Ocean Digest

Quarterly Newsletter of Ocean Society of India, Pune Chapter

Volume 1 | Issue 2 | August 2014 | ISSN 2394-1928

Contents

Foreword

Hello All,

We thank our readers for the immense response on the first issue of Ocean Digest—your encouragement and critical comments help us to move foreward! So here we are, with the second issue of Ocean Digest!

The current monsoon season rainfall is still on the negative side of the long-term mean. On the other hand, current tropical Pacific conditions indicate a weakening of the cooling in the central Pacific. More details are discussed in the *Spotlight* section of this issue, along with other regular features. The *Invited Article* and the *Review* ponder on the role of Indian Ocean on monsoon and climate variability over the Indian subcontinent and neighboring countries. As usual, we have a *History* article, and this time we get back into the bygone era when maritime navigation was the major means of transport. The *Student Article* in this issue talks about the aerosol distribution over the Indian Ocean. We have also brought you recent news and updates in the scientific arena. We hope you find them interesting!

Ocean Digest is a quarterly newsletter published by OSI Pune Chapter at the Indian Institute of Tropical Meteorology, Pashan, Pune-411008, India. Send correspondences about articles and subscriptions to oceandigest@tropmet.res.in.

Editor: Dr. Ashok Karumuri
URL: www.tropmet.res.in/oceandigest/

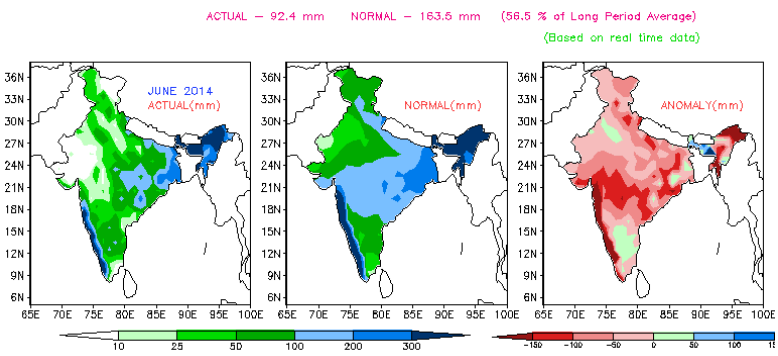


Fig. 1. The actual, normal, and anomalous rainfall during June 2014. *Source*: IMD

How the Monsoon fared so far...

Spotlight

Not surprisingly, the spotlight of the season is the ongoing Monsoon. Many regions around the nation received less than average rainfall during June-July. As per the IMD, the All India Summer Monsoon Rainfall (ISMR) fell short by 43.5% for the month of June (Fig. 1). The progression of the summer monsoon was rather sluggish, and this was also associated with anomalous incursion of northwest circulation from the extratropics (Fig. 2). The monsoon, however, seems to have picked up, and we saw a well-distribution rainfall condition around most of the country by end of July, contributed by a monsoon depression that crossed over to the land from the Bay of Bengal. As of 25 August, the cumulative deficit of the monsoon rainfall reduced to -18% of its long period average. The extended-range prediction from the IITM [http://www.tropmet.res.in/erpas/] issued on 19 August is that "Reduced monsoon activity is likely to continue over most parts of the country except south peninsula and north-east India. Conditions are likely to improve by the first week of September over Central India. Large scale monsoon intraseasonal activity shows a northward movement towards central India and will be active in the first week of September."

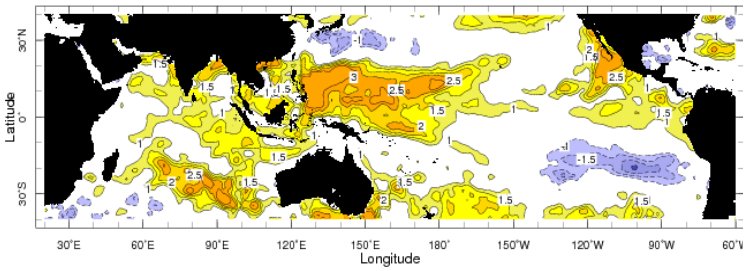


Fig. 2. June 2014 - sea surface temperature anomalies (deg C) *Source*: IRI Climate Data Library

Now, a bit of discussion about the deficit monsoon rainfall. Along with the severe deficit of about 43% of the normal rainfall in June 2014, the tropical Pacific witnessed a basinwide anomalously warm condition (Fig. 2). There is a debate whether such an SST pattern, associated with a weakened Southern Oscillation, can affect the monsoon. Interestingly, similar basinwide anomalously warm conditions were seen in 2009 from June through October, and associated with a deficit monsoon condition. An AGCM study reported that such SSTs favor a below-normal rainfall. However, as the 2009 event is only a solitary case, more events, and detailed studies are necessary to confirm or deny the association. Interestingly, the warming in the tropical Pacific seems to be abating, at least temporarily, which is good news. It is to be seen whether the Pacific warming will strengthen again.

- Ashok Karumuri *and* Milind Mujumdar, IITM

Role of oceans in monsoon variability

Invited Article

Prof. **P. V. Joseph**
Nansen Environmental Research Centre India

Summer monsoon rainfall is a precious natural resource for the countries of south Asia including India, but it is highly variable in space and time. India gets three fourths of its annual rainfall from its summer monsoon called also the south-west monsoon.

