

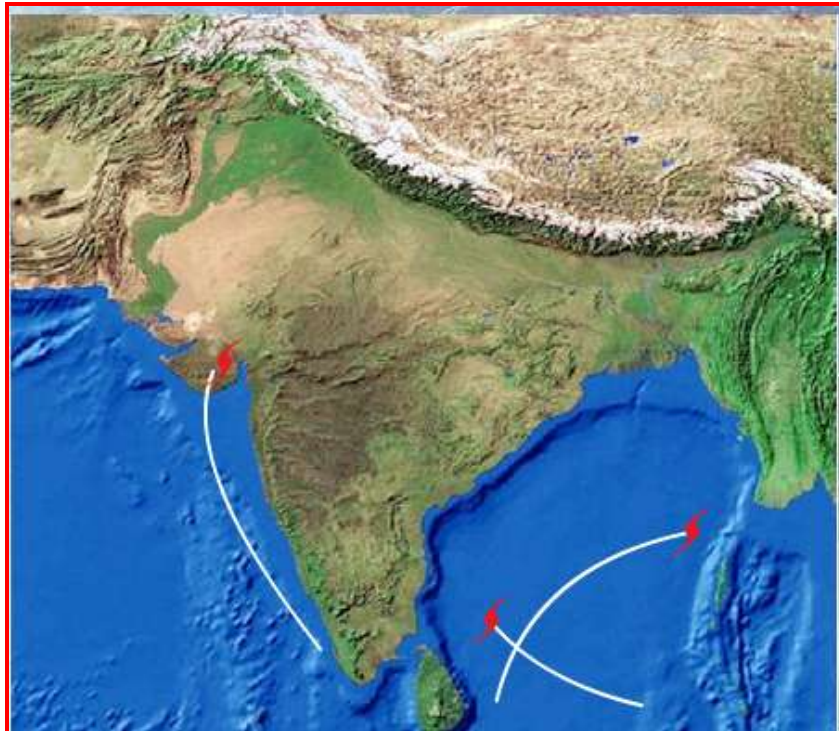


Cyclone eAtlas - IMD

Version 2.0 / 2011

User's Guide

Tracks of Cyclones and Depressions over North Indian Ocean
(from 1891 onwards)



Cyclone Warning & Research centre
India Meteorological Department
Regional Meteorological Centre, Chennai

Foreword

This User's Guide describes the *Cyclone eAtlas – IMD*, Version 2.0 released in Nov 2011. *Cyclone eAtlas – IMD*, Version 2.0 is the web based application of the standalone PC based application of *Cyclone eAtlas – IMD*, Version 1.0 released in 2008 with some minor modifications.

The functionalities provided in the *Cyclone eAtlas – IMD*, Version 2.0 (web based) are the same as that in Version 1.0 (supplied in CD form). The broad based objectives of the software are:

- ✚ Display of any number of tracks of Cyclones and Depressions (C&Ds) for any selection of input parameters within seconds
- ✚ Provision to select a few of the displayed tracks for further analysis
- ✚ Analysis tools like map form statistics, tables and bar diagrams for better interpretation

However, the provision for saving and retrieving the background data provided in the CD format is not available in the web based application. User's have to buy the CD for accessing the background data.

The User's Guide, Version 2.0 provides a menu-wise description of the functionalities in the software and is complimentary to the *Technical Note of Cyclone eAtlas – IMD*, Version 2.0 which describes the methodologies of computations and provides explanations for stratification of parameters and abbreviations / notations used for various terminologies.

All feedbacks and requests for CD supply may be sent to cwrcrmcchennai@gmail.com

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List of Abbreviations / Notations used

I Commonly used abbreviations and their expansions

| | | |
|------|---|--|
| JF | - | Jan-Feb |
| MAM | - | Mar-May |
| JJAS | - | Jun-Sep |
| OND | - | Oct-Dec |
| Ann | - | Annual |
| UTC | - | Universal Time Coordinate |
| C&Ds | - | Cyclones and Depressions |
| CD | - | Cyclonic Disturbance |
| BOB | - | Bay of Bengal |
| AS | - | Arabian Sea |
| D | - | Depression |
| CS | - | Cyclonic Storm |
| SCS | - | Severe Cyclonic Storm |
| F | - | Formation |
| Di | - | Dissipation |
| MI | - | Maximum Intensity |
| CI | - | Crossing Intensity (Intensity at the time of crossing coast) |
| lon | - | Longitude |
| lat | - | Latitude |

II Abbreviations used to denote various pre-defined coastal belts

East coast of India

| | | |
|-----|---|------------------|
| cap | - | Andhra Pradesh |
| or | - | Orissa |
| tnn | - | Tamil Nadu North |
| tns | - | Tamil Nadu South |
| wb | - | West Bengal |

West coast of India

| | | |
|-----------|---|--------------|
| ck | - | Karnataka |
| gu1 & gu2 | - | Gujarat |
| ker | - | Kerala |
| kg | - | Konkan & Goa |

Countries to the east of India

| | | |
|-----|---|----------------|
| ar | - | Arakan |
| bd | - | Bangladesh |
| sle | - | Sri Lanka East |
| slw | - | Sri Lanka West |

Countries to the west of India

| | | |
|-----|---|-----------------------|
| pak | - | Pakistan |
| iaa | - | Iran, Arabia & Africa |

Menu-wise Description of Functionalities

Introduction

The software contains 11 menus pertaining to various functionalities and are sorted according to the type of output products generated. The *Menus 1&2* generate output products in the form of tracks of C&Ds that satisfy the input options exercised by the user. The format of output used for display of tracks is as follows:

Format of Output for Display of Tracks of C & Ds

Display of stages of tracks of C & Ds:

Depression - is represented by dotted lines eg.,

Cyclonic Storm - is represented by thin lines eg., _____

Severe Cyclone Storm - is represented by thick lines eg., _____

Markings on the tracks:

- ✚ In the starting point of each track the Month and year of formation of the CD is displayed.
- ✚ The 03UTC positions of the CD are shown as circles in the track and the corresponding date is displayed inside each circle.
- ✚ The arrow indicates the position of dissipation and ending point of the track.

The *Menus 3 to 8* generate statistics on frequencies of movement, formation, dissipation, mean direction of motion, scalar & vector speed, recurvature, percentage frequency of direction of motion in Map form for every 2.5° longitudinal x 2.5° latitudinal grid and frequency of coastal crossing of C&Ds between two coastal stations in the Map.

The *Menus 9-10* generate statistics on Annual frequencies for various months / seasons and Month-wise / Season-wise statistics on frequency, percentage frequency & probability of intensification in Tabular / Graphical (Bar Diagram) formats. *Menu 11* lists all the CDs month-wise for the given input options.

For explanations on stratification of parameters and methodologies of computations, [Technical Note of Cyclone eAtlas – IMD, Version 2.0](#) may be referred.

Description of Menus

I) Display of Tracks

Menu 1

View of Tracks of C&Ds by General Selection

This is the main screen wherein the user selects various parameters and in various combinations to get the desired OUTPUT - by **Display of Tracks**.

On Clicking the menu *View by general selection* in the left hand side of the screen, this screen is displayed for the user to select input options.

The user has three different types of query options for filtering the data and display of tracks:

Basic Options

The mandatory options are the Basic Options.

Advanced Options

The user can further refine the search by invoking the Advanced options.

Display Options

The user can opt for display of tracks with or without date markings.

The user can choose any of the options or combinations of options as input parameters. At first, the software prompts the user to select the Basic Option which is mandatory.

View of Tracks of C&Ds by General Selection

Invoking the Basic Options

It is mandatory for the user to invoke the following **Basic Options**.

First Year - Select the FROM Year (beginning Year) of the desired output from the combo box

Last Year - Select the TO Year (Ending Year) of the desired output from the combo box

First Month - Select the FROM Month (beginning Month) of the desired output from the combo box

Last Month - Select the TO Month (Ending Month) of the desired output from the combo box

Basin of formation - Select the Basin where the CDs formed. The user has the choice of **Bay of Bengal** or **Arabian Sea** or **Land** Area. The user can select **ALL** the options or a multiple choice as he desires.

Intensity (Level) or simply **Intensity** - Select the Intensity of the CD as **Depression** or **Cyclonic Storm** or **Severe Cyclonic storm**. The user can select all at the same time or a combination as the case may be.

Intensity (Type) – Select the type of intensity as **Maximum Intensity** attained by the CD or the Intensity at the time of coastal crossing or simply **Crossing Intensity / At Crossing**.

The screenshot displays the 'View of Tracks of C and Ds' window in a web browser. The interface is organized into several sections:

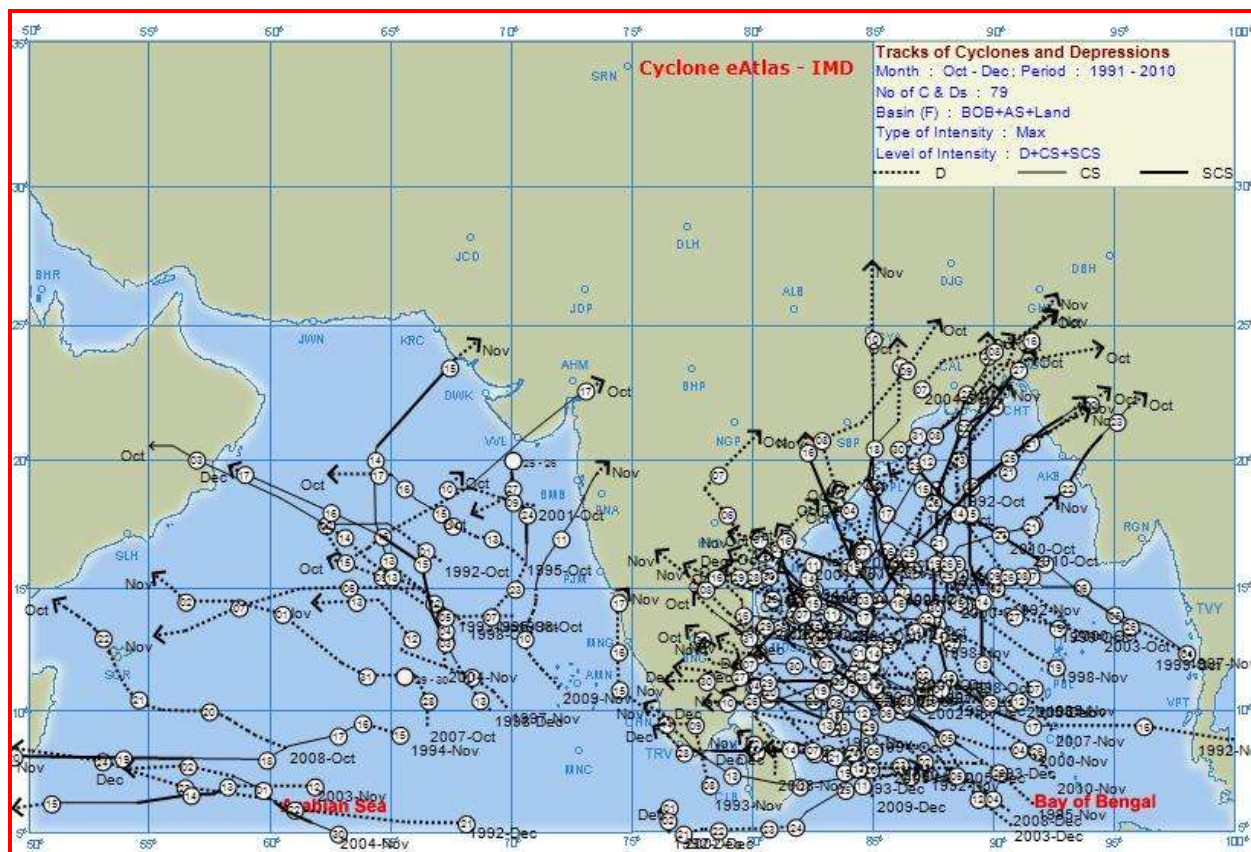
- Basic Options:** Includes dropdown menus for 'First Year' (1991), 'Last Year' (2010), 'First Month' (January), and 'Last Month' (December). It features radio buttons for 'Basin (F)' (Bay of Bengal, Arabian Sea, Land Area, All), 'Intensity' (Depression, Cyclonic Storm, Severe Cyclonic Storm, All), and 'Intensity Type' (Maximum, At Crossing).
- Advanced Options 1:** Contains radio buttons for 'Crossed Sea' and 'Crossed Land'. It includes input fields for 'Longitude' and 'Latitude' with 'From' and 'To' sub-fields, and a 'Basin(Dt)' dropdown menu.
- Advanced Options 2:** Features radio buttons for 'Sea to Land' and 'Land to Sea', and a 'View Coastal Int.' checkbox. It includes a 'Custom Coastal Int.' dropdown menu and a 'Map for Custom Int.' button.
- Display Option:** At the bottom, it has radio buttons for 'With Marking' and 'Without Marking', along with 'View' and 'Reset' buttons.

A sidebar on the left provides navigation options under 'Display of Tracks' (General selection, Specific selection), 'Statistical information' (Map force view, Monthly frequency, Formation/Disintegration, Direction of motion, Scale/Vector speed, Frequency of Recurrence, Progress between stations), 'Tabular/Graphical View' (Annual frequency, N frequency & probability, Consolidated list), and 'Documentation' (About atlas, Technical notes, Help, Abbreviations, Contact Us, Copyright, Disclaimer).

On selecting the Basic option, the user can go ahead to see the desired OUTPUT. For viewing the OUTPUT, the user can choose the display options *With Markings* or *Without Markings*.

To view the OUTPUT, press the **VIEW** Button. On clicking, the OUTPUT is displayed in another screen with the background Map.

The desired output would be:



The output displays the chosen basic options on the top left corner of the map.

- On the top right corner of the map, the chosen basic options are displayed.
- On the top left corner of the map, the chosen advanced options are displayed.

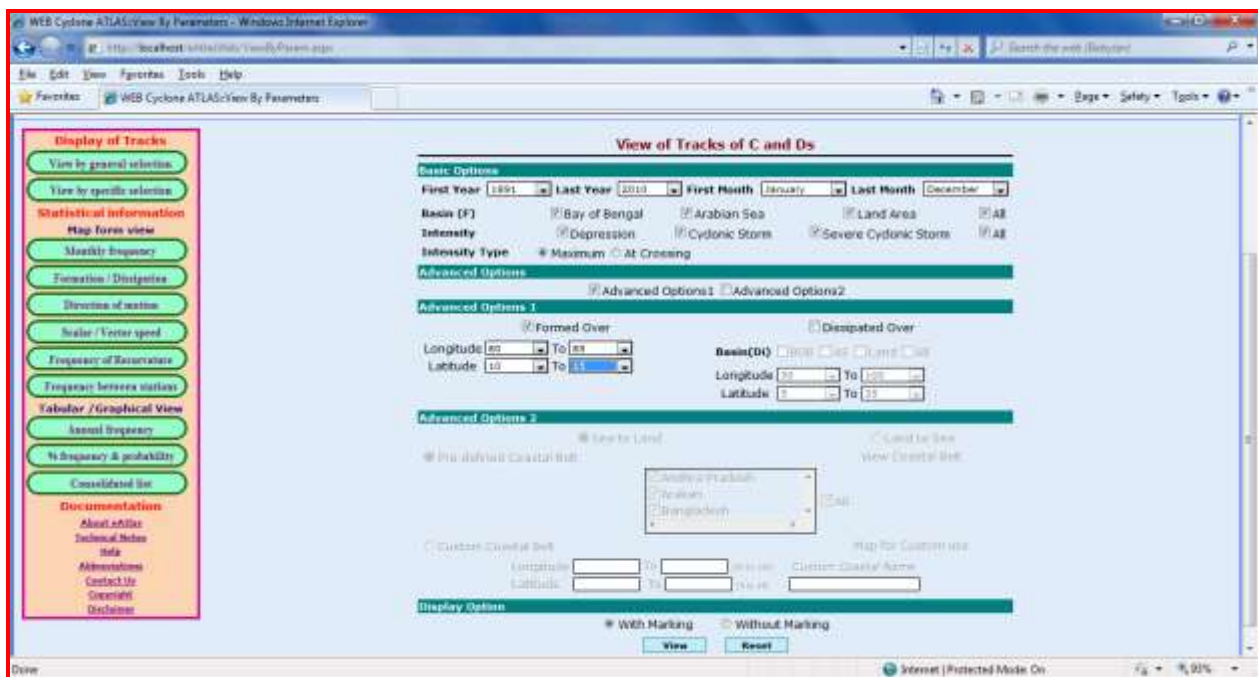
Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

View of Tracks of C&Ds by General Selection

Invoking the Advanced options 1

This option helps the user to view C&Ds that formed over a particular Latitude and Longitude grid or C & Ds that dissipated over particular Latitude and Longitude grid or both.

The user first selects the Basic options. On choosing the Advanced Options 1, the user is prompted to enter the region of **Formation / Dissipation**. The user can also select the Basin of Dissipation (Di) as **Bay of Bengal** or **Arabian Sea** or **Land** or **ALL**.

