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Persistent Organic Pollutants in Biotic and Abiotic Components of Antarctic Pristine Environment

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Antarctic Environment

Highest
Driest
Coldest
Windiest
Emptiest

Largely covered by the Antarctic ice sheet, ~ 0.35 % of the continent remains free from ice and snow cover for part or all of the year.

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Antarctic Environment

Low temperature,

Different pH levels,

Low organic nutrient and water availability,

Strong winds

UV radiation

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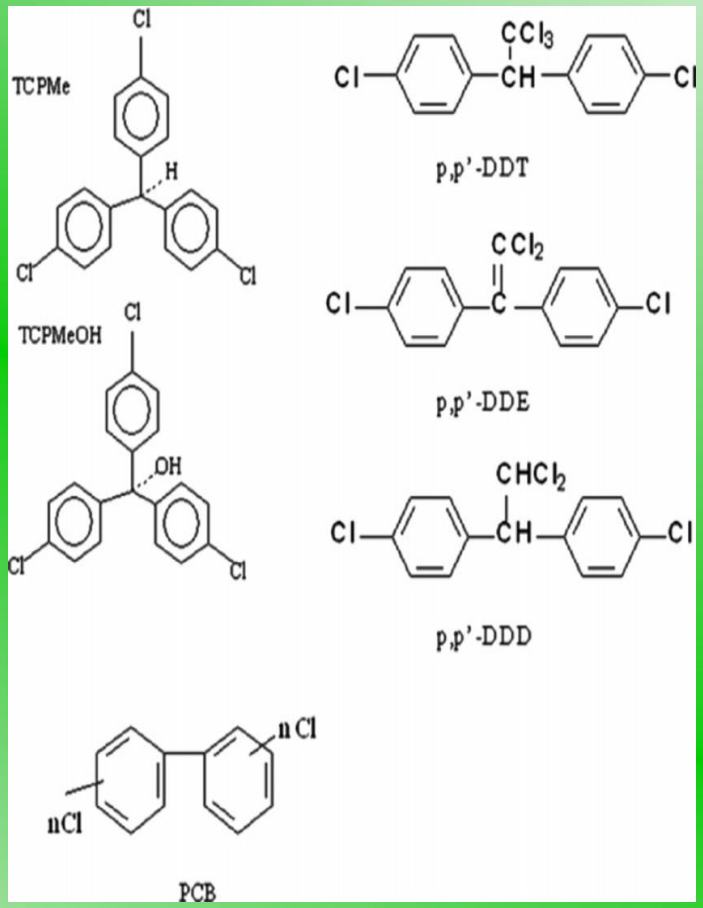
Persistent Organic Pollutants (POPs) in Antarctic Pristine Environment

POPs are toxic in nature, semi volatile organic compounds that resist photolytic, chemical, biological degradation and have fatal properties. POPs are considered by high lipid solubility and low water solubility.

POPs have been detected in Antarctica despite its geographical isolation and almost complete absence of human settlements



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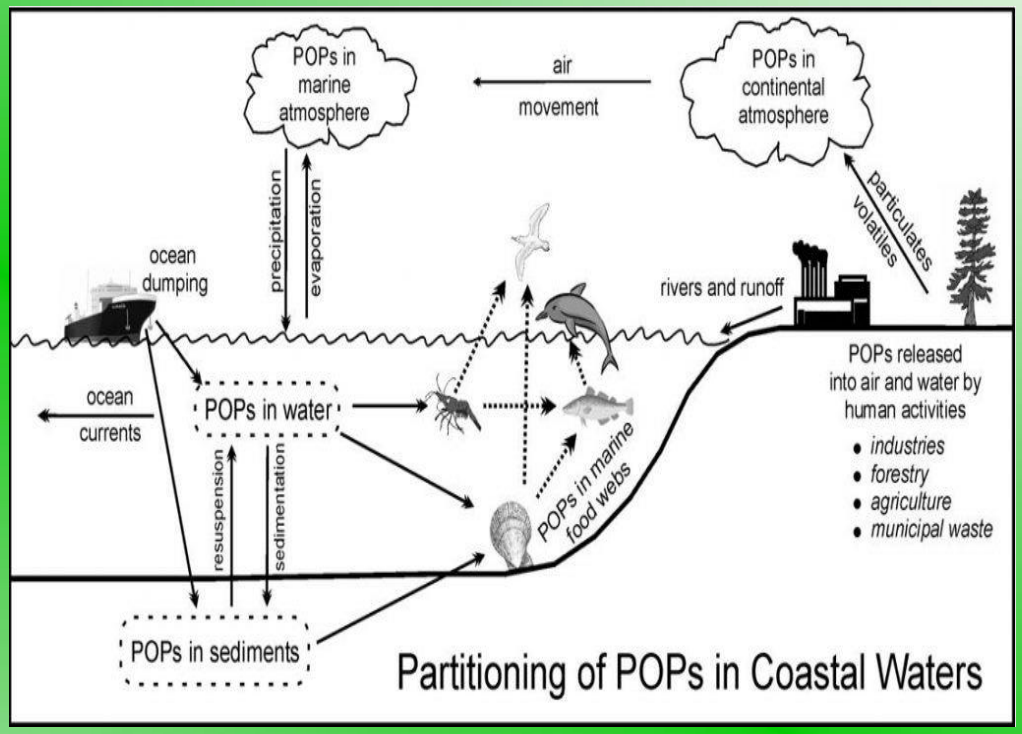
Persistent Organic Pollutants (POPs) in Antarctic Pristine Environment

POPs including organochlorines are used for industrial purposes and pest control, are worldwide spread through the atmosphere and transferred to Polar Regions via cold condensation



These pollutants are transported globally through water, air and migratory species, after travelling long distances are deposited far from their original place. Soil, sediment and snow are the recorders of POP levels besides they accumulate valuable information for previous environmental and climatic proceedings

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Impact of Scientific and tourism activities

Scientific stations and tourism activities have caused an exponential increase in human presence on the continent, affecting the ecosystem

Maitri Research Base

Bharati Research Base

Progress Research Base

Zhongshan Research Base

Many human activities in scientific bases located throughout Antarctica have been associated with alteration, and negative impact on, the environment by physical, chemical and biological contamination

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Distribution of POPs through aerographic effect

Grasshopper Effect

POPs migrate across the earth by the process called "grasshopper effect". It is frequently a seasonal phenomenon in which POPs evaporate from a warmer region, enter in to the atmosphere and are condensed in a comparative colder region.

