1998 Debye interpolation function formula, as a reference formula to discover these sea water parameters by taking practical data from National centers for environmental information.

**Keywords**:Mean temperature, Mean salinity, Mean conductivity, mean permittivity, s/m, F/m, ppt.

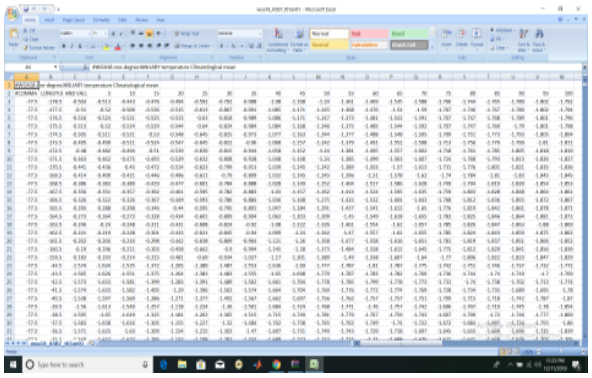
## 1. Introduction:

Sea water are a combination of inorganic and organic compounds, organic compounds which consist of carbon component's, have no effect on sea water parameters, while inorganic compounds which have no components of carbons these are the salts dissolved in sea water, the source of inorganic compounds are volcanoes, rain which altered its concentrations in sea water. The sea water parameters are related with this inorganic compound's, if the inorganic compounds concentrations are maximum the sea water parameters i.e. mean conductivity, mean permittivity, mean salinity and mean temperatures are maximum, and if the inorganic compound's concentrations are minimum the sea water parameters i.e. mean conductivity, mean permittivity, mean salinity and mean temperatures are also minimum. Which we discuss below, we use Debye model as a reference model to discover the sea water parameters, in past scientist used Debye model for permanent data and unchanging frequency, to find the sea water parameters which is not feasible in actual world.

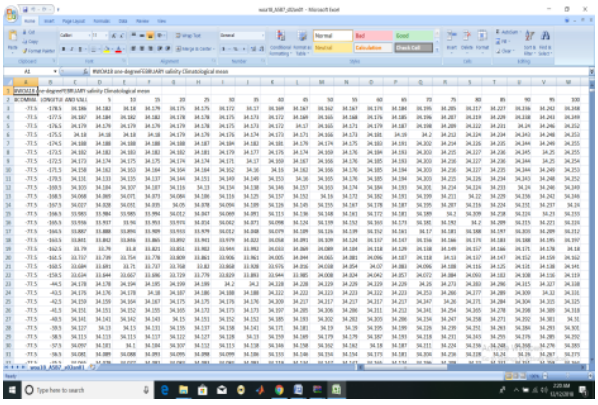
## 2. Real time data of salinity and temperatures of sea:

The practical data are took from National centers for environmental information, in shape of salinity and temperatures from different deepness, latitudes, longitudes from all over the seas of the world, in shape of analyzed mean data and statistical mean data as shown below.

## a) Analyzed mean data

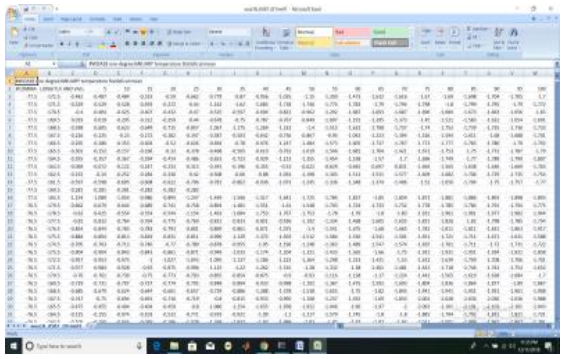


a) Fig 1 Temperature data.

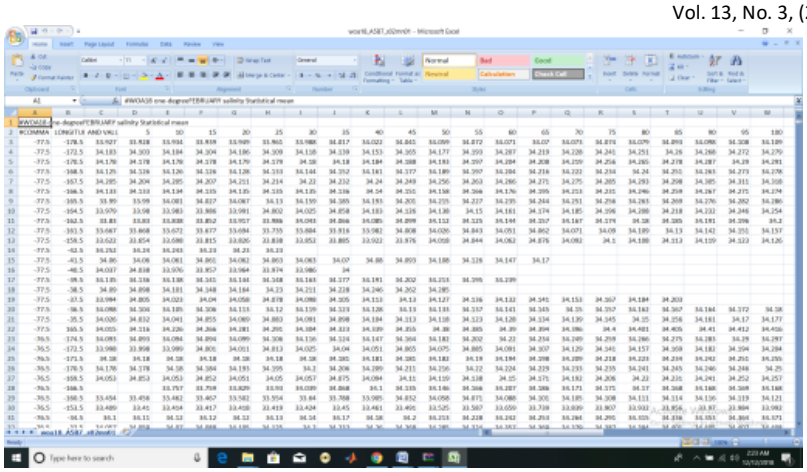


b) Fig2 salinity data.

## b) Statistical mean data:



a) Fig 3 Temperature data.



b) Fig 4 salinity data.

