World Ocean Day-2023

"Planet Ocean: Tides are Changing"

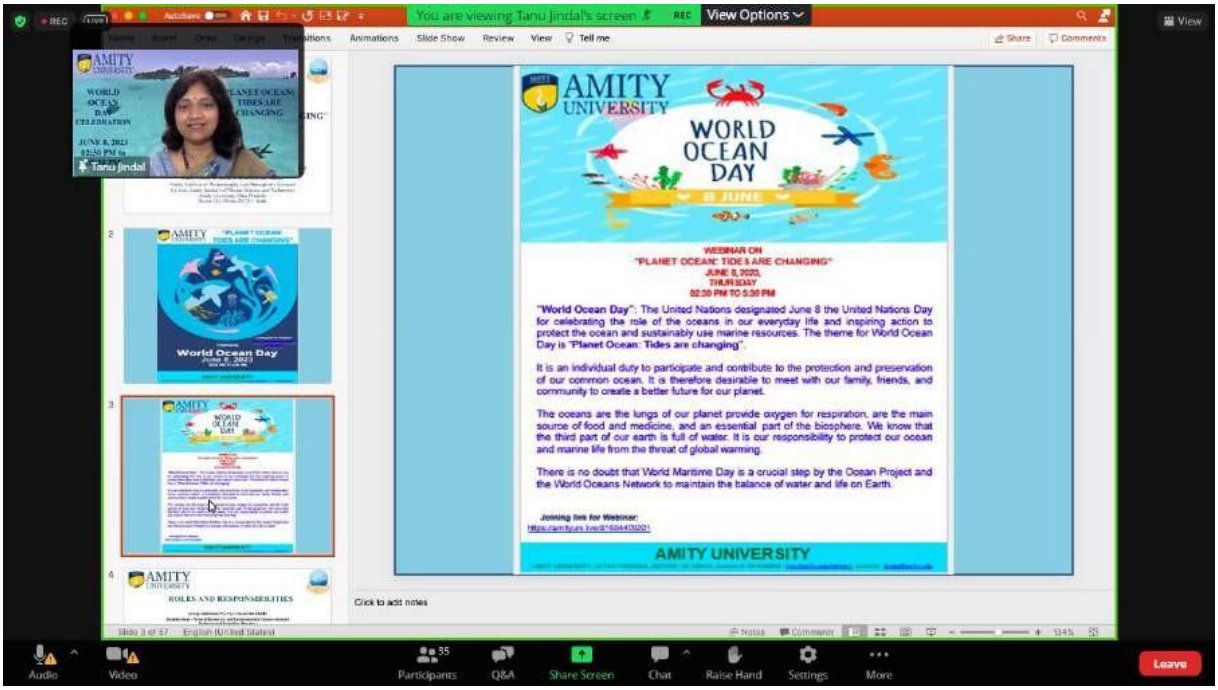
Date & Time: 8th June, 02:30 pm-5:30 pm

Start Time: 02:30 pm
End Time: 5:30 pm

Introduction to the theme by Prof. Tanu Jindal

- Prof. (Dr.) Tanu Jindal, Director of Amity Institute of Environmental Toxicology, Safety, and Management (AIETSM), Amity University, Noida (India). She welcomed the dignitaries and introduced this year's theme for World Ocean Day, PlanetOcean: Tides are Changing. She gave a welcoming speech highlighting the theme. She talked about Amity Science Technology and Innovation Foundation. The focus of thefoundation is to provide a multi-dimensional thrust on research & development. Earth environment & climate cluster is a very important cluster for global warming andclimate change. She discussed various programs associated with different institutes. She highlighted her projects, patents and books. She discussed the Amity Institute of Oceanography & Atmospheric Sciences (AIOAS). Amity Institute of Environmental Toxicology, Safety and Management (AIETSM) had participated in the 10th Indian Southern Ocean Expedition (SOE). She discussed different instruments which were used in the sampling of ocean water likeCTD. UCTD, MPN, Micro profiler, FRRF, etc. She showed the laboratory setup on the Ship. She focused on the results of the different water samples which were collected during the 10thSOE. High reliance on plastics since 1950 and increased global production of plastic by 9 %. Sources of marine litter, the environmental and source economic impacts, human behaviorand cultural drives, and tools to assess innovative sector-relevant solutions. Lack of affordable and sustainable alternatives available to consumers, shift away fromsingle-use plastic products, and

technology for recycling and reusing litter. Save Ocean and Save Life was the punch line.

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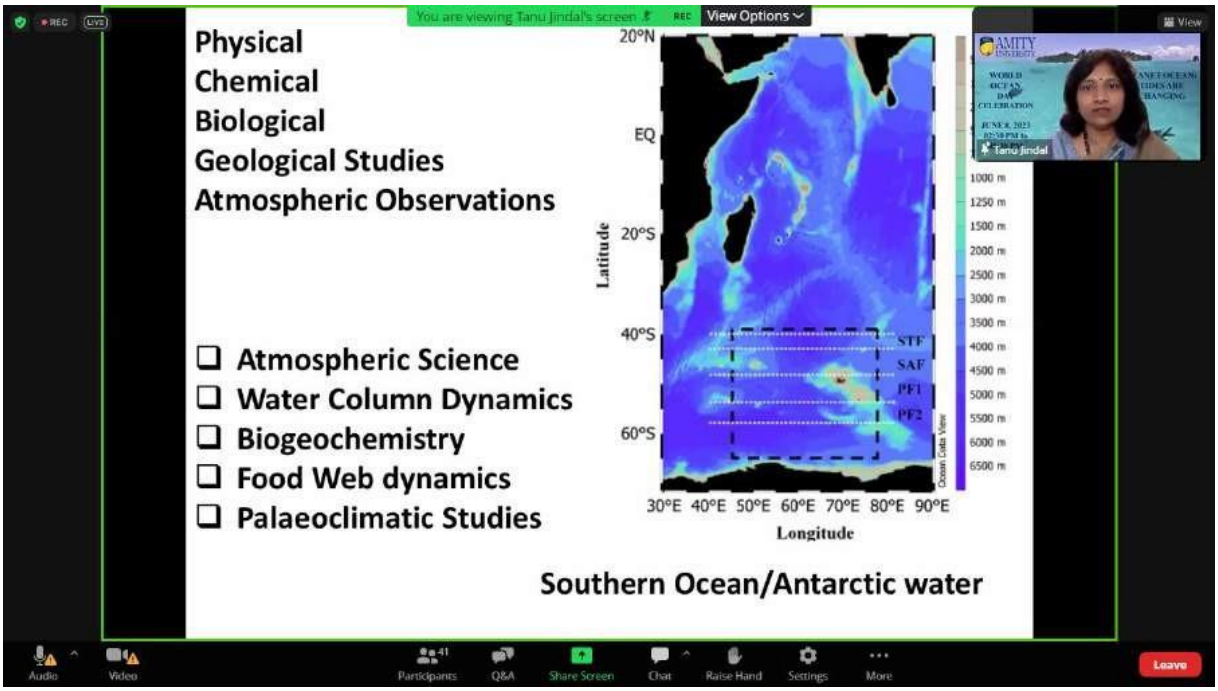
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Physical
Chemical
Biological
Geological Studies
Atmospheric Observations
Atmospheric Science
Water Column Dynamics
Biogeochemistry
Food Web dynamics
Palaeoclimatic Studies
20°N
EQ
20°S
40°S
60°S
Latitude
30°E 40°E 50°E 60°E 70°E 80°E 90°E
Longitude
STF
SAF
PF1
PF2
Ocean Data View
Southern Ocean/Antarctic water
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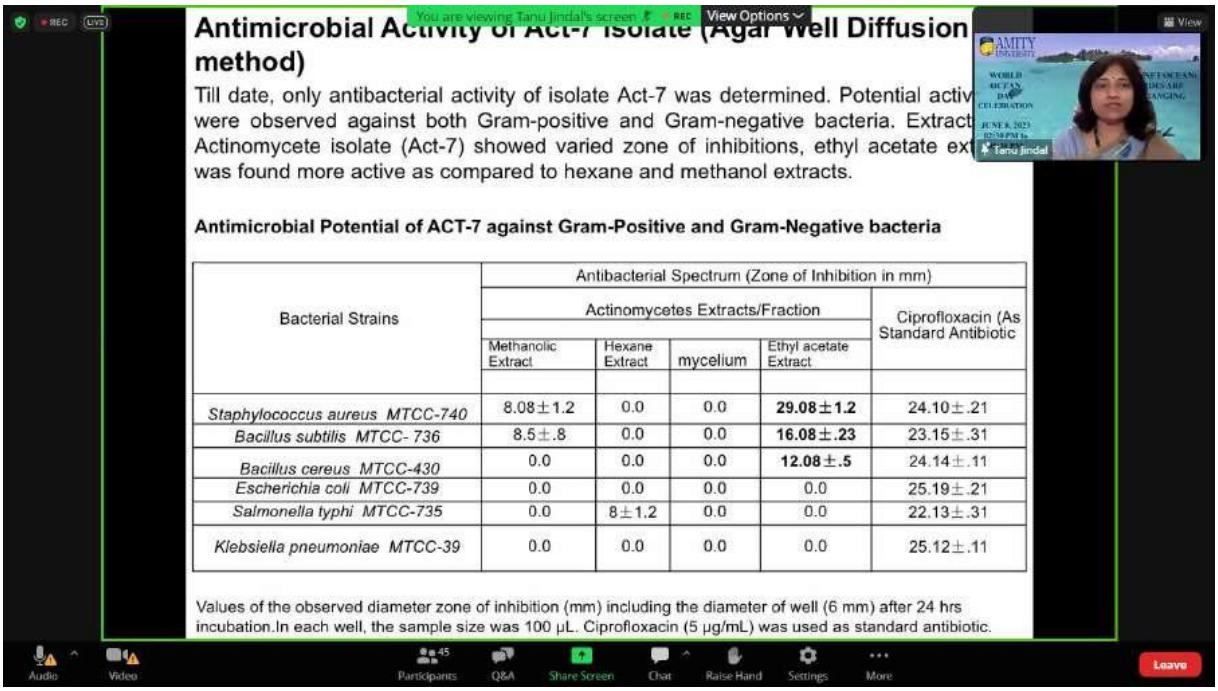
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Antimicrobial Activity of Act-7 Isolate (Agar Well Diffusion method)
Till date, only antibacterial activity of isolate Act-7 was determined. Potential activ
were observed against both Gram-positive and Gram-negative bacteria. Extract
Actinomycete isolate (Act-7) showed varied zone of inhibitions, ethyl acetate ex
was found more active as compared to hexane and methanol extracts.
Antimicrobial Potential of ACT-7 against Gram-Positive and Gram-Negative bacteria
Bacterial Strains
Antibacterial Spectrum (Zone of Inhibition in mm)
Actinomycetes Extracts/Fraction
Ciprofloxacin (As Standard Antibiotic
Methanolic Extract
Hexane Extract
mycelium
Ethyl acetate Extract
Staphylococcus aureus MTCC-740 8.08±1.2 0.0 0.0 29.08±1.2 24.10±.21
Bacillus subtilis MTCC- 736 8.5±.8 0.0 0.0 16.08±.23 23.15±.31
Bacillus cereus MTCC-430 0.0 0.0 0.0 12.08±.5 24.14±.11
Escherichia coli MTCC-739 0.0 0.0 0.0 0.0 25.19±.21
Salmonella typhi MTCC-735 0.0 8±1.2 0.0 0.0 22.13±.31
Klebsiella pneumoniae MTCC-39 0.0 0.0 0.0 0.0 25.12±.11
Values of the observed diameter zone of inhibition (mm) including the diameter of well (6 mm) after 24 hrs incubation.In each well, the sample size was 100 µL. Ciprofloxacin (5 µg/mL) was used as standard antibiotic.
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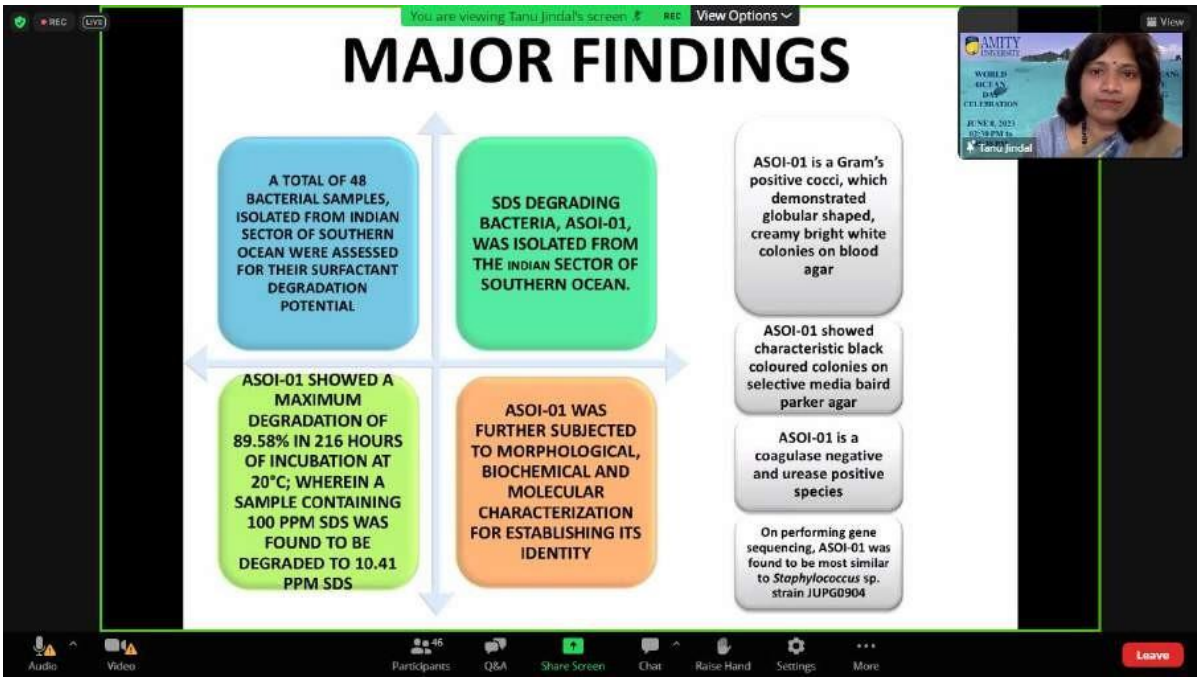
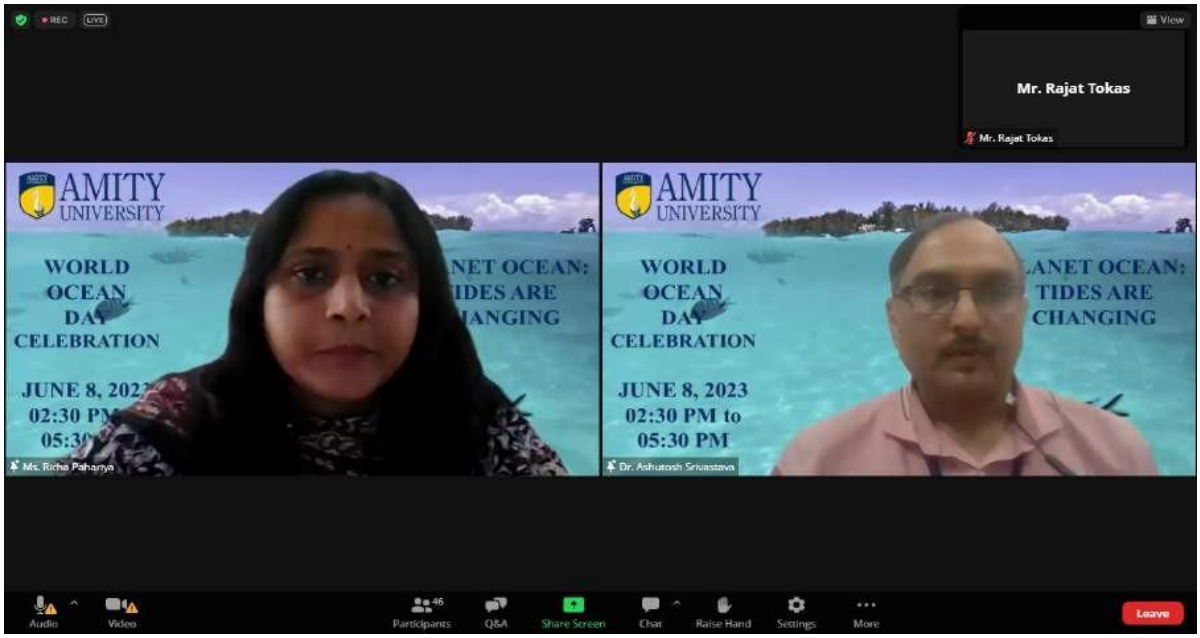


Address by Dr. Ashutosh Srivastava

- An inspirational message was addressed by Dr. Ashutosh Srivastava, Center Head of the Centre of Marine Science and Technology, Amity Institute of Biotechnology, Amity University, Noida. He thanked Prof. Tanu Jindal for the invitation. He addressed the theme for World Ocean Day, Planet Ocean: Tides are Changing.



Address by Dr. D.K. Bandyopadhyay

- An inspirational message was addressed by Dr. D.K Bandyopadhyay, Chief Advisor FPO, and Chairman, Amity Law School, Amity University, Noida. He welcomed the dignitaries and addressed this year's theme for World Ocean Day, PlanetOcean: Tides are Changing. The temperature of the polar regions is increasing. He appreciated AIETSM Team for organizing this event. He thanked Prof. Tanu Jindal for the invitation.

Presentations were given by-

1. **Dr. Satheesh C. Shenoi,** Former Director, Indian National Centre for Ocean Information Services (INCOIS)

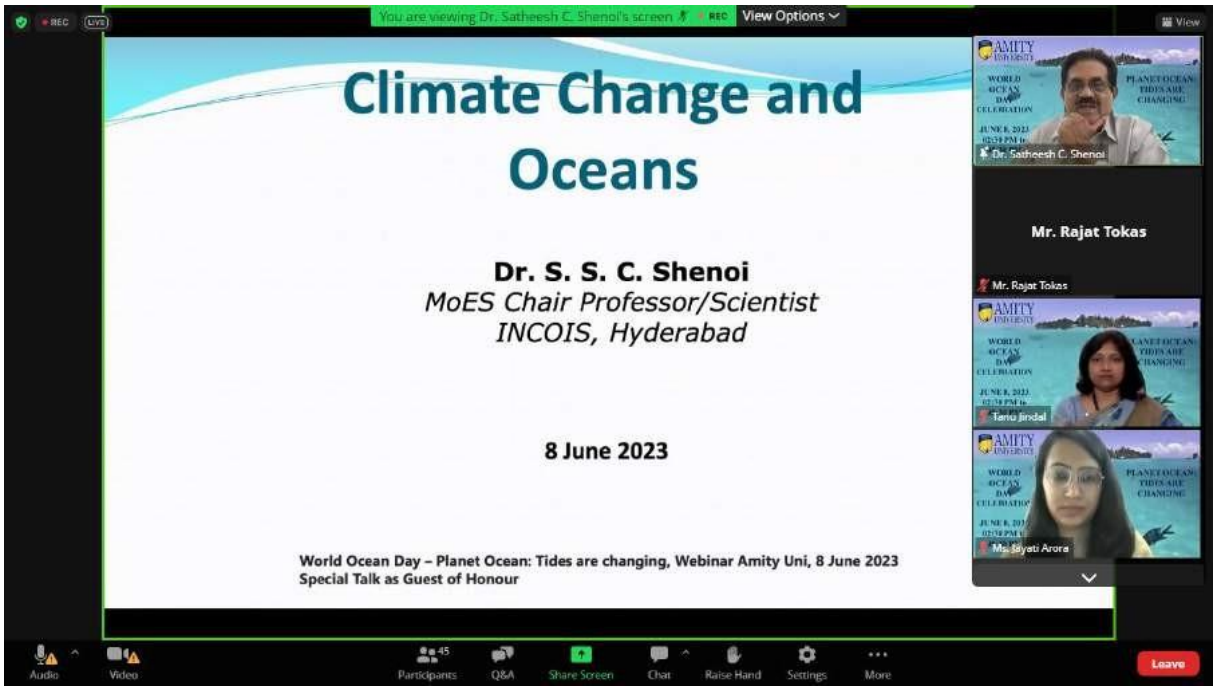
2. **Prof. Sunil Kumar Singh,** Director National Institute of Oceanography (NIO)

3. **Dr. Anil Kumar N,** Scientist G, National Centre for Polar and Ocean Research (NCPOR)
4. **Dr. Narsinh Thakur,** Senior Principal Scientist, National Institute of Oceanography
5. **Captain Sarabjeet Singh Parmar,** Senior Fellow, National Maritime Foundation.
6. **Parli Bhaskar,** Scientist E, Ocean Science Group, National Centre for Polar and Ocean Research (NCPOR)

Speaker-wise discussion points (as per program flow):