According to the India Meteorological Department, if the Indian Summer Monsoon Rainfall (ISMR) of the four monsoon months June to September is deficient by 10 % (about one standard deviation) of its long-term average, it is declared as a drought year. The adverse impact of a monsoon drought on agriculture, energy generation and the overall Indian economy is well known. Using a network of 306 climatological raingauge stations well distributed over India, a prominent decadal variability in ISMR has been documented in fig-1 which gives the anomaly of ISMR in units of standard deviation for the years 1871–2010 (data from the Indian Institute of Tropical Meteorology website www.tropmet.res.in). During the 3 decade long DRY epochs 1901–1930 and 1961–1990, India had monsoon droughts on average once in 3 years. In contrast during the WET epochs 1871–1900 and 1931–1960, the frequency of droughts had been once in 10–20 years only. Thus during the 120 years 1871–1990 we had regular 30-year epochs alternating between DRY and WET. Using the available network with a smaller number of raingauge stations it was found that

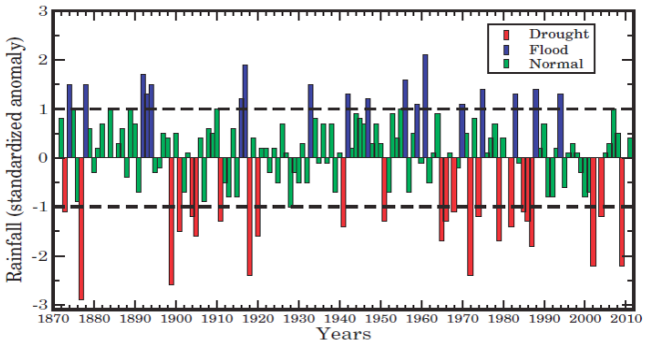


Fig. 1. Standardised anomaly of rainfall (ISMR) of the years 1871 to 2010 .

1841–1870 was a DRY epoch. Recent research has given indications that global oceans have a role in this variability. Extrapolating the epochal nature of monsoon into the future, the period 1991-2020 is expected to be a WET epoch (during the 23 year period of this epoch already over we had only 3 droughts – in 2002, 2004 and 2009) and 2021-2050 is feared to be a DRY epoch. There is therefore urgency to do research in ocean-atmosphere interaction to understand the mechanisms causing decades of frequent droughts in Indian monsoon rains.

ISMR has large inter-annual variability as may be seen from fig-1 particularly in the DRY epoch 1961-1990. Generally, a deficient monsoon year is followed by a normal or excess monsoon year, a sort of biennial oscillation. This phenomenon has been called the Tropospheric Biennial Oscillation (TBO) in which the Sea Surface Temperature (SST) of the tropical Indian and west Pacific oceans take part. The SST anomalies averaged for the September to November periods following the five severe Indian drought monsoons of 1965, 1972, 1979, 1982 and 1987 are shown in fig-2. Soon after a season of monsoon drought, the Indian ocean develops a warm SST anomaly and west Pacific ocean a cold SST anomaly and this anomaly pattern persists till the following monsoon which has normal or excess ISMR. This is very good for India and makes it different from Africa where monsoon droughts have occurred during 10–15 consecutive years leading to loss of life on a massive scale due non-availability of food. Thanks to the ocean, the food managers of India have to store food grains to meet the needs of one or at most two consecutive drought years only, which is being done. We have gained through research of the recent three decades, good insight into the mechanisms of TBO from observational and modelling studies of the ocean-atmosphere system

The birth of the Low Level Jetstream (LLJ), a low level fast flowing inter-hemispheric air current of the monsoon (see fig-3) which is a conduit carrying the moisture required for monsoon rains coincides with the time of monsoon onset over Kerala and LLJ exists every day during the following monsoon months, with major fluctuations in its strength and spatial location in the active–break cycle of the monsoon. Summer monsoon onset over Kerala (India) is found to be related to the time of transition across the equator of the raining cloud band associated with the Inter Tropical Convergence Zone (ITCZ) over the tropical oceans, from south of the equator to the north of it, which is related to the large-scale SST anomalies in the global oceans around the equator persisting during the previous six months as shown by observational and modelling studies. In the active–break cycle of the Asian summer monsoon, the ocean and the atmosphere are found to interact on the time scale of 30–60 days. Net heat flux at the ocean surface, monsoon LLJ and the seasonally persisting shallow mixed layer of the ocean

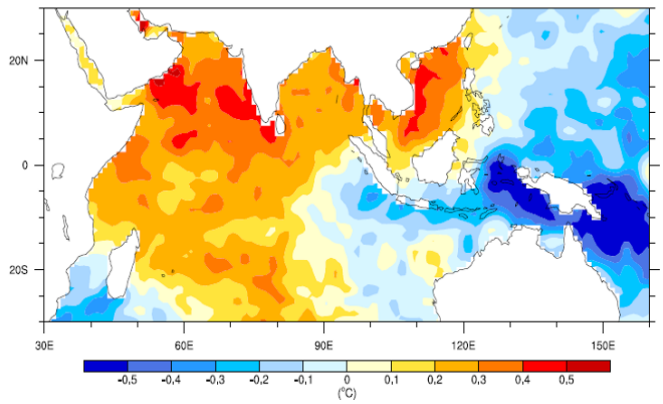


Fig. 2. Mean SST anomalies of Sept-Nov as composite of five severe drought monsoon years 1965, 1972, 1979, 1982 and 1987.