### 3. Mean salinity of sea water :

The salinity means the salts solved in sea water, it is calculated in parts per thousand denote by ppt. The maximum salinity concentrations quantity consists of sodium chlorides; the further salts are calcium chloride, magnesium chlorides, magnesium sulfate, and sodium bicarbonates. The source of salinity are volcanoes they liberate different types of chemical gases and form different type of salts, which pour to sea water and form inorganic compounds, the other cause is rain, the rain fall on saline mountains and different salts flows to sea water. The mean salinity means that we acquire total numbers of data points from sea water and divide by overall number of data points.**[1,2,3,4,5,].**

Simulation results of Mean salinity using Analyzed mean data and statistical data of sea water:

### 3. a) Mean salinity using Analyzed mean data of sea water:

We obtain salinity practical data of sea water from surface of sea to deepness of 5500 m, from National centers for environmental information and use Mat lab simulation code to generate different outcome as shown in fig 5, fig 6, fig 7, and fig 8. This practical data is accessible in array form 41089*2, it shows that it's the data points of salinity all over the world of different seas, from surface of sea to deepness of 5500 m; it is only for February months from 2005 to 2017. In fig 5 from 2 to 10 ($c^0$), the salinity concentrations vary from 30 to 33 ppt. It shows the deepness and middle of sea water it means that at this point, the inorganic compounds are in the lowest quantity and temperatures of sea water are also smallest at deepness of sea water, the salinity concentrations are a function of temperatures of ocean water, so as we go further from deepness of sea to surface of sea water, the inorganic compounds concentrations and temperatures of sea water increases linearly as in fig 5, from 10 to 15.2 ($c^0$), the salinity concentrations vary to 33 to 34.6 ppt. The salinity concentrations are also a function of sea water conductivity as exposed in fig 6 from 29.8 to 33 ppt. The mean conductivity range from 2.5 to 3.6 s/m it shows the deepness and middle of sea water, and as we travel from deepness of sea to surface of sea water as shown in fig 6 from 33 to 34.7 ppt. The sea water conductivity range from 3.6 to 4.2 s/m, it means at these points the sea water salinity concentrations and temperatures are maximum. The fig 7 also shows that

the sea water salinity are a function of sea water permittivity real part, the real part shows that how much energy stored electric field in sea water, the fig 7 illustrate that from 29.7 to 33 ppt. Salinity concentrations, the permittivity real part have the lowest value of 17.3 to 24 F/m approximately, and it shows the deepness of sea water, at this point the sea water temperatures, salinity concentrations and conductivity of sea water are bare minimum, but as we shift from deepness of sea water to surface of sea water the permittivity real part and salinity concentrations increases linearly in fig 7, from 33 to 34.3 ppt. The real part of permittivity ranges from 24 to 27.3 F/m approximately, It means that the energy stored by sea water electric field are highest at this point, the sea water temperatures, sea water salinity concentrations and conductivity of sea water are also highest, and it's the surface of sea water. The fig 8 shows the relationship of salinity concentrations and imaginary part of permittivity, in fig 8, from 29.8 to 33 ppt. Salinity concentrations and the imaginary part of permittivity ranges from 9.9 to 13.8 F/m approximately, it shows the deepness and middle of sea water it also shows that at this point the electric field liberate the energy in a minimum quantity, but as we shift further from deepness of sea to surface of sea water as in fig 8, from 33 to 34.5 ppt. Salinity concentrations and the energy discharge by electric field increases from 13.8 to 17.8 F/m approximately. It also shows that energy liberates by electric field are inversely proportional to salinity concentrations, temperatures of sea water, conductivity of sea water.

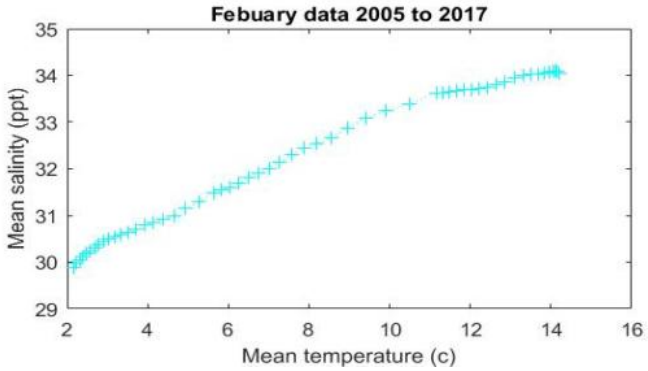



Fig 5 Mean salinity vs. mean temperature.

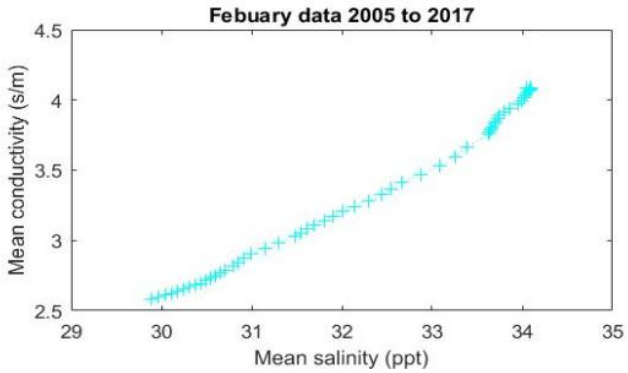



Fig 6 Mean salinity vs. mean conductivity.