1. **Dr. Satheesh C. Shenoi- "Climate Change and Oceans"**

- He gave a brief introduction to global surface temperature. He discussed the change in global surface temperature from 1850 to 2020. In 2020, the global sea level set a new record and the rate of sea level rise is accelerating. It doubled from 1.4 mm/year to 3.6 mm/year during 2006-2015. Between 1979 and 2021, the Antarctic ice sheet lost 114 Gt of ice per year, contributing 13.7 mm to sea level rise. Altimeter data during 1993-2012 shows that the rate of sea level rises over the NorthIndian Ocean is similar to the Global value of 3.2 mm yr^{-1}. More than 500 sites have been inventories with low O_2 conditions in the past half century;in the open ocean O_2 waters encompass several million $km^{3.}$ India has 30,000 plastic processing units, and over seven thousand recycling units. The present annual per capita consumption of plastics is 13.6 kg per year and is estimatedto increase to 24 kg per year by 2025. The Ganges-Brahmaputra ranked the sixth-highest plastic waste contributor to the IndianOcean. Smaller polluted Indian rivers are also major contributors of plastic to the ocean. The frequency of extremely severe cyclonic storms has increased during the post-monsoonseasons of 1998-2018. The Paris Agreement set out a global framework to avoid dangerous climate change bylimiting global warming to well below 2^{o} C and pursuing efforts to limit it to 1.5 ^{o}C. The world needs rapid decarbonization to limit the temperature rise to 1.5-2.0 ^{o}C abovepre-industrial levels to avoid triggering multiple irrevocable changes in the climate system.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Climate Change and Oceans
Dr. S. S. C. Shenoi
MoES Chair Professor/Scientist
INCOIS, Hyderabad
8 June 2023
World Ocean Day – Planet Ocean: Tides are changing, Webinar Amity Uni, 8 June 2023
Special Talk as Guest of Honour
Dr. Satheesh C. Shenoi
Mr. Rajat Tokas
Tanu Jindal
Ms. Jayati Arora
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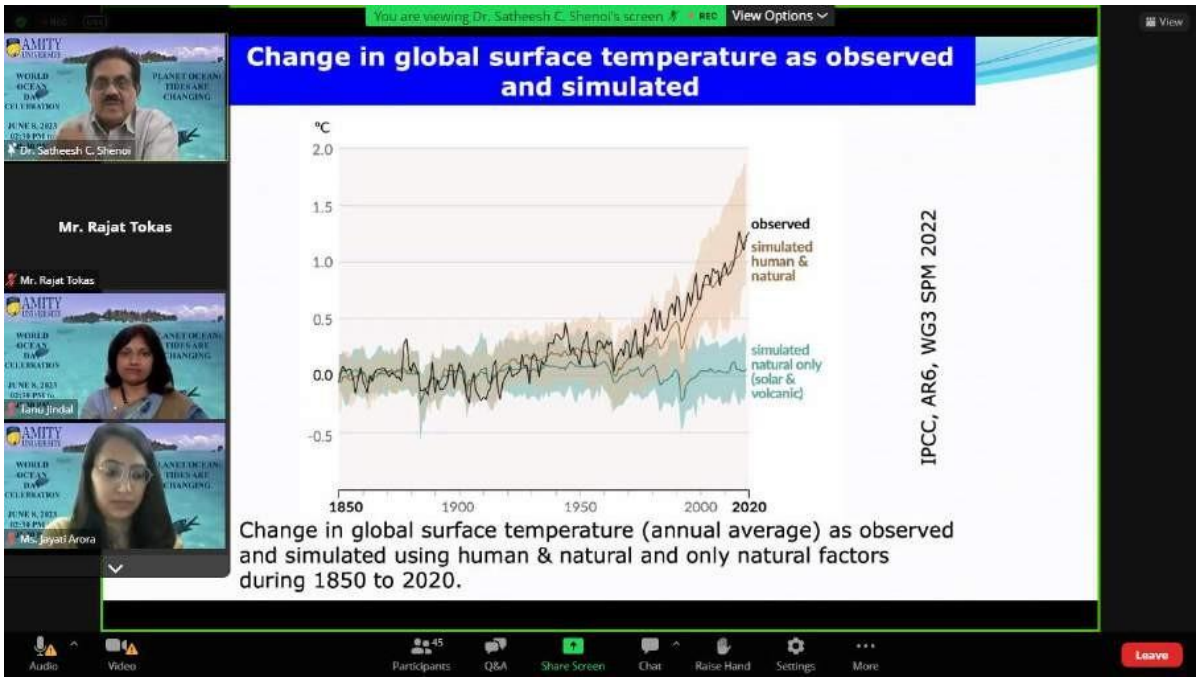
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Change in global surface temperature as observed and simulated
°C
2.0
1.5
1.0
0.5
0.0
-0.5
1850
1900
1950
2000
2020
observed
simulated human & natural
simulated natural only (solar & volcanic)
IPCC, AR6, WG3 SPM 2022
Change in global surface temperature (annual average) as observed and simulated using human & natural and only natural factors during 1850 to 2020.
Dr. Satheesh C. Shenoi
Mr. Rajat Tokas
Tanu Jindal
Ms. Jayati Arora
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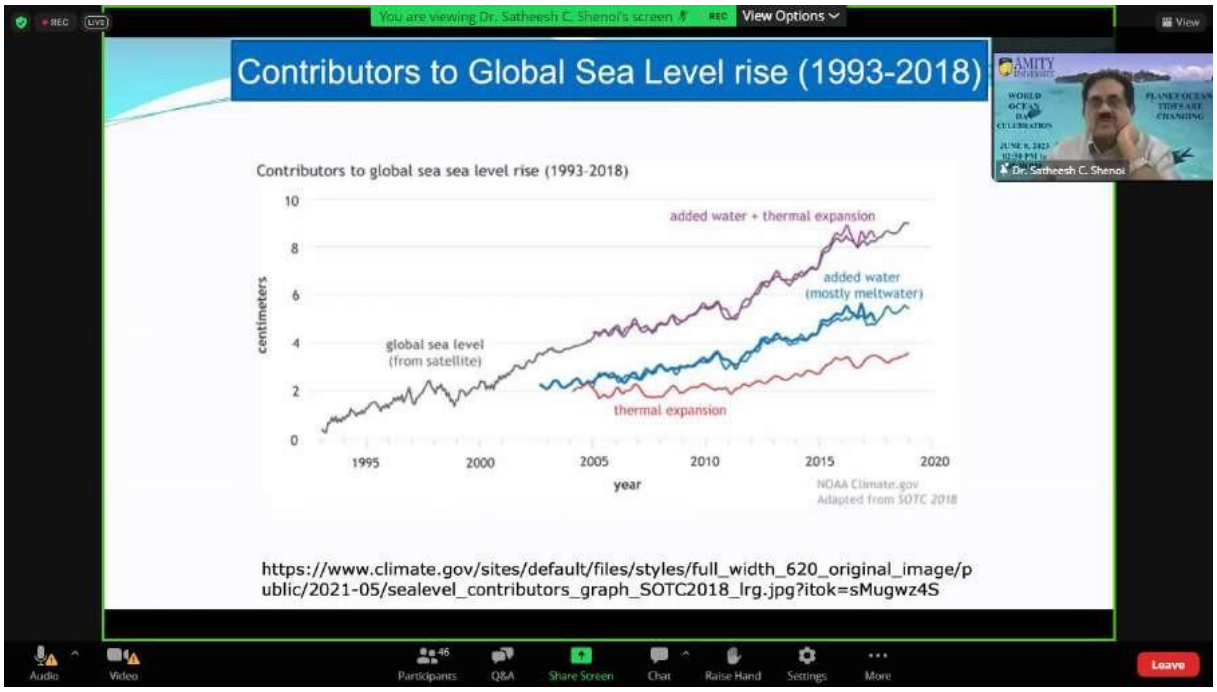
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Contributors to Global Sea Level rise (1993-2018)
Contributors to global sea sea level rise (1993-2018)
added water + thermal expansion
added water
(mostly meltwater)
global sea level
(from satellite)
thermal expansion
centimeters
year
NOAA Climate.gov
Adapted from SOTC 2018
https://www.climate.gov/sites/default/files/styles/full_width_620_original_image/public/2021-05/sealevel_contributors_graph_SOTC2018_lrg.jpg?itok=sMugwz4S
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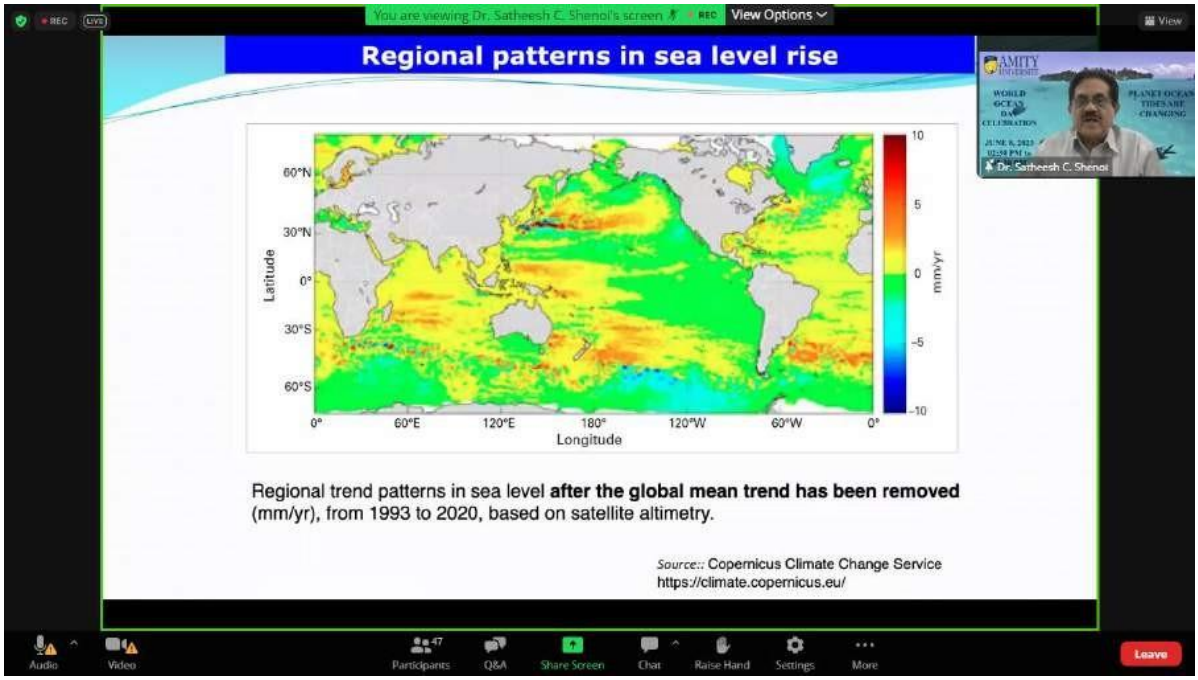
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Regional patterns in sea level rise
Latitude
Longitude
mm/yr
Regional trend patterns in sea level **after the global mean trend has been removed** (mm/yr), from 1993 to 2020, based on satellite altimetry.
Source:: Copernicus Climate Change Service
https://climate.copernicus.eu/
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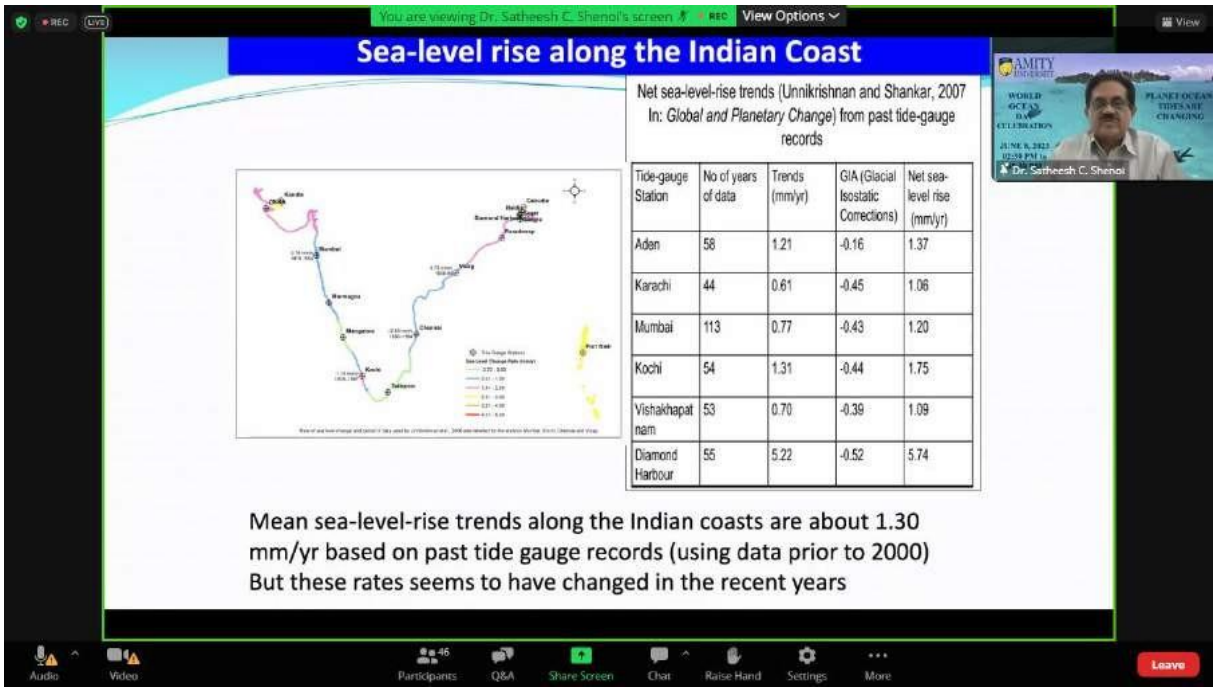
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Sea-level rise along the Indian Coast
Net sea-level-rise trends (Unnikrishnan and Shankar, 2007 In: Global and Planetary Change) from past tide-gauge records
Tide-gauge Station | No of years of data | Trends (mm/yr) | GIA (Glacial Isostatic Corrections) | Net sea-level rise (mm/yr)
Aden | 58 | 1.21 | -0.16 | 1.37
Karachi | 44 | 0.61 | -0.45 | 1.06
Mumbai | 113 | 0.77 | -0.43 | 1.20
Kochi | 54 | 1.31 | -0.44 | 1.75
Vishakhapatnam | 53 | 0.70 | -0.39 | 1.09
Diamond Harbour | 55 | 5.22 | -0.52 | 5.74
Mean sea-level-rise trends along the Indian coasts are about 1.30 mm/yr based on past tide gauge records (using data prior to 2000)
But these rates seems to have changed in the recent years
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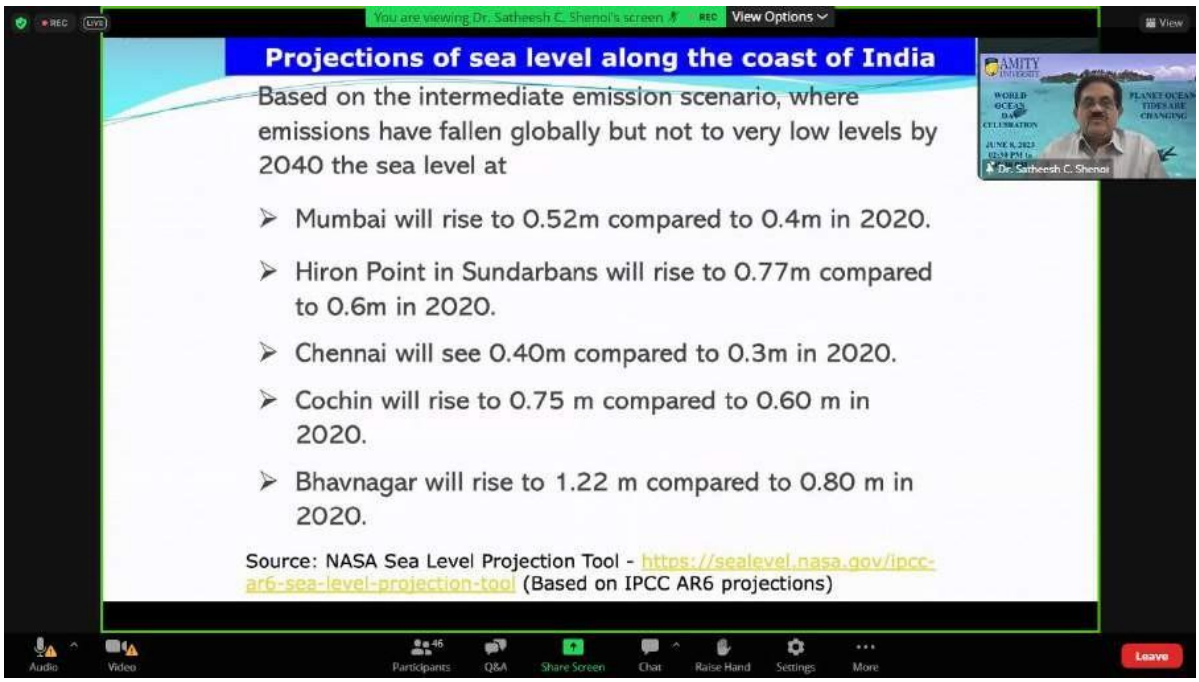
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Projections of sea level along the coast of India
Based on the intermediate emission scenario, where emissions have fallen globally but not to very low levels by 2040 the sea level at
Mumbai will rise to 0.52m compared to 0.4m in 2020.
Hiron Point in Sundarbans will rise to 0.77m compared to 0.6m in 2020.
Chennai will see 0.40m compared to 0.3m in 2020.
Cochin will rise to 0.75 m compared to 0.60 m in 2020.
Bhavnagar will rise to 1.22 m compared to 0.80 m in 2020.
Source: NASA Sea Level Projection Tool - https://sealevel.nasa.gov/ipcc-ar6-sea-level-projection-tool (Based on IPCC AR6 projections)