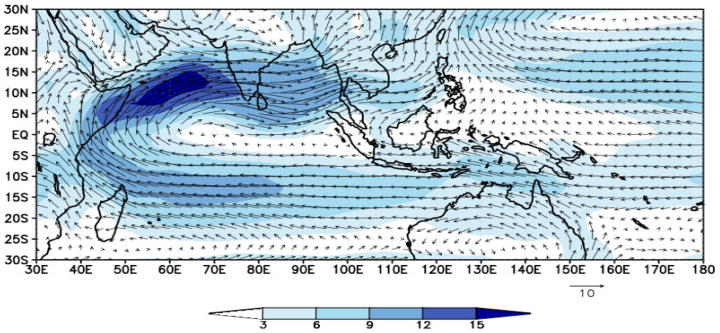


Fig. 3. Mean wind at 850 hPa (~1500 m above sea level) of July and August as average of 1950-2010 showing the core of the Low Level Jetstream. Magnitude of the wind is shown by the shading (1m/s = 3.6 Km/hour).

north of the LLJ axis are found to play important roles in this interaction. In an El Niño year, the LLJ extends eastwards towards the international date-line creating an area of shallow ocean mixed layer there, which is hypothesised to lengthen the active–break cycle typically from 1 month in a La Niña to 2 months in an El Niño year. Indian monsoon droughts are known to be associated with El Niños, and long break monsoon spells are found to be a major cause of monsoon droughts.

In the global warming scenario, the observed rapid warming of the equatorial Indian ocean SST is hypothesised to have caused the weakening trend of the monsoon LLJ and the observed decreasing trend in the seasonal number of monsoon depressions. Thus on all time-scales intra-seasonal, inter-annual, decadal and longer we find that monsoon variability is influenced by ocean – atmosphere interaction. We have now excellent arrangements to monitor the ocean and atmosphere routinely and fast computers to analyse the data and do observational and modelling studies. Young scientists who have chosen ocean and atmosphere as their work area may study ocean – atmosphere interaction in relation to monsoon through global data analysis, process studies and modelling.

This article is a summary of the invited lecture Prof. P.V. Joseph gave at the International Space Science Center at Berne in Switzerland during February 2012, and published by Springer in *Surveys in Geophysics*, Vol 35, No.9, May 2014, pages 724-739. doi:10.1007/s10712-013-9274-7.

Future Climate of Indian Ocean Rim Countries

Review

Extreme Indian Ocean Dipole events

In the last issue of Ocean Digest, we had reviewed the latest research on global warming and its implications on the frequency and magnitude of of El Niño events in a changing climate. In the current review we focus on the Indian Ocean Dipole (IOD), a dominant ocean-atmosphere coupled mode of climate variability in Indian Ocean. A positive IOD period is characterised by cooler than normal water in the tropical eastern Indian Ocean and warmer than normal water in the tropical western Indian Ocean. IOD affects the strength and variability of the monsoon and associated rainfall over the Indian Ocean rim countries. For example, a positive IOD event may enhance the rainfall over the regions west of the Indian Ocean, and at the same time supress the rain towards its east.

While the frequency of extreme El Niño events are increasing, recent studies regarding Indian Ocean dipole have reported that overall frequency and amplitude of positive Indian Ocean Dipole events (pIOD) are not changing in the warming environment. However, the latest study by Cai et al. (2014) finds that extreme positive IOD events increased from one event in every 17.3 years over the 20th century to one in every 6.3 years over the 21st century.

The change in perception comes from their proposition that extreme cases of positive IOD events are a combination of first two dominant modes of the Indian Ocean Climate variability. The nonlinear interaction between these two modes determines the extreme and moderate cases of positive IOD. They used historical and future simulations under the Coupled Model Intercomparison Project phase 5 (CMIP5) to arrive at this conclusion.

The traditional IOD events are identified on the basis of "the difference in SST anomalies between the western (50-70E and 10S-10N) and eastern (90-110E and 10-0S) parts of Indian Ocean" (Saji et al. 1999). Since this definition may not be sufficient to distinguish the extreme IOD events from the moderate IOD events, Cai et al. (2014b) propose a new identification method for extreme positive IOD based on a space-time analysis (emperical orthogonal function,

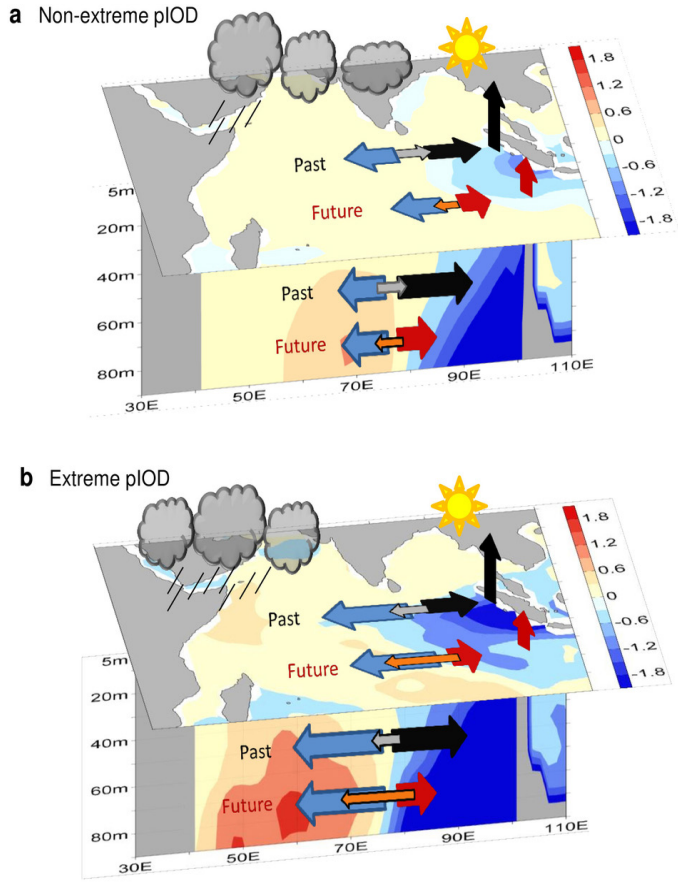


Fig. 1. Schematic of extreme positive Indian Ocean Dipole (pIOD) event in response to greenhouse warming. *Source*: Nature Publishing Group

EOF) of rainfall anomaly and the vertical velocity at middle-troposphere (500 hPa) in the equatorial Indian Ocean (40-100E, 10S-10N). An extreme positive IOD, in their analysis, is defined as those events in which the representative time series of first EOF mode is greater than 1 standard deviation and that of the second mode is greater than 0.5 standard deviation. Events which are satisfied by the first mode alone are the moderate pIOD events.