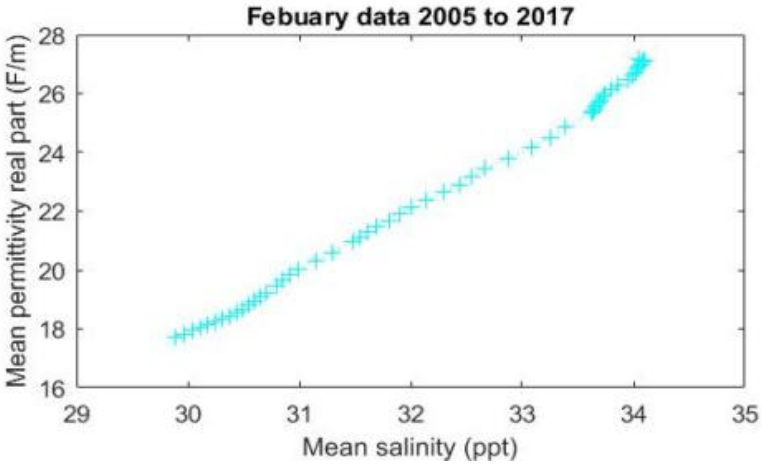



Fig 7 Mean salinity vs. Mean permittivity real part.

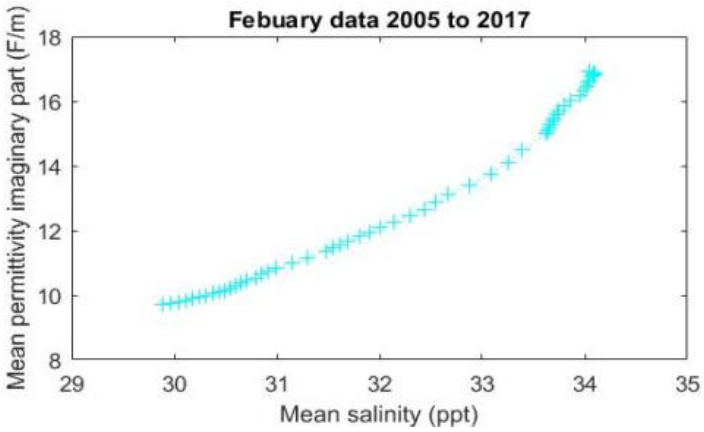



Fig 8 Mean salinity vs. mean permittivity imaginary part.

### 3. b) Mean salinity using Statistical mean data of sea water:

The statistical mean data means examine the data statistically, we take the salinity data array of 27547*59 from National centers for environmental information, and use Mat lab simulation code to create different outcome of salinity versus different parameters of sea water as shown in fig 9, fig 10, fig 11, fig 12. The fig 9 shows that as we travel from deepness of sea to surface of sea, as in fig 9 from temperatures 2.5 to 10 ($c^0$), the salinity concentration ranges from 28 to 32.8 ppt. But as we shift further from deepness and middle of sea to surface of sea water as in fig 9, from 10 to 19 ($c^0$), there is a minor increase in salinity concentrations and it almost looks constant and it ranges from 32.8 to 34.2 ppt. It means that the inorganic compound's concentrations increases minor and at 19 ($c^0$), it drops 29.1 ppt. Approximately its means at this point, the salinity concentrations are minimum, it's a truth that the sea water concentrations are not identical on the whole surface of sea water, in ancient times the scientists thinking that the sea water temperatures, conductivity and salinity are similar on every surface of sea, but it is not like that it is not identical. In fig 10 the salinity concentrations vary linearly with sea water conductivity from 28.3 to 33 ppt. The sea water conductivity ranges from 2.4 to 3.3 s/m, it shows the deepness and mid of sea water, and at deepness of sea water the salinity concentrations, temperatures of sea water are in the lowest amount, as we shift further from 33 to 34.7 ppt. Salinity concentrations and the

conductivity of sea water vary from 3.3 to 4.5 s/m approximately, but at 34.7 ppt. Salinity concentration s it falls to 3.8 s/m conductivity, it means at this point some surface of sea water have the least value of salinity concentrations, because the sea water surfaces have not the same salinity concentrations and temperatures. The conductivity is also a function of salinity concentrations and temperatures of sea water. The salinity concentration is also a function of permittivity real part as revealed in fig 11 below, from 28 to 33 ppt. Of salinity concentrations the real part of permittivity ranges from 16 to 22.8 F/m, its shows the deepness and mid of sea water and the energy stored in electric field in sea water are also bare minimum at this point. The salinity concentration also affects the permittivity imaginary part as exposed in fig 12 below, from 28.1 to 33 ppt. Of salinity concentrations it has a minimum value of 8.1 to 12 F/m, it shows the deepness and mid of sea water, so the energy discharge at this point is minimum as we go further from depth of sea to surface of sea water, the energy liberate by electric field increases as shown in fig 12 from 33 to 34.7 ppt. The energy liberate are from 12 to 18.2 F/m approximately, at this point it also go down to 16.1 F/m, its due to variation of sea water salinity concentrations, temperatures of sea water, and conductivity of sea water variation, because sea water surface are not regular as we have already discuss above.

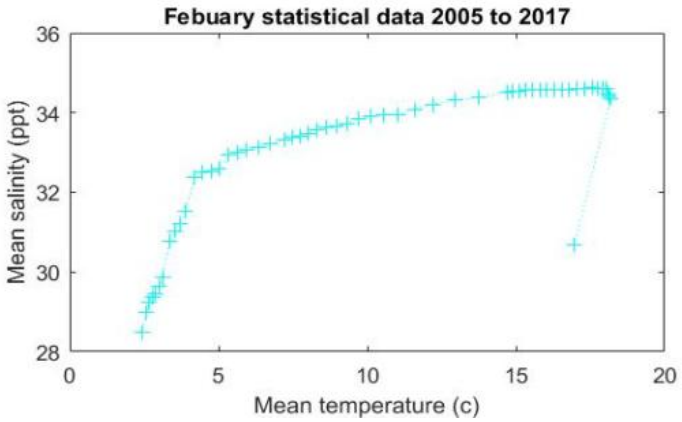



Fig 9 Mean salinity vs. mean temperature.