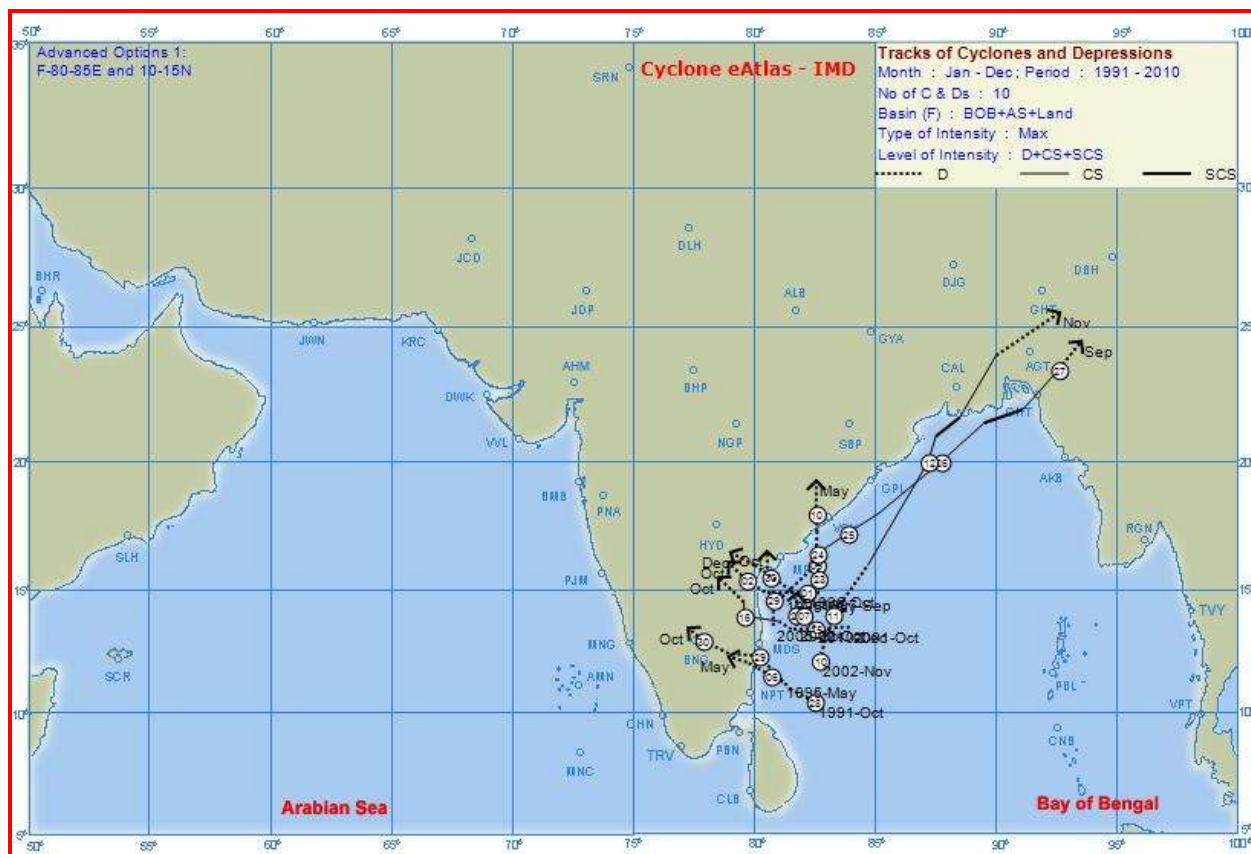


When the user selects the **Formed Over** option, the software allows the user to select the Longitude and latitude values. The user selects the FROM and TO Latitudes and Longitudes of the region where the CD formed.

When the user selects the **Dissipated Over** option, the software allows the user to select the Longitude and latitude values or the Basin of Dissipation. The user selects the Basin of Dissipation or the FROM and TO Latitudes and Longitudes of the region where the CD dissipated.

The user has the option to view the OUTPUT with or without marking on the Map.
 After selecting all these options, the user can view the OUTPUT by pressing VIEW Button.

The desired output shall be as follows:



The output shows two display boxes, one on the top left corner of the map and one at the top right corner of the map.

- On the top right corner of the map, the chosen basic options are displayed
- On the top left corner of the map, the chosen advanced options are displayed

Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Invoking the Advanced option 2

This options helps the user to choose the belt of coastal crossing of C&Ds.

The software provides the following options.

Coastal crossing - To choose between **Sea to Land** or **Land to Sea**

Coastal belt – Pre-defined or Custom defined

Single or Multiple coastal belts can be selected from the Pre-defined coastal belts.

View coastal belt option helps to view the pre-defined coastal belts.

Map for custom use utility is to facilitate the user for custom defining the coastal belt.

The user can give a name to the coastal belt chosen by entering the same in the **Custom Coastal Name** option which would appear in the output.

Sequence of input options

Choosing the Basic options is mandatory for selection of the Advanced option-2.

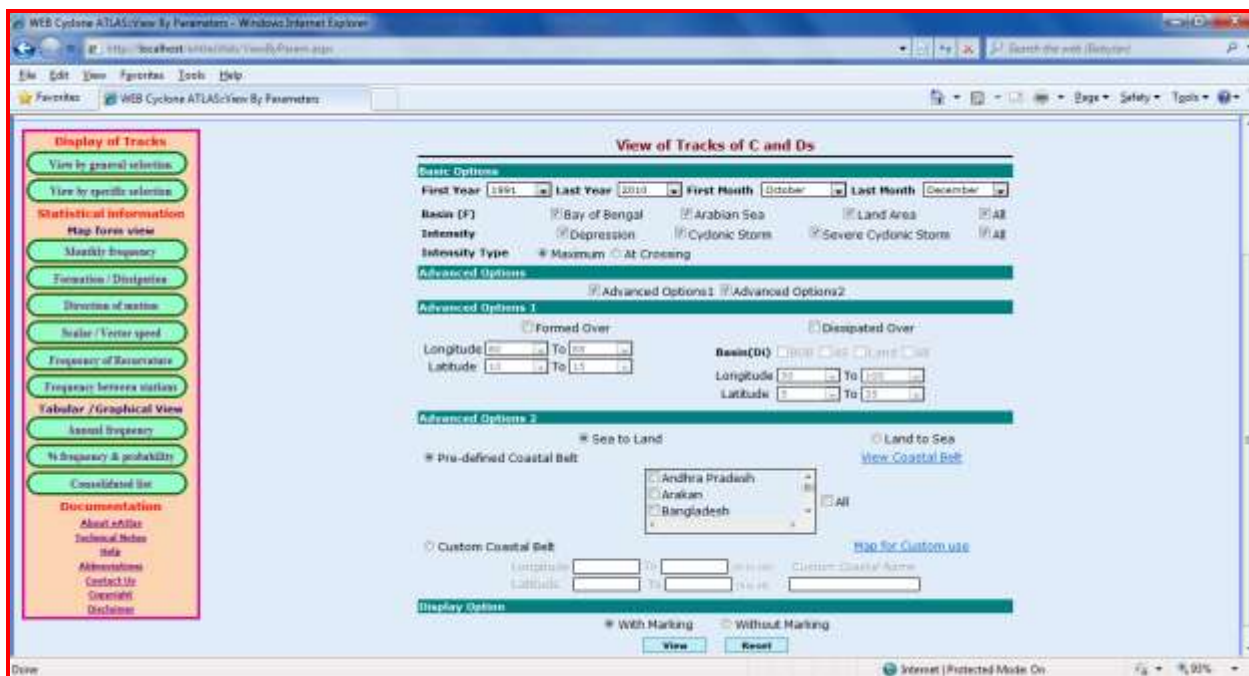
On clicking the Advanced options 2, the corresponding fields are enabled for the user to select or enter his choice.

First select the mode of coastal crossing - **Sea to Land** or **Land to Sea**

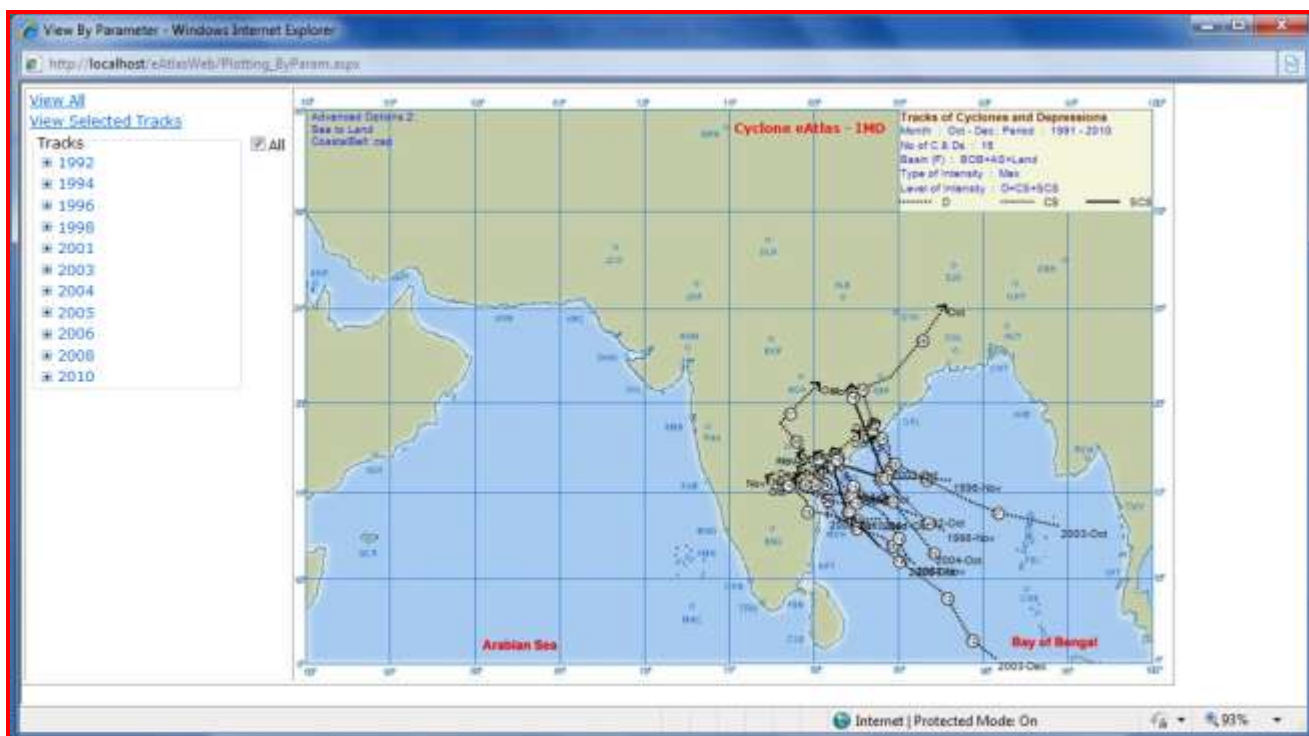
Then select the coastal belt of crossing - whether **Pre-defined** or **Custom defined**. **View coastal belt** utility can be used to see the latitudinal / longitudinal belt of each pre-defined coastal belt. Map for Custom use utility can be used for choosing the latitudinal / longitudinal belt for custom definition. An appropriate name for the custom defined coastal belt can be typed in Custom coastal name option which would appear in the output.

The user can view the desired OUTPUT **with** or **without marking**.

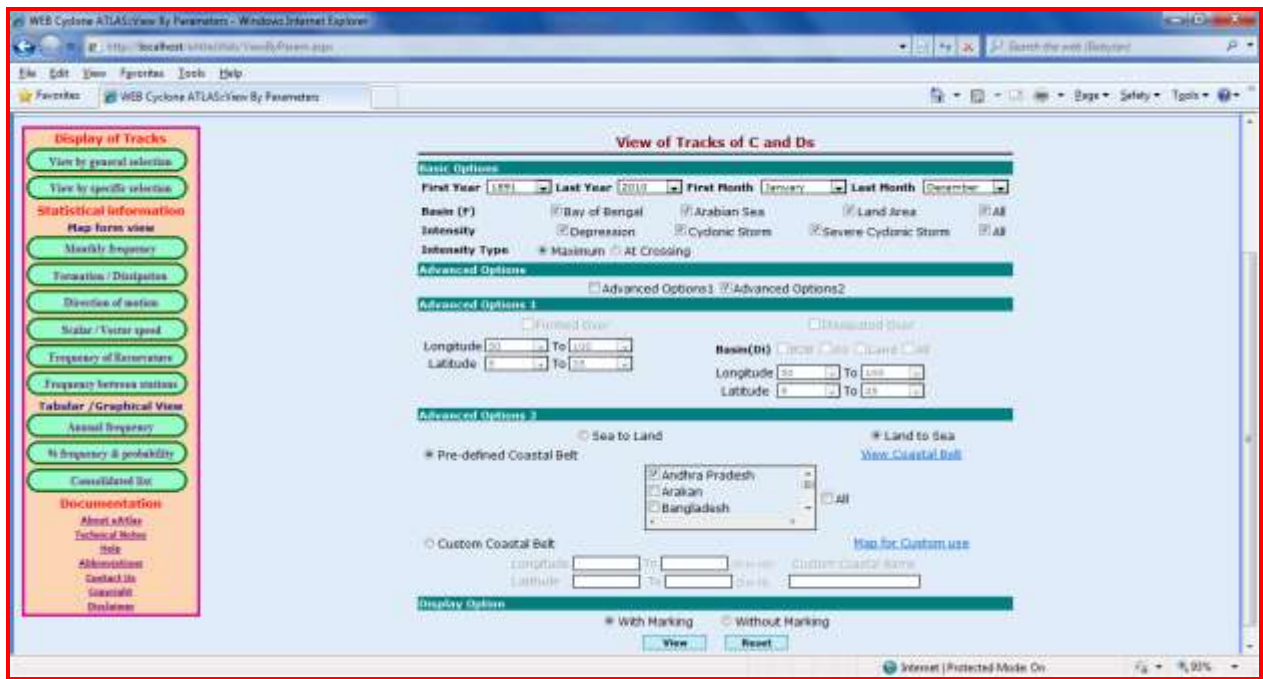
Input screen for **Sea to Land** and **pre-defined coastal belt** options:



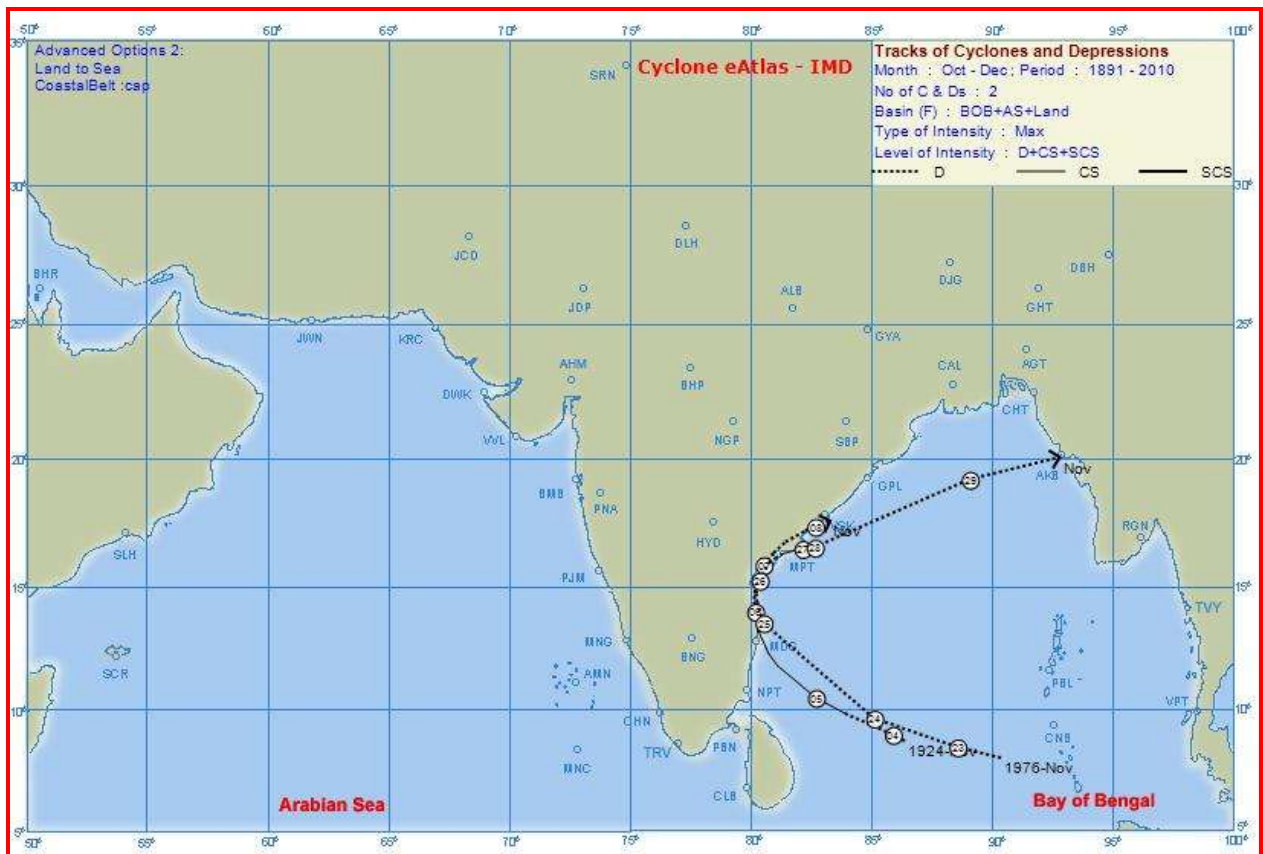
After making all his selections, the user presses the VIEW button, to view the output on the map. The Map output will be displayed as shown below:



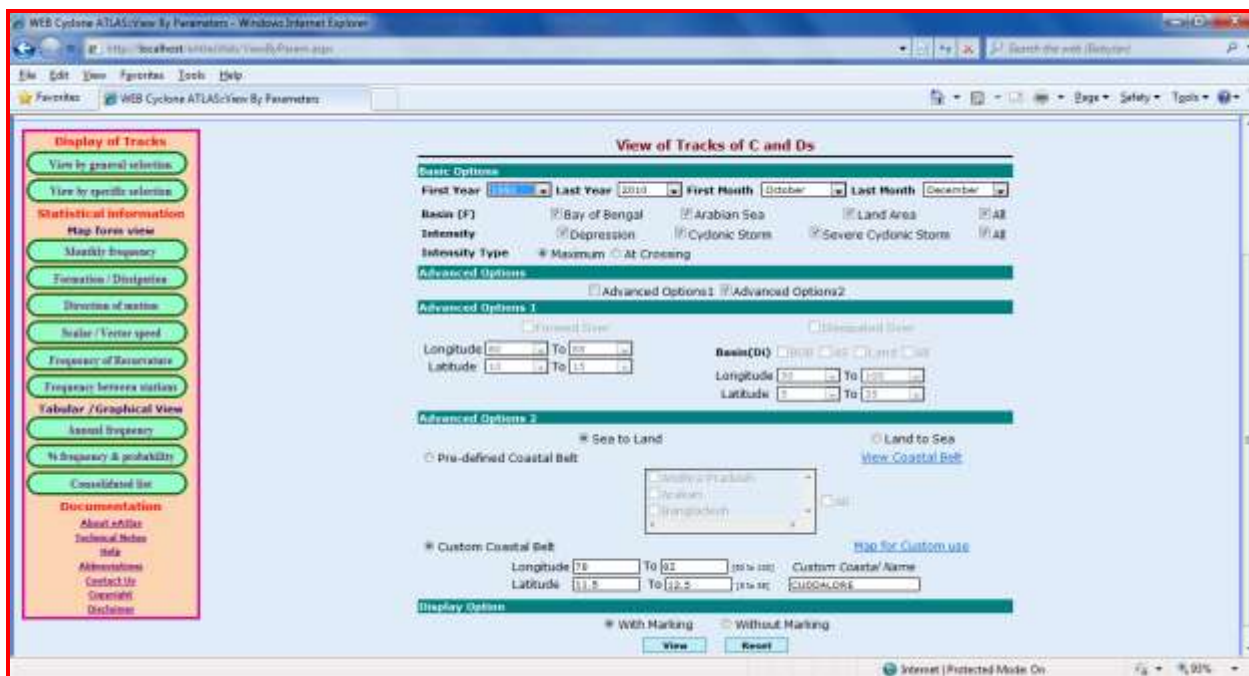
The input screen for **Land to Sea** and **Pre-defined coastal belt** options:



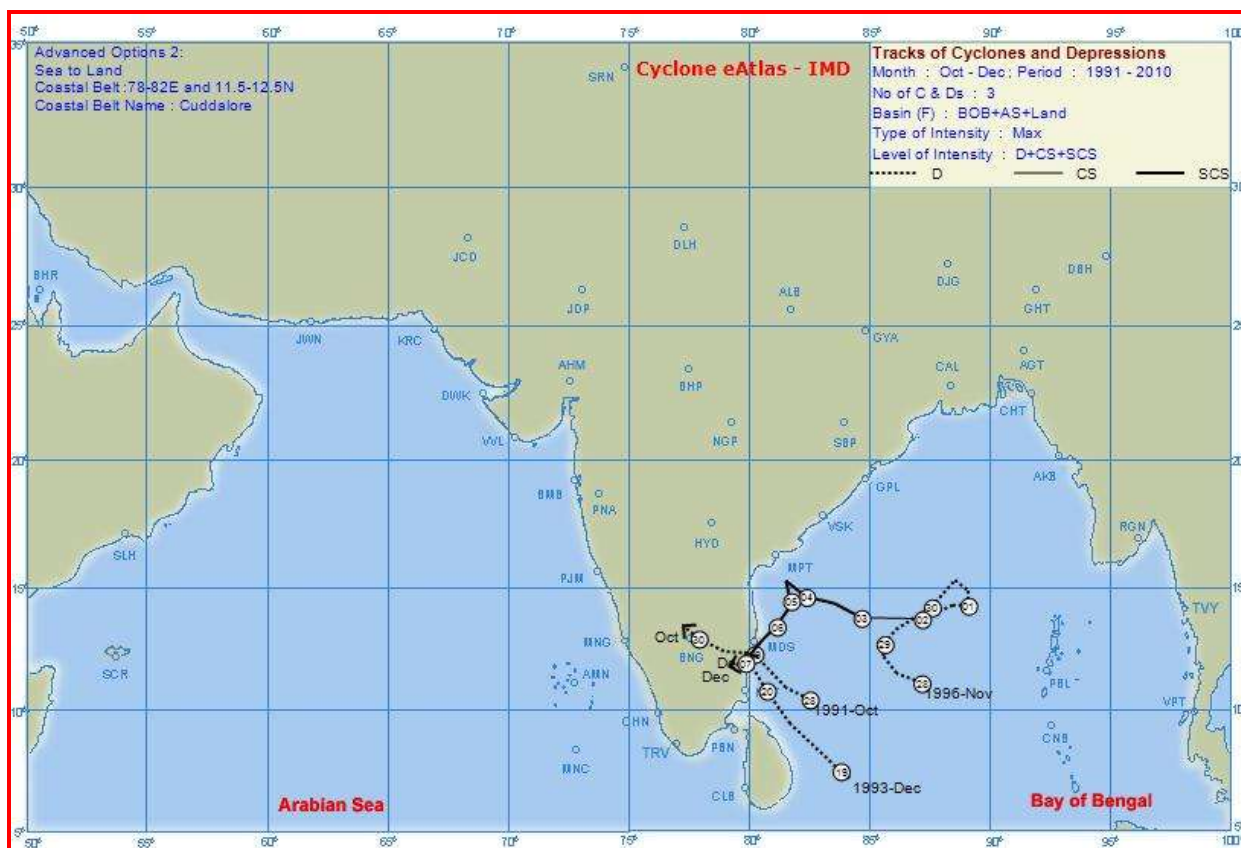
The desired OUTPUT will be as shown:



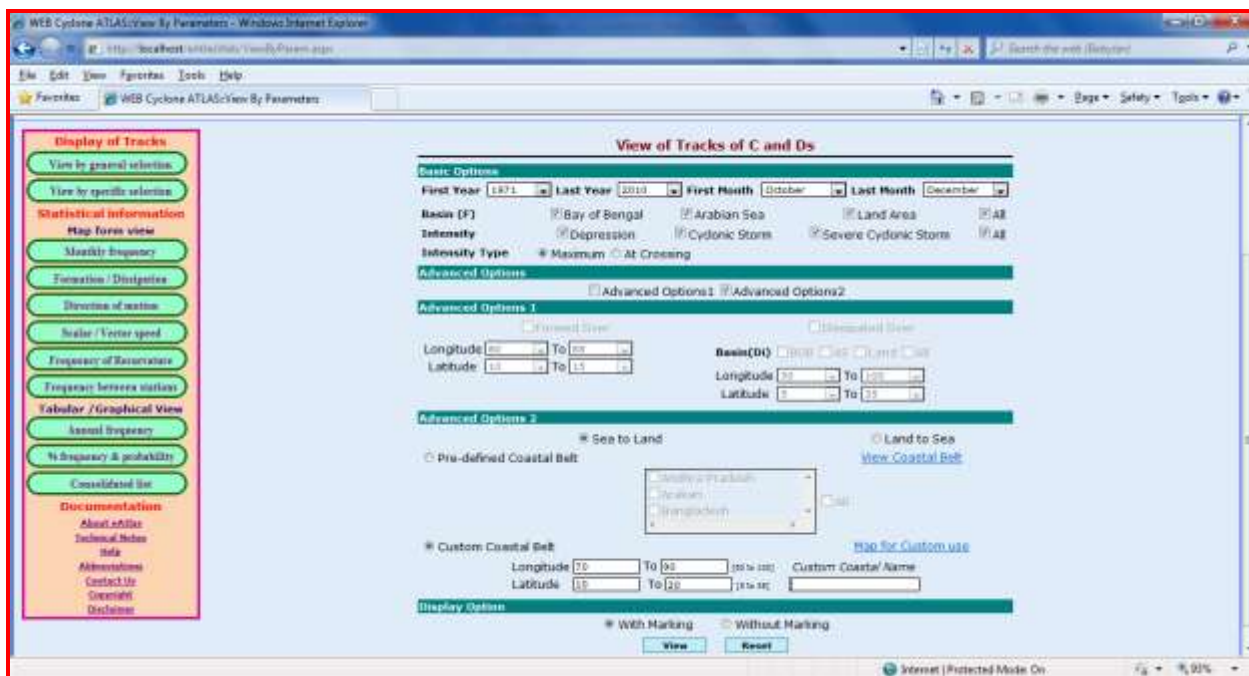
Input screen for **Sea to Land** and **Custom defined coastal belt**:



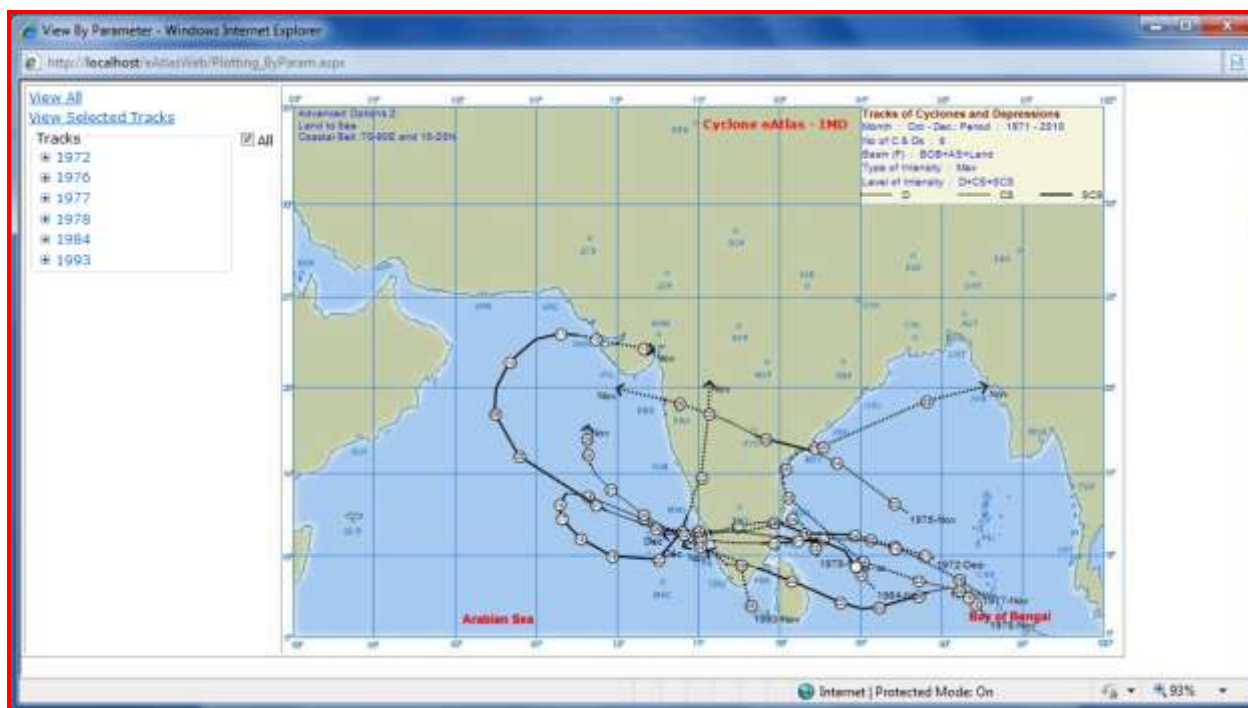
The desired OUTPUT for Sea to Land crossing and Custom defined coastal belt definition of 78-82° and 11.5-12.5°N with Custom Coastal Name “Cuddalore” shall be as follows.



The input screen for **Land to Sea** and **Custom defined coastal belt** options:



The desired OUTPUT for Land to Sea crossing and Custom defined coastal belt options shall be as follows.



The OUTPUT shows two display boxes, one on the top left corner of the map and one at the top right corner of the map.

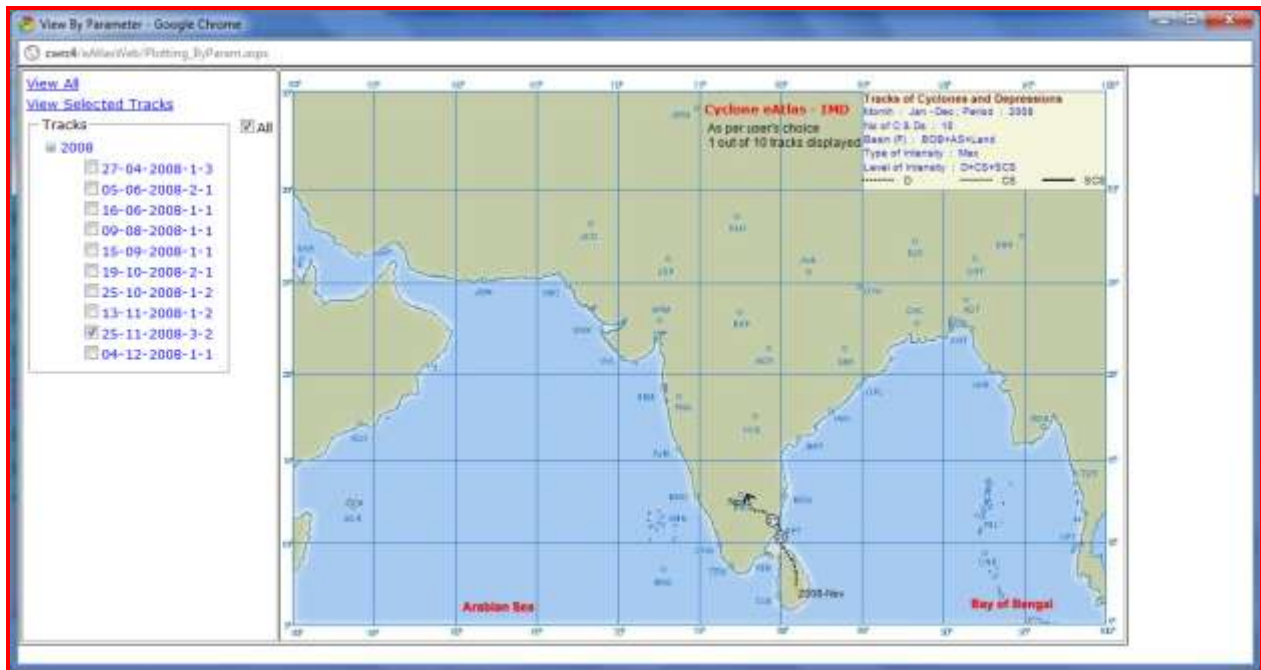
- On the top right corner of the map, the chosen basic options are displayed
- On the top left corner of the map, the chosen advanced options are displayed

Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

View of Tracks of C&Ds by General Selection

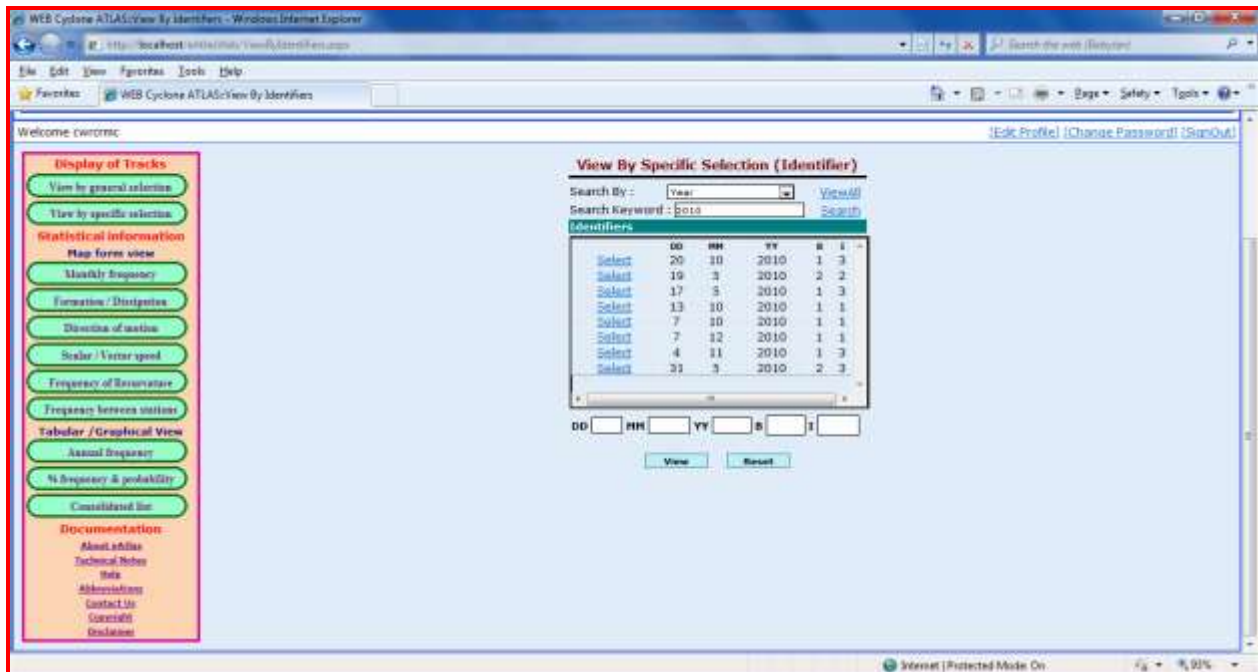
View selected tracks option

This option on the left hand side of the displayed OUTPUT enables the user to select and view specific tracks from amongst the ones displayed in the output.



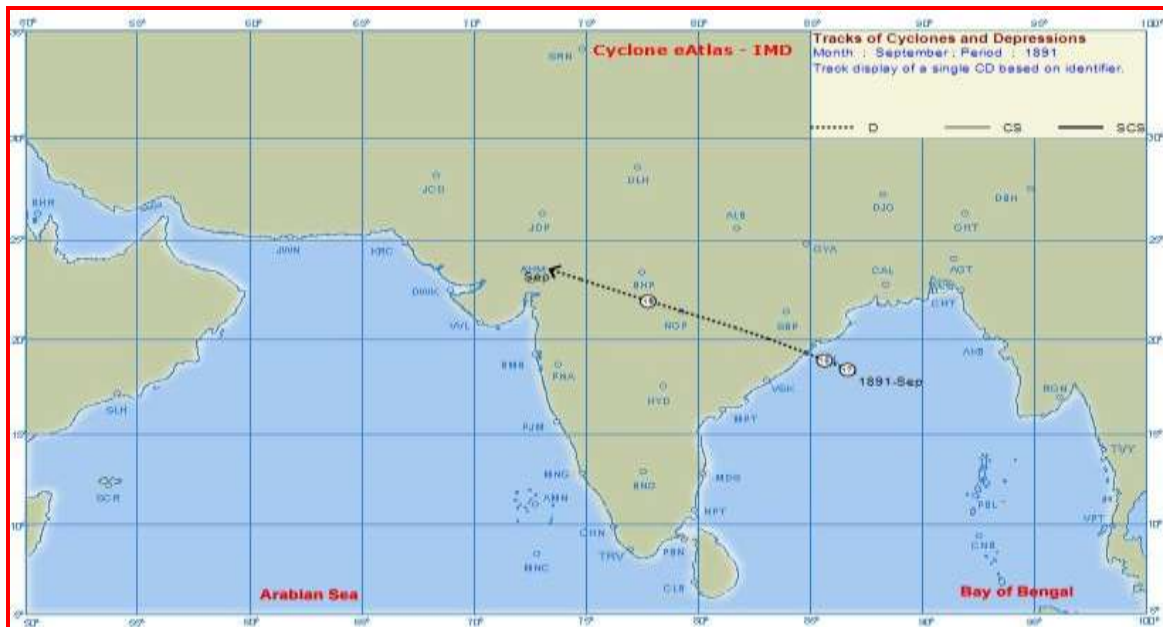
Menu 2

View by Specific Selection



In this screen, the user can select and view the track of a single CD by choosing the Identifier of the CD. In order to locate the desired Identifier, a search option with multiple criteria is provided. The user can search for the desired Identifier by **Year / Month / Basin / Intensity**. The user selects the criteria from the “SEARCH BY” combo box.