So what are the implications for the dynamics over the Indian Ocean? Usually, the mean westerly equatorial wind over Indian Ocean drives eastward upper ocean currents, transporting warm water eastwards. In case of moderate positive IOD events, the anomalous conditions cause weakening of the mean flow, whereas for the extreme events there is reversal of mean winds and ocean current over the equatorial Indian Ocean as the ones in 1961, 1994 and 1997 (Fig. 1).

Extreme Wet and Dry spells of the Monsoon

Recently, the south Asian monsoon regime went through climatic extremes like the severe flash floods in Mumbai (year 2005), Pakistan (2010) and northern India (2013) and prolonged dry spell during 2002 northern summer, with 50% rainfall deficit over different regions, altering agricultural productivity.

Using 60 years of IMD rainfall dataset Deepti Singh et al. (2014) found a significant decreasing trend in the July-August mean rainfall over the monsoon core, while in contrast they observe an increasing trend in the variability of the rainfall intensity. The probability density peak is reduced in 1981-2011, when compared with 1951-1980 while the frequency of light rainfall as well as heavy rainfall has increased during the same period. From 1951 to 1980 the frequency of wet spell have increased (statistically not significant) and then again decreased, consistent with the decrease in number of monsoon depressions. Though mean duration of the wet spells have not changed significantly, the intensity of wet spells increased significantly. The duration and cumulative length of extreme dry spells are having an increasing trend while their average values are not significantly different.

Altogether Singh et al. (2014) reveals that there is a change in the characteristics of subseasonal monsoon activity by which the wet spells become more intense and dry spells become frequent but less intense. They have argued that the global warming induced enhancement in the moisture availability can enhance moisture convergence and increase the available potential energy for cloud/convective activity, which are responsible for the above changes.

Meanwhile, with the help of sensitive experiments using coupled models, Sabeerali et al (2014) argue that the pronounced Indian Ocean warming is responsible for the increase in the monsoon subseasonal variance and the slowdown of its northward propagation. They examined the northward propagating Monsoon Intra-Seasonal Oscillation (MISO) and observed that its variance has increased and the northward propagation have slowdown in recent decade (2001-2010) as compared to earlier (1979-1988).

References:
1. Cai et al., 2014, Increased frequency of extreme Indian Ocean Dipole event due to greenhouse warming; *Nature Geoscience*, 510, 254-258.
2. Singh, Deepti et al. 2014, Observed changes in extreme wet and dry spells during the South Asian summer monsoon season. *Nature Climate Change*, 4.
3. Sabeerali, C.T. et al. 2014, Modulation of monsoon intraseasonal oscillations in the recent warming period. *J. Geophysical Res.: Atmospheres*, 119(9), 5185–5203.

Review Article compiled by Gibies George; *edited by* Bhupendra Bahadur Singh *and* Roxy Mathew Koll, IITM

The Suez Canal

History

The Suez Canal is a manmade canal connecting the Mediterranean Sea to the Red Sea through the Gulf of Suez and it is todays one of the strategic maritime passages. The modern form of this canal that functions today opened in 1869, and remains one of the planet's busiest shipping lanes since then. Through it the vast percentage of Europe's energy needs are transported from the Middle East oil fields. Around 2.4 million barrels of oil are shipped through the canal each day while the pipeline parallel to the canal carries another 2.5 million a day representing for around 5.5% of world oil output. Without this canal the European ships en route to south Asia has to travel all the way circumnavigating African continent. The strategic point of the Suez Canal thus saves over 5000 km distance for ships carrying oil from Middle East to the United States and Europe.

History of Suez Canal dates back to the BC. The first canal between the Nile River delta and the Red Sea was excavated about the 13th century BC. Its purpose was to expand trade between the Mediterranean and the Middle East, which became significant by 100 AD. During the next 1,000 years, the canal was neglected, but at different times Egyptian and Roman rulers modified it. Restoration efforts were abandoned in the 8th century AD as the Roman Empire collapsed and Mediterranean trade dropped. This situation endured until the nineteen century when powerful maritime interests saw the need to make a Mediterranean - Red Sea

connection a reality again.

In 1854, Ferdinand de Lesseps, the former French consul to Cairo (capital of Egypt), secured an agreement with the Ottoman governor of Egypt to build a canal 100 miles across the Isthmus of Suez. An international team of engineers drew up a construction plan and in 1856 the Suez Canal Company was formed and granted the right to operate the canal for 99 years after completion of the work.

Construction began in April 1859, and at first digging was done by hand with picks and shovels wielded by forced labourers. Later, European workers with dredgers and steam shovels arrived. Labour disputes and a cholera epidemic slowed construction. On November 17, 1869, the Suez Canal was opened to navigation.

When the canal was built it was 164 km long, 8 m deep accommodating a ship of 22 feet draft size (under water hull depth of ship). As the ships developed and increased its sizes, the canal needed to be developed. As of 2010 the canal is 210 km long, 80 m deep and gigantic ship of 66 feet draft can be navigated through this canal, however Suez canal is too

narrow for free two-way traffic and still limits to contain ships with bigger sizes than its potential limit.