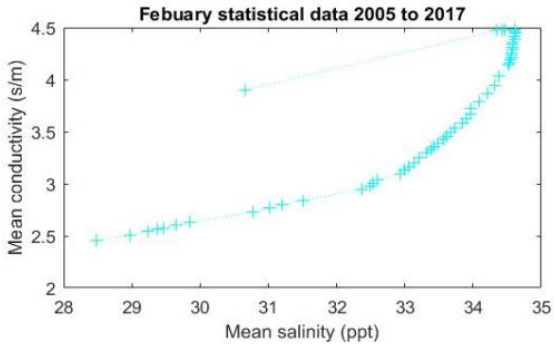



Fig 10 Mean salinity vs. mean conductivity .

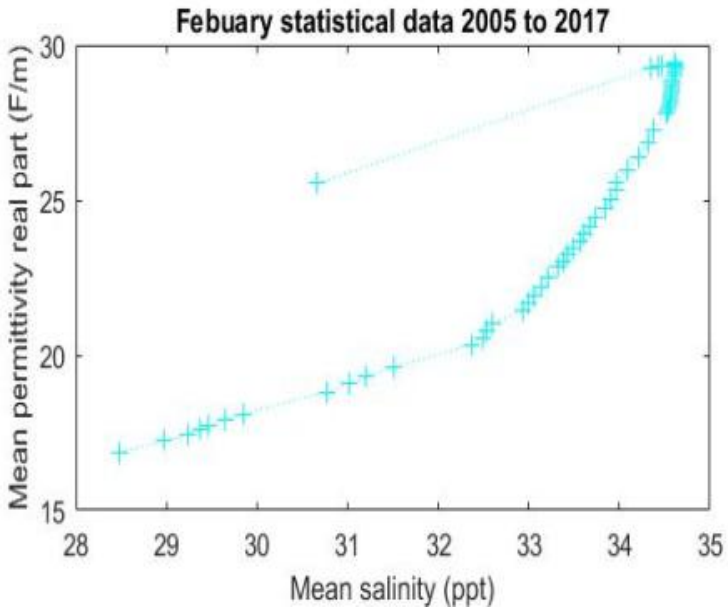



Fig 11 Mean salinity vs. mean permittivity real part.

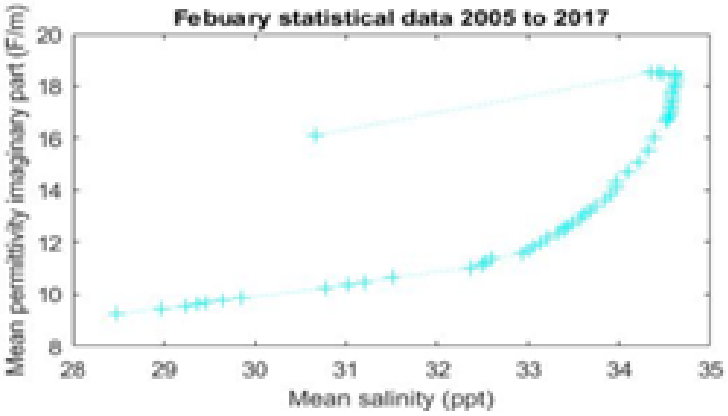



Fig 12 Mean salinity vs. mean permittivity imaginary part.

## 4. Mean temperature of sea water:

The temperature shows the ocean water hotness or coldness, it is calculated in Celsius in system international denoted by ($c^0$), the ocean water temperature ranges from -2 to 28, and at dissimilar surfaces of ocean water it varies. So the mean temperature means the entire number of data points of ocean water divide by the total number. We take data points 41089*59 from National centers for environmental information, and use Mat lab simulation code to make different results of mean temperature versus different parameters of ocean water as shown in fig 9, fig 10, fig 11, and fig 12. **[6,7,8]**

Simulation results of Mean temperature using Analyzed mean data and statistical data of sea water:

## 4 a) Mean temperature using Analyzed mean data of sea water:

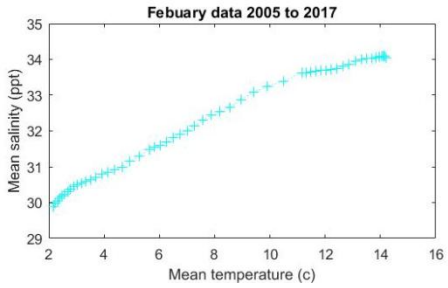



Fig 13 Mean temperature vs. mean salinity.