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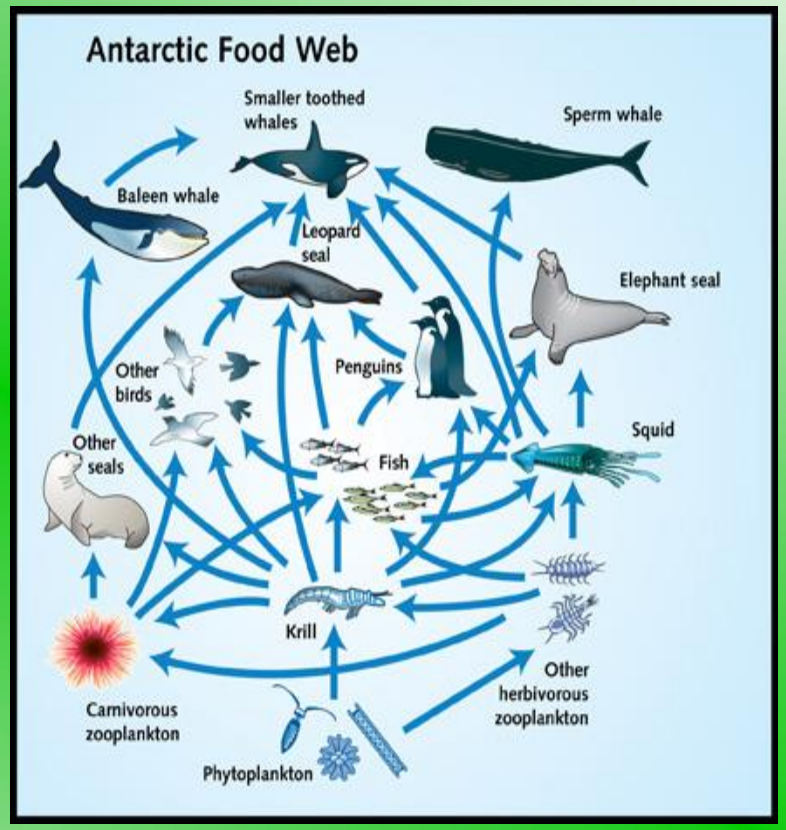
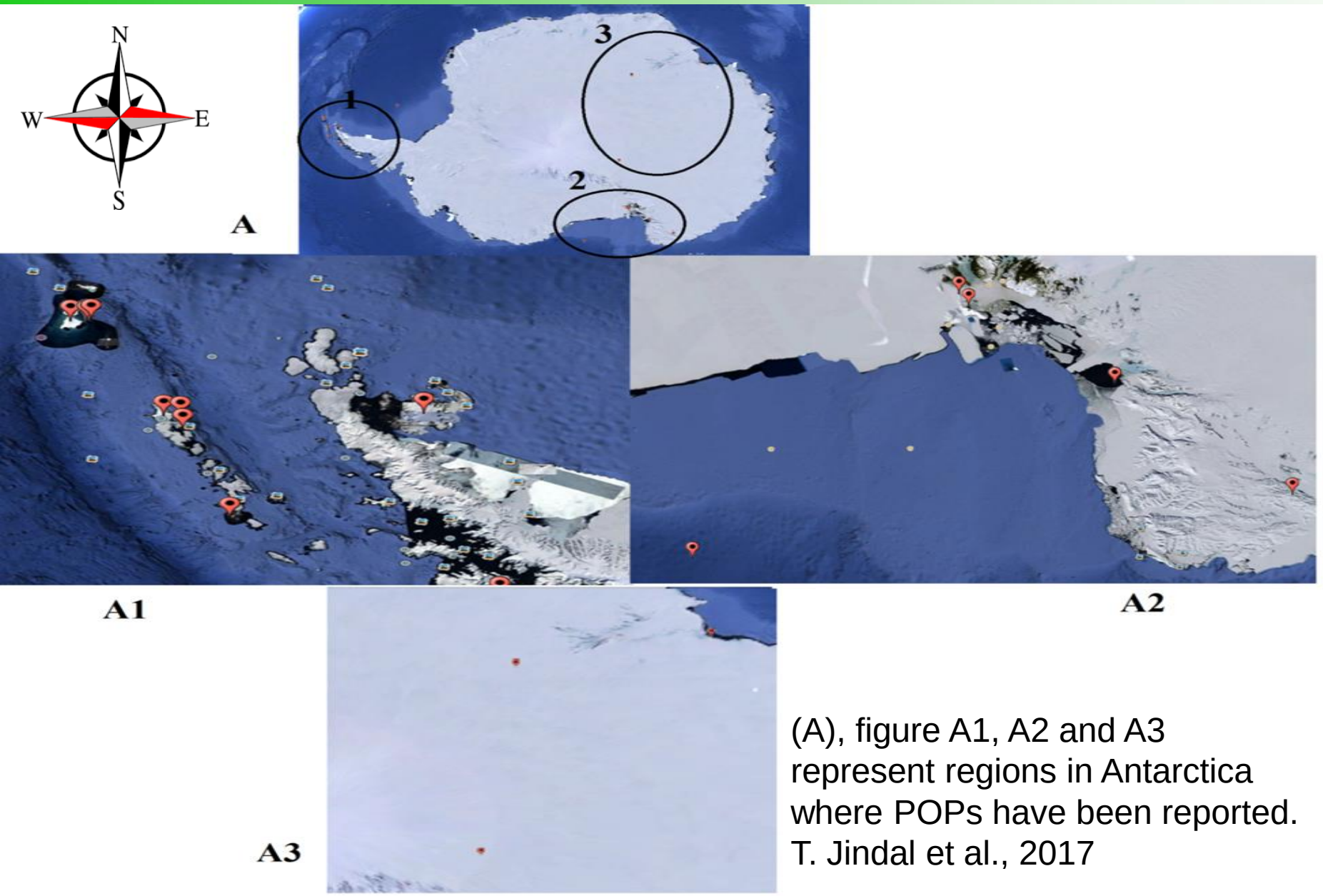
Transmission of POPs through the Antarctic food chains