The canal has no locks because of the flat terrain (a lock is a device for raising and lowering boats between stretches of water of different levels on canal waterways). The minor sea level difference between each end (Red sea in the east and Mediterranean in the west) is inconsequential for shipping.

The canal has the capacity to accommodate up to 25,000 ships per year (about 78 per day), but handles about 20,000, on average 55 ships per day, which roughly account for 15% of the global maritime trade. Since the canal can only handle unidirectional traffic, crossings must be organized into convoys of about 10 to 15 ships. Three convoys per day, two southbound and one northbound, are organized. The transit time is about 10 hours northbound and 12 hours southbound. Missing a convoy involves supplementary delays to the point that many maritime shipping companies (particularly for containers) will skip a port call to insure that their ships arrive on time at the Suez Canal to be part of a specific convoy. A rail line also runs parallel to the canal.

Oceanographic studies show that as the canal has no sea surge gates, the entrance/exit ports are subject to the sudden impact of tsunamis from the Mediterranean Sea and Red Sea. The opening of the canal created the first salt-water passage between the Mediterranean and the Red Sea. Although the Red Sea is about 1.2 m higher than the eastern Mediterranean the current between the Mediterranean and the middle of the canal at the Bitter Lakes flows north in winter and south in summer. The current varying with the tide at the Bitter Lakes, which were hyper-saline natural lakes, blocked the migration of Red Sea species into the Mediterranean for many decades, but as the salinity of the lakes gradually equalised with that of the Red Sea the barrier to migration was removed, and plants and animals from the Red Sea have begun to colonise the eastern Mediterranean. The Red Sea is generally saltier and more nutrient-poor than the Atlantic, so the Red Sea species have advantages over Atlantic species in the salty and nutrient-poor eastern Mediterranean. Accordingly, most Red Sea species invade the Mediterranean biota, and only few do the opposite. This migratory phenomenon is called Lessepsian migration (after Ferdinand de Lesseps) or "Erythrean invasion".

References:
1. Flint, et al., 2012, Journal of Coastal Research, 28, 4, 745-759.
2. http://en.wikipedia.org/wiki/Suez_Canal#Timeline
3. http://www.suezcanal.gov.eg/
4. http://www.history.com
5. http://www.worldatlas.com

History Article compiled by
Vinu Valsala *and* Chaitri Roy, IITM

Source and compositional variability of aerosols over the Indian and Southern Ocean during austral summer

Student Article

Roseline C Thakur
NCAOR, Goa

Marine aerosol is a major component of the global atmospheric aerosol and is the main route of transferring marine species onto land and terrestrial species to the oceans (Duce et al., 1991). Therefore, an understanding of the composition and source of marine aerosols are important to evaluate the relative impact of anthropogenic and biogenic processes on the global biogeosphere and climate.

In order to study the composition and distribution of marine aerosols over the Indian and Southern Ocean, sampling of marine aerosols was carried out during the austral summer of 2010 using an 8-staged non viable Impactor onboard ORV Sagar Nidhi between 7°N to 65°S. The entire sampling track included three broad oceanic regions: Northern Indian Ocean- 7˚N to Equator (NIO), Southern Indian Ocean - 1˚S to 59˚S (SIO) and Southern Ocean - 60˚S to 65˚S (SO) (Fig.1). A total of 10 sets of 24 hourly aerosol samples (sampling stations

S1-S10) were collected for the compositional and size analysis of aerosols. Each set comprised of 8 glass fiber filters (81mm diameter) for collecting coarse mode (10µm-2.5 µm) and fine mode (<2.5µm) aerosols. A Dionex ICS-2500 reagent-free ion chromatography (RF-IC) system placed in a clean room was used for the major ion analysis.

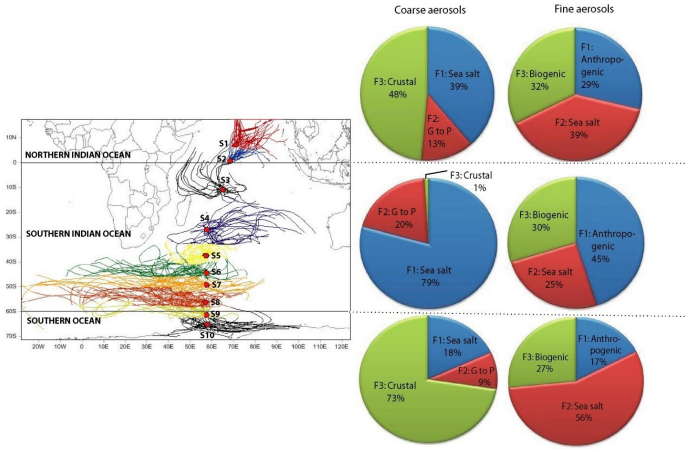


Fig. 1. Sampling Locations and Air mass back trajectories with percentage contributions of different types (source and size) of aerosols over the three oceanic regions. (Note: G to P is gas to particle conversion).

Study of air mass trajectory (Fig. 1) using HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) model revealed that the sampling sites in SO (S9 and S10) are influenced from two different air masses: the inland winds, blowing from the Antarctic land mass and the south westerly marine air mass. In order to study the origin of these aerosols and the components dominating in it, principle component analysis was undertaken. The Southern Indian Ocean (10°S to 59°S) had the highest loading of anthropogenic and sea salt aerosols, which lead to the formation of secondary aerosols through gas to particle transformations. The rocky Antarctic coastline, acts as a source of coarse crustal aerosols over SO (60°S to 65°S). The factor analysis also reveals that F–, Cl–, NO3– and nssSO42– were the primary anthropogenic species which were present in the fine aerosols over the SIO region. There was an increase in the concentration of super-micron particles from 7°N to 65°S. Such a systematic increase in concentration towards the southern latitudes can be attributed to the increasing humidity, sea fog and low pressure conditions towards the Southern Ocean.