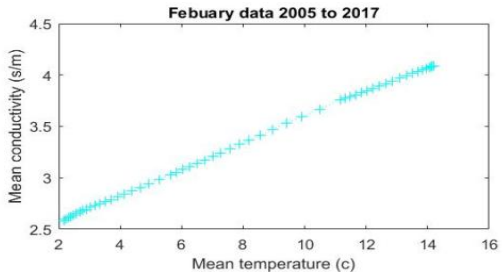



Fig 14 Mean temperature vs. mean conductivity

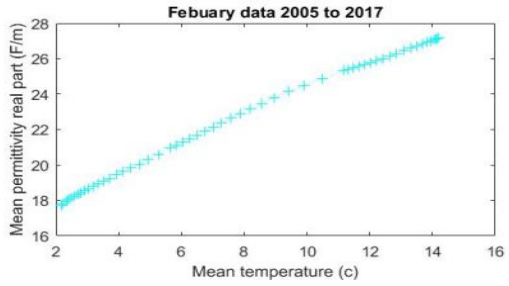



Fig 15 Mean temperature vs. mean permittivity real part

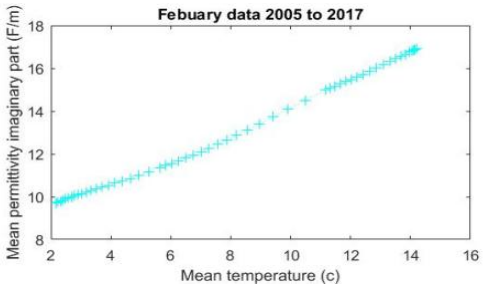



Fig 16 Mean temperature vs. mean permittivity imaginary part

The mean temperature are also depends on salinity concentrations, if the salinity concentrations are highest the temperatures of ocean water are also utmost, and if the temperatures of sea water are least the salinity concentrations are also minimum, as exposed in fig 13 from 2 to 10 ($c^0$), the salinity concentrations vary from 30 to 33.1 ppt. Approximately and it is the deepness and mid of marine water, but as the temperatures of sea water increases from 10 to 15($c^0$), approximately, the salinity concentrations ranges from 33.1 to 34.3 ppt. It shows that as we go from depth of ocean to

surface of ocean water, the inorganic compound's concentrations percentage increases. The mean temperatures are also a function of mean conductivity as revealed in fig 14, from 2 to 10 ($c^0$), the conductivity vary from 2.5 to 3.6 s/m approximately, and it's the depth of sea water as the mean temperatures increases from 10 to 15 ($c^0$), the conductivity of sea water jumps from 3.6 to 4.3 s/m approximately, and it shows that we are going from deepness of ocean to surface of ocean water, at surface of ocean water the conductivity of sea water are highest and temperature and salinity concentrations are also utmost, as we recognize salinity concentrations and temperatures of ocean are the function of sea water conductivity. The mean temperature also reliant on permittivity real part as shown in fig 15, from 2 to 10 ($c^0$), the real part of permittivity vary from 17.8 to 22.7 F/m approximately, as exposed in fig 15, it shows the deepness of ocean water, at this point the energy store by electric field are bare minimum because the at this point, the sea water temperatures, salinity concentrations and sea water conductivity are lowest, as we go further from depth of ocean to surface of ocean water, the mean temperature vary from 10 to 15.4 ($c^0$), which yield to raise the ocean water permittivity real part as shown in fig 15, the real part of permittivity vary from 22.7 to 26.9 F/m approximately. So the mean temperatures are also affected, the ocean water permittivity imaginary part as revealed in fig 16, from 2 to 10 ($c^0$), it has the minimum value of 9.7 to 13 F/m, and from 10 to 15 ($c^0$), it has a maximum value of 13 to 16.9 F/m approximately, the imaginary part shows the electric field energy discharge, at depth it is minimum while at surface of ocean it is maximum as shown in fig 16 above.

### 4. b) Mean temperature using Statistical mean data of sea water:

This analysis shows the mean temperature with different ocean water parameters statistically as exposed in below figures.

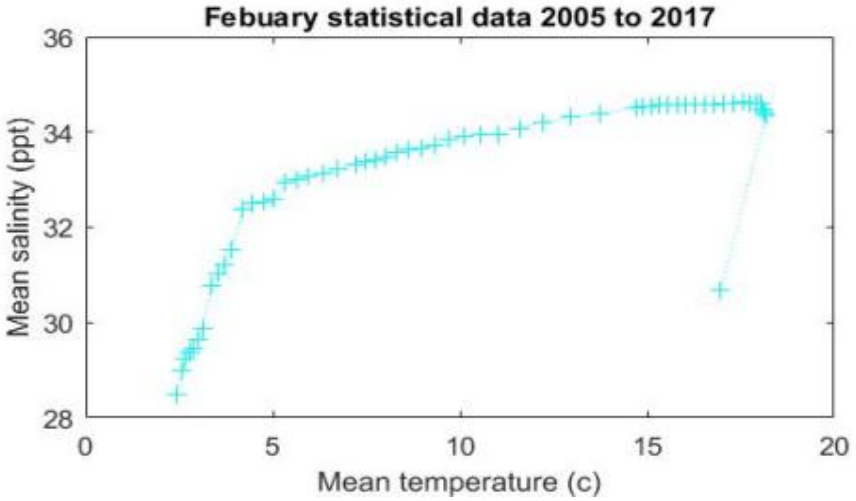



Fig 17 Mean temperature vs.Mean salinity.

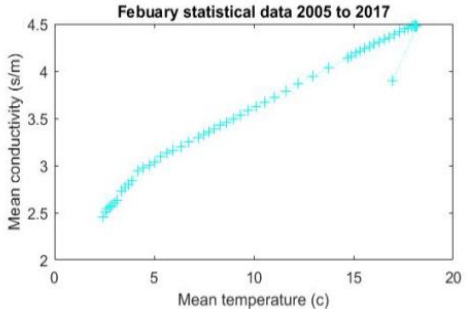



Fig 18 Mean temperature vs. mean conductivity.