Then the user has to type the relevant search string in the “SEARCH KEYWORD” field. For Example, if the user selects the “SEARCH BY” criteria as “YEAR”. He will have to enter the desired year such as “1891” as shown below. Then the identifiers of all the CDs during the year “1891” will be listed below. The user has to click on the [select](#) option against the desired identifier and then click on “OK” button to view the track of the specific CD as shown below.



Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

The following statistical information can be generated in 2.5° latitudinal x 2.5° longitudinal grid:

- ✚ Monthly Frequency of passage of C & Ds
- ✚ Frequency of Formation and Dissipation of C & Ds
- ✚ Percentage frequency of direction of motion of C & Ds
- ✚ Scalar and Vector speed and Direction of motion of C & Ds
- ✚ Frequency of recurvature of C & Ds
- ✚ Frequency of crossing of C & Ds between two coastal stations

The terminologies used are D for Depression, CS for Cyclonic Storm and SCS for Severe Cyclonic Storm.

For the purpose of computation of map statistics, for each position of a CD, its month of occurrence at that instant and its intensity level when it traverses over a particular grid are considered i.e., for CDs forming in one month and extending into the next month, the portion of the CD corresponding to the month under consideration and the corresponding

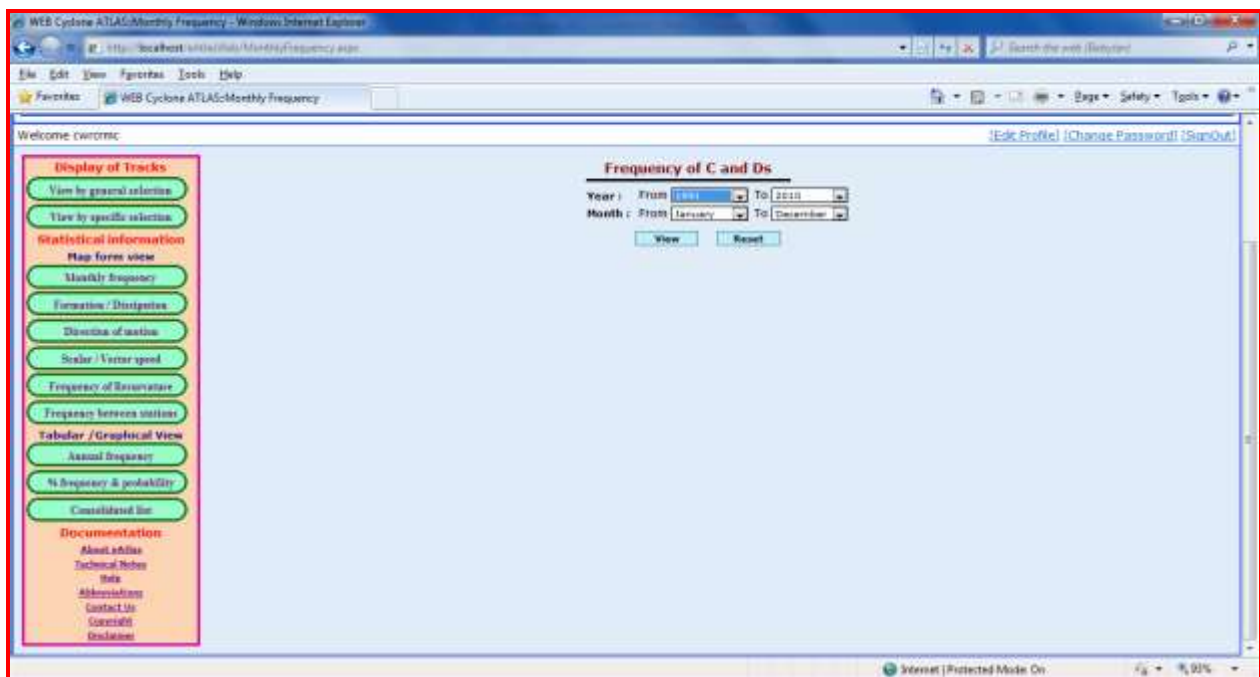
intensity levels only will be taken for computations for that month. Further, the 3 UTC position of the CD on each day is considered as the starting point of the track for that date. For example, a CD formed as a depression on 29 April 1976 and extended up to 2 May 1976. It intensified into a CS in April itself (30th), but further intensified into an SCS on 01st May only. Accordingly, for generation of statistics for the month of April, the portion of the track up to the 3 UTC position of 1st May (including formation of D and CS) will be considered. From the 3 UTC position of 1st May to the dissipation point (including formation of SCS and dissipation of SCS, CS and D) will be considered for generation of statistics for the month of May.

II) Map from Statistics

Menu 3

Monthly Frequency

This functionality helps the user to view the Monthly Frequency of the three different combinations of Intensity levels of C & Ds (All (D+CS+SCS), Cyclonic storms (CS+SCS) and Severe cyclonic storms (SCS)) over different ranges of years and months / season.



From Year - Select the Beginning year of the desired output from the List

To Year - Select the Ending year of the desired output from the List

From Month - Select the Beginning Month of the desired output from the List

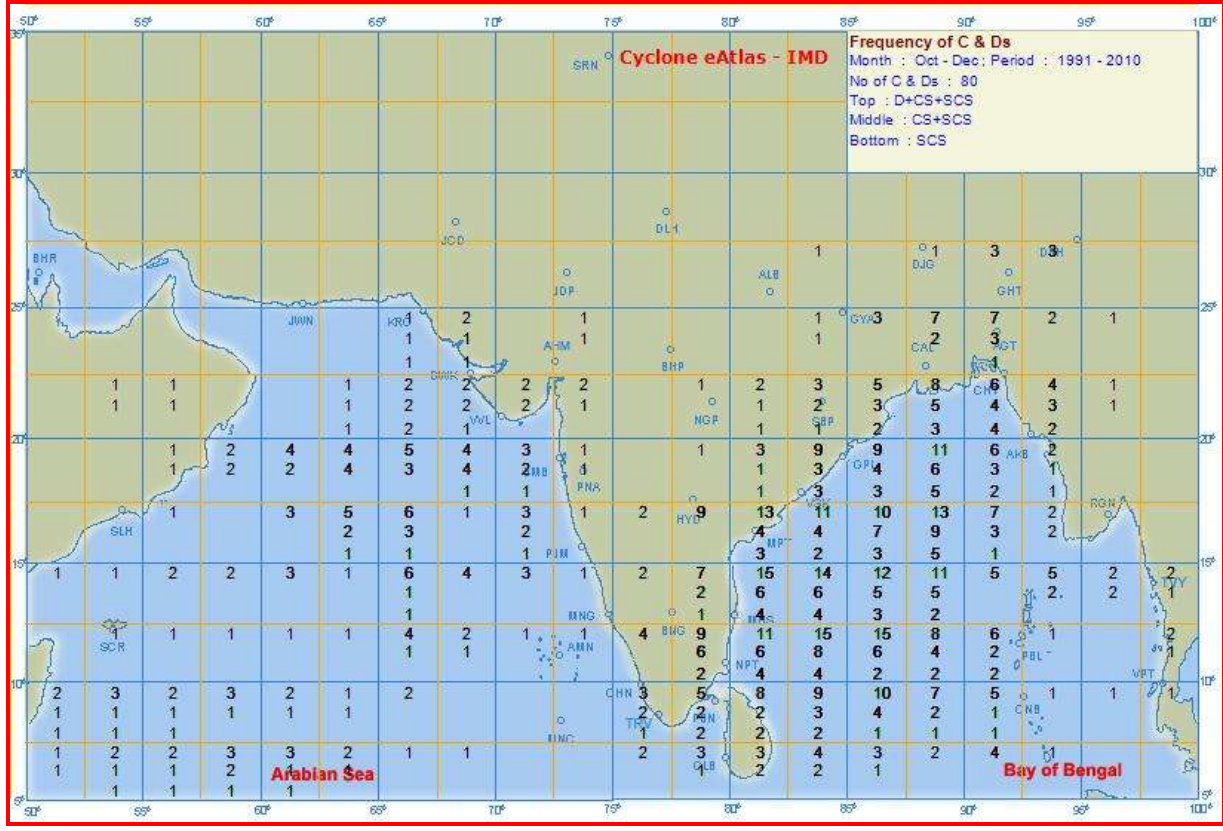
To Month - Select the Ending Month of the desired output from the List

Then, click on the VIEW Button, to view the output. The displayed output comprises of frequencies of D+CS+SCS, CS+SCS and SCS shown one below the other in that order in each $2.5^{\circ} \times 2.5^{\circ}$ grid on the Map (i.e.)

- ✚ The number on top of the each $2 \frac{1}{2}^{\circ}$ grid box denotes – the number of frequency of combination of D+CS+SCS
- ✚ The number on Middle of the each $2 \frac{1}{2}^{\circ}$ grid box denotes – the number of frequency of combination of CS+SCS

- ✚ The number on Bottom of the each 2 ½° grid box denotes – the number of frequency of SCS
- ✚ Blank indicates 'Nil' frequency of C & Ds in that respective category.

The OUTPUT displayed is as shown under.



Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Menu 4

Monthly Frequency of Formation and Dissipation

This SCREEN helps the user to view the Frequency of the C&Ds that Formed or Dissipated over different ranges of years and months / season.

The user has to make the following selections:

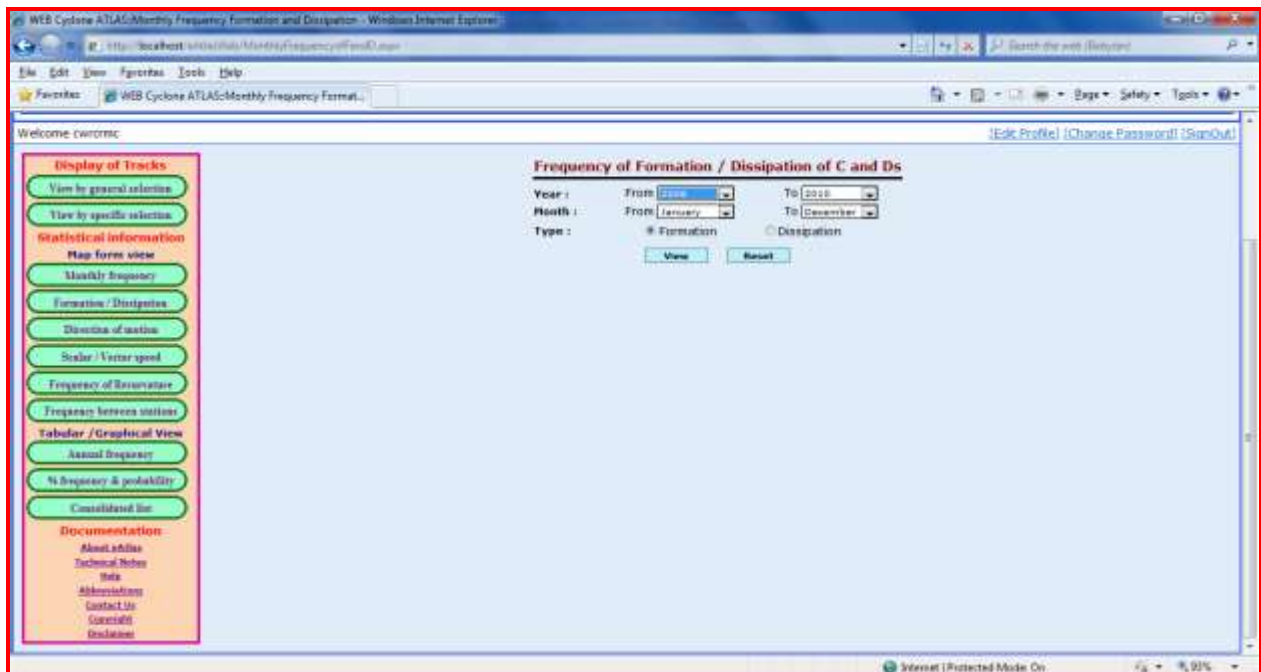
From Year - Select the Beginning year of the desired output from the combo box.

To Year - Select the Ending year of the desired output from the combo box.

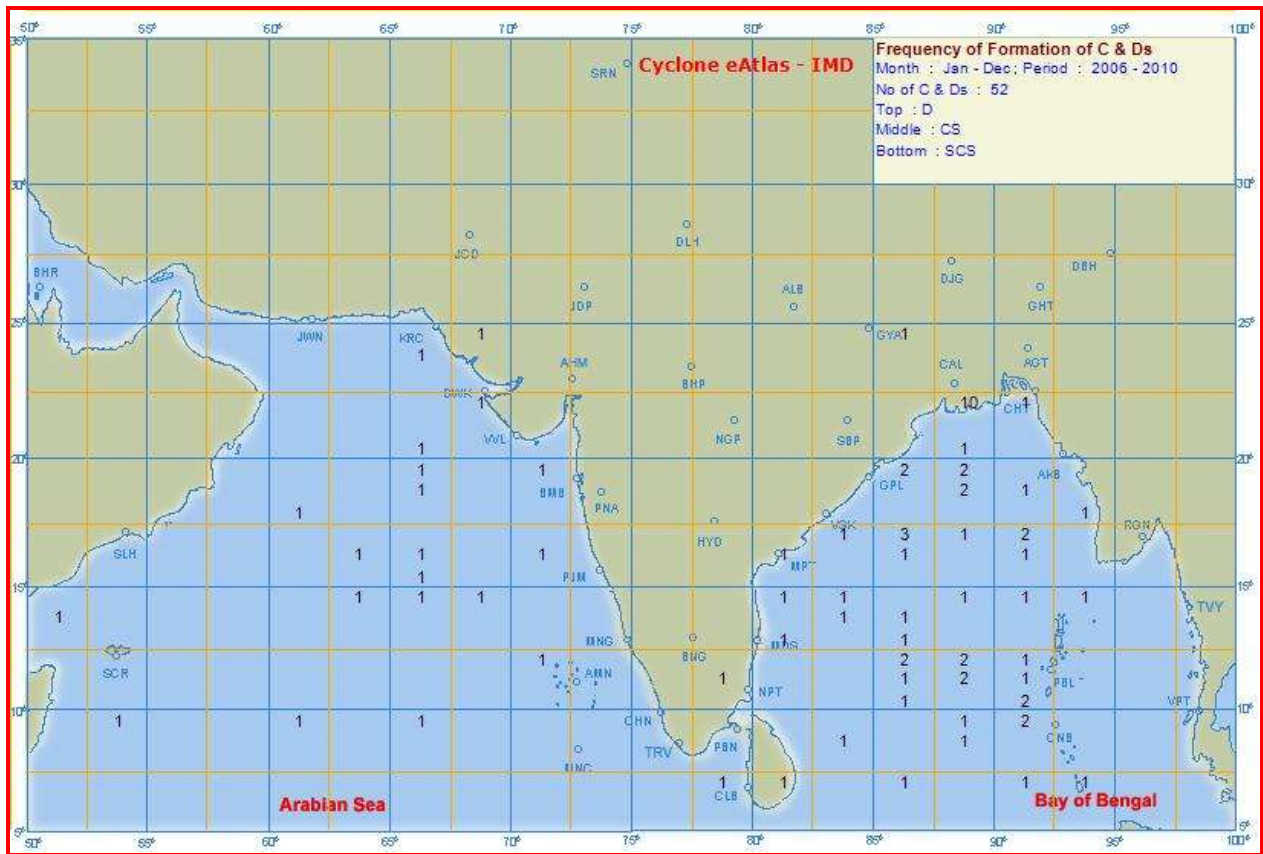
From Month - Select the Beginning Month of the desired output from the combo box.

To Month - Select the Ending Month of the desired output from the combo box.

The user can view either the statistics of **Formation** or **Dissipation** of the C & Ds by clicking the option button.