The variations among the methanesulphonic acid (MSA, a biogenic source proxy) and non- sea-salt sulphate (nssSO42–, a biogenic and/ or anthropogenic source proxy) concentrations along the transect were not correlated, indicating that anthropogenic input is influencing the SO42– concentrations. The Net Primary productivity (NPP) calculated from the MODIS data for the study period (Fig. 2) revealed a positive correlation with NH4+ concentration in the regions of SIO and SO with its highest concentration (0.05µM/m3) at 42-44°S, coinciding with the Subtropical Front (STF) in our study region. Our study also revealed a significant Cl– depletion in the aerosols and the degree of Cl– deficit was size-dependent, increasing with decreasing particle sizes. The neutralization ratios suggested differential behavior of ions with respect to the prevailing meteorological conditions. The coarse mode aerosols were neutralized by ammonia leading to the formation of NH4NO3 particles. The fine modes were predominately composed of NH4HSO4 and its formation is favored by the high humidity and foggy conditions over the study area.

The present study provides spatially distributed data of ionic chemistry over this poorly studied oceanic sector and also merits additional investigation to characterize physico-chemical properties of marine aerosols in this region.

Acknowledgements. *This work was carried out as part of 4th Southern ocean expedition. The support of Dr. Thamban Meloth and Director NCAOR is highly acknowledged.*