- The ecosystems of Antarctic and Arctic have been mainly affected by POPs which have made their way into the food web.
- Plants, marine planktons and filtering organisms are the key moderators which absorb the nutrients in the water column. These are the food materials for fish. After consumption of these organisms as food, POPs present in them accumulate in their adipose tissue.
- The concentration of POPs in the adipose tissue goes higher up the food chain, where they can reach levels up to several tens of thousands of times higher than in the surrounding environment.
- POPs ascent in the food web from fish to birds and reach the large marine mammals including humans at the top of the food chain, at increasing concentrations.
- Migratory birds also spread POPs at several thousand kilometers from their original source.



Geographical presence of POPs in Antarctica



(A), figure A1, A2 and A3 represent regions in Antarctica where POPs have been reported. T. Jindal et al., 2017

Occurrence of POPs in Antarctic Water Bodies

POPs Category *	Nature of Sample	Location	Concentration	Reference
PCBs	Surface Micro layer, Sub Surface Water	Gerlache Inlet, Ross Sea	427 pg/l 48 pg/l	Fuoco et. al.,2005
PAHs	Surface Micro Layer, Sub Surface Water	Gerlache Inlet, Ross Sea	2300 pg/l 325 pg/l	Fuoco et. al.,2005
HCH-α, HCH- γ	Surface water	Western Antarctica Peninsula	1.65-4.54 pg/l 0.9-10.5 pg/l	Dickhut et. al., 2005
PCBs	Surface sea water	Ross Sea and Terranova Bay	55-84 pg/l 23 pg/l 36-53 pg/l	Fuoco et. al., 2009
PAHs	Surface sea water	Ross Sea and Terranova Bay	122-330 pg/l 328-360 pg/l 96-281 pg/l	Fuoco et. al., 2009
PCBs	Lake water	Victoria Land	46-143 pg/l	Vecchiato et. al., 2015

Occurrence of POPs in Atmosphere

PCBs	Atmosphere	Korean Antarctic Research Station	0.85-3.12 pg/ m^3	Choi et. al., 2008
PCBs	Atmosphere	Antarctic Peninsula	20-43 pg/ m^3	Bengston Nash, 2011
PBDE	Atmosphere	King Sejong Station on King George Island	0.67-2.98 pg/ m^3	Li et. al., 2012 a
PCBs	Atmosphere	Terra Nova Bay	0.16-2.07 pg/ m^3	Piazza et. al., 2013
PBDEs	Atmosphere	Terra Nova Bay	0.14-1.69 pg/ m^3	Piazza et. al., 2013
PCBs	Atmosphere	Norwegian Troll Station	0.78-3.68 pg/ m^3	Kallenborn et. al., 2013
PCBs	Atmosphere	Chilean station	1-4 pg/ m^3	Pozo et. al., 2014
PCBs	Atmosphere	Chinese Great Wall Station, West Antarctica	0.91-35.9 pg/ m^3	Wang et. al., 2017
PBDEs	Atmosphere	Chinese Great Wall Station, West Antarctica	0.60-16.1 pg/ m^3	Wang et. al., 2017

Occurrence of POPs in Antarctic Sediments

POPs	Nature of Sample	Location	Concentration	Reference
PAHs	Marine sediment	Scott Base McMurdo Sewage Outfall Turtle Rock, Cape Evans	110–370 ng/g 1100–2100 ng/g 70–360 ng/g	Negri et. al., 2006
PAHs	Marine sediment	Scott Base McMurdo Sewage Outfall Turtle Rock, Cape Evans	15–30 ng/g 270–550 ng/g 10–30 ng/g	Negri et. al., 2006
PAHs	Marine benthic sediment	Mc-Murdo Station	1077–2053 ng/g 621–5024 ng/g	Kim et. al., 2006
PAHs	Marine sediment	Potter Cove (South Shetland Islands)	28–312 ng/g dry wt 36–1908 ng/g dry wt	Curtosi et. al., 2007
PAHs	Marine sediment	James Ross Island	20-50 ng/g	Klanova et. al., 2008
PCBs	Marine sediment	James Ross Island	0.4-0.5 ng/g	Klanova et. al., 2008
PBDEs	Sediment	Mc-Murdo Sound	< 677 ng/g (TOC basis)	Hale et. al., 2008
HCH-γ	Marine sediment	James Ross Island	0.2-0.3 ng/g	Klanova et. al., 2008
HCB	Sediment	West Antarctic Peninsula	2-130 pg/g dw	Zhang et. al., 2013
p,p'-DDE	Sediment	West Antarctic Peninsula	20.0 pg/g dw	Zhang et. al., 2013
PCBs	Lake Sediment	Victoria Land	10-634 pg/g	Vecchiato et. al., 2015
PBDEs	Lake Sediment	Victoria Land	193-1682 pg/g	Vecchiato et. al., 2015
HCBs	Sediment	King George Island	57.7 pg/g dw	Zhang et. al., 2015