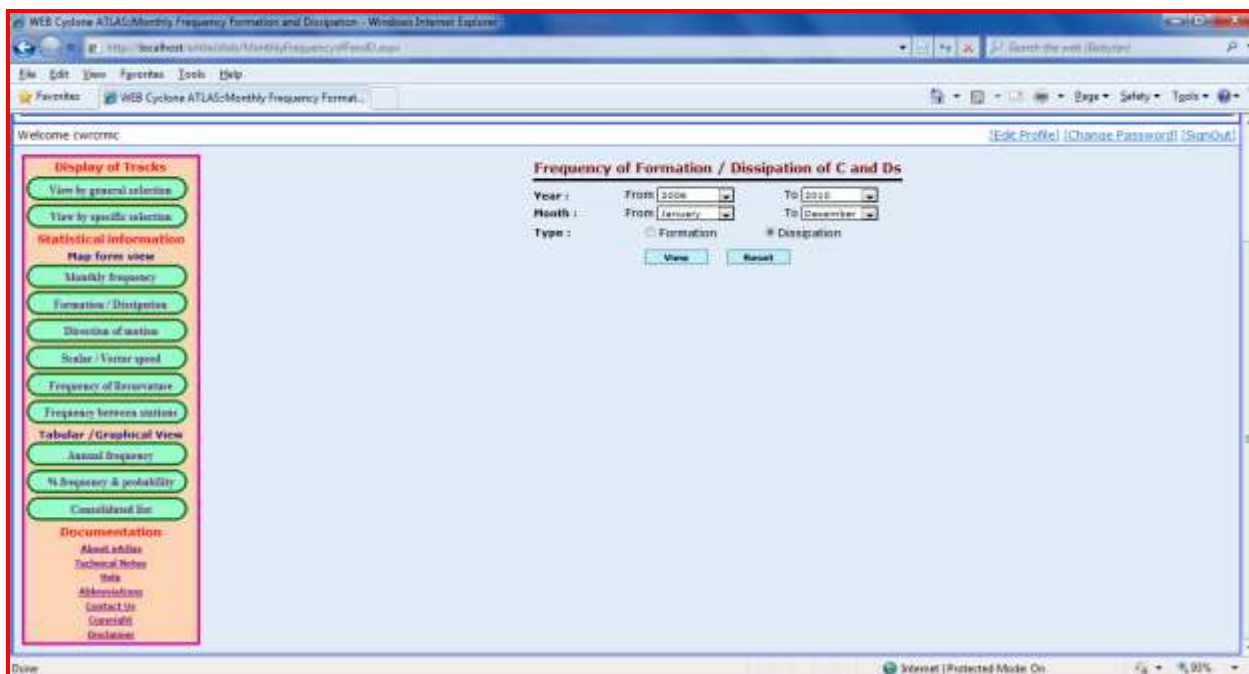
On clicking the VIEW Button, the output will be displayed in the 2½ x 2½° Lon / Lat Grid and will correspond to the statistics of Formation or Dissipation as per the user choice.



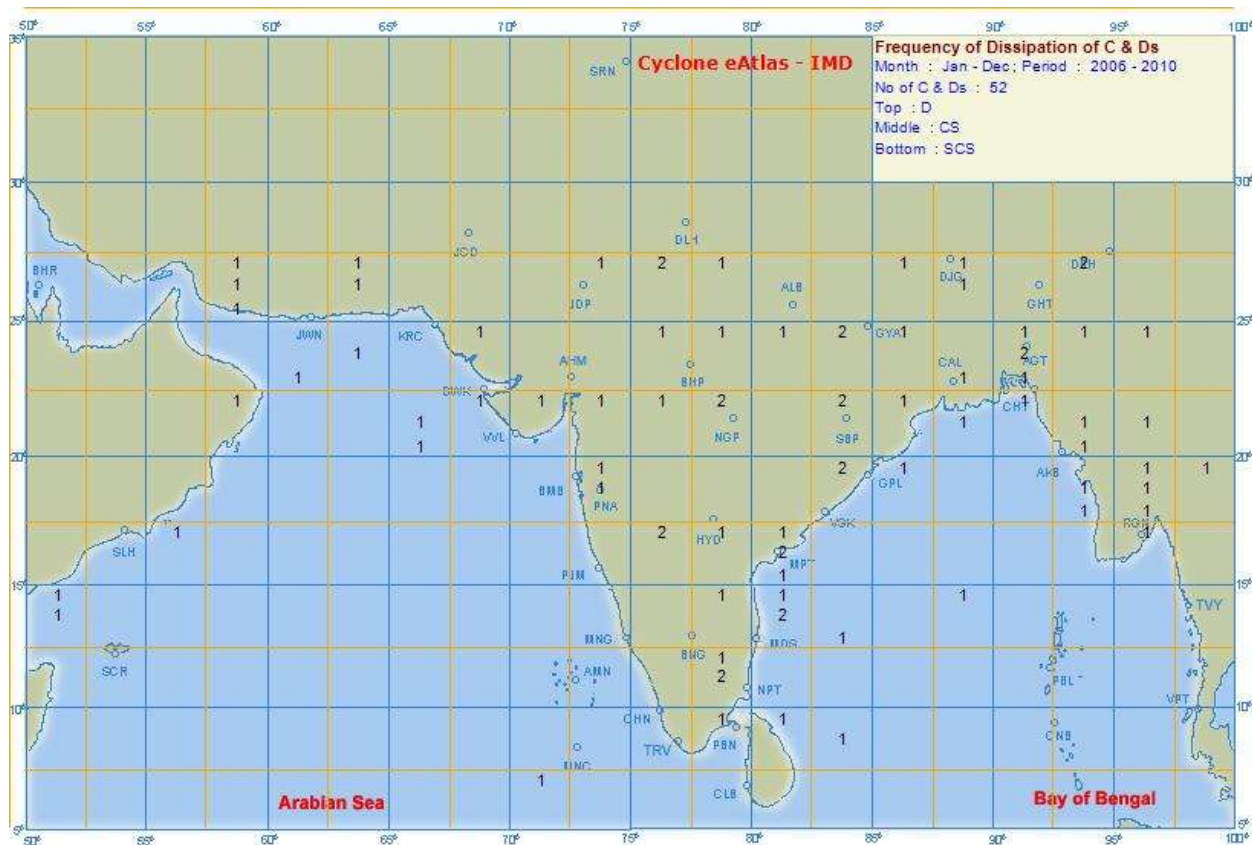
Three values can be read from each of the $2\frac{1}{2}^\circ$ Grid.

- ✚ The number on top of the each $2\frac{1}{2}^\circ$ grid box denotes –frequency of formation / dissipation of Depressions
- ✚ The number on Middle of the each $2\frac{1}{2}^\circ$ grid box denotes –frequency of formation / dissipation of Cyclonic Storms (Intensification from D to CS / weakening from CS to D)
- ✚ The number on Bottom of the each $2\frac{1}{2}^\circ$ grid box denotes –frequency of formation / dissipation of Severe Cyclonic Storms (Intensification from CS to SCS / weakening from SCS to CS).
- ✚ A Blank indicates 'Nil' frequency in the corresponding category.

Input screen for **Dissipation** option:



The desired OUTPUT will be as shown:



Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Menu 5

Percentage frequency of Direction of Movement

This option helps the user to determine the direction of the movement of C & Ds over different ranges of years and months / season.

The user has to make the following selections:

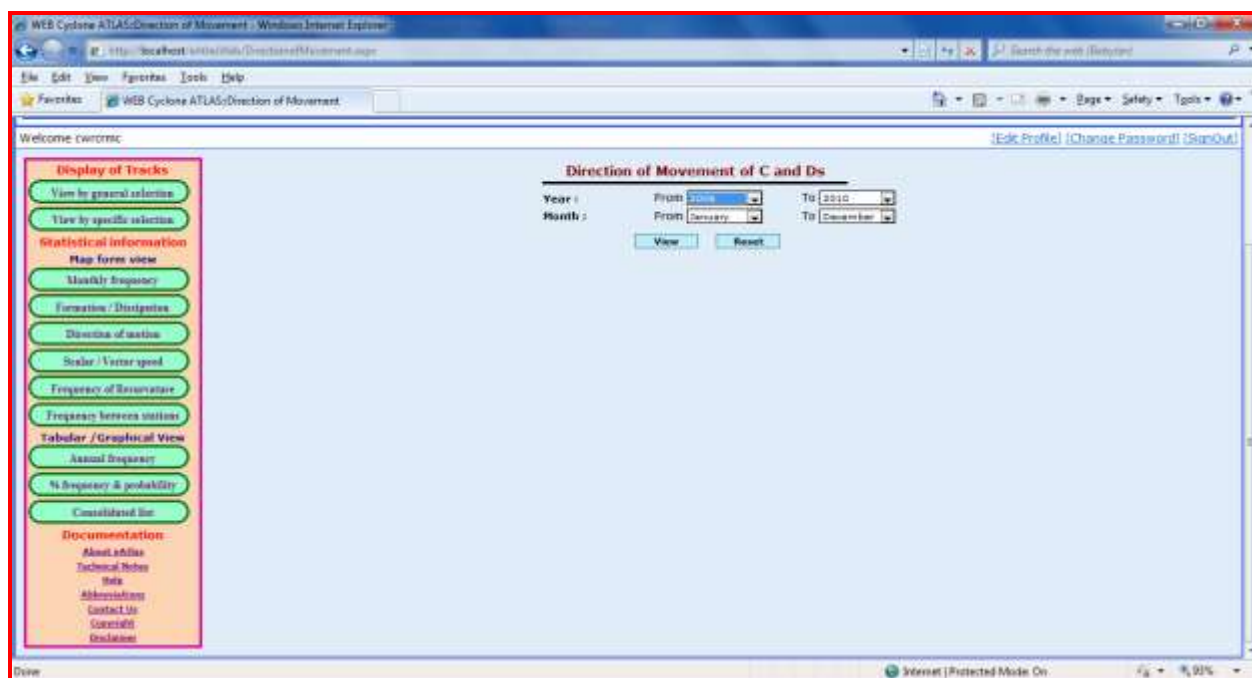
From Year - Select the Beginning year of the desired output from the combo box.

To Year - Select the Ending year of the desired output from the combo box.

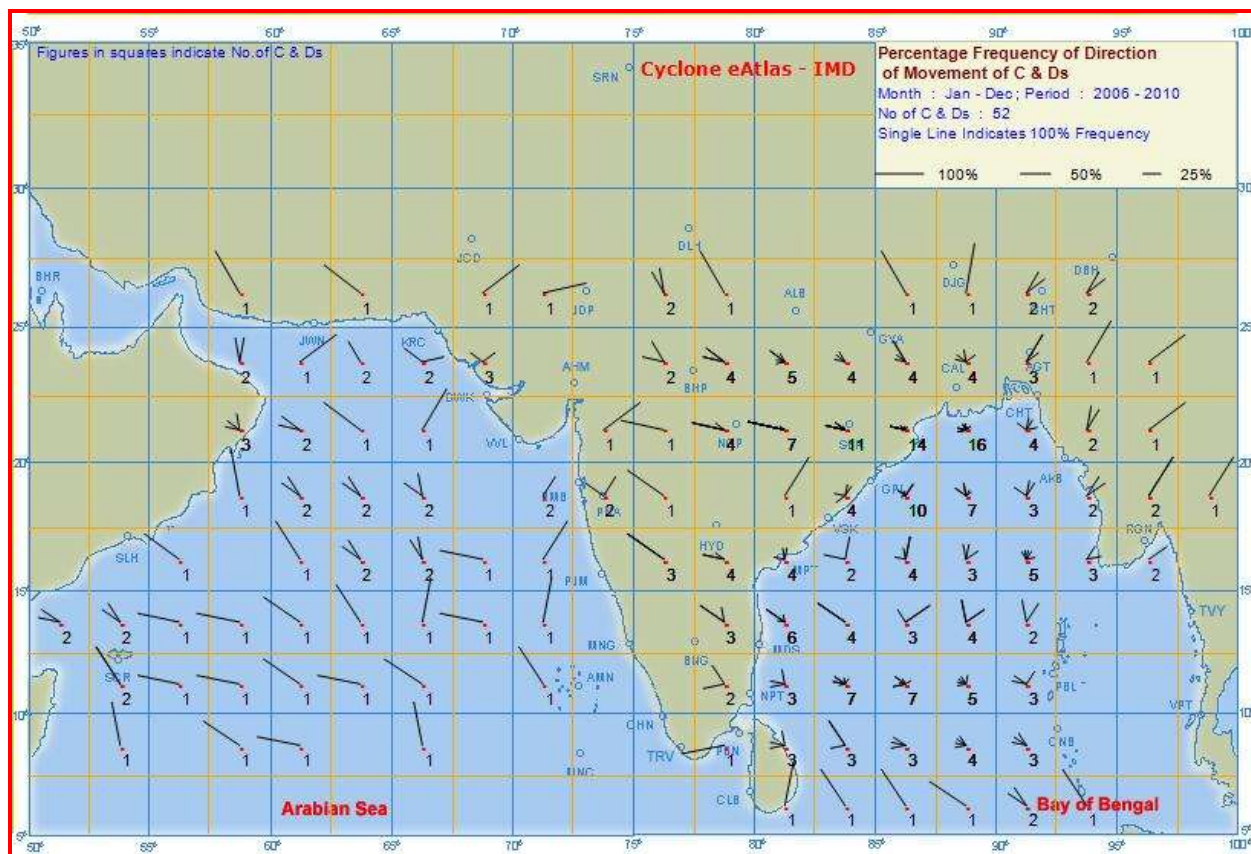
From Month - Select the Beginning Month of the desired output from the combo box.

To Month - Select the Ending Month of the desired output from the combo box.

On clicking the VIEW button, the user can view the percentage frequency of direction of motion in each $2.5 \times 2.5^\circ$ grid.



The OUTPUT display will be as under:



The direction is indicated as a shaft originating from the centre of the grid. Single shaft in a grid indicates 100% frequency. If there are multiple shafts in a grid, the corresponding frequencies add up to 100%. A scale indicating shaft length of 25%, 50% and 100% is displayed in the top right legend box. The frequency of C&Ds that passed through each grid is also displayed.

Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Menu 6

Mean Scalar and Vector Speed and Direction of movement

From this SCREEN, the user can generate the Scalar and Vector Mean Speed of C&Ds) over different ranges of years and months / season.

The user has to make the following selections:

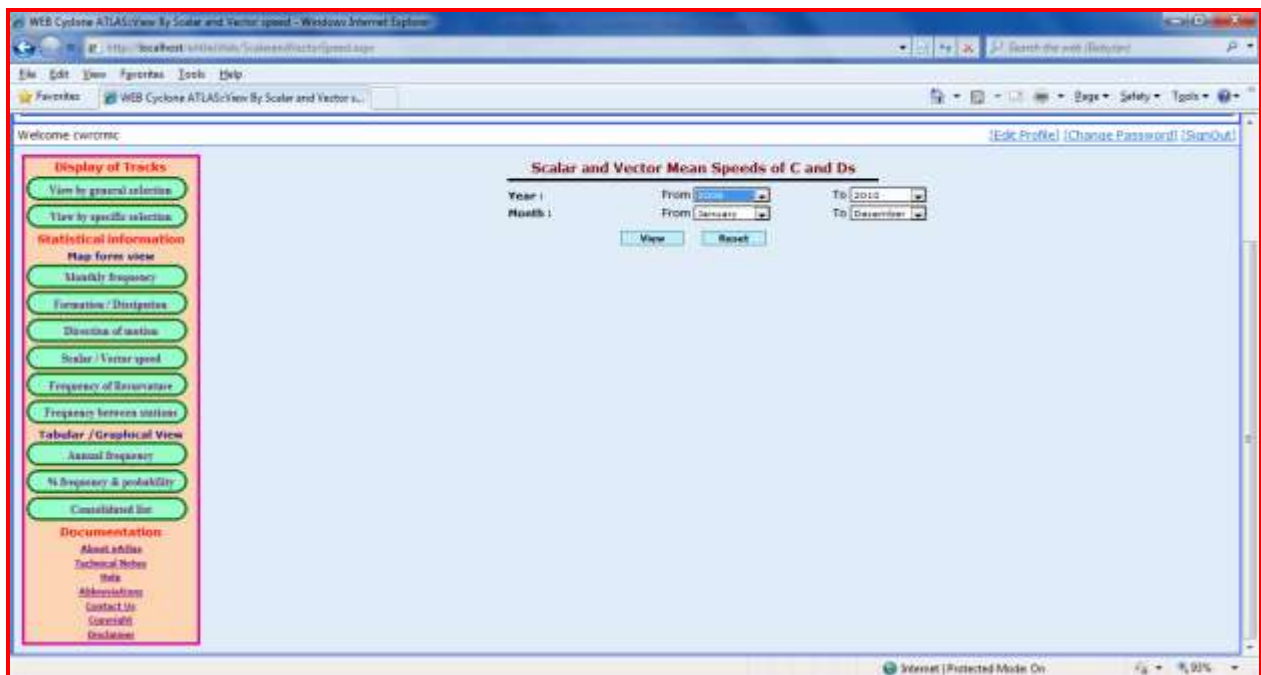
From Year - Select the Beginning year of the desired output from the combo box

To Year - Select the Ending year of the desired output from the combo box

From Month - Select the Beginning Month of the desired output from the combo box

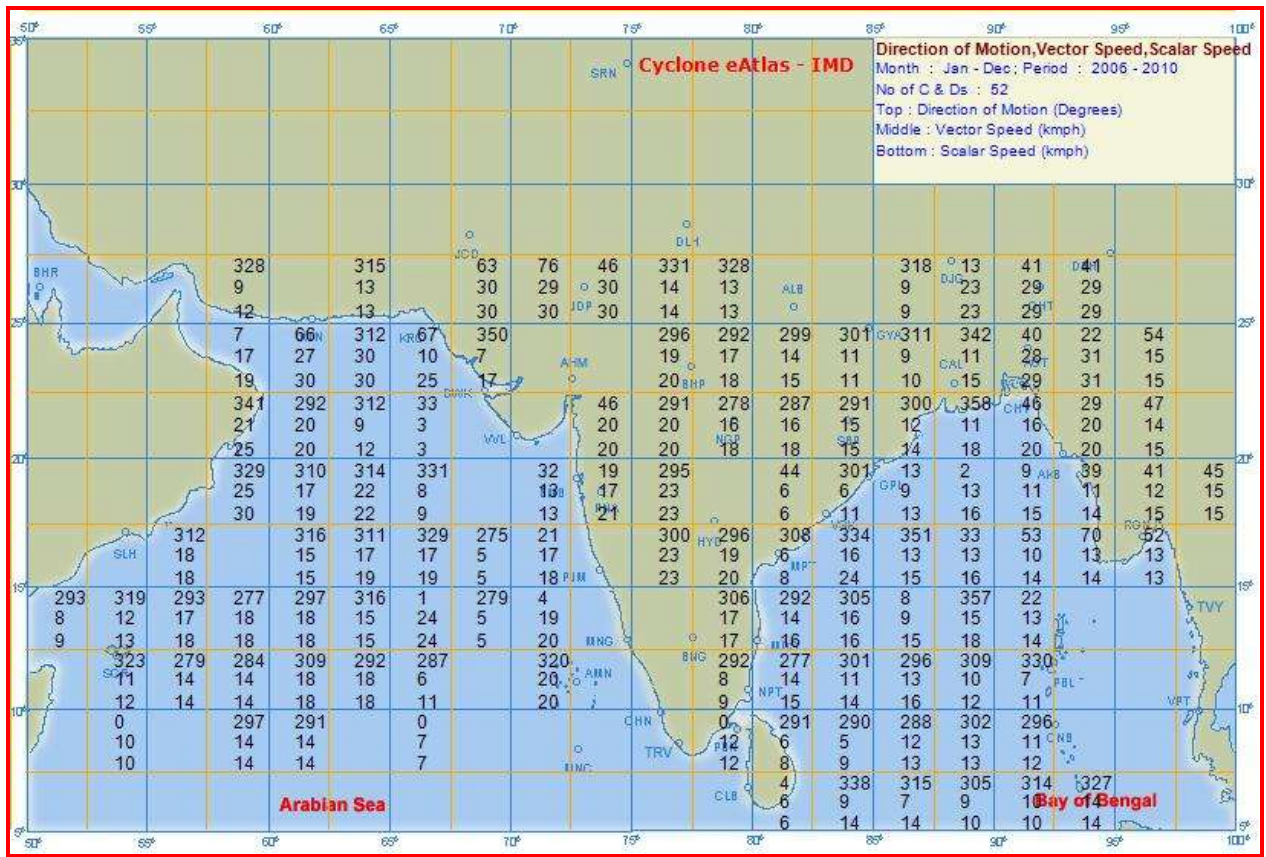
To Month - Select the Ending Month of the desired output from the combo box

On clicking the VIEW button, the user can view the OUTPUT.