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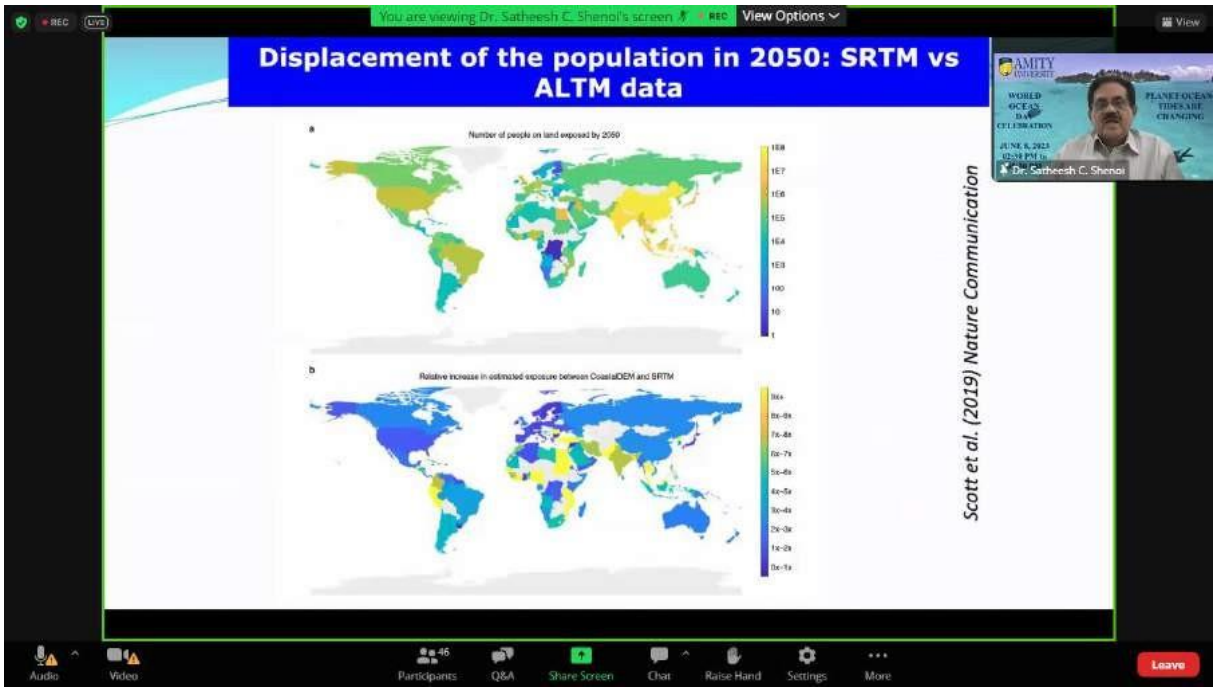
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Displacement of the population in 2050: SRTM vs ALTM data
Number of people on land exposed by 2050
Relative increase in estimated exposure between CoastalDEM and SRTM
Scott et al. (2019) Nature Communication
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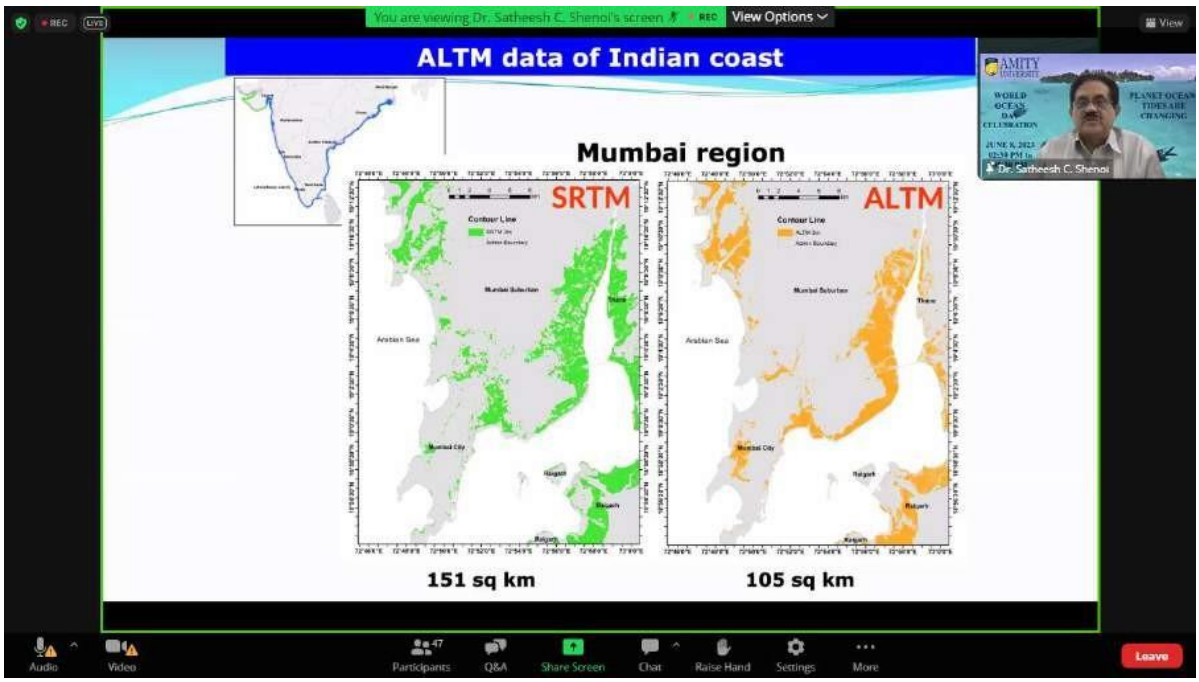
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ALTM data of Indian coast
Mumbai region
SRTM
ALTM
151 sq km
105 sq km
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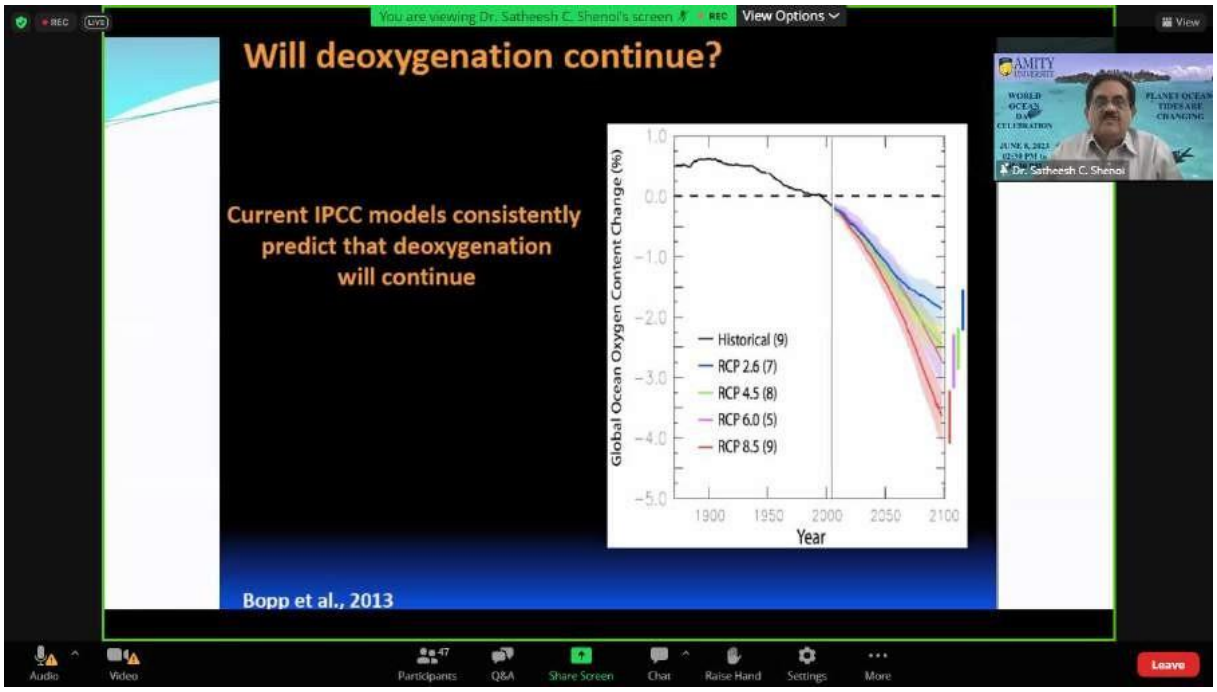
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Will deoxygenation continue?
Current IPCC models consistently predict that deoxygenation will continue
Global Ocean Oxygen Content Change (%)
Historical (9)
RCP 2.6 (7)
RCP 4.5 (8)
RCP 6.0 (5)
RCP 8.5 (9)
Year
Bopp et al., 2013
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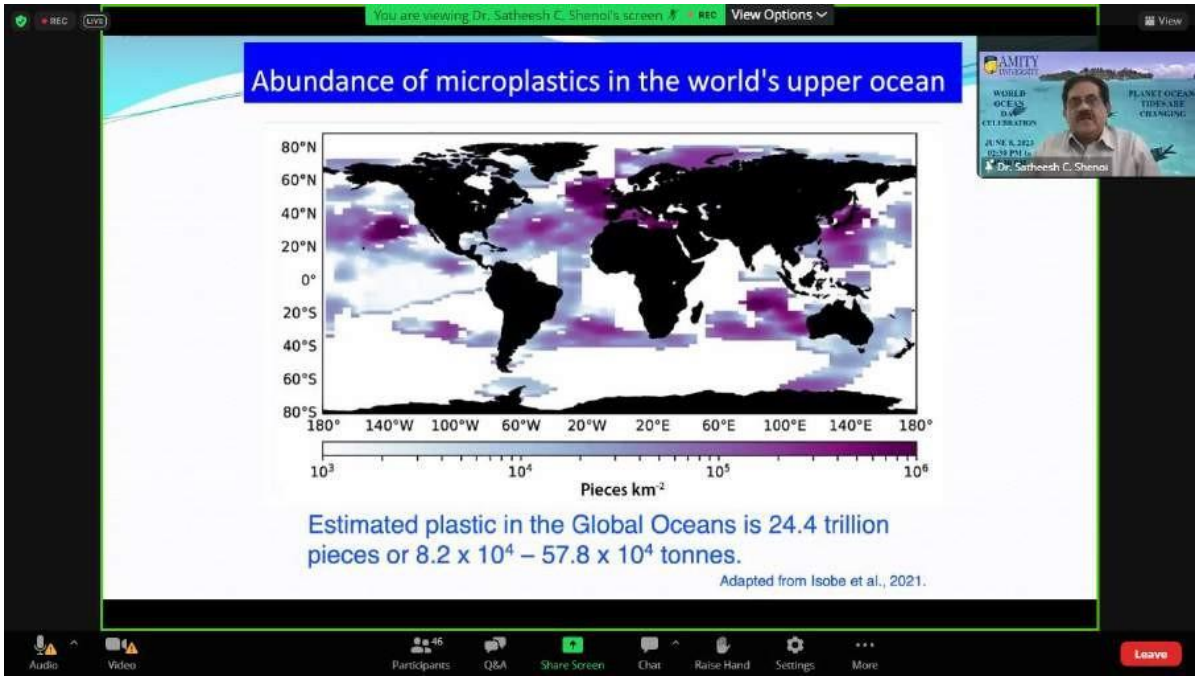
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Abundance of microplastics in the world's upper ocean
Pieces km-2
Estimated plastic in the Global Oceans is 24.4 trillion pieces or 8.2 x 10⁴ – 57.8 x 10⁴ tonnes.
Adapted from Isobe et al., 2021.
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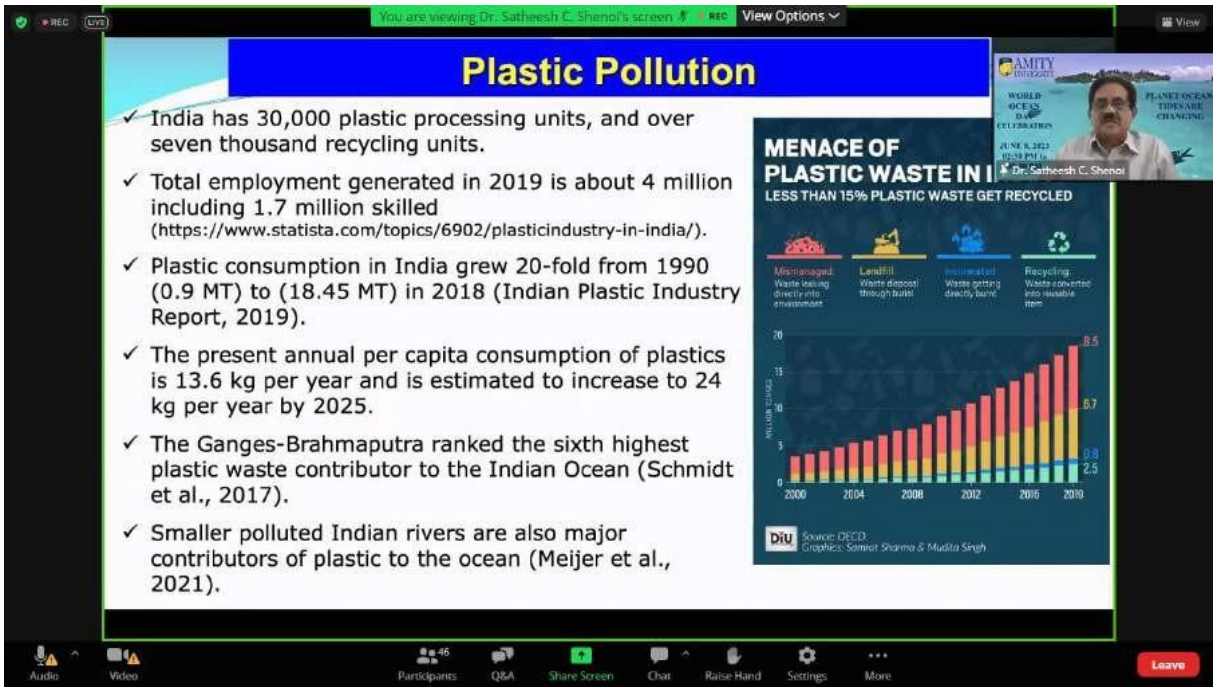
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Plastic Pollution
✓ India has 30,000 plastic processing units, and over seven thousand recycling units.
✓ Total employment generated in 2019 is about 4 million including 1.7 million skilled (https://www.statista.com/topics/6902/plasticindustry-in-india/).
✓ Plastic consumption in India grew 20-fold from 1990 (0.9 MT) to (18.45 MT) in 2018 (Indian Plastic Industry Report, 2019).
✓ The present annual per capita consumption of plastics is 13.6 kg per year and is estimated to increase to 24 kg per year by 2025.
✓ The Ganges-Brahmaputra ranked the sixth highest plastic waste contributor to the Indian Ocean (Schmidt et al., 2017).
✓ Smaller polluted Indian rivers are also major contributors of plastic to the ocean (Meijer et al., 2021).
MENACE OF PLASTIC WASTE IN I
LESS THAN 15% PLASTIC WASTE GET RECYCLED
Mismanaged
Landfill
Recycling
2000
2004
2008
2012
2016
2019
Source: OECD
Graphics: Samrat Sharma & Mudita Singh
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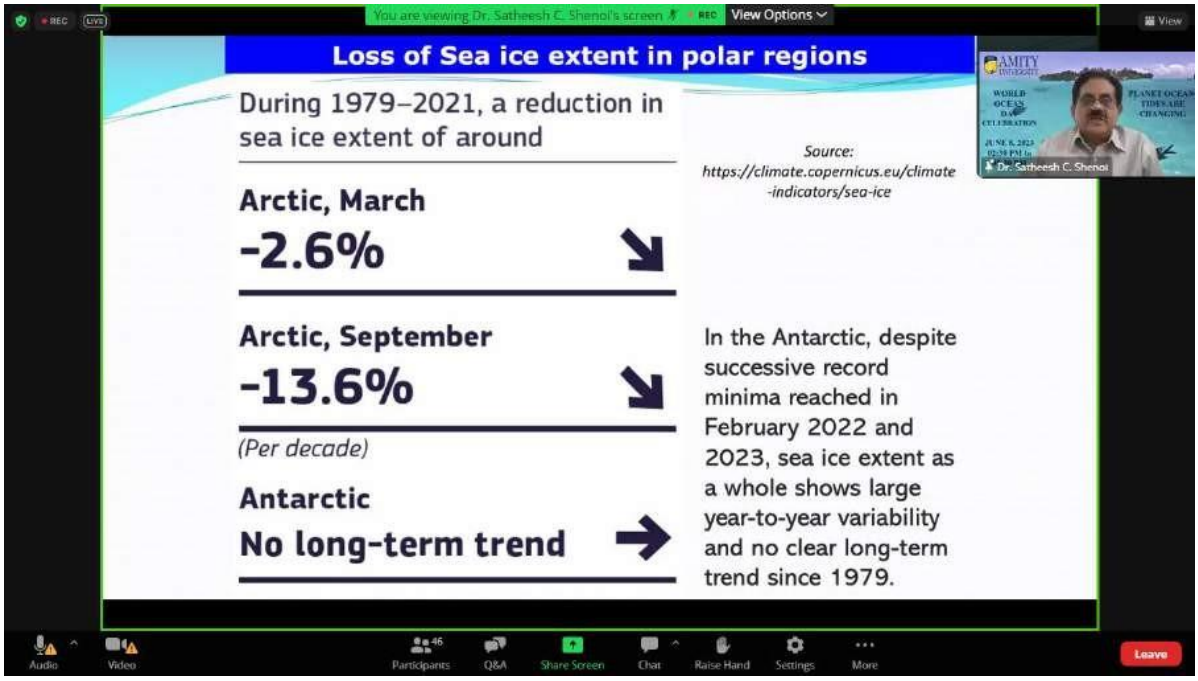
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Loss of Sea ice extent in polar regions
During 1979–2021, a reduction in sea ice extent of around
Arctic, March
-2.6%
Arctic, September
-13.6%
(Per decade)
Antarctic
No long-term trend
Source:
https://climate.copernicus.eu/climate-indicators/sea-ice
In the Antarctic, despite successive record minima reached in February 2022 and 2023, sea ice extent as a whole shows large year-to-year variability and no clear long-term trend since 1979.
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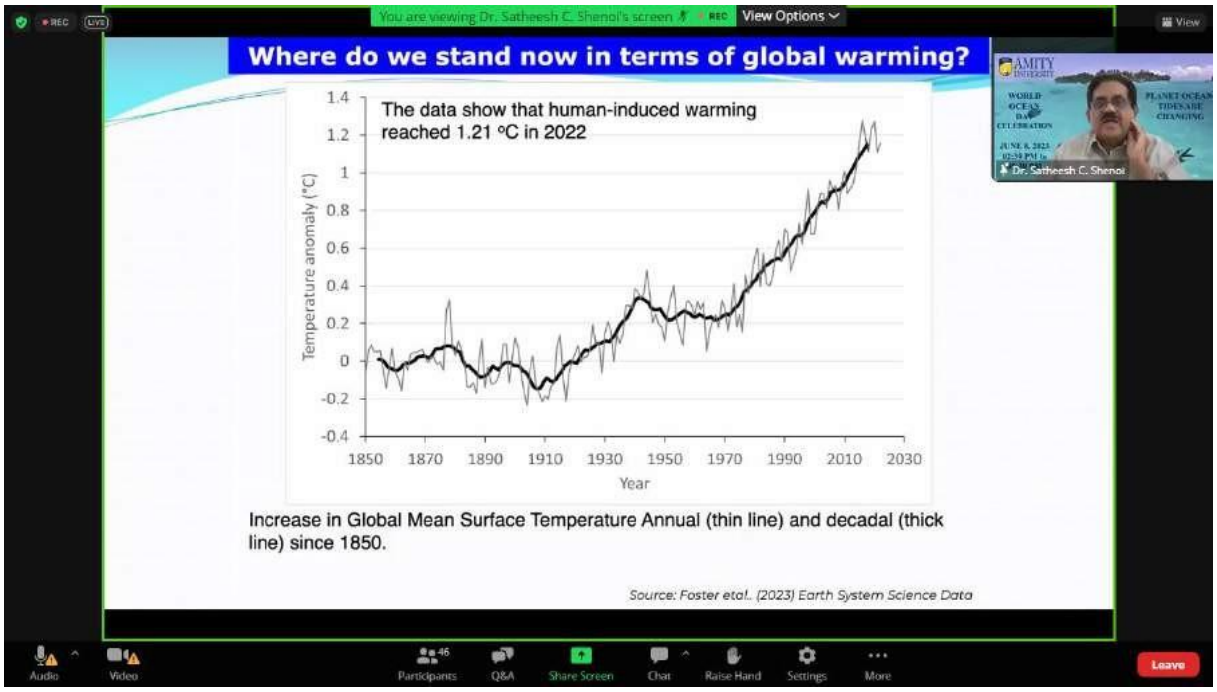
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Where do we stand now in terms of global warming?
The data show that human-induced warming reached 1.21 °C in 2022
Temperature anomaly (°C)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
1850 1870 1890 1910 1930 1950 1970 1990 2010 2030
Year
Increase in Global Mean Surface Temperature Annual (thin line) and decadal (thick line) since 1850.
Source: Foster et al. (2023) Earth System Science Data
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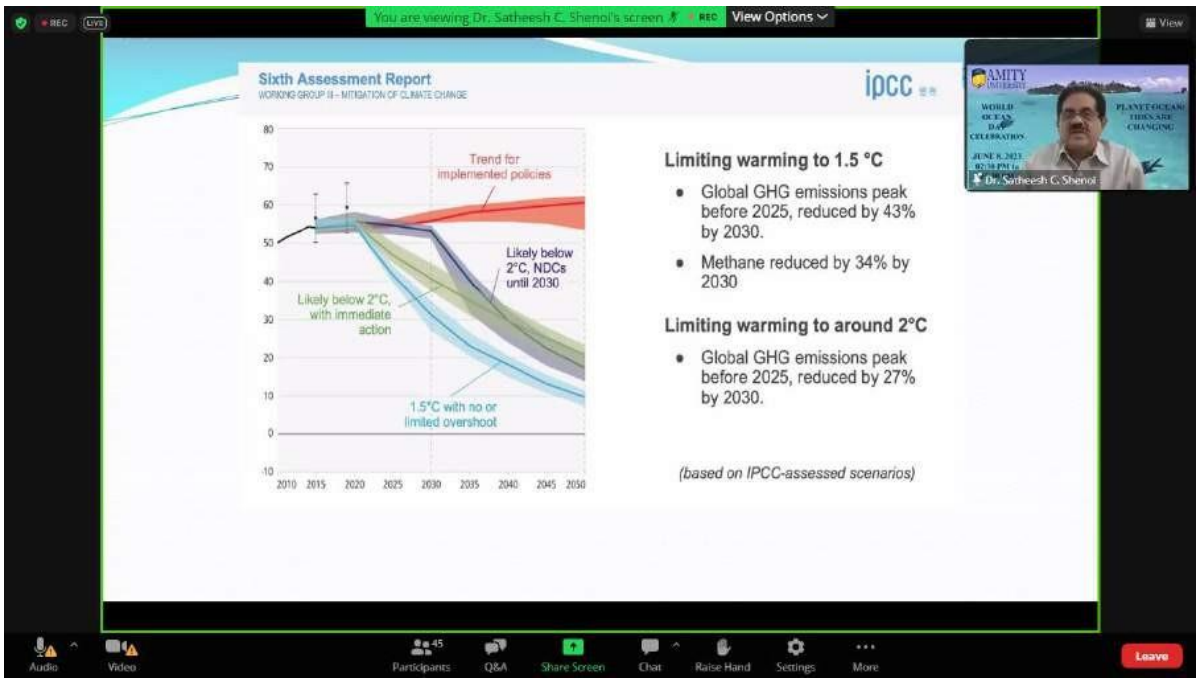
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WORKING GROUP III – MITIGATION OF CLIMATE CHANGE
ipcc
Trend for implemented policies
Likely below 2°C, NDCs until 2030
Likely below 2°C, with immediate action
1.5°C with no or limited overshoot
2010 2015 2020 2025 2030 2035 2040 2045 2050
Limiting warming to 1.5 °C
Global GHG emissions peak before 2025, reduced by 43% by 2030.
Methane reduced by 34% by 2030
Limiting warming to around 2°C
Global GHG emissions peak before 2025, reduced by 27% by 2030.
(based on IPCC-assessed scenarios)
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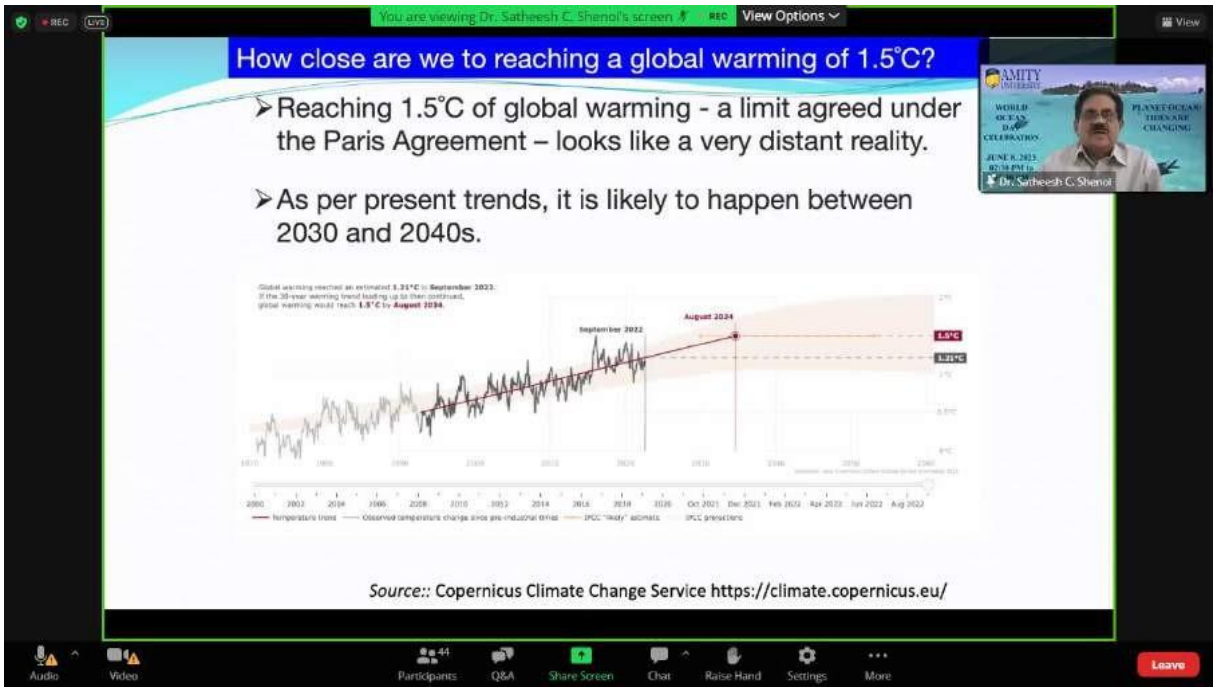
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How close are we to reaching a global warming of 1.5°C?
➢Reaching 1.5°C of global warming - a limit agreed under the Paris Agreement – looks like a very distant reality.
➢As per present trends, it is likely to happen between 2030 and 2040s.
September 2023
August 2024
1.5°C
1.21°C
Source:: Copernicus Climate Change Service https://climate.copernicus.eu/
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Carbon Dioxide Removal
– required to counterbalance hard-to-eliminate emissions
– through biological methods: reforestation, and soil carbon sequestration
– new technologies require more research, up-front investment, and proof of concept at larger scales
– essential to achieve net zero
– agreed methods for measuring, reporting and verification required
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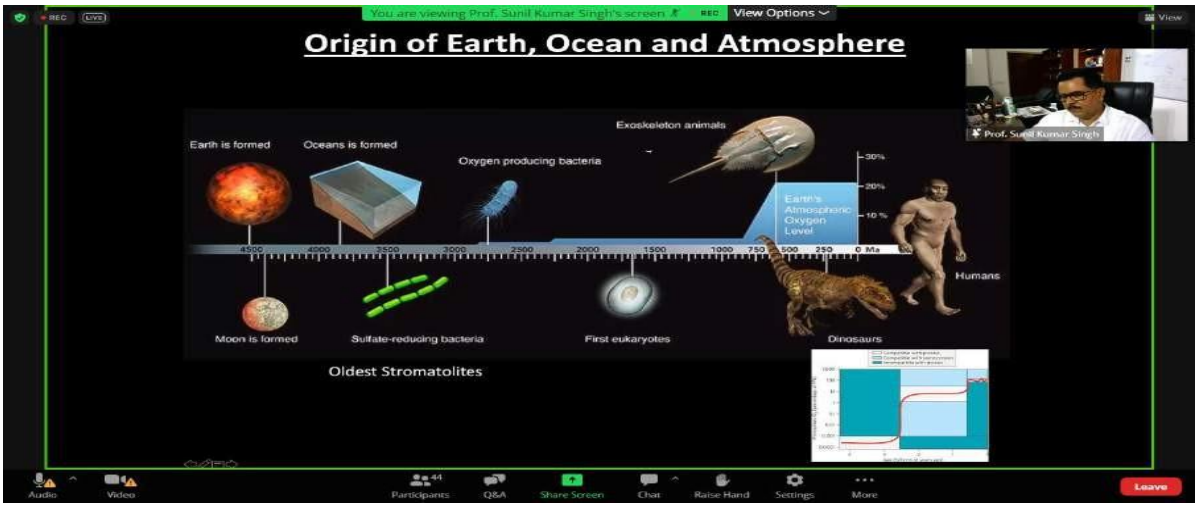
2. **Prof. Sunil Kumar Singh- "Indian Ocean: Global Perspective"**