Occurrence of POPs in Antarctic Soil

POPs Category*	Nature of Sample	Location	Concentration	Reference
PAHs	Soil	Mc-Murdo Station	1724–46479 ng/g 664–74267 ng/g	Kim et. al., 2006
PAHs	Soil	Potter Cove (South Shetland Islands)	10–1182 ng/g dry wt 12–552 ng/g dry wt	Curtosi et. al., 2007
PCBs	Soil Sample	West Antarctica	0.008-0.03 ng/g dw	Park et. al., 2010
PCBs	Soil Surface (1 cm)	West Antarctica	0.012-0.32 ng/g dw	Cabrerizo et. al., 2012
HCB	Soil Surface (1 cm)	West Antarctica	0.07 ng/g dw	Cabrerizo et. al., 2012
PAHs	Soil Surface (0-5 cm)	West Antarctica	0.16-3.51 ng/g dw	Cabrerizo et. al., 2012
PCBs	Soil	Victoria Land	112-561 pg/g	Vecchiato et. al., 2015
PBDEs	Soil	Victoria Land	0.77-33 ng/g	Vecchiato et. al., 2015
HCBs	Soil	King George and Adley Island	67.9-108 pg/g dw	Zhang et. al., 2015
HCHs	Soil	King George and Adley Island	6.25-31 pg/g dw	Zhang et. al., 2015
DDTs	Soil	King George and Adley Island	18.8-277 pg/g dw	Zhang et. al., 2015
PCBs	Soil	Chinese Antarctic Zhongshan Station	A-8.20±7.72 pg/g C-3.41±1.97 pg/g	Mwangi et. al., 2016

Occurrence of POPs in Antarctic Sea Ice/Snow

POPs Category*	Nature of Sample	Location	Concentration	Reference
HCH-α, HCH-γ	Sea ice	Western Antarctica Peninsula	<0.04-2.18 pg/l 3.6-5.7 pg/l	Dickhut et. al., 2005
Heptachlor, Heptachlor epoxide	Sea ice	Western Antarctica Peninsula	<2.5–5.8 pg/l <0.6–2.2 pg/l	Dickhut et. al., 2005
PCBs	Snow	Victoria Land	110-580 pg/l	Vecchiato et. al., 2015
PBDEs	Snow	Victoria Land	130-340 pg/l	Vecchiato et. al., 2015

Occurrence of POPs in Antarctic Mosses

POPs Category*	Nature of Sample	Location	Concentration	Reference
HCH- α, HCH- γ	Mosses	Victoria Land	0.4-4 ng/g dry wt 0.2-1.6 ng/g dry wt	Borghini et. al., 2005
HCB	Mosses	King George Island	811±180 pg/g dw	Cipro et. al., 2011
HCH	Mosses	King George Island	1200±810 pg/g dw	Cipro et. al., 2011
DDT	Mosses	King George Island	1620±580 pg/g dw	Cipro et. al., 2011
PCBs	Mosses	West Antarctica	0.04-0.76 ng/g dry wt	Cabrerizo et. al., 2012
HCB	Mosses	West Antarctica	0.021-0.12 ng/g dry wt	Cabrerizo et. al., 2012
p,p'-DDE	Mosses	West Antarctica	0.005-0.04 ng/g dry wt	Cabrerizo et. al., 2012
PAH	Mosses	West Antarctica	4.4-34 ng/g dry wt	Cabrerizo et. al., 2012
HCB	Mosses	King George Island	139-663 pg/g dw	Zhang et. al., 2015
HCH	Mosses	King George Island	21.1-162 pg/g dw	Zhang et. al., 2015

Occurrence of POPs in Antarctic Lichen

POPs Category*	Nature of Sample	Location	Concentration	Reference
p,p'-DDE, p,p'-DDT	Lichen	Russian Stations	0.40 ng/g dry wt 0.71 ng/g dry wt	Negoita et. al., 2003
PCBs	Lichen	West Antarctica	0.005-0.004 ng/g dry wt	Park et. al., 2010
DDT	Lichen	King George Island	353±40 pg/g dw	Cipro et. al., 2011
PCBs	Lichen	West Antarctica	0.043-0.61 ng/g dry wt	Cabrerizo et. al., 2012
HCB	Lichen	King George Island	207-632 pg/g dw	Zhang et. al., 2015
PCBs	Lichen	Chinese Antarctic Zhongshan Station	A. 16.4 pg/g B. 7.93 pg/g E- 26.2 pg/g	Mwangi et. al., 2016
PCDD/Fs	Lichen	Chinese Antarctic Zhongshan Station	A. 1.87 pg/g B. 1.77 pg/g E- 2.00 pg/g	Mwangi et. al., 2016

Occurrence of POPs in Antarctic Krill

POPs Category*	Nature of Sample	Location	Concentration	Reference
HCB	Krill	Elephant island, Weddel sea and Shetland islands	1.0 ng/g	Goerke et. al., 2004
PCBs	Krill	Ross Sea in Terra Nova Bay	1.67 ng/g wet wt (whole body)	Corsolini et. al., 2006
DDE-p,p' , DDTs	Krill	12 sampling stations (NE sector)	0.13 ng/g wet wt,2.6 ng/g lipid wt 0.18 ng/g wet wt,3.5 ng/g lipid wt	Bengstone et. al., 2008
HCB	Krill	12 sampling stations (NE sector)	0.2 ng/g wet wt,4.37 ng/g lipid wt	Bengstone et. al., 2008
HCH-α, HCH-β, HCH-γ	Krill	12 sampling stations (NE sector)	0.01 ng/g wet wt,0.28 ng/g lipid wt, 0.01 ng/g wet wt,0.16 ng/g lipid wt, 0.01 ng/g wet wt,0.13 ng/g lipid wt	Bengstone et. al., 2008
PCBs	Krill	12samplingstations (NE sector)	0.05 ng/g wet wt 1.2 ng/g lipid wt	Bengstone et. al., 2008