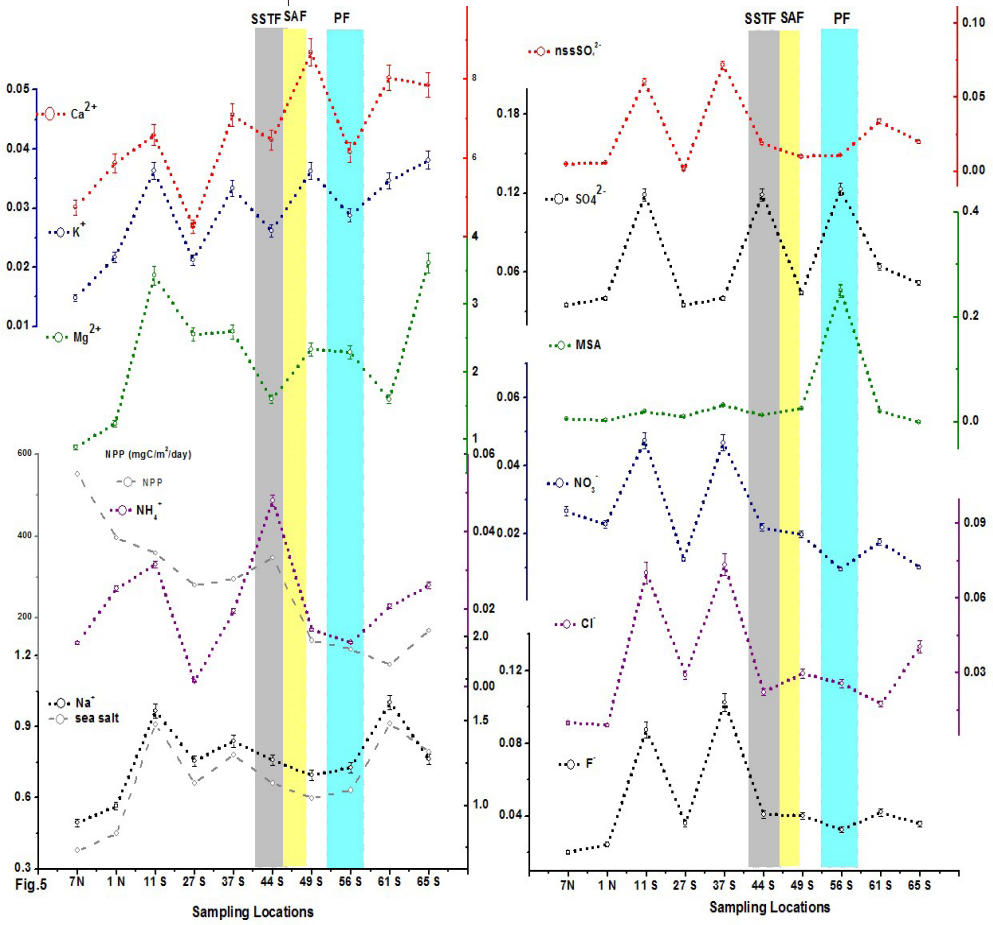


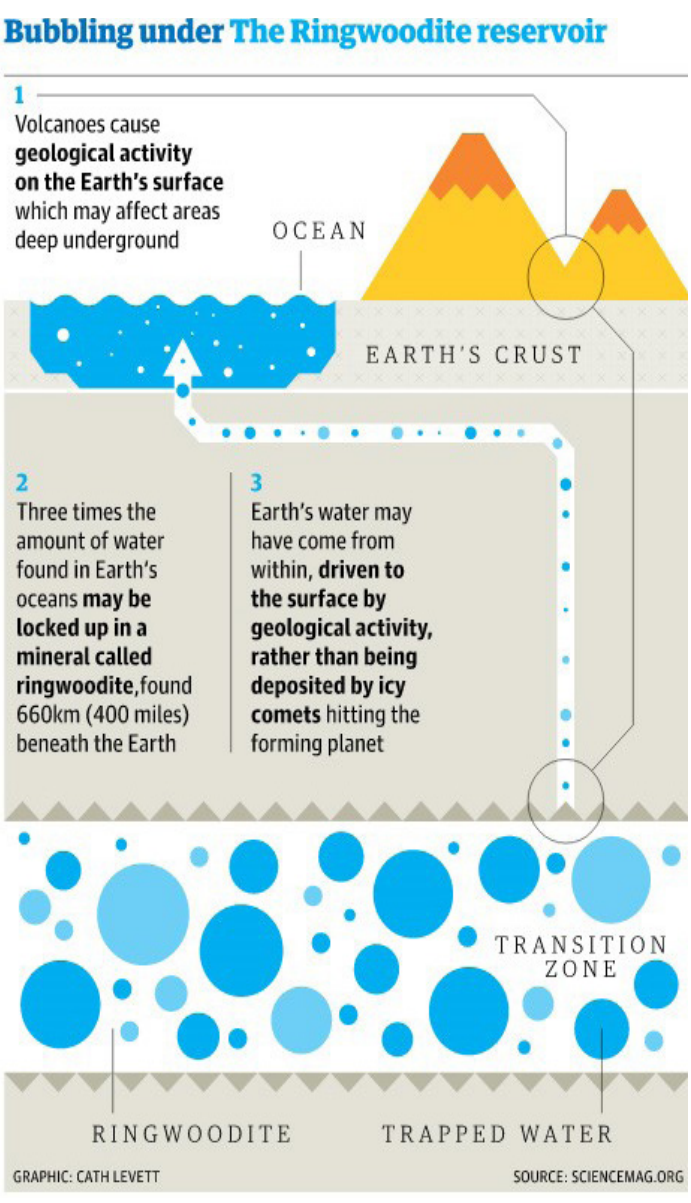
Fig. 2. Average concentrations of Cations and Anions over different latitudes along the cruise track. The error bars show standard deviation. Note the dotted lines show the boundaries of oceans in the study transect.
SSTF: Southern Subtropical Front, SAF: Su Antarctic Front, PF: Polar Front.

News and Views

Recent Updates

Massive Ocean discovered towards earth's core

The most vital element for the existence of life on our 'Blue Planet' is Water. The most recent discovery by the geologists, a massive reservoir of water deep beneath the Earth's surface, is extremely exciting. The water is concealed within a blue rock called 'Ringwoodite' lying 700 kilometres underground in the mantle, the layer of hot rock between Earth's surface and its core. At such depths, water is forced to split into a



hydroxyl radical (OH) because of extremely high pressure and temperatures. This OH radical then combines with minerals on a molecular level. This finding suggests that Earth's surface water essentially came from within, as part of a 'whole-Earth water cycle', hence seems to discard the prevailing theory that our surface water arrived on Earth via a bunch of icy comets. (Ref: Schmandt, B.1, Jacobsen, S. D., Becker, T. W., Liu, Z., Dueker, K. G. Dehydration melting at the top of the lower mantle, Science 13, 2014, vol 344 no 6189 pp, 1265-1268)

Read more: http://www.newscientist.com/article/dn25723-massive-ocean-discovered-towards-earths-core.html#.U6FdZ7En_88.

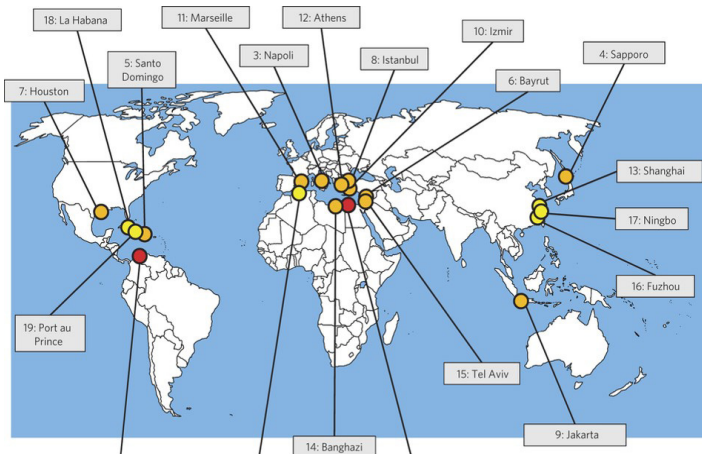
The coming flood: Explore the future's rising seas

Sea level is rising at an accelerating rate, global warming being the primary cause. Records and research shows a steady rise in sea level, its rate being 0.04 to 0.1 inches per year since 1900. This rate may be further increasing. Interestingly, satellite altimetry indicates that since 1992, the rate of rise has been 0.12 inches per year. This is a considerably larger rate than the sea-level rise averaged over the last few thousand years.

Read more: http://oceanservice.noaa.gov/facts/sealevel.html and http://www.ucsusa.org/global_warming/science_and_impacts/impacts/causes-of-sea-level-rise.html

The warming world

A vast majority of climate scientists agree that global warming is happening, human activity being its primary cause. The atmosphere is overloaded with carbon dioxide, which is mainly anthropogenic. Carbon dioxide traps heat and steadily drives up the planet's temperature. Since the late 1800's, the average surface temperature has increased more than one degree Fahrenheit. The past three decades contributes the maximum to this increase.



These 20 cities have to lose the most if there is a sea level rise. The map above is assuming a relatively mild sea-level rise (7.9 inches by mid-century) and a steady investment in flood-control technology.