The display of OUTPUT will be as under:

- ✚ The number on top of each $2\frac{1}{2}^\circ$ grid box denotes the Direction of Motion in Degrees.
- ✚ The number in the Middle of each $2\frac{1}{2}^\circ$ grid box denotes Vector Speed in kmph.
- ✚ The number on Bottom of the each $2\frac{1}{2}^\circ$ grid box denotes Scalar Speed in kmph.
- ✚ A Blank indicates 'Nil' value.



Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Menu 7

Frequency of Re-curvature

This screen helps to determine the number of C&Ds that had re-curved towards North Eastern direction over different ranges of years and months / season and also for specific areas of formation defined by the Basins of formation (Bay of Bengal –BOB, Arabian Sea – AS and Land) as well as custom defined latitudinal and longitudinal grid of formation.

The user has to make the following selections:

From Year - Select the Beginning year of the desired output from the combo box.

To Year - Select the Ending year of the desired output from the combo box.

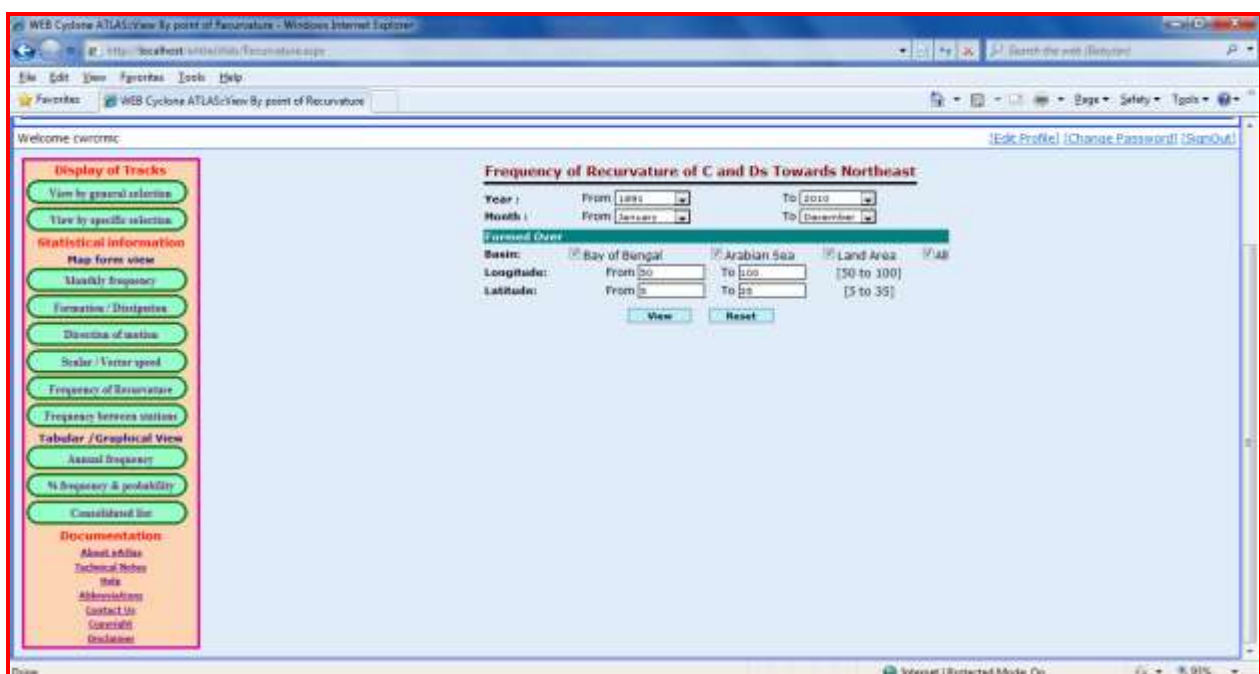
From Month - Select the Beginning Month of the desired output from the combo box.

To Month - Select the Ending Month of the desired output from the combo box.

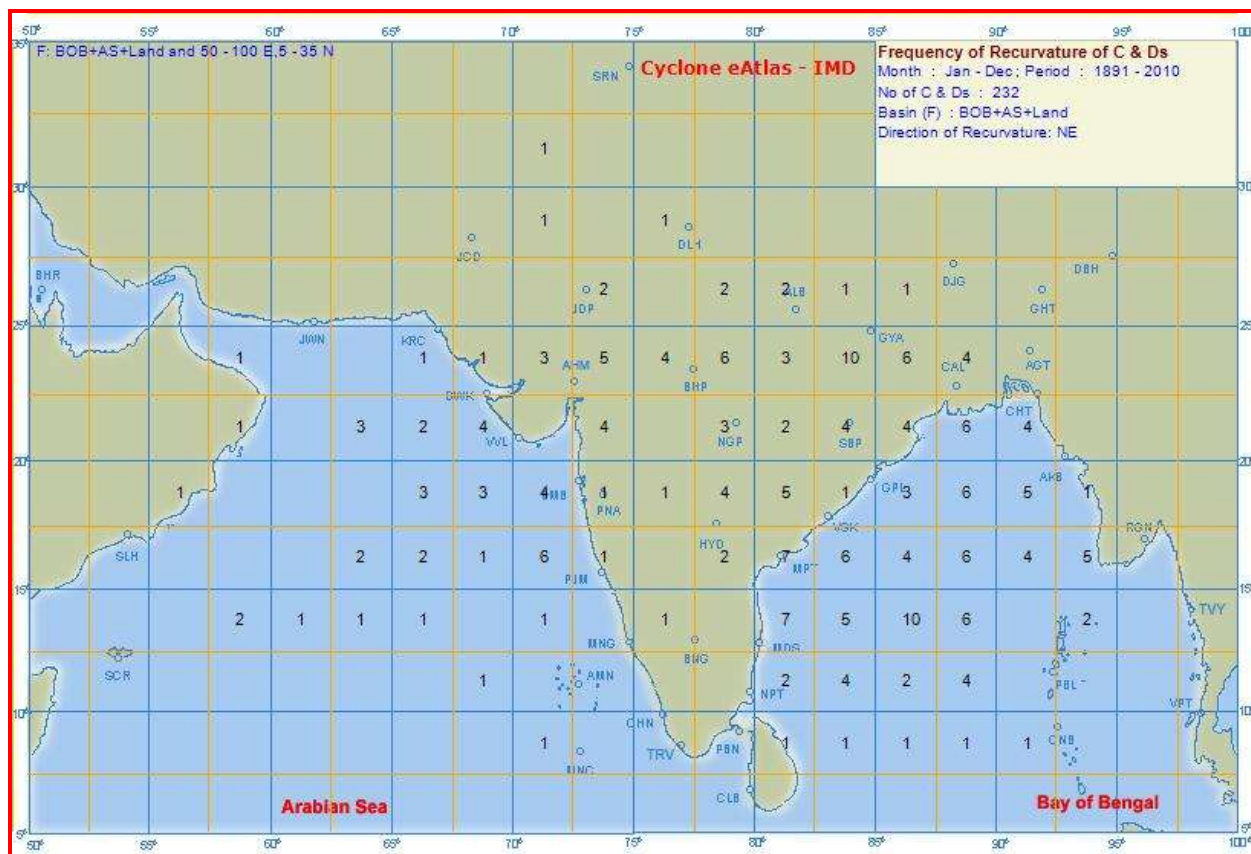
Basin of formation – Select the Basin of formation. The user has the option to choose ALL the basins or a combination of basins (Bay of Bengal –BOB or Arabian Sea – AS or Land (default is ALL).

Range of Latitudes and Longitudes of formation – This is optional. If the user has no specific choice, the default values (50-100°E and 5-35°N) will be taken.

On clicking the VIEW button, the user can view the OUTPUT in 2.5°x2.5° grid.



The OUTPUT will be displayed as shown under.



The OUPUT is displayed as frequency of C&Ds that had recurved towards northeast in 2½°x2½° grid.

A Blank indicates 'Nil' frequency in the grid.

Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Menu 8

Frequency of C&Ds crossing coast between two stations

From this option, frequency of C & Ds that has crossed the coast between two stations marked in the map for various input options of year(s), month(s), Basin of formation (including custom defined region of formation), Intensity (level) and type of Intensity.

The user selects the desired query from the combo boxes as detailed below:

From Year - Select the Beginning year of the desired output from the combo

To Year - Select the Ending year of the desired output from the combo

From Month - Select the Beginning Month of the desired output from the combo

To Month - Select the Ending Month of the desired output from the combo

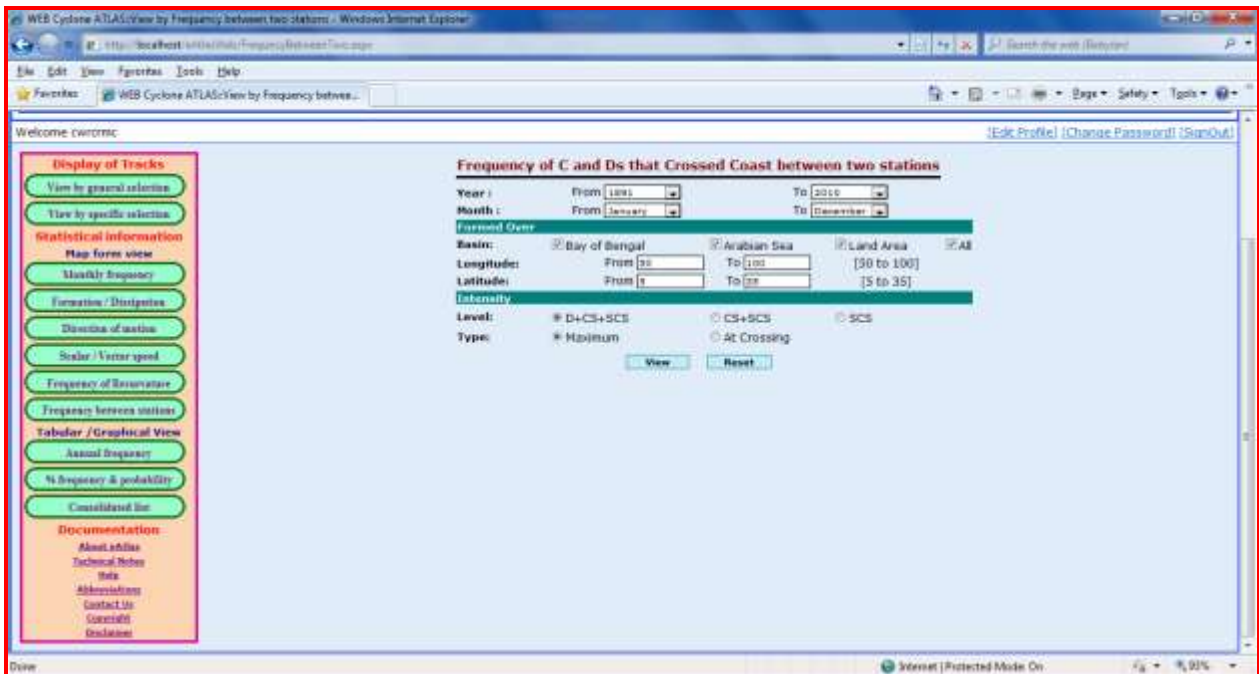
Basin of formation - The user has the option to choose ALL the basins or a combination of the basins (BOB – Bay of Bengal or AS – Arabian Sea or Land). Default is ALL.

Range of Latitudes and Longitudes of formation – This is optional. If the user has no specific choice, the default values (50-100°E and 5-35°N) will be taken.

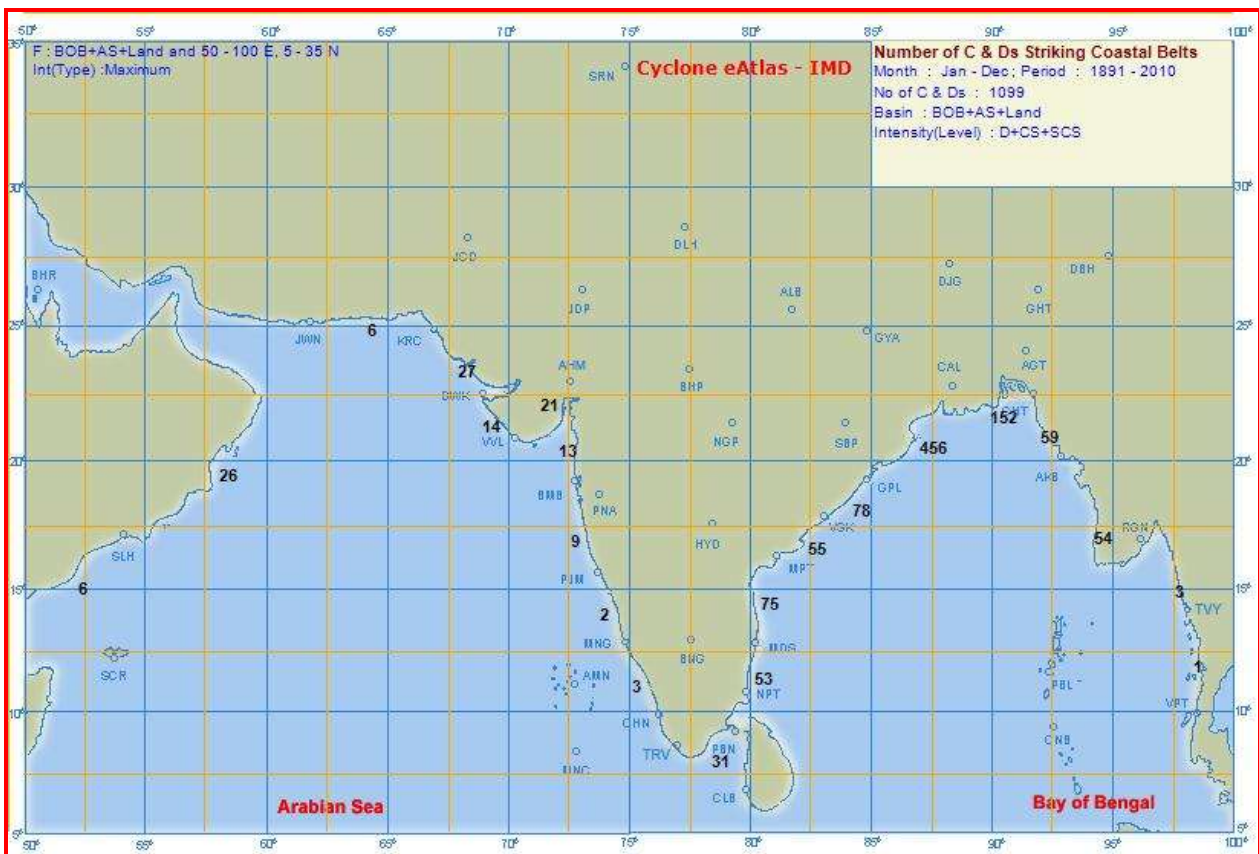
Intensity (Level) - Select any one of the Intensity option such as (D+CS+SCS or CS+SCS or SCS)

Intensity Type - The user has the option to select the Intensity Type as Maximum Intensity or Intensity at the time of crossing (Maximum or At Crossing)

On clicking the VIEW button, the user can view the OUTPUT in 2.5°x2.5° grid.



The OUTPUT will be displayed in the MAP as shown below.



The OUPUT is displayed as shown in the above figure. The numbers along the coast line indicate the frequencies of C & Ds that has crossed the coastal stretch between the two marked stations.

Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

III - Tabular and graphical outputs

Menu 9

Annual monthly / Seasonal Frequency of C & Ds

This SCREEN helps the user to get vital statistics of the Frequencies of C & Ds over a period of Years and for various Basins of formation and levels of Intensity. The user has the option to view the statistics BY MONTH or BY SEASON.

OUTPUT can be viewed in a TABLE format or as a BAR DIAGRAM.