Occurrence of POPs in Antarctic Adelie Penguin

POPs Category*	Sample Type	Location	Concentration	Reference
PCBs	Adelie penguin eggs (unhatched, n=5)	Edmonson Point (74°20'56.7''S and 165°08'10.03''E)	3.3 ng/g wet wt ,30 ng/g lipid wt	Kumar et. al., 2002
Mirex	P. Adeliae	Waters around Elephant Island	0.6 ng/g	Goerke et. al., 2004
PBDEs	Penguin(eggs)	Ross Sea in Terra Nova	0.29±031 ng/g wet wt	Corsolini et. al., 2006
DDE p,p'	Adelie penguin eggs	Palmer Archipelago Cape Crozier, Ross Island	58.5-755 ng/g lipid wt 73.0-176 ng/g lipid wt	Geisz et. al., 2008
HCB	P. adeliae	Hop Island ($68^0$09'S, $58^0$27'W)	153 ng/g	Van den Brink et. al., 2011
PCBs	Penguin (Pygoscelis adeliae)	Brainsfield Strait (West Antarctica)	12.03±3.91 ng/g	Corsolini et.al., 2011
DL-PCBs	Penguin	King George Island	154 pg/g dw	Wolschke et. al., 2015
PBDEs	Penguin	King George Island	6.2 pg/g dw	Wolschke et. al., 2015
HCB	Penguin (Pygoscelis Spp.)	($62^0$10'S, $58^0$26'W)	0.30-132.2 ng/g	Montone et. al., 2016

Objectives
34th & 35th ISEA, Environmental Monitoring Program

Estimation of POPs in lake water samples collected from Larsemann Hills area, East Antarctica

Sampling sites

- **The Larsemann Hills is an ice-free area of approximately 50 km2, located halfway between the Vestfold Hills and the Amery Ice Shelf on the south-eastern coast of Prydz Bay, Princess Elizabeth Land, East Antarctica.**
  - **Bharati Indian Research Station which is located between Thala Fjord & Quilty bay, east of Stornes Peninsula in Antarctica at 69° 24.41' S, 76° 11.72' E approximately 35 m above sea level.**

Sampling Sites

S.No	Lake identification	Region	Latitude	Longitude
1	L1 C	Northern Grovness Peninsula	69°24'24.56"S	76°11'19.49"E
2	L1 D	Northern Grovness Peninsula	69°24'22.28"S	76°11'22.72"E
3	L1 E	Northern Grovness Peninsula	69°24'23.51"S	76°11'25.20"E
4	L3	Northern Grovness Peninsula	69°24'27.56"S	76°11'3.71"E
5	L5 (005)	Northern Grovness Peninsula	69°24'32.83"S	76°10'45.75"E
6	L6 (VI) (Bharti Top)	Northern Grovness Peninsula	69°24'37.30"S	76°11'5.13"E
7	L7 (VII)	Northern Grovness Peninsula	69°24'34.32" S	76°11'39.41"E
8	L7 A	Northern Grovness Peninsula	69°24'32.78"S	76°11'57.96"E
9	L7 B	Northern Grovness Peninsula	69°24'30.05"S	76°11'57.38"E
10	MURK WATER LAKE	Northern Grovness Peninsula	69°24'53.37"S	76°12'46.16"E
11	L1	Southern Grovness Peninsula	69°25'13.70"S	76°13'18.33"E
12	L2	Southern Grovness Peninsula	69°25' 5.10"S	76°12'45.05"E
13	L3	Southern Grovness Peninsula	69°25'09.07"S	76°12'36.1"E
14	L4	Southern Grovness Peninsula	69°25'04.46"S	76°12'19.93"E
15	L5 SG	Southern Grovness Peninsula	69°25'08.65"S	76°11'53.9"E
16	P1 Brookness	BROOKNESS ISLAND	69°23'49.54"S	76°23'17.43"E
17	P2 Brookness	BROOKNESS ISLAND	69°24'09.005"S	76°23'15.00"E
18	P3 Brookness	BROOKNESS ISLAND	69°23'32.17"S	76°22'17.78"E
19	P4 Brookness	BROOKNESS ISLAND	69°23'22.19"S	76°22'55.82"E
20	PSL-34 Reid Lake (Progress)	BROOKNESS ISLAND	69°23'8.83" S	76°22'42.06"E

Antarctic Lakes

ON SITE SAMPLING

Assessment of Persistent Organic Pollutants

Methodology :

Take 500 ml of water sample in a 1000 ml separating funnel

↓

Add 2g of sodium chloride, shake it

↓

Add 50 ml Methylene Chloride & Shake for 2-3 min

↓

Filter lower layer of Methylene Chloride through Whatman No. 41 filter paper containing 4-5g of activated sodium sulphate

↓

Repeat the extraction process three times & Combine the Methylene Chloride layers in 250 ml round bottom flask

↓

Evaporate the Methylene Chloride in rotary vacuum evaporator at 40-45 ^{0}C

↓

Reconstitute with Hexane in 1ml GC Vial

↓

Analysis through GC-ECD or GC-MS/MS

Results: Persistent Organic Pollutants in Lake water sample

S.No	Compound	Pesticide Final Concentration (µg/liter)								
		Std.	Blank	Merk Water lake	L7	P4 Brookness	L3NG	L4SG	L1D	PSL-34 Reid Lake (Progress)
1	Monocrotophos	80.46	ND	0.04	0.02	0.03	0.02	0.02	0.02	0.02
2	Phorate	98.63	ND	ND	ND	ND	ND	ND	ND	ND
3	BHC-alpha (Benzene Hexachloride)	114.80	ND	ND	ND	ND	ND	ND	ND	ND
4	Atrazine	95.59	ND	0.02	0.02	0.01	0.02	0.01	0.01	0.01
5	BHC-beta	110.37	ND	ND	ND	ND	ND	ND	ND	ND
6	BHC-gamma (Lindane)	107.22	ND	ND	ND	ND	ND	ND	ND	ND
7	BHC-delta	103.46	ND	ND	ND	ND	ND	ND	ND	ND
8	Paraoxon-methyl	96.24	ND	0.01	ND	0.01	0.01	0.01	0.06	0.01
9	Chlorpyrifos-methyl	112.62	ND	ND	ND	ND	ND	ND	ND	ND
10	Parathion-methyl	110.00	ND	ND	ND	ND	ND	ND	ND	ND
11	Heptachlor	91.81	ND	ND	ND	ND	ND	ND	ND	ND
12	Alachlor	100.81	ND	ND	0.03	0.03	**0.09**	ND	ND	ND
13	Isoproturon	97.63	ND	0.01	0.01	0.01	0.07	0.04	ND	0.02
14	Malaoxon	97.79	ND	0.01	0.04	0.04	0.03	0.01	**0.09**	0.03
15	Aldrin	98.68	ND	ND	ND	ND	ND	ND	ND	ND