- He discussed the origin of the earth, ocean, and atmosphere. Volcanic outgassing creates an atmosphere (CO_2, CH_4, NH_3, H_2O). The chemical weathering process removes atmospheric CO_2. Volcanism is the major source of atmospheric CO_2. Silicate weathering acts as the major sink for atmospheric CO_2. He discussed ocean chemistry and more iron in the ocean. Indian monsoons, extreme events, biogeochemistry, and physical changes in IO are the majorsources for climate change. The oceans have absorbed ~ 93 % of the additional heat due to anthropogenic global warming since 1950.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Origin of Earth, Ocean and Atmosphere
Prof. Sunil Kumar Singh
Earth is formed
Oceans is formed
Oxygen producing bacteria
Exoskeleton animals
Earth's Atmospheric Oxygen Level
30%
20%
10 %
4500
4000
3500
3000
2500
2000
1500
1000
750
500
250
0 Ma
Humans
Moon is formed
Sulfate-reducing bacteria
First eukaryotes
Dinosaurs
Oldest Stromatolites
Audio
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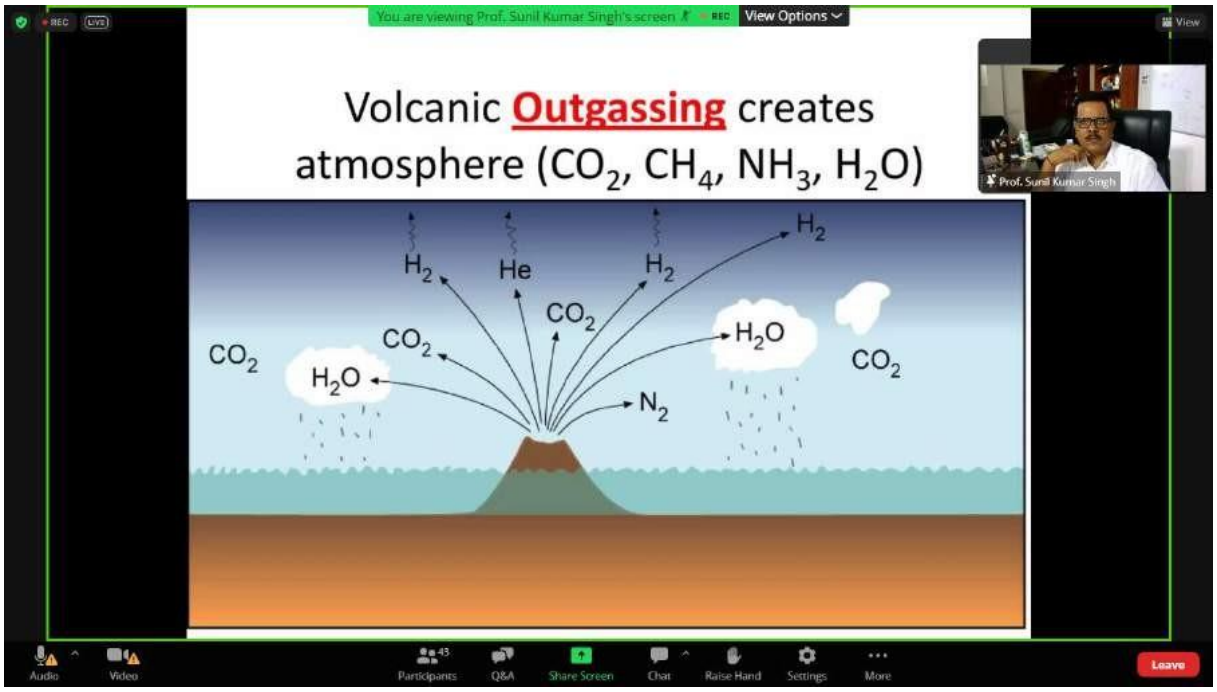
You are viewing Prof. Sunil Kumar Singh's screen
View Options
Volcanic Outgassing creates atmosphere (CO_2, CH_4, NH_3, H_2O)
H_2
He
H_2
H_2
CO_2
CO_2
CO_2
H_2O
H_2O
N_2
Prof. Sunil Kumar Singh
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Participants
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Share Screen
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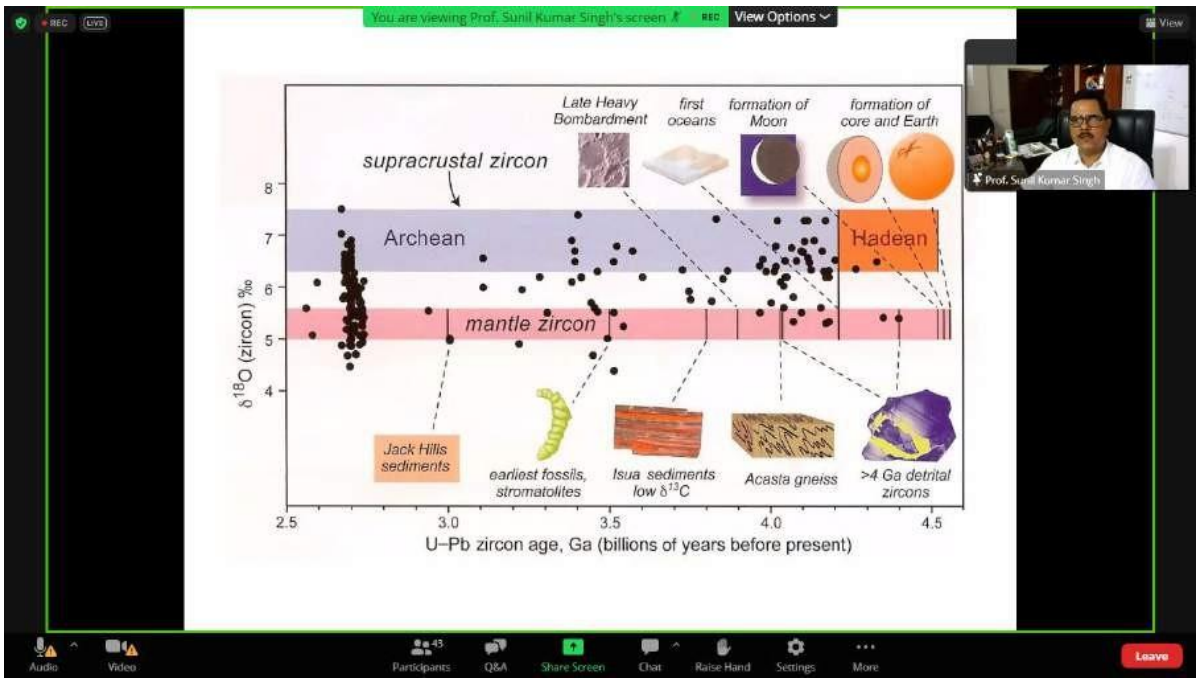
You are viewing Prof. Sunil Kumar Singh's screen
View Options
Late Heavy Bombardment
first oceans
formation of Moon
formation of core and Earth
supracrustal zircon
Archean
Hadean
mantle zircon
$\delta^{18}O$ (zircon) ‰
Jack Hills sediments
earliest fossils, stromatolites
Isua sediments low $\delta^{13}C$
Acasta gneiss
>4 Ga detrital zircons
U–Pb zircon age, Ga (billions of years before present)
Prof. Sunil Kumar Singh
Audio
Video
Participants
Q&A
Share Screen
Chat
Raise Hand
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More
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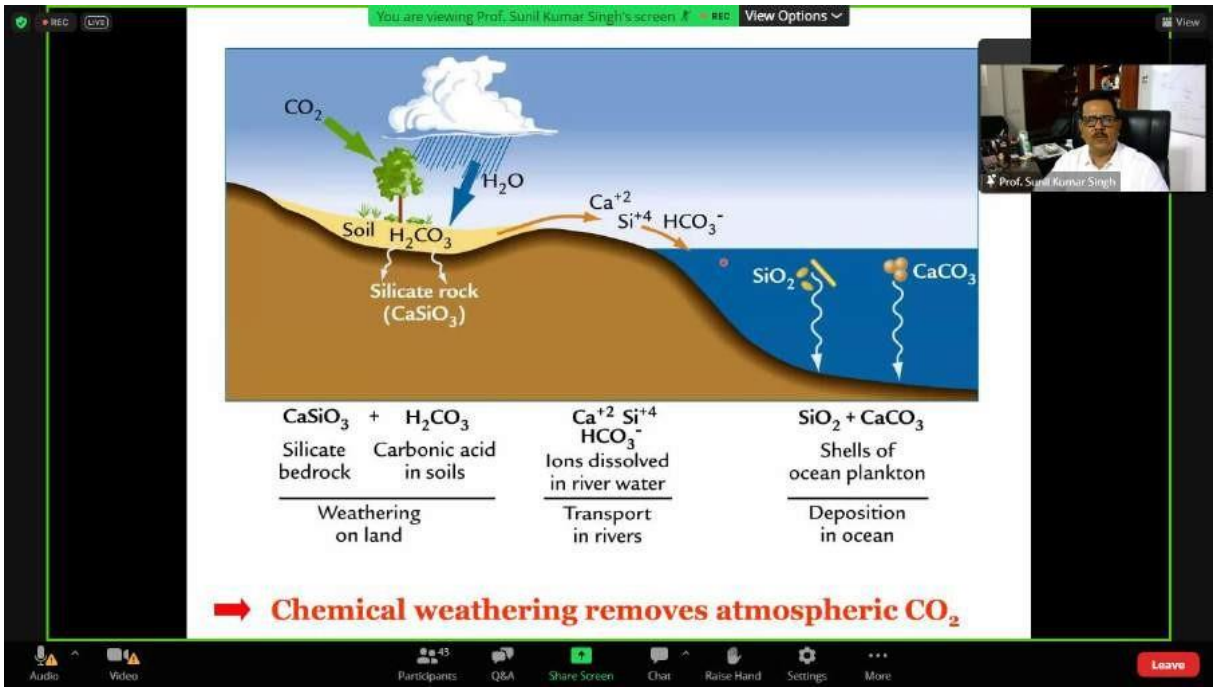
You are viewing Prof. Sunil Kumar Singh's screen
View Options
CO_2
H_2O
Soil
H_2CO_3
Silicate rock
($CaSiO_3$)
Ca^{+2} Si^{+4} HCO_3^-
SiO_2
$CaCO_3$
$CaSiO_3$ + H_2CO_3
Silicate bedrock
Carbonic acid in soils
Weathering on land
Ca^{+2} Si^{+4} HCO_3^-
Ions dissolved in river water
Transport in rivers
SiO_2 + $CaCO_3$
Shells of ocean plankton
Deposition in ocean
Chemical weathering removes atmospheric CO_2
Prof. Sunil Kumar Singh
Audio
Video
Participants
Q&A
Share Screen
Chat
Raise Hand
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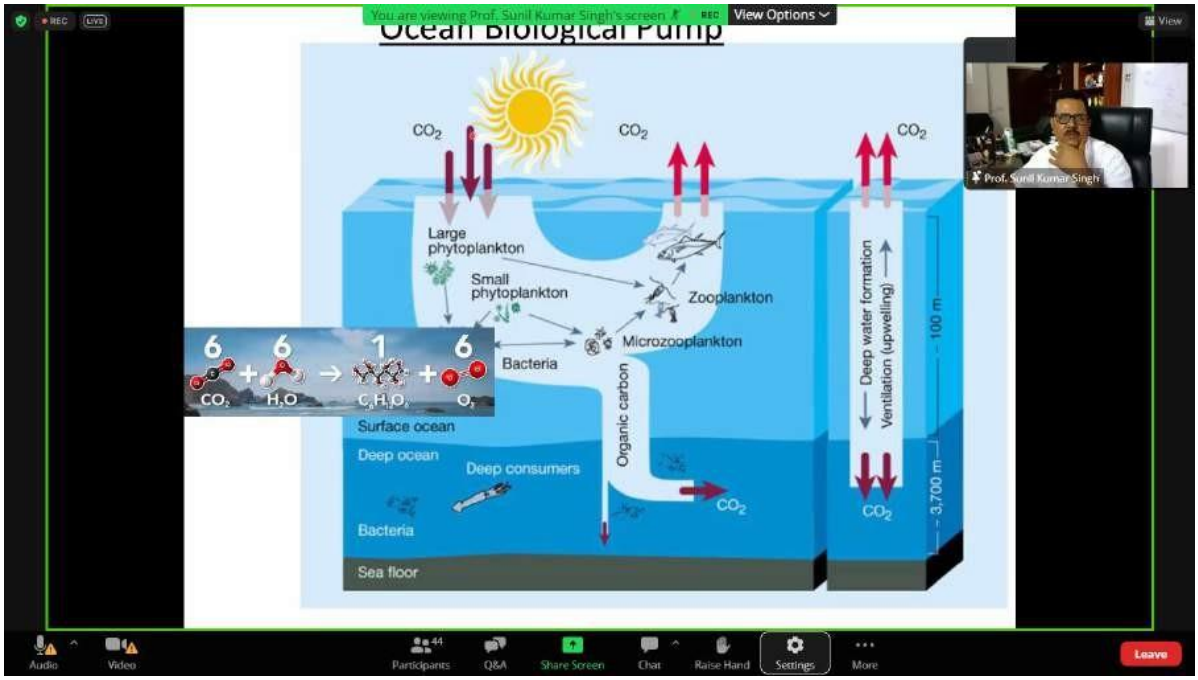
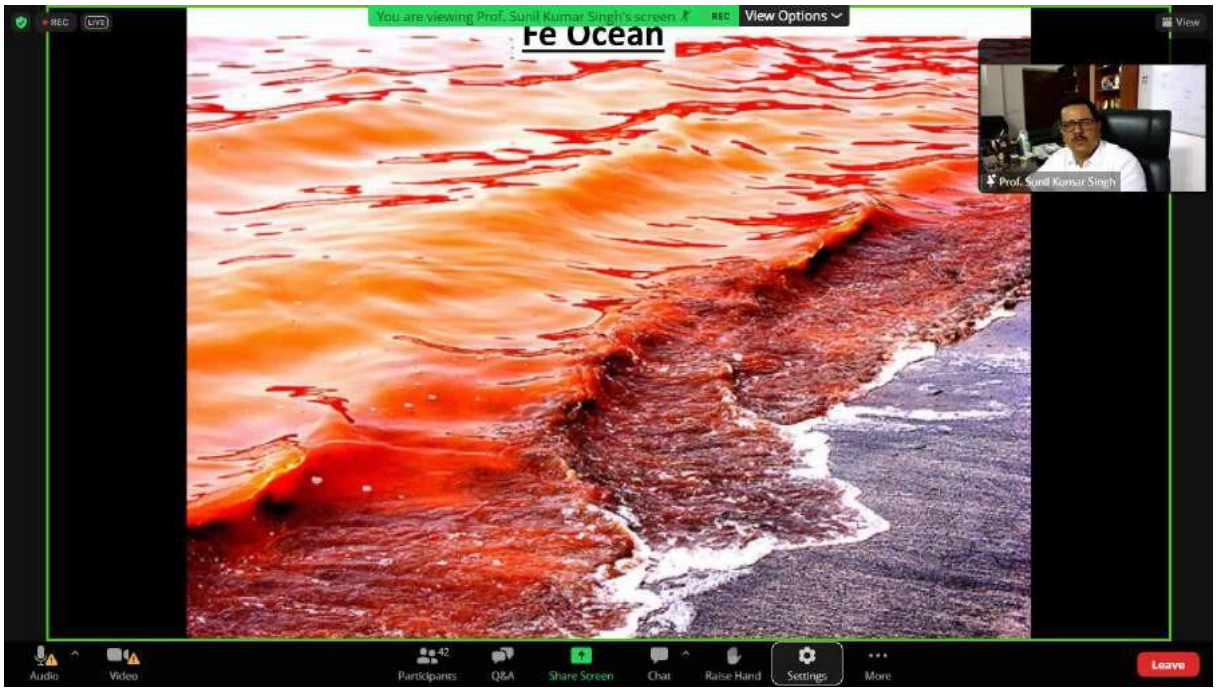
More
Leave


You are viewing Prof. Sunil Kumar Singh's screen
View Options
Ocean Biological Pump
CO_2
CO_2
CO_2
Large phytoplankton
Small phytoplankton
Zooplankton
Microzooplankton
Bacteria
6 CO_2 + 6 H_2O → 1 $C_6H_{12}O_6$ + 6 O_2
Surface ocean
Deep ocean
Deep consumers
Bacteria
Organic carbon
CO_2
Deep water formation
Ventilation (upwelling)
100 m
3,700 m
CO_2
Sea floor
Prof. Sunil Kumar Singh
Audio
Video
Participants
Q&A
Share Screen
Chat
Raise Hand
Settings
More
Leave