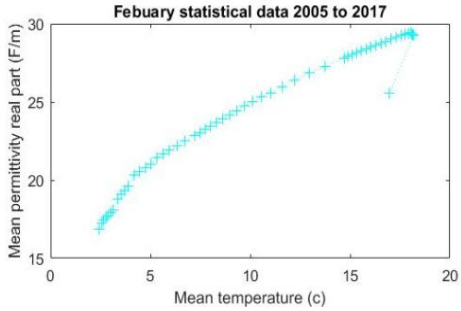



Fig 19 Mean temperature vs. mean permittivity real part

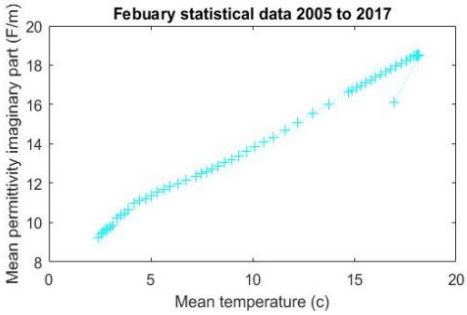



Fig 20 Mean temperature vs. mean permittivity imaginary part

The mean temperature from 2.5 to 10 ($c^0$), outcome in 28 to 33.3 ppt. Salinity concentrations approximately, which is the deepness and mid of ocean but as the temperature vary from 10 to 19 ($c^0$), approximately, the salinity concentrations vary from 33.3 to 34.9 ppt. This shows we are going toward the surface of ocean water as shown in fig 17 above. The mean temperatures are also affects with ocean water mean conductivity as shown in above fig 18, from 2.5 to 10 ($c^0$), the ocean water mean conductivity vary from 2.4 to 3.4 s/m approximately, it's the deepness of ocean, as we travel from deepness of ocean to surface of ocean, the marine water conductivity changes from 3.4 to 4.5 s/m approximately, at temperature range of 10 to 17.9 ($c^0$), approximately, and it's the surface of ocean water, at this point the salinity concentrations and temperatures of sea are highest, and conductivity are also a function of salinity concentrations and temperatures of ocean water. The mean temperature also affects the ocean water permittivity real part as revealed in fig 19 above, from temperatures range of 2.5 to 10 ($c^0$), it has a bare minimum value of 16 to 24.1 F/m approximately, and it's the deepness of ocean, while at temperatures 10 to 19 ($c^0$), it has the highest value of 24.1 to 29.8 F/m approximately, which is the surface of ocean water, at this point the ocean water parameters are at utmost level. So the real part of permittivity

shows us the energy immersed by electric field. So the mean temperatures are also affects the imaginary part of ocean water too as exposed in fig 20 above, from 2 to 10 ($c^0$), it has the lowest value of 8.5 to 12.1 F/m approximately, and it's the depth and mid of ocean water, at this phase the ocean water parameters have a bare minimum values, as we shift from deepness of ocean to surface of ocean water, the mean temperatures vary from 10 to 18.6 ($c^0$), approximately, which alter the imaginary part of ocean water permittivity from 12.1 to 18.9 F/m approximately, as revealed in above fig 20, the imaginary part of sea water permittivity shows the energy discharge by electric field.

## 5. Mean Conductivity of sea water:

The mean conductivity of ocean water allows the current to flow through ocean water, it is maximum at the surface of ocean water due to plentiful amount of sea water, salinity concentrations and ocean water maximum temperatures, while they are minimum at the deepness of ocean water, it is calculated in Siemens per meter (s/m) in system international, and its represented by a Greek word sigma "σ ". **[9,10,11,12].**

Mathematically mean conductivity

$$\sigma(s, t) = h(t) + k(t) \quad s \qquad \textbf{(1)}$$

$$h(t)=0.086374+.030606t-.0004121t^2$$

$$k(t)=0.077454+.001687t+.00001937\ t^2$$

Where in equation (1) "h(t)" is coefficient of time, and"k(t) " are coefficient of salinity.

### 5 a) Mean conductivity using Analyzed mean data of sea water:

In this section we compared the mean conductivity versus different sea water parameters as shown in fig 21, fig 22, fig 23, and fig 24 as shown below.