Results: Persistent Organic Pollutants in Lake water sample

16	Malathion	91.02	ND	0.01	0.01	0.01	0.02	0.01	0.01	0.01
17	Chlorpyrifos	90.69	ND	0.02	ND	0.03	0.03	0.03	0.03	0.03
18	Phorate Sulfone	91.97	ND	ND	ND	0.05	0.03	0.04	0.03	0.03
19	Phorate Sulfoxide	95.30	ND	ND	0.03	0.05	0.04	0.02	0.04	0.04
20	Heptachlor exo-epoxide	107.55	ND	ND	ND	ND	ND	ND	ND	ND
21	DDE-o,p'	101.94	ND	ND	ND	ND	ND	ND	ND	ND
22	Endosulfan I (alpha isomer)	91.84	ND	0.02	0.03	0.03	0.02	0.06	0.01	0.06
23	Butachlor	98.28	ND	ND	0.01	ND	ND	ND	0.01	0.00
24	Dieldrin	104.02	ND	ND	ND	ND	ND	ND	ND	ND
25	DDE-p,p'	101.74	ND	ND	ND	ND	ND	ND	ND	ND
26	DDD-o,p'	111.99	ND	ND	ND	ND	ND	ND	ND	ND
27	Endrin	99.60	ND	ND	ND	ND	ND	ND	ND	ND
28	Endosulfan II (beta isomer)	111.80	ND	ND	ND	ND	ND	ND	ND	ND
29	DDD-p,p'	93.08	ND	ND	ND	ND	ND	ND	ND	ND
30	DDT-o,p'	100.33	ND	ND	ND	ND	ND	ND	ND	ND
31	Endrin aldehyde	88.64	ND	ND	ND	ND	ND	ND	ND	ND
32	Ethion	95.22	ND	0.04	0.02	0.05	0.02	0.02	0.07	0.04
33	Endosulfan sulfate	93.40	ND	ND	ND	ND	ND	ND	ND	ND
34	DDT-p,p'	101.07	ND	0.01	0.06	0.07	0.05	0.06	0.08	0.05

Results: Persistent Organic Pollutants in Lake water sample

S.No	Compound	PAH & PCB Final Concentration (µg/liter)								
		Std.	Blank	Merk Water lake	L7	P4 Brookness	L3N G	L4SG	L1D	PSL-34 Reid Lake (Progress)
1	Naphthalene	142.14	ND	0.05	0.06	0.04	0.04	0.04	0.06	0.02
2	Acenaphthylene	143.25	ND	0.01	0.02	0.02	0.01	0.02	0.03	0.02
3	Acenaphthene	142.90	ND	0.02	0.02	0.02	0.02	0.03	0.03	0.02
4	Fluorene	132.67	ND	0.03	0.03	0.03	0.03	0.04	0.05	0.04
5	Phenanthrene	132.32	ND	0.01	0.01	0.01	0.01	0.02	0.02	0.02
6	2,2',5-Trichlorobiphenyl (PCB 18)	148.10	ND	ND	ND	ND	ND	ND	ND	ND
7	Anthracene	128.57	ND	0.01	0.02	0.02	0.01	0.03	0.03	0.02
8	2,4',5-Trichlorobiphenyl (PCB 31)	193.53	ND	ND	ND	ND	ND	ND	ND	ND
9	2,4,4'-Trichlorobiphenyl (PCB 28)	152.11	ND	ND	ND	ND	ND	ND	ND	ND
10	2,3,3'-Trichlorobiphenyl (PCB 20)	149.26	ND	ND	ND	ND	ND	ND	ND	ND
11	2,2',5,5'-Tetrachlorobiphenyl (PCB 52)	155.84	ND	ND	ND	ND	ND	ND	ND	ND
12	2,2',3,5'-Tetrachlorobiphenyl (PCB 44)	158.91	ND	ND	ND	ND	ND	ND	ND	ND
13	Fluoranthene	131.52	ND	ND	0.03	0.03	0.03	0.01	**0.06**	0.04
14	Pyrene									

Results: Persistent Organic Pollutants in Lake water sample

15	2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)	157.22	ND	ND	ND	ND	ND	ND	ND	ND
16	2,2',3,4,5,6'-Hexachlorobiphenyl (PCB 143)	161.79	ND	ND	ND	ND	ND	ND	ND	ND
17	2',3,4,4',5-Pentachlorobiphenyl (PCB 118)	155.05	ND	ND	ND	ND	ND	ND	ND	ND
18	2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)	158.68	ND	ND	ND	ND	ND	ND	ND	ND
19	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)	154.82	ND	ND	ND	ND	ND	ND	ND	ND
20	Benz[a]anthracene	133.31	ND	0.01	0.01	0.01	0.01	0.01	0.01	0.01
21	Chrysene	139.57	ND	0.01	0.01	0.01	0.01	0.01	0.01	0.01
22	2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)	153.64	ND	ND	ND	ND	ND	ND	ND	ND
23	2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB 170)	159.23	ND	ND	ND	ND	ND	ND	ND	ND
24	2,2',3,3',4,4',5,5'-Octachlorobiphenyl (PCB 194)	156.13	ND	ND	ND	ND	ND	ND	ND	ND
25	Benzo(b)fluoranthene	133.42	ND	ND	ND	ND	ND	ND	ND	ND
26	Benzo[k]fluoranthene	140.04	ND	ND	ND	ND	ND	ND	ND	ND
27	Benzo(a)pyrene	134.36	ND	ND	ND	ND	ND	ND	ND	ND
28	Indeno(1,2,3-cd)pyrene	126.63	ND	0.01	0.01	0.01	0.01	0.01	0.01	0.01
29	Dibenz[a,h]anthracene	128.26	ND	ND	ND	ND	ND	ND	ND	ND
30	Benzo[g,h,i]perylene	132.01	ND	0.01	ND	ND	ND	ND	ND	ND