You are viewing Prof. Sunil Kumar Singh's screen
View Options
Fe Ocean
Prof. Sunil Kumar Singh
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Participants
Q&A
Share Screen
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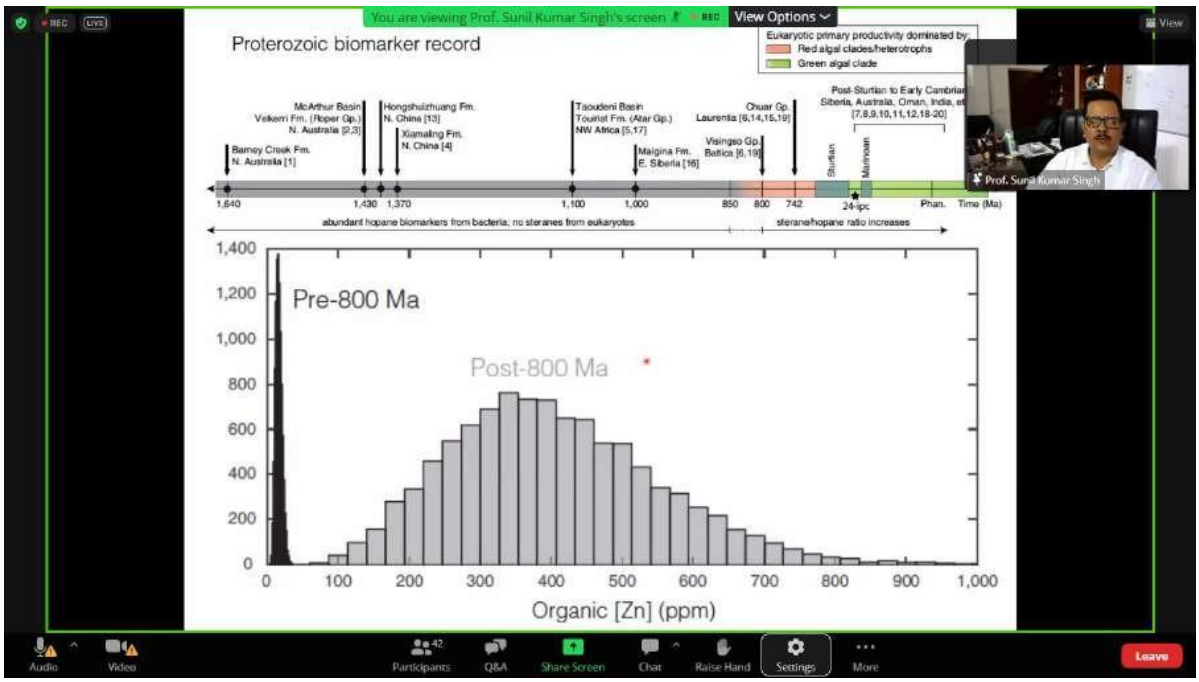
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View Options
Proterozoic biomarker record
Eukaryotic primary productivity dominated by:
Red algal clades/heterotrophs
Green algal clade
McArthur Basin
Velkerri Fm., (Roper Gp.)
N. Australia [2,3]
Barney Creek Fm.
N. Australia [1]
Hongshuizhuang Fm.
N. China [13]
Xiamaling Fm.
N. China [4]
Taoudeni Basin
Touirist Fm. (Atar Gp.)
NW Africa [5,17]
Maigina Fm.
E. Siberia [16]
Visingso Gp.
Baltica [6,19]
Chuar Gp.
Laurentia [6,14,15,19]
Post-Sturtian to Early Cambrian
Siberia, Australia, Oman, India, et
[7,8,9,10,11,12,18-20]
Sturtian
Marinoan
1,640
1,430
1,370
1,100
1,000
850
800
742
24-ipc
Phan.
Time (Ma)
abundant hopane biomarkers from bacteria; no steranes from eukaryotes
sterane/hopane ratio increases
Pre-800 Ma
Post-800 Ma
Organic [Zn] (ppm)
Prof. Sunil Kumar Singh
Audio
Video
Participants
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Share Screen
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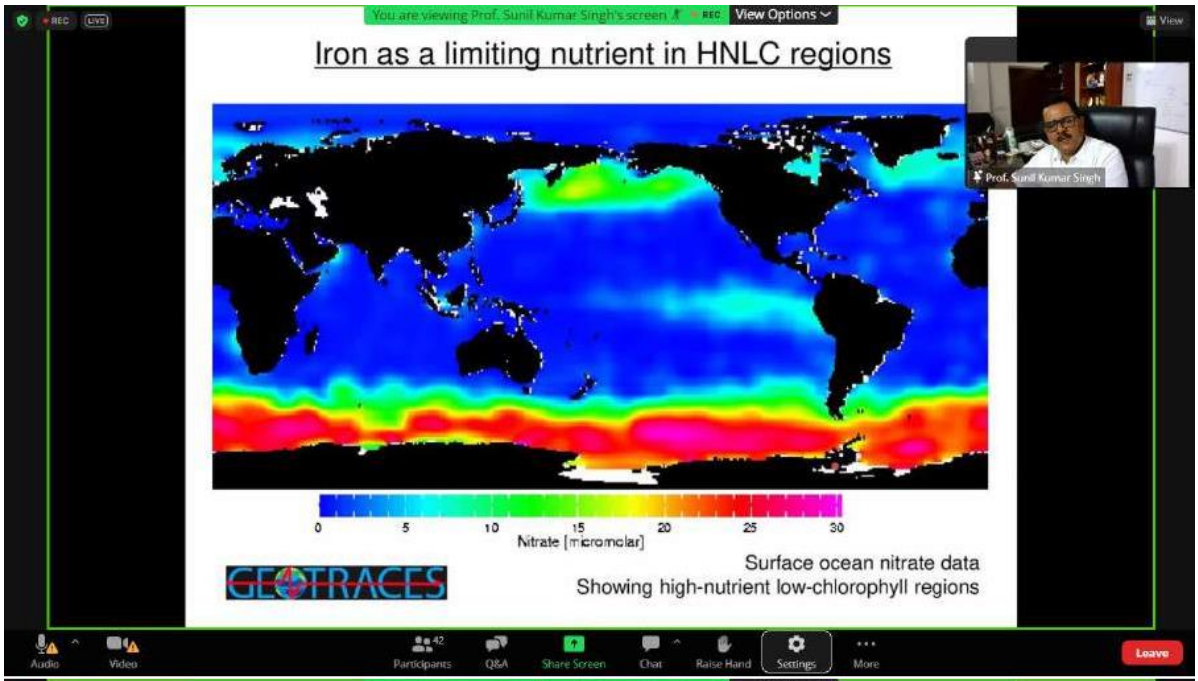
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View Options
Iron as a limiting nutrient in HNLC regions
Prof. Sunil Kumar Singh
0
5
10
15
20
25
30
Nitrate [micromolar]
GEOTRACES
Surface ocean nitrate data
Showing high-nutrient low-chlorophyll regions
Audio
Video
Participants
Q&A
Share Screen
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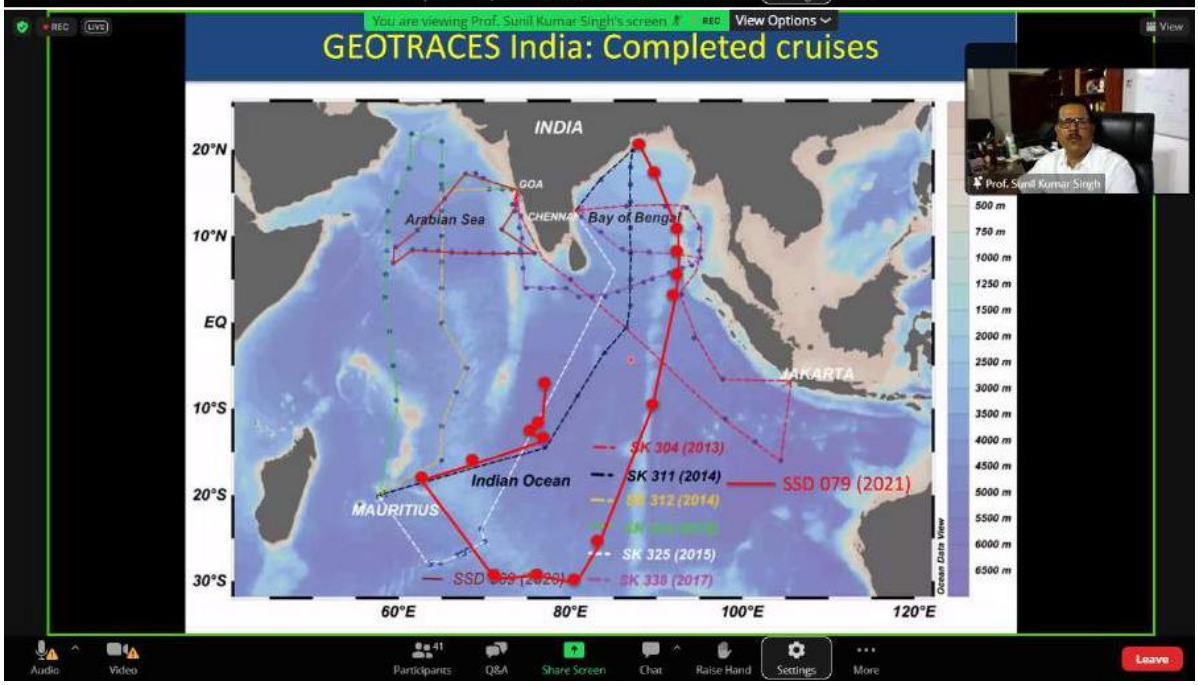
Leave


You are viewing Prof. Sunil Kumar Singh's screen
View Options
GEOTRACES India: Completed cruises
Prof. Sunil Kumar Singh
INDIA
GOA
CHENNAI
Arabian Sea
Bay of Bengal
JAKARTA
Indian Ocean
MAURITIUS
20°N
10°N
EQ
10°S
20°S
30°S
60°E
80°E
100°E
120°E
SK 304 (2013)
SK 311 (2014)
SSD 079 (2021)
SK 325 (2015)
SK 338 (2017)
500 m
750 m
1000 m
1250 m
1500 m
2000 m
2500 m
3000 m
3500 m
4000 m
4500 m
5000 m
5500 m
6000 m
6500 m
Ocean Data View
Audio
Video
Participants
Q&A
Share Screen
Chat
Raise Hand
Settings
More
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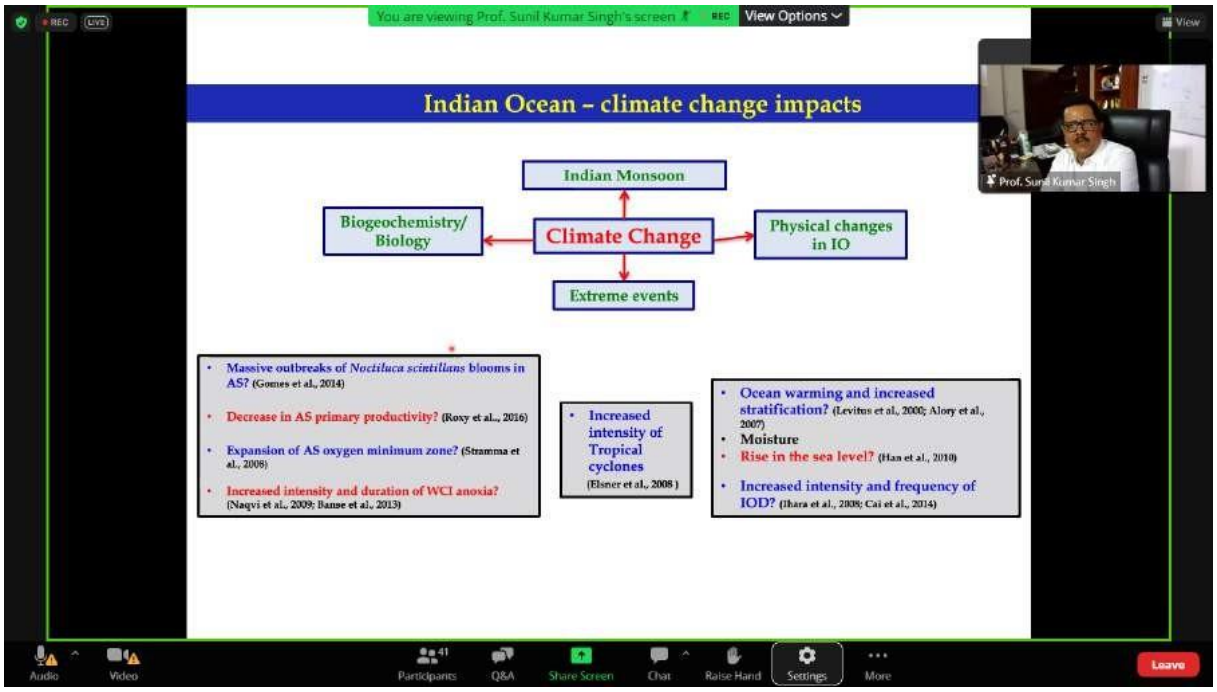

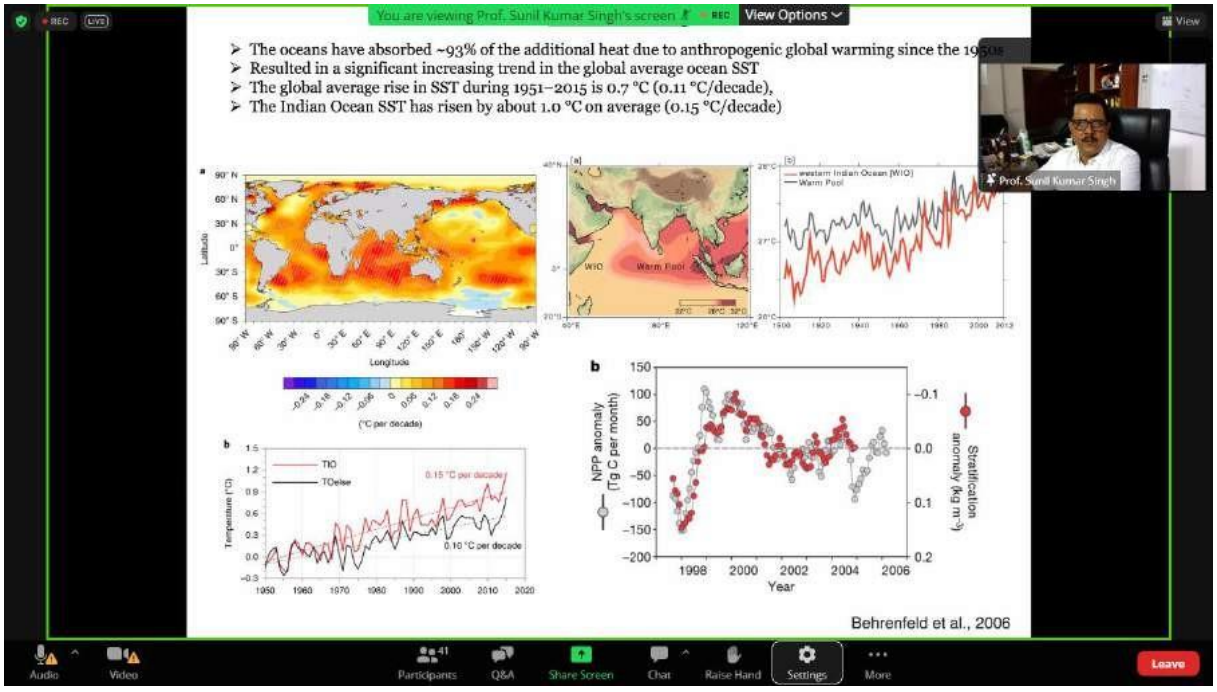

1. **Dr. Anil Kumar N "Understanding the Southern Ocean Ecosystem processes in the global warming scenario: an overview of Indian campaign"**

- He discussed various campaigns for the Southern Ocean. He also discussed the Antarctic circumpolar current. He and his team had participated in the 11th Indian Scientific Expedition

to the SouthernOcean. The journey started from Mauritius to the Southern Ocean and the Southern Ocean toMauritius. Gyres are subject to large-scale cyclonic wind stress, leading to strong easterly winds overthe shelf break that depresses isotherms. They are planning to set up mooring systems in the Indian Sector of the Southern Ocean incollaboration with Southern Ocean Observing System (SOOS). Surface flux mooring in the subtropical frontal region of the Southern Ocean. Time series measurement is to collect the hydrodynamic and biochemical observations for aperiod of one year covering all seasons. They are working on the presence of microplastics in the Antarctic organisms.