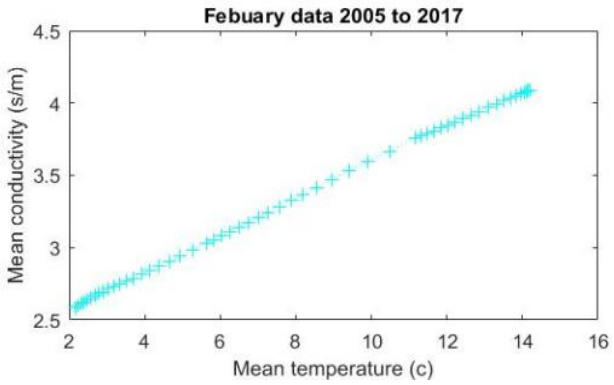



Fig 21 Mean temperature vs. mean conductivity

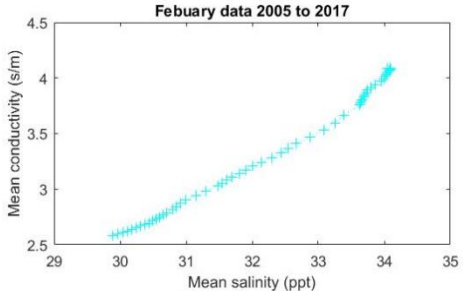



Fig 22 Mean conductivity vs. mean salinity

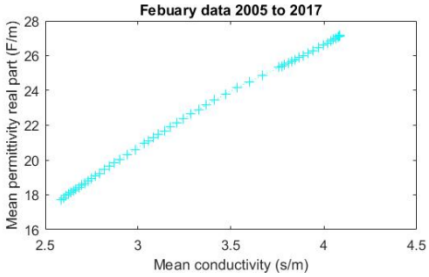



Fig 23 Mean conductivity vs. mean permittivity real part

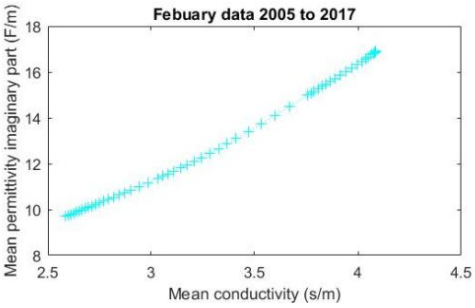



Fig 24 Mean conductivity vs. mean permittivity imaginary part

The mean conductivity are a function of mean temperature as exposed in fig 17 from 2 to 10 ($c^0$), the mean conductivity vary from 2.5 to 3.7 s/m approximately, as shown in fig 21 above and it's the deepness and mid of ocean water, at this phase the ocean water temperatures and sea water salinity concentrations are bare minimum, but as we go from depth of ocean to surface of ocean water at mean temperature 10 to 15.5 ($c^0$), approximately, the ocean water mean conductivity vary from 3.4 to 4.2 s/m. It's the surface of ocean water and at this phase the ocean water temperatures and ocean water salinity are maximum. The mean conductivity are also a function of mean salinity as revealed in fig 22 above, from 29.8 to 33 ppt. Salinity concentrations, the mean conductivity has the least value of 2.5 to 3.5 s/m approximately, as shown in above fig 22 and it's the deepness of ocean water as we recognize at this point the inorganic compounds and temperatures of ocean have the least value, so the conductivity are the function of sea water salinity concentrations and temperatures of ocean water, it also affected if we move further from deepness of ocean to surface of ocean water, the salinity concentrations altered to its utmost level as exposed in fig 22 above, from 33 to 34.7 ppt. The mean conductivity vary to 3.5 to 4.3 s/m approximately as shown in above fig 22. The mean conductivity also affect the mean permittivity real part as exposed in fig 23, from 2.5 to 3.5 s/m mean conductivity, it has the least value of 17.8 to 24.2 F/m approximately as exposed in

above fig 23, and it's the deepness of ocean water, at this phase the ocean water salinity, temperatures of ocean and conductivity of ocean water have bare minimum values, so the real part of permittivity have also the least value and the energy stored by electric field have the smallest value as shown in above fig 23. But as we shift further to surface of ocean water, the real part of permittivity of ocean water have utmost values and the conductivity value also vary as exposed in fig 23, from 3.5 to 4.2 s/m it values vary to 24.2 to 27 F/m approximately, and it's the surface of ocean water it shows that the electric field stored the energy at this point are utmost and it also shows that salinity concentrations, ocean water temperatures and ocean water conductivity are also utmost at this point. The mean conductivity also affects the imaginary part of ocean water permittivity as revealed in fig 24, from 2.5 to 3.5 s/m it has the least value of 9 to 13.8 F/m approximately, and it the deepness and mid of ocean water, at this phase the energy liberate by electric field are least, as we go to surface of ocean water, the energy discharge by electric field are utmost and it ranges to 13.8 to 17.6 F/m, approximately at mean conductivity of 3.5 to 4.3 s/m approximately, and it's the surface of ocean water.

### 5. b) Mean conductivity using Statistical mean data of sea water:

In this examination we used we calculate sea water parameters statistically as exposed in below figures