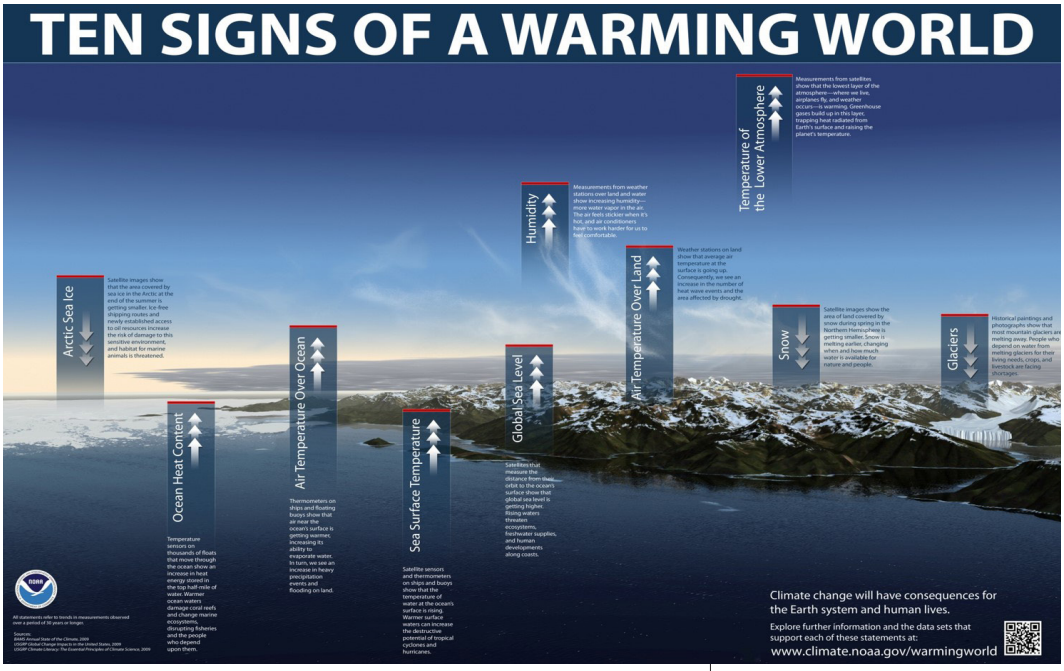
To know what has been happening at the exact location of our place of stay, visit http://warmingworld.newscientistapps.com/

A planet that is home to some 7 billion people is already on the edge—and unchecked warming could help push us over. It is time to reduce our carbon emissions to curb pace of global warming, and pass on a safer and recovered world to our children.

Read more: http://www.timeforkids.com/news/warming-world/155151 and http://www.ucsusa.org/global_warming/

Indian scientist elected to UN entity on ocean affairs

Indian scientist Rasik Ravindra has been unanimously elected as member of the UN's body focussed on oceans and law of the sea. Mr Ravindra, member of the Commission on the Limits of Continental Shelf (CLCS), was elected during the 24th



Meeting of States Parties of the United Nations Convention on the Law of the Sea. Ravindra is one of India's highly qualified scientists and has extensive experience in different spheres of geosciences. He has served as Director of National Centre for Antarctic and Ocean Research (NCAOR) from 2006-2012 and has been a professional geologist with the Geological Survey of India from 1971 to 2005. A graduate of the Jammu and Kashmir University, he has also won several prestigious awards including the National Award for Polar Sciences and Cryosphere in 2013 and National Mineral Award 1990.

Read more: http://www.ndtv.com/article/diaspora/indian-scientist-elected-to-un-entity-on-ocean-affairs-540799

Hurricane season begins! NASA reveals oceans are approaching peak temperature to trigger severe winds

The 2014 hurricane season begins. Arthur, the name of the first storm of the year is now churning off the coast of eastern Florida. A sweltering summer is forecasted as the El Nino weather phenomenon is likely to return. This could also result in fewer hurricanes. For the development and intensification of hurricanes and cyclones, sea surface temperatures (SSTs) should reach a minimum of 27.8°C. The scientists also warned that it takes only one storm to wreck havoc and urged Americans to be prepared.

Read more: http://www.dailymail.co.uk/sciencetech/article-2649959/Hurricane-season-coming-Nasa-reveals-oceans-warming-summer-weather-patterns-begin.html and http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/hurr/enso.rxml

Compiled by Chaitri Roy, Anant Parekh and Jasti Chowdary

Conferences

Upcoming Events

- World Weather Open Science Conference which will be held from 16th to 21st August in Montreal, Canada.

Opportunities

Job/Fellowship

- Outline proposals are invited for FCFA Regional Consortium Grants 2014. This interdisciplinary call aims to advance scientific understanding and prediction of African climate variability and change to inform medium-term adaptation decisions and develop knowledge, tools and methods to better integrate this science into decision making today. Further details available at: http://www.nerc.ac.uk/research/funded/programmes/fcfa/news/ao-regional/

- Full proposals are invited for FCFA – Global Climate Model Development for Africa Project 2014. This call, aims to deliver a step-change in the performance of Global Circulation Models for Africa and to make a long-term contribution to model development with an African lens. Further details available at: http://www.nerc.ac.uk/research/funded/programmes/fcfa/news/ao-global/

- Postdoctoral Position in Climate Model Evaluation using Multi-Sensor Satellite Observations and Numerical Models @ The California Institute of Technology, Jet Propulsion Laboratory.

- The APEC Climate Center (APCC), located in Busan, Korea is looking for motivated expert. a. Program Management b. Networking and communications with APEC and international stakeholders c. Public relations - Design and manage content for the APCC website- Oversee APCC's online strategy, including through the website & new media- Manage and build APCC's relationship with journalists and media. http://www.apcc21.org/eng/notice/opp/japcc0503_lst.jsp

- Project Scientist/Postdoctoral Researchers to be engaged in research and development as part of the project entitled "Prediction of newly found climate phenomena and its societal application" at JAMSTEC.