Conclusion

- POPs are found to be highly varied between different regions of the Antarctic continent and within region, varying primarily with climate change and biogeochemical control of the global cycling and fate of these xenobiotics.
- Food supplies of Antarctic researchers probably vegetables are very much prone to carry pesticide residues and could also be a contributor of POPs in the Antarctic environment.
- Occurrence of POPs in Antarctic environment and their accumulation into Antarctic biodiversity may cause problems such as mutagenicity, genotoxicity, reproductive disorders, disruption of the immune system and interference with the development of the young.

Conclusion

- In order to decrease the risk of POPs, we need more efficient monitoring system at base levels which checks and monitors the emission of these pollutants besides preventing the emission of POPs specially pesticides by improving their regulations and policies, strengthening poorly monitored pesticide regulations, effective monitoring by apex agencies for banned pesticides, proper training for the use of pesticides, its dosages according to the pests and crops, use of Integrated Pest Managements (IPM) etc

Conclusion

- Opting for clean energy would be also an appreciable step. Usage of coal in the power plants is one of the key emission sources. Power plants emit PCBs; heavy metals like mercury which are very much persistent in the environment.

- Develop countries are coming forward to help the underdeveloped/developing nations to have clean energy options like nuclear power plants and solar power plants.

- These steps would help in controlling emission and transportation of these xenobiotics in atmosphere and thereby into the Antarctic ecosystem.

Conclusion

- Use of generators, vehicle, helicopters, flights, ships and other modes of transport which use fossil fuels are also partial contributor in the local Antarctic regions especially nearby stations.

- Use of personal care products, physical contaminants, construction material etc. if not monitored effectively would surely leave the chemical footprints

- We need to cut down the usage of plastic on the earth to save the Pristine environment of Antarctica as phthalates residues also have been found

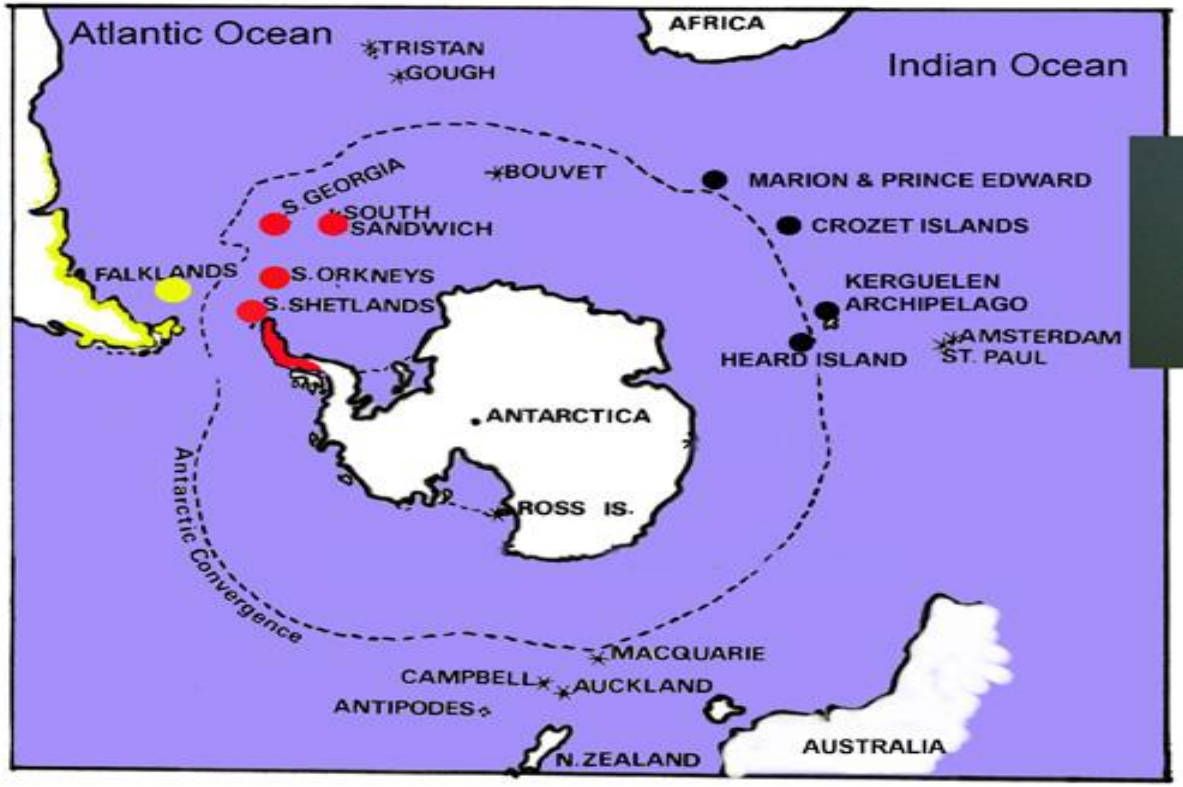
Conclusion

A comprehensive collaborative research effort focusing on above factors are urgently required to identify the gap areas emphasizing the recent developments in the POPs research.

Distribution patterns, bio-magnification processes in Antarctic wildlife and modeling of the pollutant transport are the thrust areas to elucidate the eco-toxicological risk of POPs contaminants associated with Antarctic ecosystems.