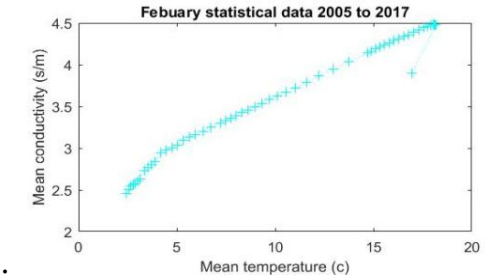



Fig 25 Mean temperature vs. mean conductivity

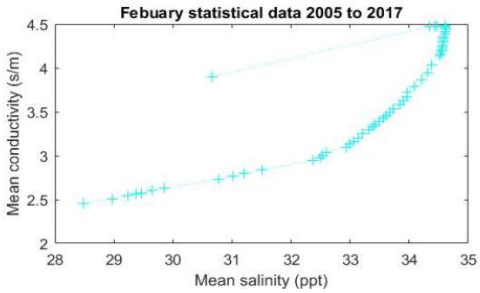



Fig 26 Mean conductivity vs. mean salinity

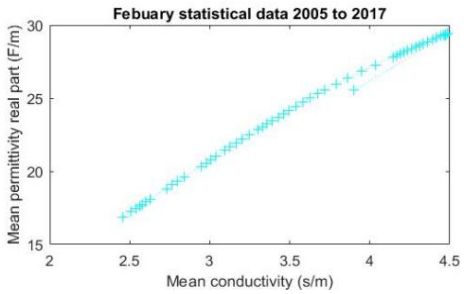



Fig 27 Mean conductivity vs. mean permittivity real part

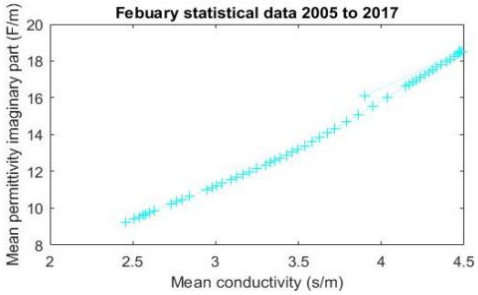



Fig 28 Mean conductivity vs. mean permittivity imaginary part

The mean conductivity affects the mean temperatures linearly as shown in fig 25 from 2.5 to 10 ($c^0$), the mean conductivity vary from 2.4 to 3.6 s/m approximately, and it's the deepness and mid of ocean water, and as we go to toward surface of ocean water, the conductivity vary from 3.6 to 4.5 s/m approximately, at temperatures range of 10 to 18 ($c^0$), as exposed in fig 25, and it's the surface of ocean water at surface of ocean water, the salinity concentrations and temperatures are utmost that's why, the mean conductivity are utmost as shown in fig 25. The mean conductivity are also affects the mean salinity as revealed in fig 26, from 28.5 to 33 ppt. It has the least value of 2.5 to 3.3 s/m approximately, and it's the deepness of ocean water and it has the utmost value of 3.3 to 4.5 s/m approximately, at salinity concentration of 33 to 34.7 ppt. As exposed in fig 26, but it drops to 3.8 s/m mean conductivity at 34.6 ppt. Salinity concentrations, it shows that the ocean water concentrations are not identical at each surface, at some surface the salinity concentrations, temperatures are utmost, and at some surfaces it is lowest. The mean conductivity are also affects the mean permittivity real part, in this examination as exposed in fig 27, it is least at depth of ocean as exposed in fig 27, from 2.5 to 3.5 s/m it has the least value of 16 to 24.7 F/m approximately, and it's the deepness of ocean water, at this phase energy stored by electric field are least, and all the sea water parameters have the lowest values, and as we go from deepness of ocean to surface of ocean water the energy stored by electric field increase from 24 to 29.7 F/m approximately, at mean conductivity of 3.5 to 4.4 s/m approximately as exposed in fig 27, and it's the surface of ocean water at this phase the ocean water parameters have an utmost values. In this survey the ocean water mean conductivity also affects the imaginary part of ocean water permittivity, as revealed in fig 28, at deepness and mid of ocean, it has the least values from 8 to 13.8 F/m approximately, at mean conductivity range of 2.4 to 3.5 s/m, and it has the utmost value of 13.8 to 18.8 F/m approximately, at mean conductivity range of 3.5 to 4.5 s/m, and it's the surface of ocean water as exposed in fig 28, at this phase the energy discharge by electric field are utmost.

## 6. Mean Permittivity of sea water:

Mean permittivity of ocean water is the ability of ocean water to accumulate energy in its electric field in system international it's denoted by Farad per meter denoted by a symbol F/m.**[13,14,15].**

Mathematically

$$\varepsilon = \varepsilon_r \varepsilon_o \textbf{(2)}$$

Where "$\varepsilon_r$" is the relative permittivity of a substance and "$\varepsilon_o$"is the vacuum permittivity of free space having a value of 8.85*10^-12 F/m.

We used Debye interpolation function to get Mean permittivity, from mean conductivity, mean temperatures and mean salinity using practical data from National centers for environmental information in shape of salinity and temperatures, and we place this data in interpolation function, and we can compute different sea water parameters, the equation is exposed below.

Debye interpolation function

Mathematically

$$\varepsilon(t, s, v) = \varepsilon_\infty + \varepsilon_o - \varepsilon_\infty / 1\text{-}j2\pi\tau v + j\,\sigma / 2\pi v\, \varepsilon^* \textbf{(3)}$$

Where in equation (3) "ε" is the permittivity of ocean water, and "$\varepsilon_\infty$, $\varepsilon_o$" are the static and frequency dielectric constants depends on temperatures of ocean and salinity of ocean water while "σ, v" are conductivity of ocean water and angular frequency of ocean water and "τ, $\varepsilon^*$" are the relaxation time and the permittivity of free space. We used Mat lab simulation tool and use equation (3) on practical data; we can compute the mean permittivity of ocean water as exposed in above figures, on analyzed mean data and on statistical mean data.

## 7. Conclusion:

We examined that the mean conductivity and mean permittivity of February Months from 2005 to 2017 are the function of ocean water salinity concentrations and temperatures of ocean water, if the salinity concentrations and temperatures of ocean water are elevated, the mean conductivity and mean permittivity of ocean water are also elevated, and if the ocean water temperatures and salinity concentrations are small the mean conductivity and mean permittivity are minimum, which we acknowledged in this paper

## 8.Future work:

This technique can also be use in future if we have practical data from National centers for environmental information accessible for more than 1500 m deepness of ocean, for February months, and we can easily discover ocean water parameters.

## 9. Acknowledgments:

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## 10.References

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