Input options for tabular output

From Year - Select the Beginning year of the desired output from the combo

To Year - Select the Ending year of the desired output from the combo

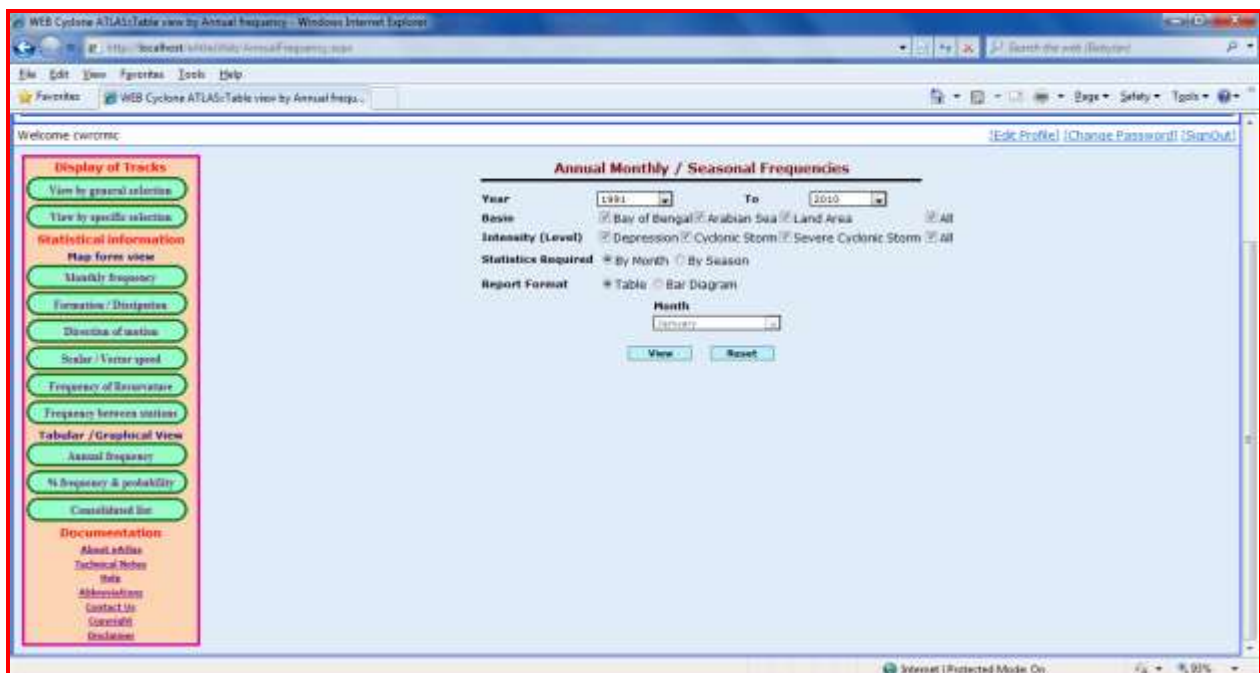
Basin of formation - The user has the option to choose ALL the basins or a combination of the basins

(BOB – Bay of Bengal or AS – Arabian Sea or Land)

Intensity (level) - Select any one of the Intensity levels such as D or CS or SCS or ALL

Statistics required - By MONTH or By SEASON.

Report format – TABLE or BAR DIAGRAM – select **Table** for Tabular output



.After making the choices, click on the VIEW Button, to view the desired OUTPUT.

The OUTPUT in the **Table format** will be displayed as shown under.

| Yearly and Monthly Frequency of Cyclones and Depressions | | | | | | | | | | | | | |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Period : 1991-2010 | | | | | | | | | | | | | |
| Basin : BOB+AS+Land | | | | | | | | | | | | | |
| Intensity(Level) : D+CS+SCS | | | | | | | | | | | | | |
| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
| 1991 | 00 | 00 | 00 | 01 | 01 | 00 | 01 | 01 | 01 | 02 | 01 | 00 | 008 |
| 1992 | 00 | 00 | 00 | 00 | 01 | 02 | 01 | 00 | 00 | 03 | 03 | 02 | 012 |
| 1993 | 00 | 00 | 00 | 00 | 00 | 01 | 00 | 00 | 00 | 00 | 02 | 02 | 005 |
| 1994 | 00 | 00 | 01 | 01 | 00 | 01 | 00 | 01 | 00 | 02 | 02 | 00 | 008 |
| 1995 | 00 | 00 | 00 | 00 | 03 | 00 | 00 | 00 | 02 | 01 | 02 | 00 | 008 |
| 1996 | 00 | 00 | 00 | 00 | 01 | 02 | 01 | 00 | 00 | 03 | 02 | 00 | 009 |
| 1997 | 00 | 00 | 00 | 00 | 01 | 01 | 01 | 03 | 01 | 00 | 02 | 00 | 009 |
| 1998 | 00 | 00 | 00 | 00 | 02 | 02 | 00 | 00 | 02 | 04 | 02 | 01 | 013 |
| 1999 | 00 | 01 | 00 | 00 | 01 | 02 | 01 | 01 | 00 | 02 | 00 | 01 | 009 |
| 2000 | 00 | 00 | 01 | 00 | 00 | 00 | 00 | 01 | 01 | 02 | 01 | 01 | 007 |
| 2001 | 00 | 00 | 00 | 00 | 01 | 01 | 00 | 00 | 01 | 02 | 01 | 00 | 006 |
| 2002 | 00 | 00 | 00 | 00 | 02 | 00 | 00 | 00 | 00 | 01 | 02 | 01 | 006 |
| 2003 | 00 | 00 | 00 | 00 | 01 | 00 | 01 | 01 | 00 | 02 | 01 | 01 | 007 |
| 2004 | 00 | 00 | 00 | 00 | 02 | 02 | 00 | 00 | 02 | 02 | 02 | 00 | 010 |
| 2005 | 01 | 00 | 00 | 00 | 00 | 02 | 01 | 00 | 03 | 01 | 02 | 02 | 012 |
| 2006 | 01 | 00 | 00 | 01 | 00 | 00 | 01 | 04 | 04 | 01 | 00 | 00 | 012 |
| 2007 | 00 | 00 | 00 | 00 | 02 | 04 | 01 | 01 | 01 | 02 | 01 | 00 | 012 |
| 2008 | 00 | 00 | 00 | 01 | 00 | 02 | 00 | 01 | 01 | 02 | 02 | 01 | 010 |
| 2009 | 00 | 00 | 00 | 01 | 01 | 02 | 01 | 00 | 01 | 00 | 01 | 01 | 008 |
| 2010 | 00 | 00 | 00 | 00 | 03 | 00 | 00 | 00 | 00 | 03 | 01 | 01 | 008 |
| Total | 002 | 001 | 002 | 005 | 022 | 024 | 010 | 014 | 020 | 035 | 030 | 014 | 179 |

BOB:Bay of Bengal ; AS:Arabian Sea

D:Depression ; CS:Cyclonic Storm ; SCS:Severe Cyclonic Storm

Source : Cyclone eAtlas - IMD

Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Input options for graphical (Bar Diagram) output

From Year - Select the Beginning year of the desired output from the combo

To Year - Select the Ending year of the desired output from the combo

Basin of formation - The user has the option to choose ALL the basins or a combination of the basins

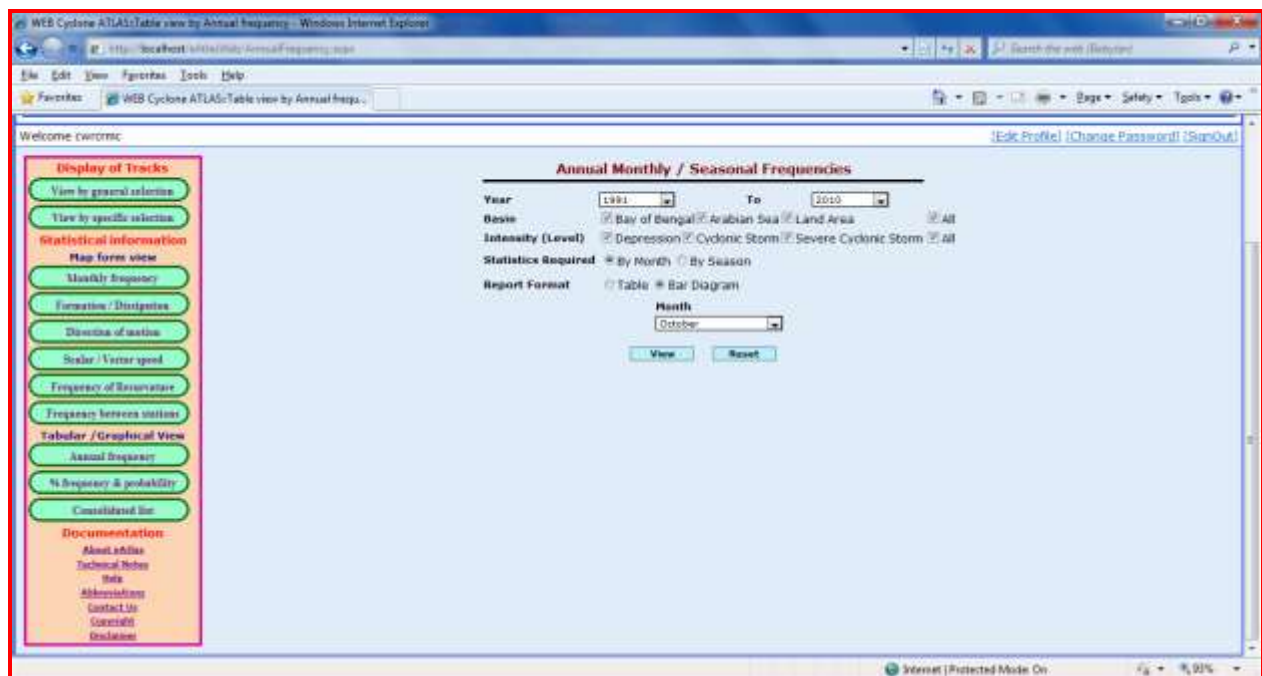
(BOB – Bay of Bengal or AS – Arabian Sea or Land)

Intensity (level) - Select any one of the Intensity levels such as D or CS or SCS or ALL

Statistics required - By MONTH or By SEASON.

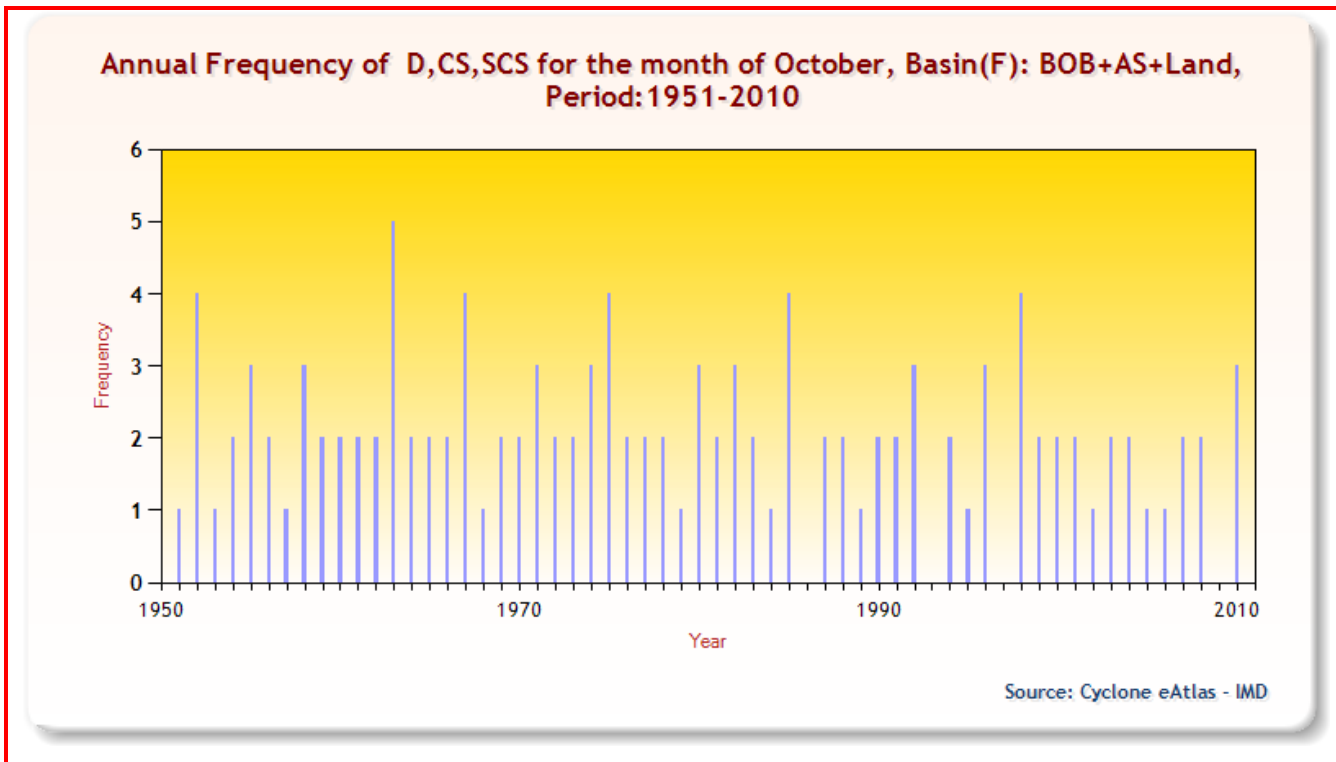
Report format – TABLE or BAR DIAGRAM – select Bar Diagram for graphical output

The user has to further select the specific **Month** or **Season** for which the statistics are required from the corresponding Combo box.



Click on the VIEW Button, to view the desired OUTPUT.

The OUTPUT will be as shown:



Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Menu 10

Monthly / Seasonal frequency / probability of intensification of C&Ds

This SCREEN helps the user to get statistics relating to **Frequency**, **Percentage frequency** and **Probability of intensification** of C&Ds over a period of Years and for various Basins of formation. The user has the option to view the statistics By MONTH or By SEASON. OUTPUT can be viewed in a TABLE format or as a BAR DIAGRAM.

Input options for tabular output

From Year - Select the Beginning year of the desired output from the combo

To Year - Select the Ending year of the desired output from the combo

Basin of formation - The user has the option to choose ALL the basins or a combination of the basins

(BOB – Bay of Bengal or AS – Arabian Sea or Land)

Statistics required - By MONTH or By SEASON.

Report format – TABLE or BAR DIAGRAM – select **Table** for Tabular output

The screenshot shows a web browser window displaying the 'Monthly / Seasonal Variation of Frequencies of C and Ds' form. The form includes the following fields and options:

- Year:** 1981 (dropdown)
- To:** 2018 (dropdown)
- Basin:** Bay of Bengal / Arabian Sea / Land Area / All
- Statistics Required:** By Month / By Season
- Report Format:** Table / Bar Diagram
- Report Type:** Frequency / Percentage Frequency / Probability
- Intensity (Level):** 0-10000 (input field)

Buttons for 'View' and 'Reset' are located below the form. On the left side of the page, there is a navigation menu with categories: 'Display of Tracks', 'Statistical information', 'Map forms view', 'Tabular / Graphical View', and 'Documentation'.

Click on the VIEW Button, to view the desired OUTPUT in Table format.

The OUTPUT will be as shown:

| Monthly Variation of Frequency of Cyclones and Depressions | | | | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Period : 1891-2010 | | | | | | | | | | | | | |
| Basin : BOB+AS+Land | | | | | | | | | | | | | |
| Intensity(Type) : Maximum | | | | | | | | | | | | | |
| Description | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
| Frequency of D+CS+SCS | 18 | 05 | 07 | 42 | 121 | 168 | 186 | 218 | 211 | 233 | 197 | 91 | 1497 |
| Frequency of CS+SCS | 08 | 02 | 05 | 32 | 85 | 63 | 45 | 32 | 52 | 113 | 138 | 53 | 628 |
| Frequency of SCS | 02 | 01 | 02 | 18 | 60 | 20 | 08 | 03 | 20 | 50 | 84 | 25 | 293 |
| Percentage Frequency of D+CS+SCS | 001.2 | 000.3 | 000.5 | 002.8 | 008.1 | 011.2 | 012.4 | 014.6 | 014.1 | 015.6 | 013.2 | 006.1 | 100 |
| Percentage Frequency of CS+SCS | 001.3 | 000.3 | 000.8 | 005.1 | 013.5 | 010.0 | 007.2 | 005.1 | 008.3 | 018.0 | 022.0 | 008.4 | 100 |
| Percentage Frequency of SCS | 000.7 | 000.3 | 000.7 | 006.1 | 020.5 | 006.8 | 002.7 | 001.0 | 006.8 | 017.1 | 028.7 | 008.5 | 100 |
| Probability(D to CS) | 044.4 | 040.0 | 071.4 | 076.2 | 070.2 | 037.5 | 024.2 | 014.7 | 024.6 | 048.5 | 070.1 | 058.2 | 042.0 |
| Probability(D to SCS) | 011.1 | 020.0 | 028.6 | 042.9 | 049.6 | 011.9 | 004.3 | 001.4 | 009.5 | 021.5 | 042.6 | 027.5 | 019.6 |
| Probability(CS to SCS) | 025.0 | 050.0 | 040.0 | 056.3 | 070.6 | 031.7 | 017.8 | 009.4 | 038.5 | 044.2 | 060.9 | 047.2 | 046.7 |

BOB:Bay of Bengal ; AS:Arabian Sea

D:Depression ; CS:Cyclonic Storm ; SCS:Severe Cyclonic Storm

Note :

1. Percentage Frequency is the monthly / seasonal frequency expressed as percentage of annual frequency.
2. Probability is the probability of intensification expressed as percentage.
3. Probability, shown as negative, indicates indeterminate probability due to zero frequency.

Source : Cyclone eAtlas - IMD

Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Input options for graphical (Bar Diagram) output

From Year - Select the Beginning year of the desired output from the combo

To Year - Select the Ending year of the desired output from the combo

Basin of formation - The user has the option to choose ALL the basins or a combination of the basins

(BOB – Bay of Bengal or AS – Arabian Sea or Land)

Statistics required - By MONTH or By SEASON.

Report format – TABLE or BAR DIAGRAM – select BAR DIAGRAM for graphical output

Then, the user has to further select from the following options:

Report type- Select type of statistics required as FREQUENCY or PERCENTAGE FREQUENCY or PROBABILITY OF INTENSIFICATION using the Radio Button.