You are viewing Dr. Anil Kumar N's screen
View Options
UNDERSTANDI ROCESSES IN
THE GLOBAL WARMING SCENARIO: AN OVERVIEW OF INDIAN
CAMPAIGN
N. ANILKUMAR, NCPOR, GOA
S.A. AGULHAS
Audio
Video
Participants
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View Options
NCPOR
Sagar Kanya [2004]
Boris Petrov [2008 & 9]
Sagar Nidhi [2010-15]
Agulhas-1 [2017, 2018, 2020]
Audio
Video
Participants
Q&A
Share Screen
Chat
Raise Hand
Settings
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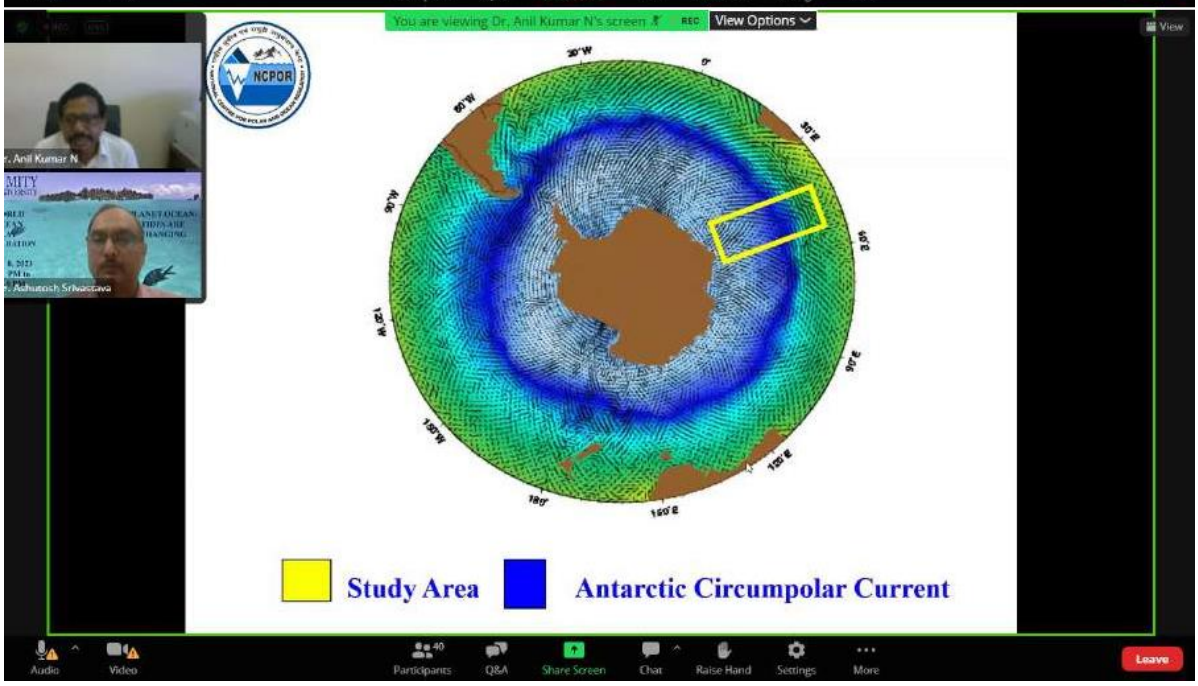
You are viewing Dr. Anil Kumar N's screen
View Options
NCPOR
Study Area
Antarctic Circumpolar Current
Audio
Video
Participants
Q&A
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Settings
More
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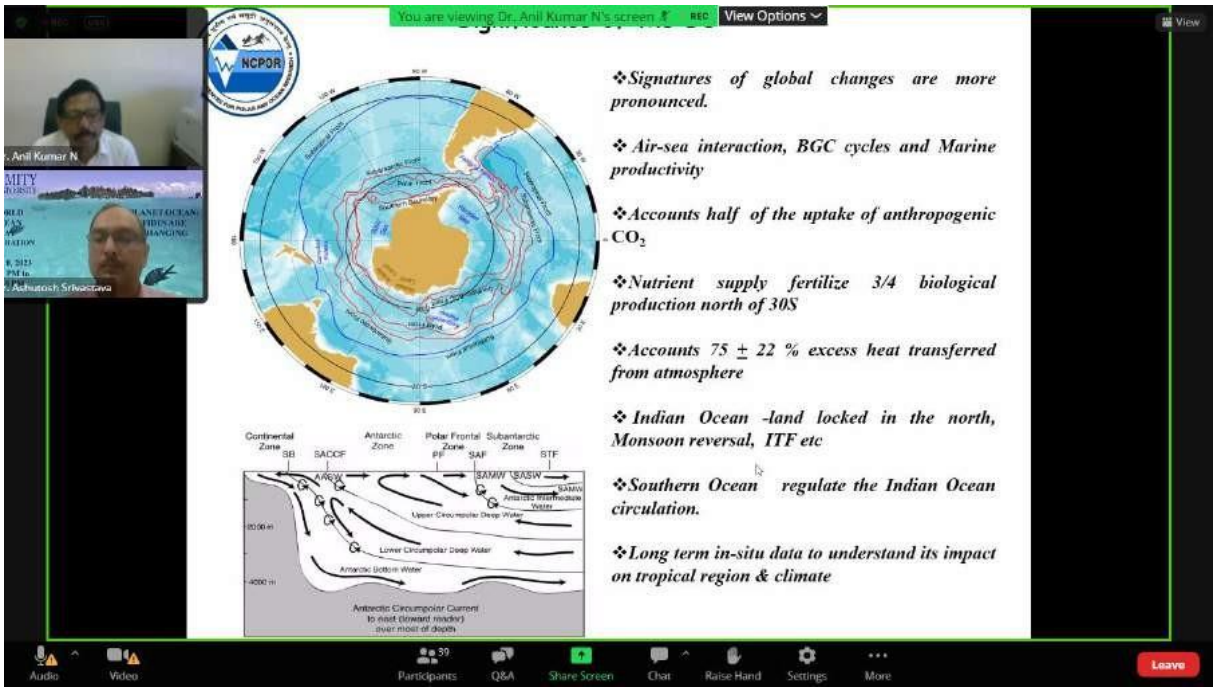
You are viewing Dr. Anil Kumar N's screen
View Options
NCPOR
❖Signatures of global changes are more pronounced.
❖ Air-sea interaction, BGC cycles and Marine productivity
❖Accounts half of the uptake of anthropogenic CO_2
❖Nutrient supply fertilize 3/4 biological production north of 30S
❖Accounts 75 ± 22 % excess heat transferred from atmosphere
❖ Indian Ocean -land locked in the north, Monsoon reversal, ITF etc
❖Southern Ocean regulate the Indian Ocean circulation.
❖Long term in-situ data to understand its impact on tropical region & climate
Continental Zone
Antarctic Zone
Polar Frontal Zone
Subantarctic Zone
SB
SACCF
PF
SAF
STF
Upper Circumpolar Deep Water
Lower Circumpolar Deep Water
Antarctic Bottom Water
Audio
Video
Participants
Q&A
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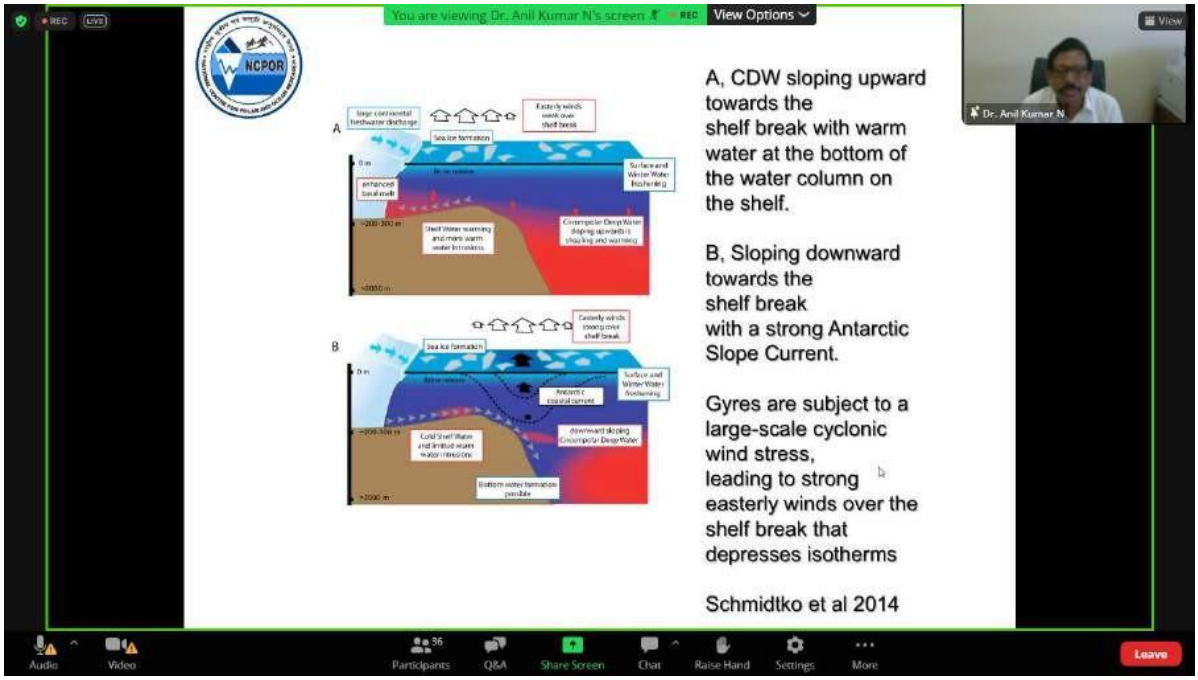
You are viewing Dr. Anil Kumar N's screen
View Options
NCPOR
A
B
A, CDW sloping upward towards the shelf break with warm water at the bottom of the water column on the shelf.
B, Sloping downward towards the shelf break with a strong Antarctic Slope Current.
Gyres are subject to a large-scale cyclonic wind stress, leading to strong easterly winds over the shelf break that depresses isotherms
Schmidtko et al 2014
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Video
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More
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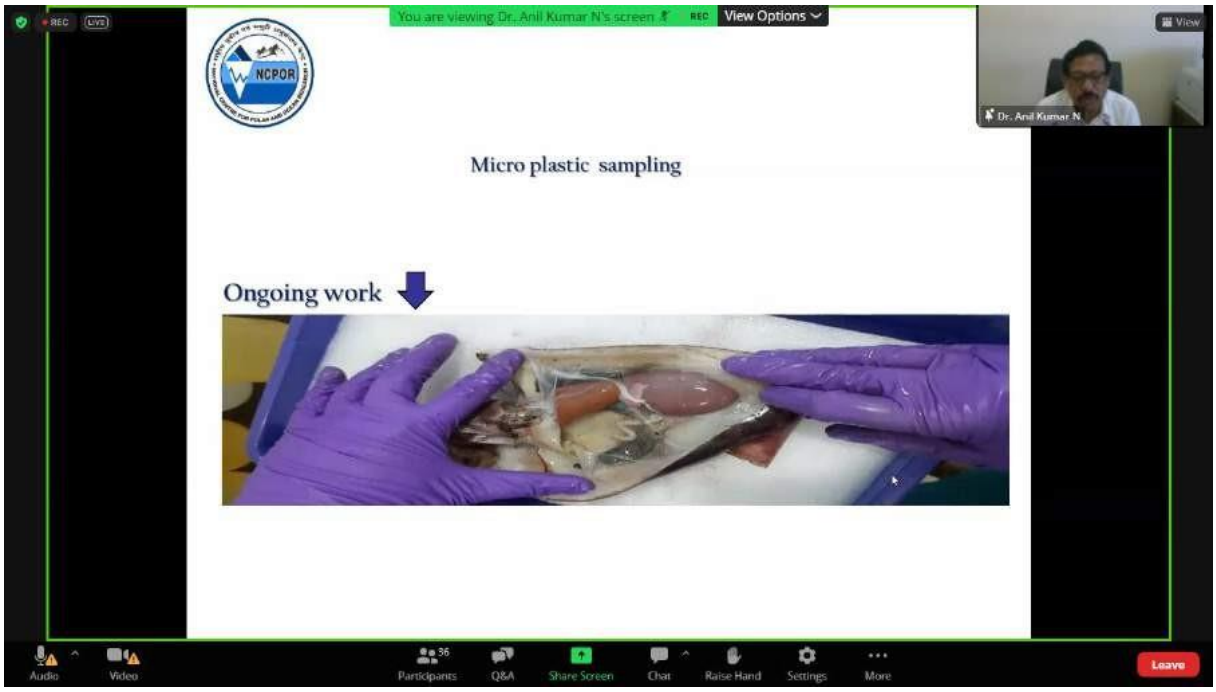
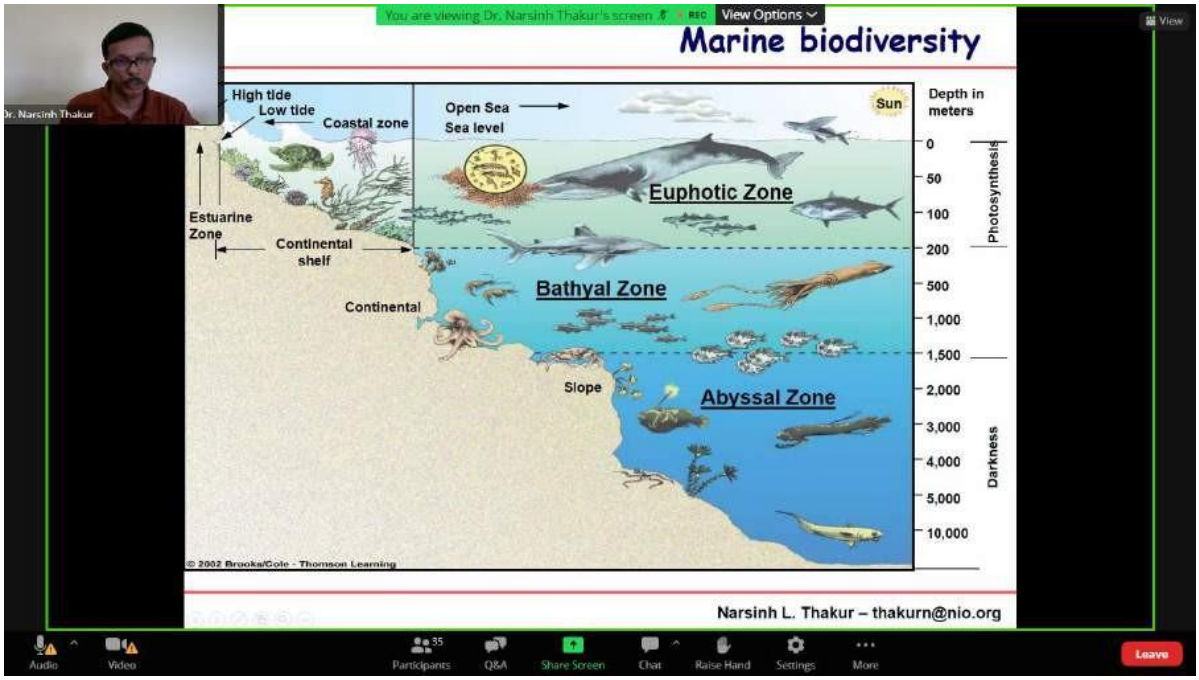


2. **Dr. Narsingh Thakur "Marine Bioprospecting"**

- He talked about marine bioprospecting, marine organisms, and chemical ecology. Bioprospecting means a systematic and organized search for useful products derived from bioresources including plants, microorganisms, animals, etc. that can be developed further for commercialization and overall benefits of the society. Marine organisms are the potential organisms for drug discovery. Sea anemones, coral, algae, jellyfish, and barnacles are the potential organisms for bioprospecting. In some sponge species, 40 % of the animal's biomass is attributed to bacteria, which exceeds the bacterial population of seawater by two to four orders of magnitude. Some sessile organisms like sponges provide habitat space for microorganisms. Ayurveda, the ancient Indian medical system recommends marine products such as praval (coral), mukta (pearl), kapardika (cowry), shukti (oyster shell), shankha (conch), agnijara (amber), etc. In many surgeries, marine sponges are used and approximately 5 different marine naturalproducts are currently on the market. Plitidepsin is used as an anti-cancer. The unique marine environment facilitates the biosynthesis of an array of secondarymetabolites which act as chemical weapons of marine organisms.


You are viewing Dr. Narsinh Thakur's screen
View Options
Marine bioprospecting
Dr. Narsinh Thakur
Narsinh L. Thakur, CSIR – NIO, Goa
thakurn@nio.org
Audio
Video
Participants
Q&A
Share Screen
Chat
Raise Hand
Settings
More
Leave


You are viewing Dr. Narsinh Thakur's screen
View Options
Marine biodiversity
Dr. Narsinh Thakur
High tide
Low tide
Coastal zone
Open Sea
Sea level
Sun
Depth in meters
Estuarine Zone
Continental shelf
Euphotic Zone
Photosynthesis
Bathyal Zone
Continental
Slope
Abyssal Zone
Darkness
0
50
100
200
500
1,000
1,500
2,000
3,000
4,000
5,000
10,000
© 2002 Brooks/Cole - Thomson Learning
Narsinh L. Thakur – thakurn@nio.org
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Video
Participants
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Settings
More
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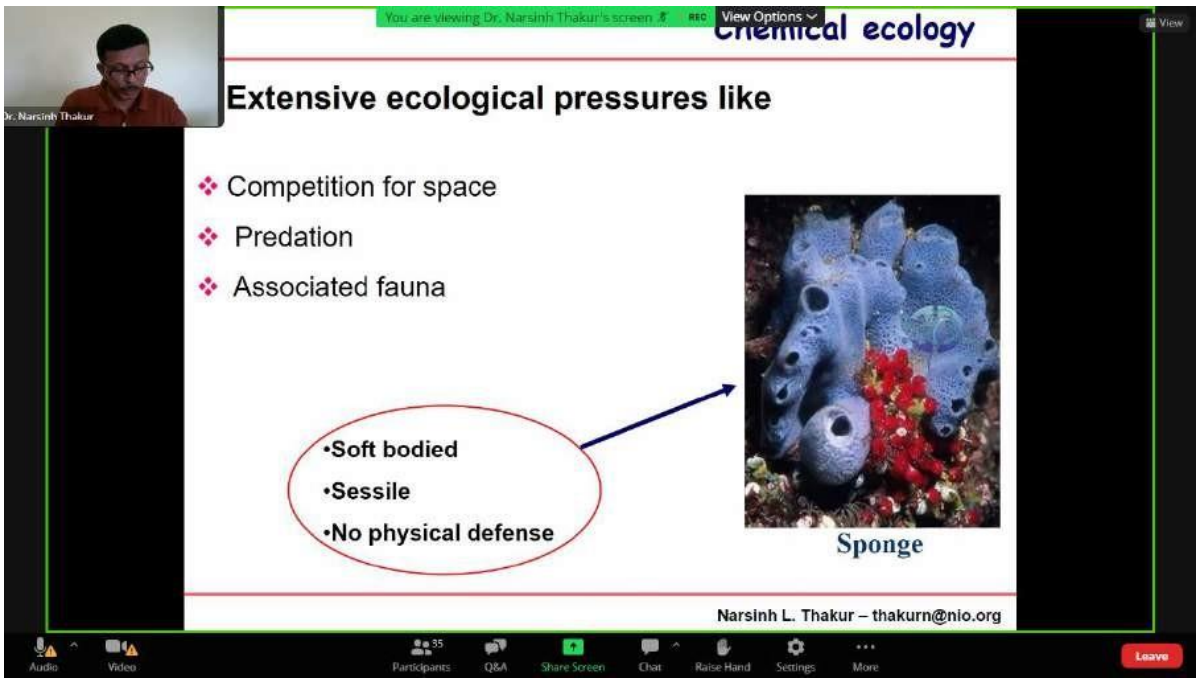
You are viewing Dr. Narsinh Thakur's screen
View Options
Marine Biodiversity
Dr. Narsinh Thakur
Sponges
A
Potential organisms for drug discovery
Narsinh L. Thakur – thakurn@nio.org
Audio
Video
Participants
Q&A
Share Screen
Chat
Raise Hand
Settings
More
Leave


You are viewing Dr. Narsinh Thakur's screen
View Options
Chemical ecology
Dr. Narsinh Thakur
Extensive ecological pressures like
Competition for space
Predation
Associated fauna
•Soft bodied
•Sessile
•No physical defense
Sponge
Narsinh L. Thakur – thakurn@nio.org
Audio
Video
Participants
Q&A
Share Screen
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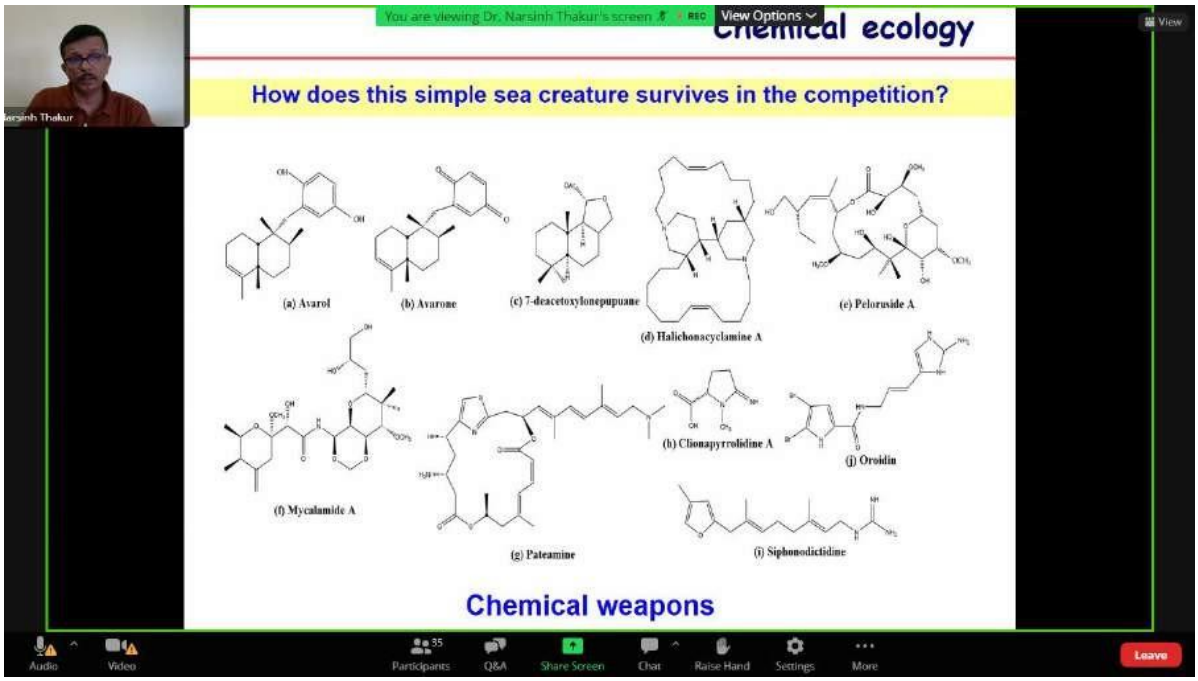
View Options
Chemical ecology
pace competation
Severe space competition in intertidal / coral reef regions
Narsinh L. Thakur – thakurn@nio.org
Audio
Video
Participants
Q&A
Share Screen
Chat
Raise Hand
Settings
More
Leave