For FREQUENCY or PERCENTAGE FREQUENCY options, the user has to select the **Intensity(level)** as D+CS+SCS or CS+SCS or SCS

For PROBABILITY OF INTENSIFICATION option, the user has to select the **From - To levels of intensification** as D to CS or D to SCS or CS to SCS

The input screen for display of statistics on Variation of Frequency of C&Ds is given below:

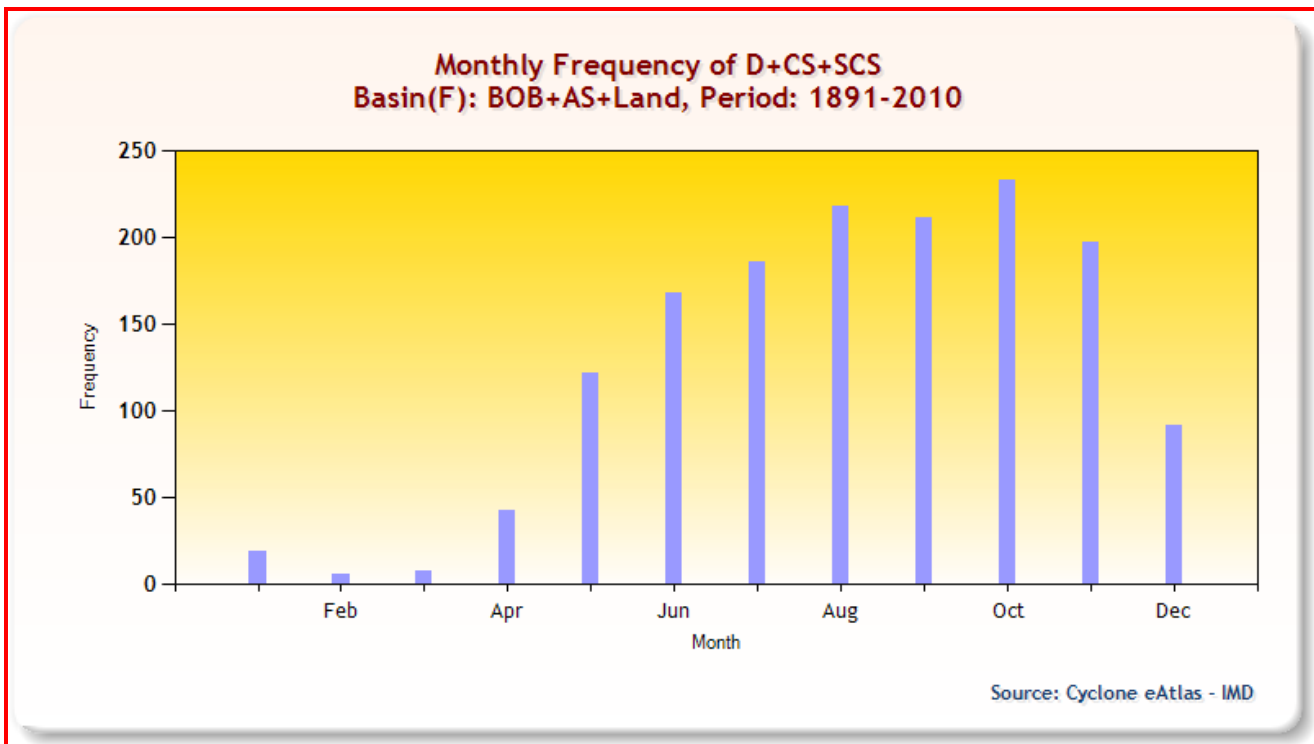
The screenshot shows a web browser window titled "WEB Cyclone ATLAS: Table view by Total Frequency and Percentage". The main content area is titled "Monthly / Seasonal Variation of Frequencies of C and Ds". The interface includes the following fields and options:

- Year:** A dropdown menu set to "1981".
- To:** A dropdown menu set to "2018".
- Basin:** Radio buttons for "Bay of Bengal", "Arabian Sea", "Land Area", and "All". "All" is selected.
- Statistics Required:** Radio buttons for "By Month" and "By Season". "By Month" is selected.
- Report Format:** Radio buttons for "Table" and "Bar Diagram". "Bar Diagram" is selected.
- Report Type:** Radio buttons for "Frequency", "Percentage Frequency", and "Probability". "Frequency" is selected.
- Intensity (Level):** A dropdown menu set to "D+CS+SCS".
- Buttons:** "View" and "Reset" buttons.

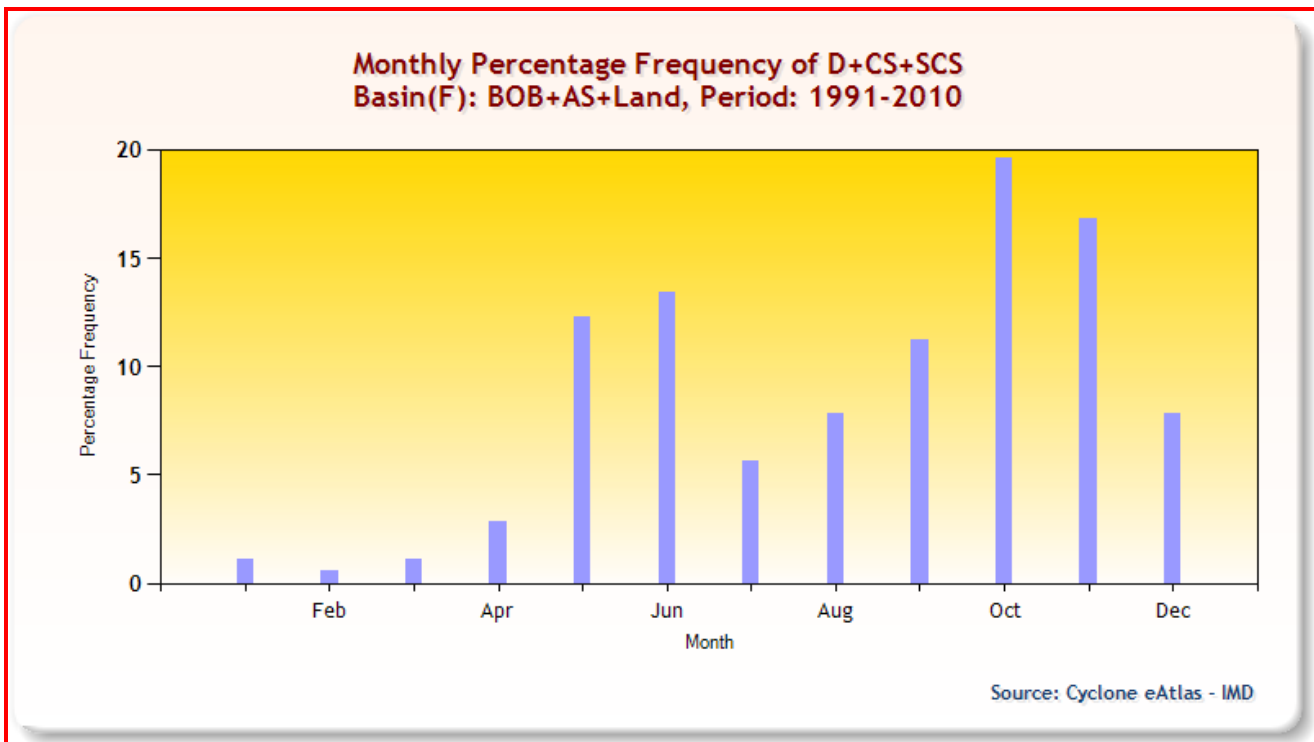
On the left side, there is a navigation menu with the following sections:

- Display of Tracks:** View by general selection, View by specific selection.
- Statistical information:** Map form view, Monthly frequency, Formation / Dissipation, Duration of motion, Scalar / Vector speed, Frequency of Recurrence, Frequency between stations, Tabular / Graphical View, Annual frequency, % frequency & probability, Consolidated list.
- Documentation:** About atlas, Technical Notes, Data, Abbreviations, Contact Us, Copyright, Disclaimer.

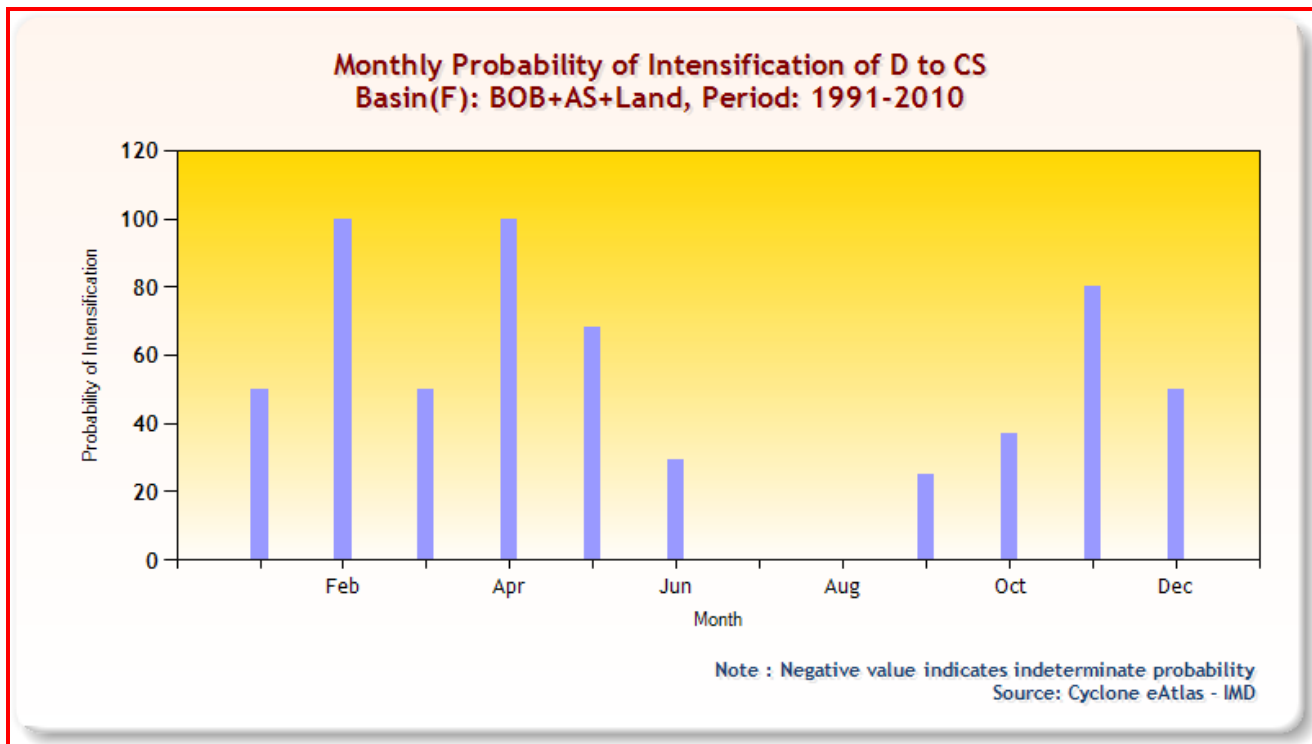
The OUTPUT will be displayed as shown under.



OUTPUT displaying statistics on Percentage Frequency will be as shown below:



OUTPUT for displaying statistics on Probability of Intensification will be as shown below:

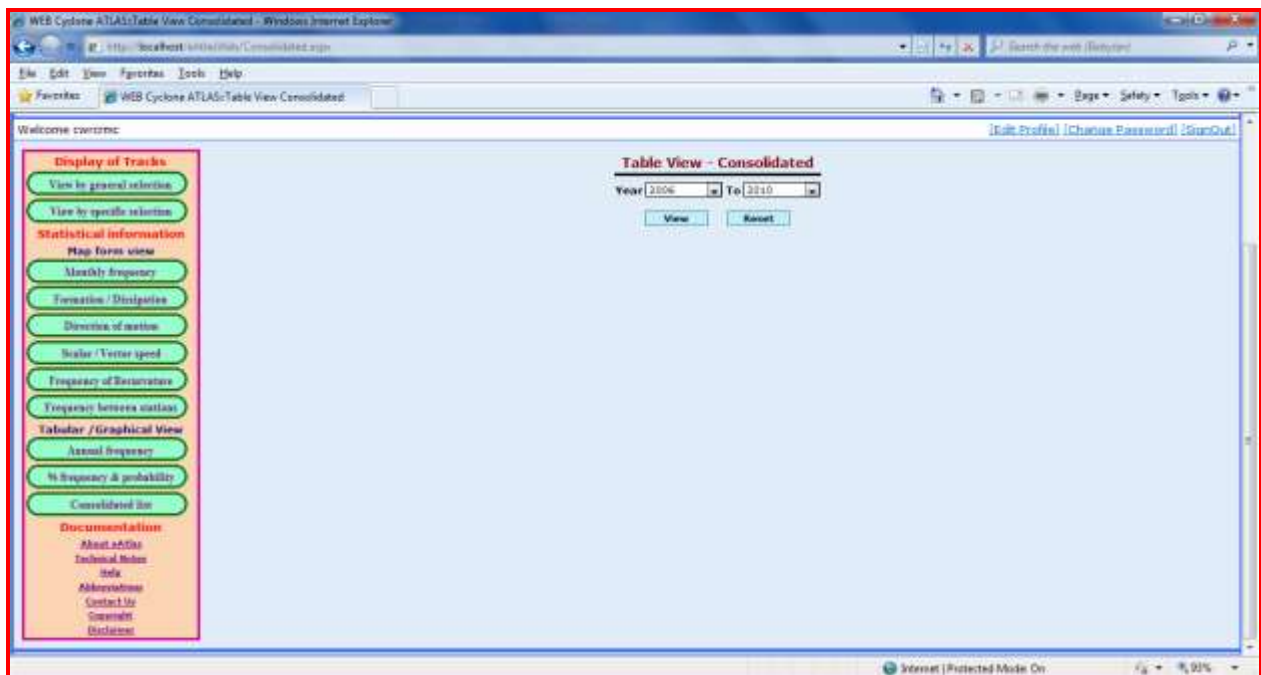


Copying, Saving and Printing the OUTPUT are possible on right clicking on the OUTPUT and using the Browser options.

Menu 11

Table View of Consolidated Listing of the C & Ds

Using this option, the user can see a list of all C&Ds for a given range of years in a Table format. The OUTPUT will be generated month-wise and will comprise of information on Maximum Intensity attained and Date and Position of formation for all the C&Ds formed during the given period.



OUTPUT will be displayed as shown below:

| List of Cyclones and Depressions | | | | | |
|---|------|---------------|--------------|---------------------------------------|-------|
| Period : 2006-2010 | | | | | |
| Month of January | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| 1 | 2006 | D | 13 | 05.02 | 79.00 |
| Month of February | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| No C&Ds | | | | | |
| Month of March | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| No C&Ds | | | | | |
| Month of April | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| 2 | 2006 | SCS | 25 | 09.54 | 91.42 |
| 3 | 2008 | SCS | 27 | 11.93 | 87.91 |
| 4 | 2010 | SCS | 04 | 07.25 | 92.50 |
| Month of May | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| 5 | 2007 | D | 03 | 13.00 | 92.60 |
| 6 | 2007 | CS | 13 | 14.07 | 90.60 |
| 7 | 2009 | D | 05 | 20.50 | 88.00 |
| Month of June | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| 8 | 2007 | SCS | 01 | 14.80 | 69.25 |
| 9 | 2007 | D | 21 | 15.26 | 86.76 |
| 10 | 2007 | CS | 25 | 22.96 | 68.01 |
| 11 | 2007 | D | 28 | 18.07 | 87.40 |

| 12 | 2008 | D | 05 | 14.61 | 65.97 |
|--------------------|------|---------------|--------------|---------------------------------------|-------|
| 13 | 2008 | D | 16 | 21.03 | 90.72 |
| Month of July | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| 14 | 2006 | D | 02 | 20.62 | 89.86 |
| 15 | 2007 | D | 04 | 21.50 | 89.50 |
| 16 | 2010 | D | 07 | 16.00 | 84.25 |
| 17 | 2010 | D | 07 | 13.50 | 82.50 |
| Month of August | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| 18 | 2006 | D | 02 | 20.60 | 88.57 |
| 19 | 2006 | D | 12 | 21.00 | 88.76 |
| 20 | 2006 | D | 16 | 20.53 | 89.06 |
| 21 | 2006 | D | 29 | 20.60 | 88.69 |
| 22 | 2007 | D | 05 | 20.00 | 89.80 |
| 23 | 2008 | D | 09 | 18.92 | 86.17 |
| Month of September | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| 24 | 2006 | D | 03 | 20.30 | 88.37 |
| 25 | 2006 | D | 21 | 22.60 | 87.45 |
| 26 | 2006 | SCS | 21 | 18.08 | 66.23 |
| 27 | 2006 | D | 28 | 17.67 | 89.62 |
| 28 | 2007 | D | 21 | 17.10 | 86.47 |
| 29 | 2008 | D | 15 | 18.92 | 89.43 |
| 30 | 2009 | CS | 09 | 11.00 | 72.00 |
| Month of October | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position Lat(°N) Lon(°E) | |
| 31 | 2006 | CS | 29 | 13.57 | 80.77 |
| 32 | 2007 | D | 27 | 11.57 | 86.73 |
| 33 | 2007 | D | 27 | 09.44 | 66.50 |
| 34 | 2008 | D | 19 | 08.53 | 60.71 |
| 35 | 2008 | CS | 25 | 15.02 | 86.17 |
| 36 | 2009 | CS | 10 | 06.50 | 85.00 |

| Month of November | | | | | |
|-------------------|------|---------------|--------------|--------------------|---------|
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position | |
| | | | | Lat(°N) | Lon(°E) |
| 37 | 2007 | SCS | 11 | 09.25 | 92.40 |
| 38 | 2008 | CS | 13 | 10.92 | 85.93 |
| 39 | 2008 | CS | 25 | 07.42 | 80.91 |
| Month of December | | | | | |
| Sl.No. | Year | Max Intensity | Initial Date | Beginning Position | |
| | | | | Lat(°N) | Lon(°E) |
| 40 | 2008 | D | 04 | 05.92 | 90.65 |

BOB:Bay of Bengal ; AS:Arabian Sea

D:Depression ; CS:Cyclonic Storm ; SCS:Severe Cyclonic Storm

Source : Cyclone eAtlas - IMD