You are viewing Dr. Narsinh Thakur's screen
View Options
Chemical ecology
How does this simple sea creature survives in the competition?
(a) Avarol
(b) Avarone
(c) 7-deacetoxylonepupuane
(d) Halichonacyclamine A
(e) Peloruside A
(f) Mycalamide A
(g) Pateamine
(h) Clionapyrrolidine A
(j) Oroidin
(i) Siphonodictidine
Chemical weapons
Audio
Video
Participants
Q&A
Share Screen
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Raise Hand
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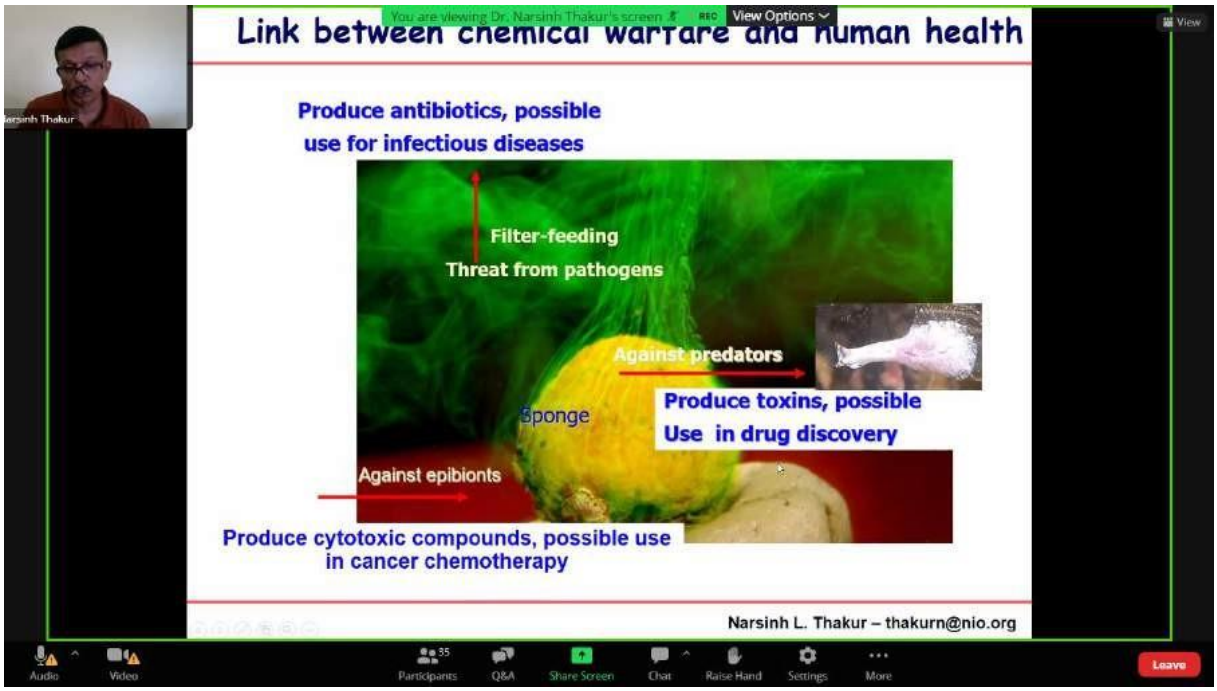
You are viewing Dr. Narsinh Thakur's screen
View Options
Link between chemical warfare and human health
Produce antibiotics, possible
use for infectious diseases
Filter-feeding
Threat from pathogens
Against predators
Sponge
Produce toxins, possible
Use in drug discovery
Against epibionts
Produce cytotoxic compounds, possible use
in cancer chemotherapy
Narsinh L. Thakur – thakurn@nio.org
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Video
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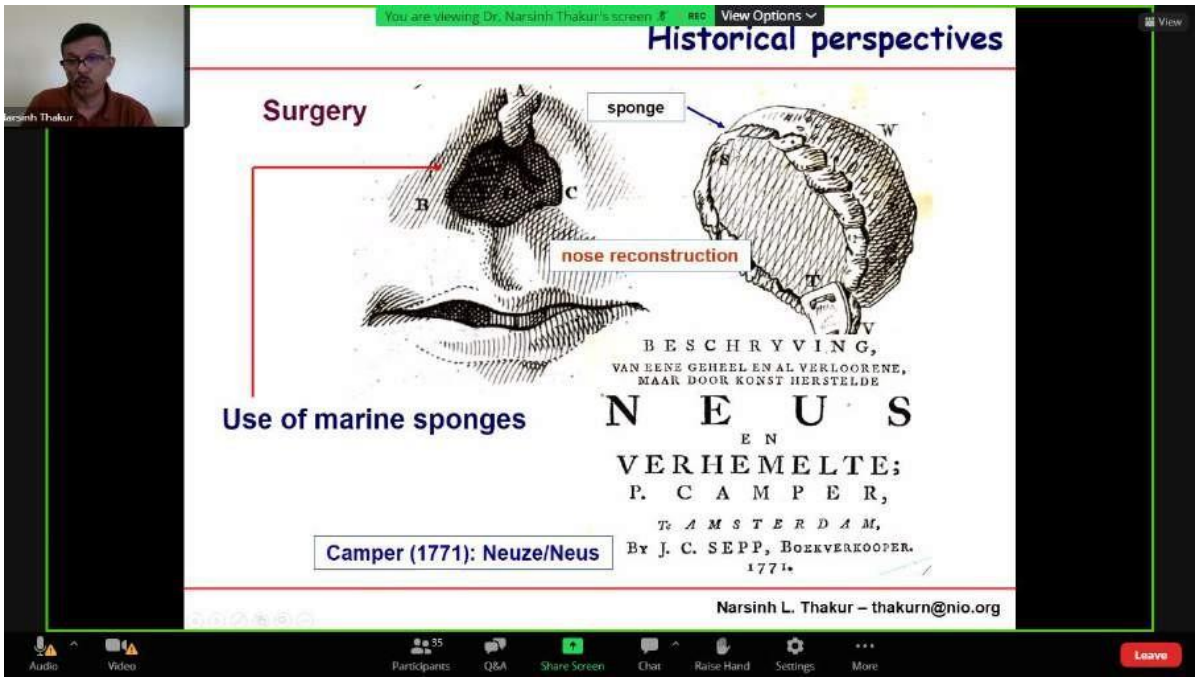
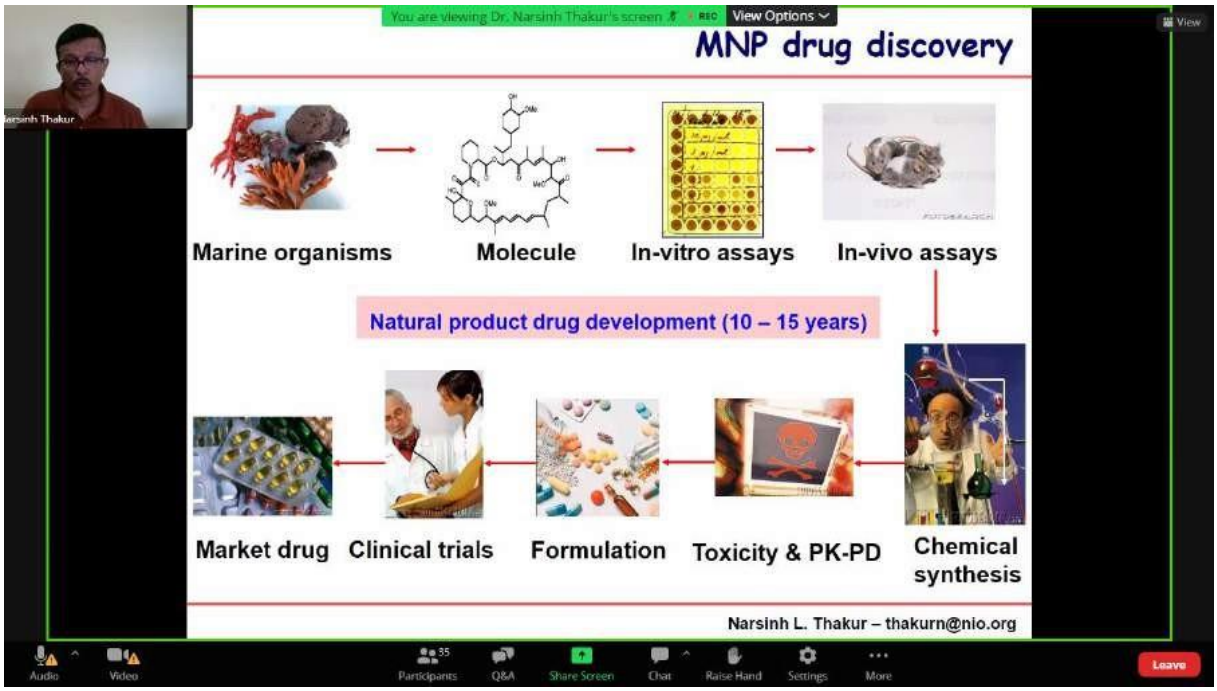
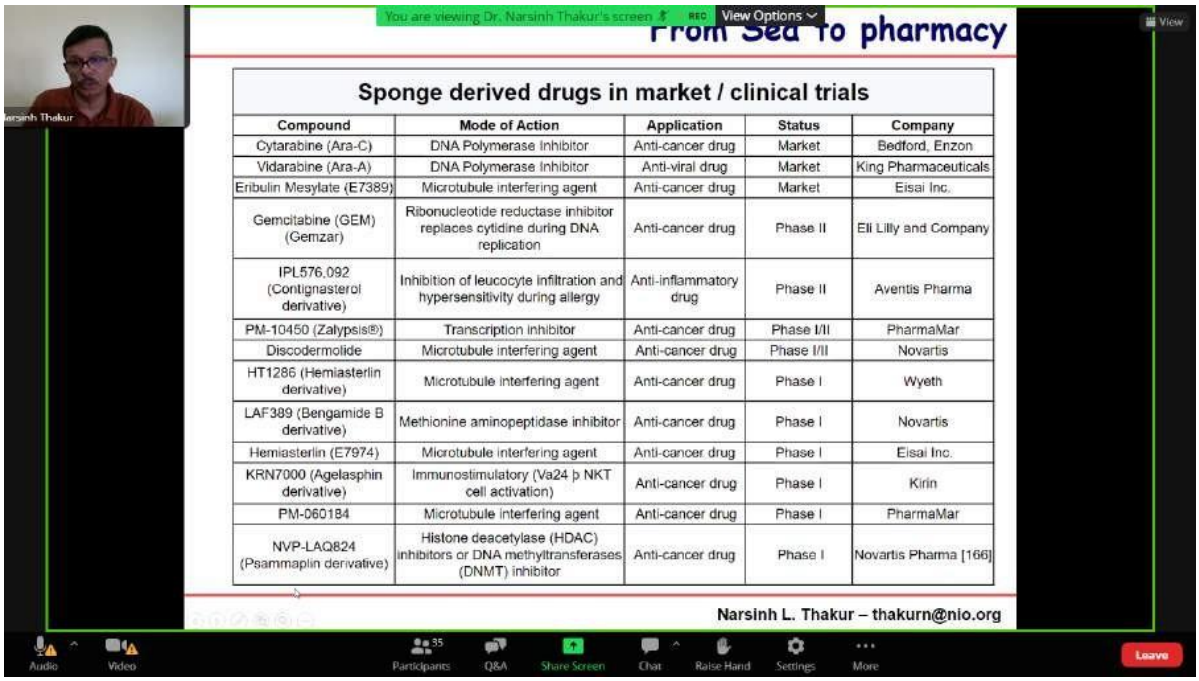
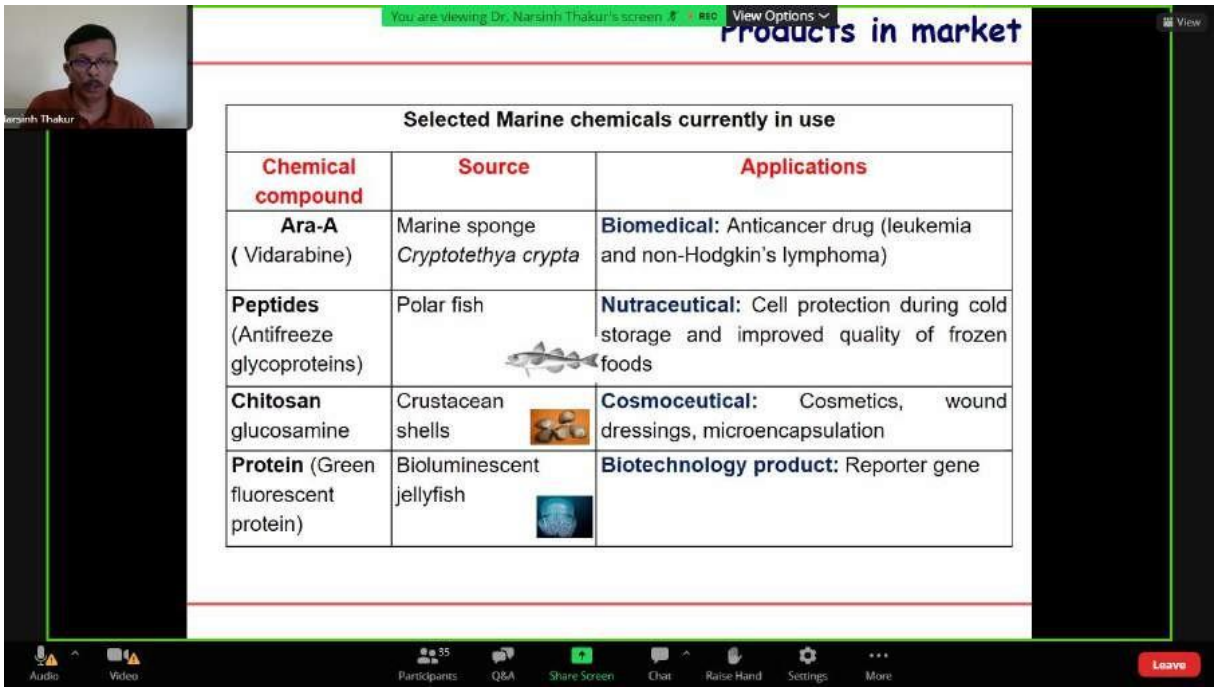

You are viewing Dr. Narsinh Thakur's screen
View Options
Historical perspectives
Surgery
sponge
nose reconstruction
Use of marine sponges
BESCHRYVING,
VAN EENE GEHEEL EN AL VERLOORENE,
MAAR DOOR KONST HERSTELDE
NEUS
EN
VERHEMELTE;
P. CAMPER,
TE AMSTERDAM,
BY J. C. SEPP, BOEKVERKOOPER.
1771.
Camper (1771): Neuze/Neus
Narsinh L. Thakur – thakurn@nio.org
Audio
Video
Participants
Q&A
Share Screen
Chat
Raise Hand
Settings
More
Leave





Sponge derived drugs in market / clinical trials

Compound	Mode of Action	Application	Status	Company
Cytarabine (Ara-C)	DNA Polymerase Inhibitor	Anti-cancer drug	Market	Bedford, Enzon
Vidarabine (Ara-A)	DNA Polymerase Inhibitor	Anti-viral drug	Market	King Pharmaceuticals
Eribulin Mesylate (E7389)	Microtubule interfering agent	Anti-cancer drug	Market	Eisai Inc.
Gemcitabine (GEM) (Gemzar)	Ribonucleotide reductase inhibitor replaces cytidine during DNA replication	Anti-cancer drug	Phase II	Eli Lilly and Company
IPL576,092 (Contignasterol derivative)	Inhibition of leucocyte infiltration and hypersensitivity during allergy	Anti-inflammatory drug	Phase II	Aventis Pharma
PM-10450 (Zalypsis®)	Transcription inhibitor	Anti-cancer drug	Phase I/II	PharmaMar
Discodermolide	Microtubule interfering agent	Anti-cancer drug	Phase I/II	Novartis
HT1286 (Hemiasterlin derivative)	Microtubule interfering agent	Anti-cancer drug	Phase I	Wyeth
LAF389 (Bengamide B derivative)	Methionine aminopeptidase inhibitor	Anti-cancer drug	Phase I	Novartis
Hemiasterlin (E7974)	Microtubule interfering agent	Anti-cancer drug	Phase I	Eisai Inc.
KRN7000 (Agelasphin derivative)	Immunostimulatory (Va24 þ NKT cell activation)	Anti-cancer drug	Phase I	Kirin
PM-060184	Microtubule interfering agent	Anti-cancer drug	Phase I	PharmaMar
NVP-LAQ824 (Psammaplin derivative)	Histone deacetylase (HDAC) inhibitors or DNA methyltransferases (DNMT) inhibitor	Anti-cancer drug	Phase I	Novartis Pharma [166]


You are viewing Dr. Narsinh Thakur's screen
View Options
Products in market
Selected Marine chemicals currently in use
Chemical compound
Source
Applications
Ara-A (Vidarabine)
Marine sponge Cryptotethya crypta
Biomedical: Anticancer drug (leukemia and non-Hodgkin's lymphoma)
Peptides (Antifreeze glycoproteins)
Polar fish
Nutraceutical: Cell protection during cold storage and improved quality of frozen foods
Chitosan glucosamine
Crustacean shells
Cosmoceutical: Cosmetics, wound dressings, microencapsulation
Protein (Green fluorescent protein)
Bioluminescent jellyfish
Biotechnology product: Reporter gene
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You are viewing Dr. Narsinh Thakur's screen
View Options
Supply issue
Possible solutions
Mariculture
Cell culture
Chemical synthesis
Molecular biology
Audio
Video
Participants
Q&A
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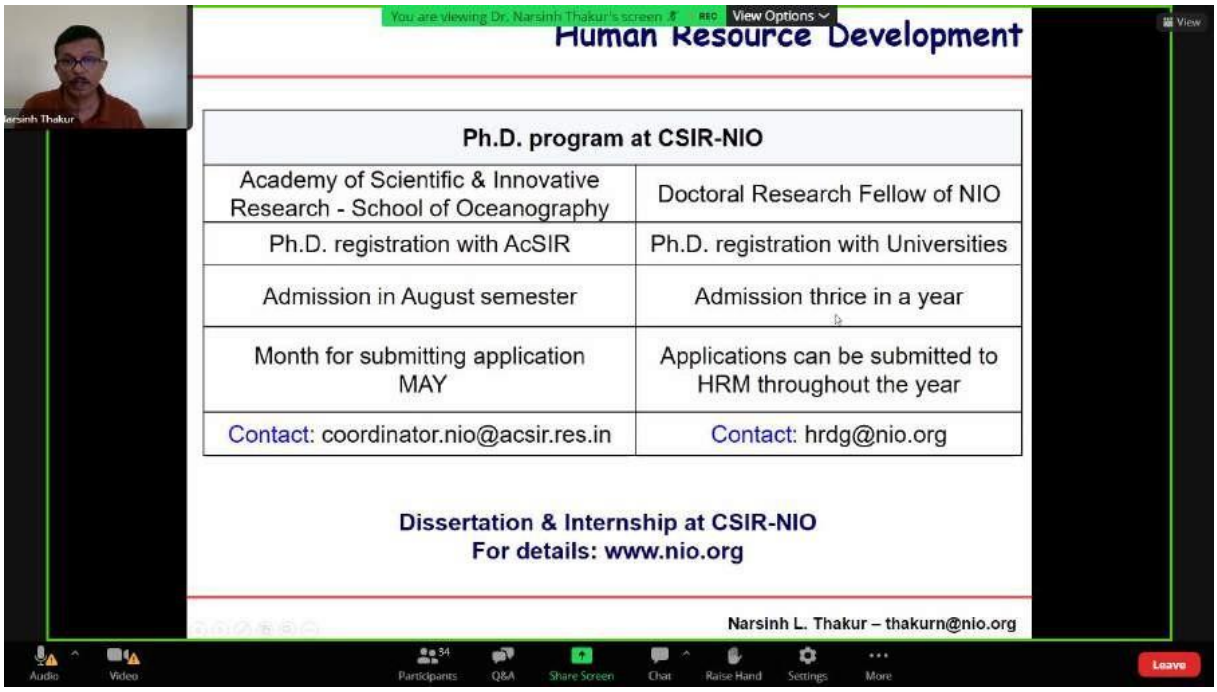
Raise Hand
Settings
More
Leave



3. Captain Sarabjeet Singh Parmar "Balancing the Oceans and Humanity"

- He discussed about the balancing of oceans and humanity. He also discussed acidification, sea level rise, and plastic pollution. The sustainable use of ocean resources for economic growth, improved livelihoods, andjobs while preserving the health of the ocean ecosystem. All economic activities related to oceans, seas, and coasts. The center for the blue economy is now a widely used term around the world with threerelated but distinct meanings. National prosperity, increase employment, promote entrepreneurship, climate changemitigation, and sustainable development are the advantages. It is required to change the tide. Need to breathe, think, and dream balancing oceans andhumans needs while progressing blue economy.


You are viewing Captain Sarabjeet S Parmar's screen
View Options
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS
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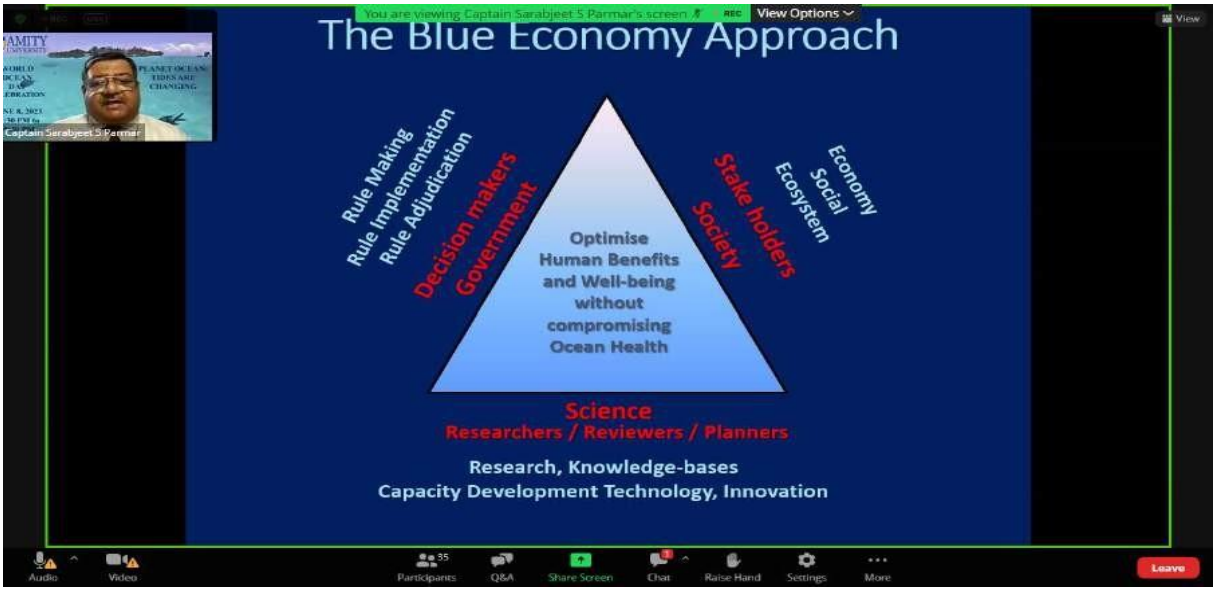
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The Blue Economy Approach
Rule Making
Rule Implementation
Rule Adjudication
Decision makers
Government
Stake holders
Society
Economy
Social
Ecosystem
Optimise Human Benefits and Well-being without compromising Ocean Health
Science
Researchers / Reviewers / Planners
Research, Knowledge-bases
Capacity Development Technology, Innovation
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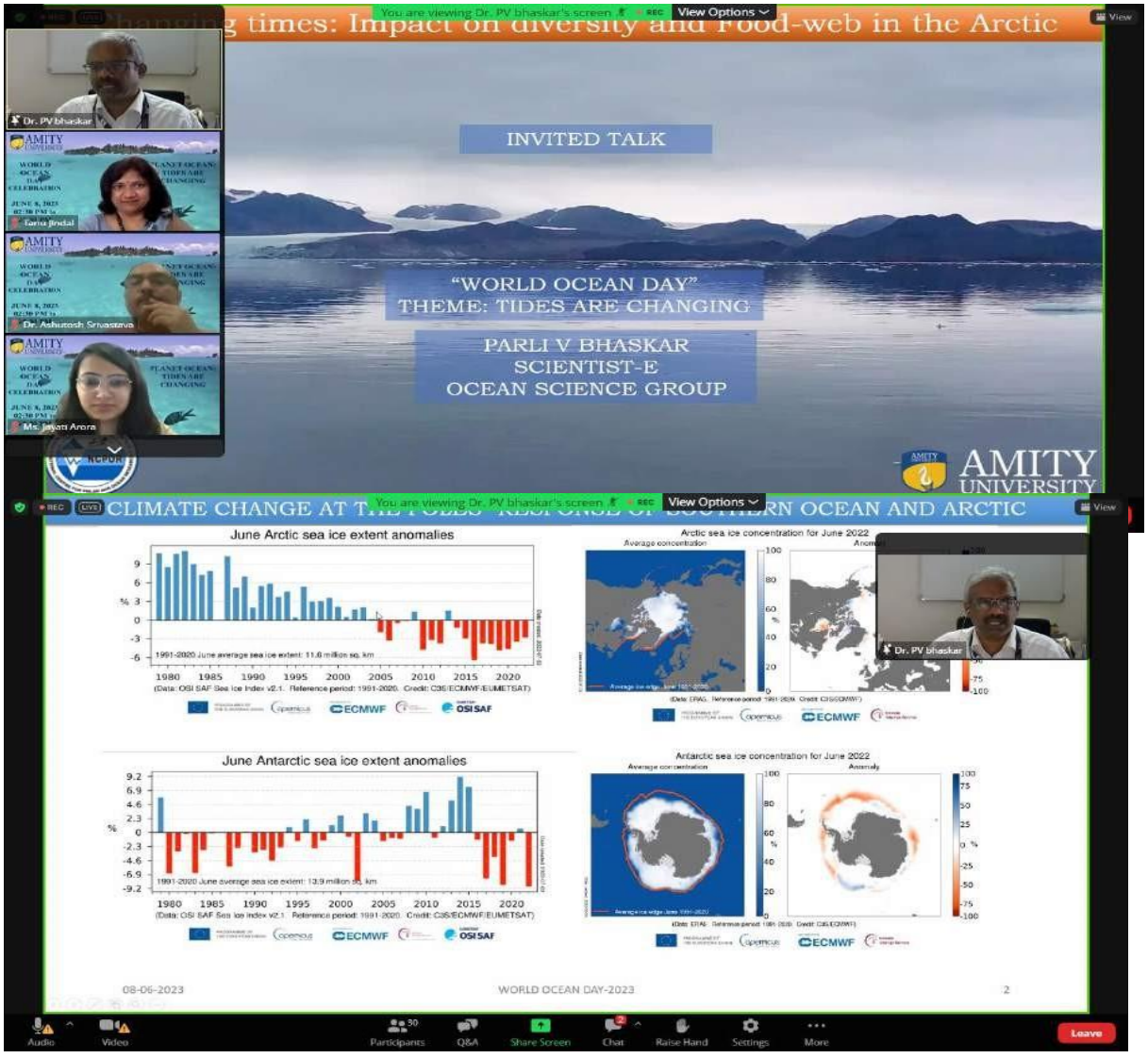
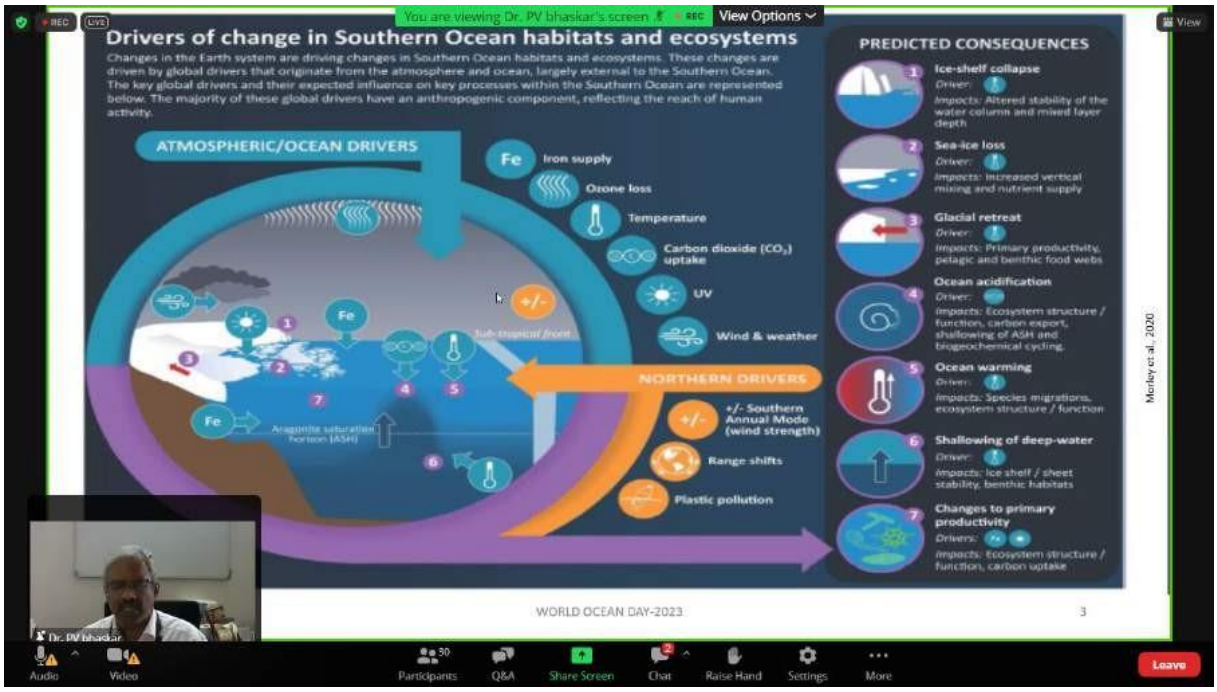
4. **Dr. PV Bhaskar "Changing times: Impact on diversity and food web in the Arctic"**

- He discussed atmospheric/ocean drivers which take part in the change in Southern Ocean habitats. The Arctic region warming up 3 times than the global average. Glaciers along Kongsfjorden shrinking rate 150 m yr^{-1} (Svendsen et al. 2002). He showed the aerial view

of Knogsfjord of the year 2011 and 2018. Phytoplankton depends on temp, light, and nutrients. Composition of phytoplankton affects grazing community: diatoms-based food-web tomicrobial loop. He discussed SST, SSS, PAR, TSM, Chl a Nutrients, phytoplankton & bacteriaenumeration, and flow cytometry. AAAT over Ny-Alesund increased from 2011 (-3.5 ºC) to 2018 (-2.4 ºC). He and his team reported the highest SST & SSS in 2011. In 2011, TSM increased towards the mouth attributed to wind direction. Increased warming is resulting in an increase in glacial meltwater influx. An increase in TSM affects water column properties. Warming is more conducive to photosynthetic heterotrophic flagellates than diatoms. Dominance of mixotrophs pan-Svalbard indicates shift in trophic structure.

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Drivers of change in Southern Ocean habitats and ecosystems
Changes in the Earth system are driving changes in Southern Ocean habitats and ecosystems. These changes are driven by global drivers that originate from the atmosphere and ocean, largely external to the Southern Ocean. The key global drivers and their expected influence on key processes within the Southern Ocean are represented below. The majority of these global drivers have an anthropogenic component, reflecting the reach of human activity.
ATMOSPHERIC/OCEAN DRIVERS
Fe
Iron supply
Ozone loss
Temperature
Carbon dioxide (CO_2) uptake
UV
Wind & weather
+/-
Sub-tropical front
NORTHERN DRIVERS
+/- Southern Annual Mode (wind strength)
Range shifts
Plastic pollution
Aragonite saturation horizon (ASH)
PREDICTED CONSEQUENCES
1 Ice-shelf collapse
Driver:
Impacts: Altered stability of the water column and mixed layer depth
2 Sea-ice loss
Driver:
Impacts: Increased vertical mixing and nutrient supply
3 Glacial retreat
Driver:
Impacts: Primary productivity, pelagic and benthic food webs
4 Ocean acidification
Driver:
Impacts: Ecosystem structure / function, carbon export, shallowing of ASH and biogeochemical cycling
5 Ocean warming
Driver:
Impacts: Species migrations, ecosystem structure / function
6 Shallowing of deep-water
Driver:
Impacts: Ice shelf / sheet stability, benthic habitats
7 Changes to primary productivity
Drivers:
Impacts: Ecosystem structure / function, carbon uptake
Morley et al., 2020
WORLD OCEAN DAY-2023
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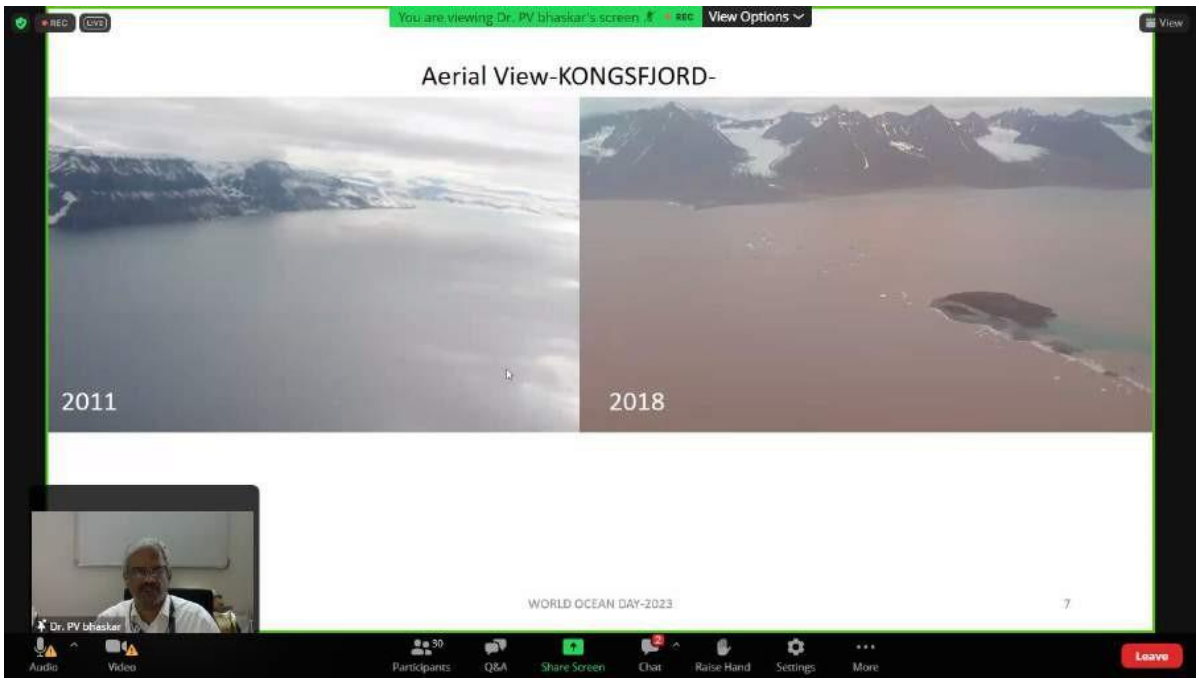
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Aerial View-KONGSFJORD-
2011
2018
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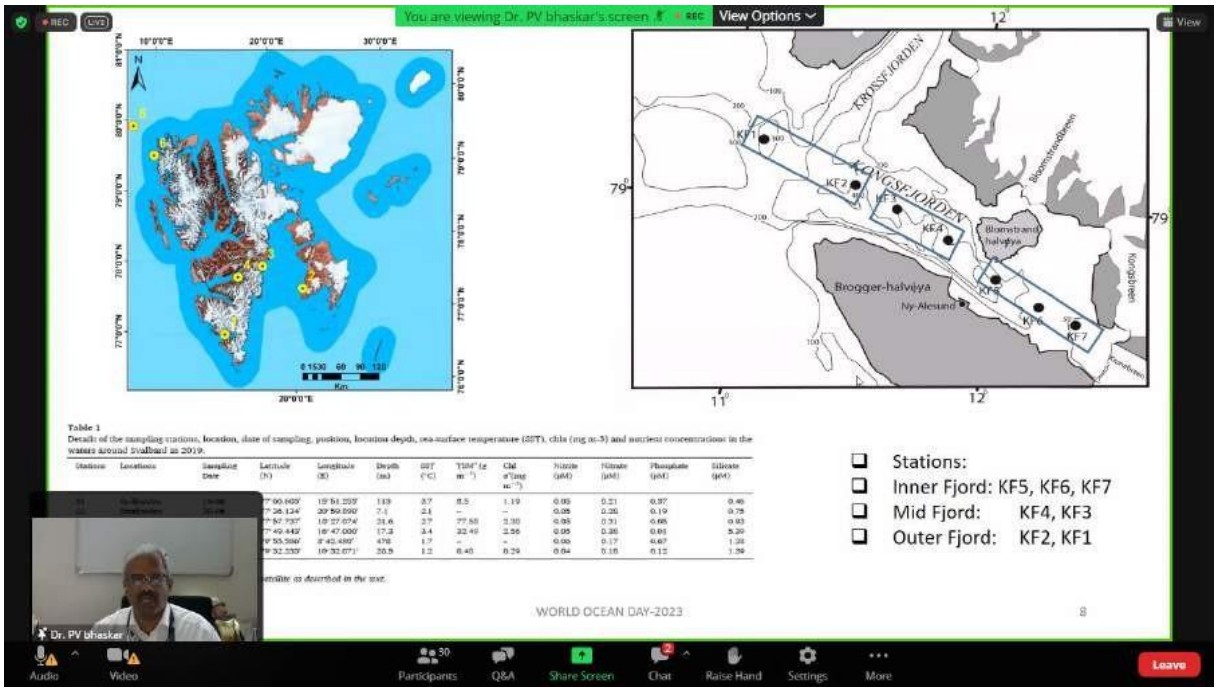
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KONGSFJORDEN
KROSSFJORDEN
KF1
KF2
KF3
KF4
KF5
KF6
KF7
Blomstrandhalvøya
Brogger-halvøya
Ny-Ålesund
Table 1
Details of the sampling stations, location, date of sampling, position, location depth, sea-surface temperature (SST), chla (mg m-3) and nutrient concentrations in the waters around Svalbard in 2019.
Stations:
Inner Fjord: KF5, KF6, KF7
Mid Fjord: KF4, KF3
Outer Fjord: KF2, KF1
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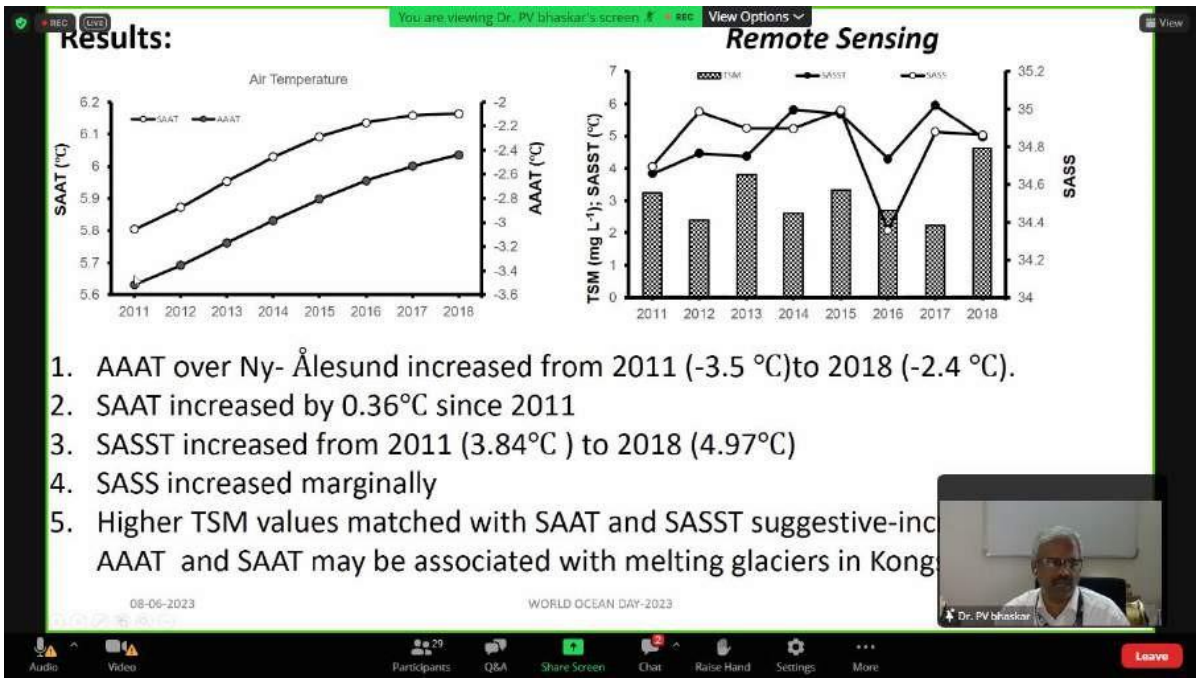
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Results:
Remote Sensing
Air Temperature
SAAT
AAAT
SAAT (°C)
AAAT (°C)
TSM
SASST
SASS
TSM (mg L-1); SASST (°C)
1. AAAT over Ny- Ålesund increased from 2011 (-3.5 °C)to 2018 (-2.4 °C).
2. SAAT increased by 0.36°C since 2011
3. SASST increased from 2011 (3.84°C) to 2018 (4.97°C)
4. SASS increased marginally
5. Higher TSM values matched with SAAT and SASST suggestive-inc
AAAT and SAAT may be associated with melting glaciers in Kong
08-06-2023
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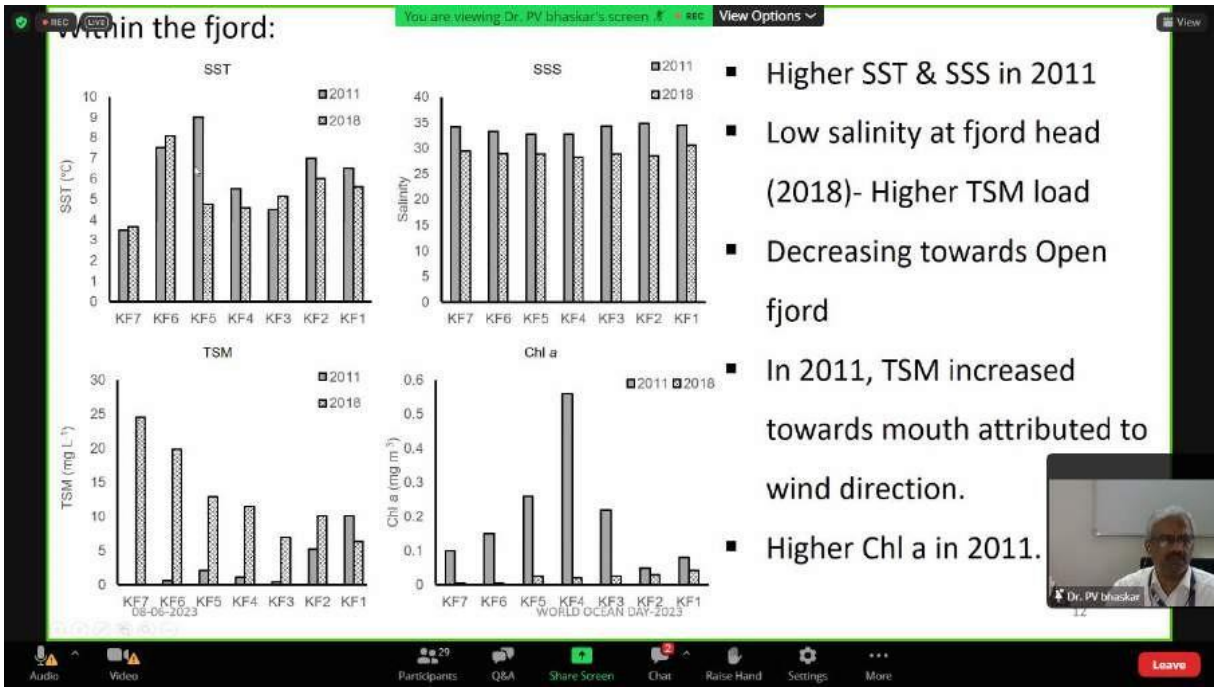

Vote of thanks

The vote of thanks was given by Dr. Abhishek Chauhan, Senior Scientist, Amity Institute of Environmental Toxicology, Safety & Management, Amity University, Noida (UP).