Pink-faced Sheathbill
Chionis alba

Summer - breeding
Winter & non- breeding



Black-faced Sheathbill
Chionis minor

Non-migratory residents

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Amity Centre for Antarctic Research and Studies (ACARS) was established on 16th October 2014 at Amity University under the visionary guidance of Dr. Ashok K. Chauhan, Founder President, Amity Universe.

Centre was established to carry out research on several aspects such as Environmental Monitoring, Toxicology, Microbiology, chemical contamination and ecosystem health in and around Indian Antarctic research stations, arctic and Himalaya

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Vision :

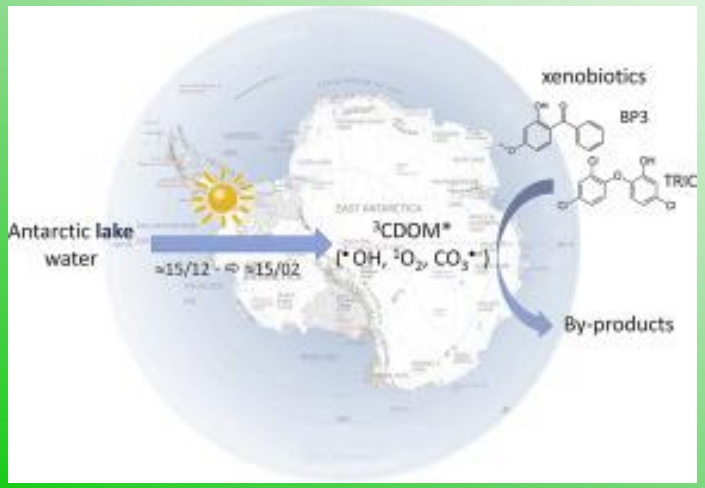
The institution endeavors to become an active and foremost institution in the field of polar sciences where scientists/faculty and dedicated researchers perform cutting-edge research to study ecosystem, cause and effect analysis of environmental contaminants and their impact on pristine environment due to anthropogenic activities besides exploring new avenues for research .

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Mission :

ACARS has taken the mission of environmental health and monitoring by encouraging, high quality research on the effects of chemical toxicants (e.g. PAH, PCB, pesticides, heavy metals, dioxins/dibenzofurans) and other xenobiotic agents in polar regions.

Institution also targets screening of Antarctic microbes for their potential in bioremediation of above pollutants besides exploring novel biotech applications such as nutraceuticals, enzyme, antibiotics, surfactants other industrially important products. Focus of R&D remains on creating, disseminating and applying new knowledge in Polar research.



AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Amity Participation in Antarctic expeditions

Amity Participation in Antarctic expeditions with NCAOR long-term proposal submitted to ISEA, approved under 12th five year plan of Ministry of Earth Science in Environmental monitoring programme

Amity scientists have participated in last two Indian scientific Expeditions under the leadership of Prof. Tanu Jindal and collected samples **for Environmental Monitoring and Health of Indian Antarctic Stations in pursuit of Antarctica treaty system and its Governance**.

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

34th Indian Scientific Expedition to Antarctica (Duration: 7th January to 1st March, 2015)

PI: Prof. Tanu Jindal

Expedition Member: Dr. Anuj Ranjan

MAITRI (Duration: 22nd to 28 February, 2015) Indi nt research base in Antarctica was built shortly before the first station Dakshin Gangotri was buried in ice and abandoned in 1990–91. Maitri is situated on the rocky mountainous region called Schirmacher Oasis. The station has modern facilities to carry out research in various disciplines, such as biology, earth sciences, glaciology, atmospheric sciences, meteorology, cold region engineering, communication, human physiology and medicine.

'BHARATI (Duration: 7th January to 22nd February 2015) India's Third and newest permanent research base is situated on a rocky promontory fringing the Prydz Bay between Stornes and Broknes peninsula in the Larsemann Hills area. It is located approximately midway between the eastern extremity of the Amery Ice Shelf and the southern boundary of the Vestfold Hills.

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

35th Indian Scientific Expedition to Antarctica (Duration: 17th November 2015 to 15th Feb, 2016)

PI: Prof. Tanu Jindal
Expedition Member: Dr. Abhishek Chauhan
Maitri Research Base:
Duration: 15th January 2015 to 9th February 201
Bharati Research Base:
Duration: 30th November 2015 to 14th January 2016
Total 128 samples (water, soil, sediments, moss, algal mats) 67 from Maitri research base and 61 from lakes and ponds in the Larsemann hills (LH) area (69°20'–69°30'S,75°55'–76°30'E) were collected. Sampling was carried out through helicopter at various locations such as Northern Grovness Penisula, Southern Groveness Peninsula and Brookness Peninsula, (Reid Lake Brok Island, Prog Heli Drok Island, P-1-Brook Island and P-2 Brok Island) Fisher Island, Solomon Island, Sander Cock Island, Mcloed Island, Esther Island.

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

On site samples analysis:

Lake water samples were analyzed for pH, DO, TDS, Conductivity, Temp, Turbidity, Phosphate, Nitrate, Nitrite, Chromium, Aluminum, Iron, Cu, Zinc, Sulphate, Nickel, Mg Hardness, , Ca Hardness, Chloride, Ferrous, Bromine, Manganese, Sulphide, Chlorine total , Chlorine free, Cyanide and report completed

Analysis at Amity

Coliform and Faecal coliform bacteria were estimated to check the possible contamination / human interference in and around Bharti research base, Antarctica. isolated from lake water samples

32 bacterial strains, 24 fungal strains have been isolated so far, these strains are preserved for further studies on biochemical and molecular characterization up to species level

Micro-algal spp. including cyanobacteria have been isolated from lake water and benthic mat samples. Photoinucbation facility have been develop for their mass cultivation so that further biotechnological applications can be explored

ON SITE SAMPLING

Sampling and Survey

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Doctoral Research:

"Anthropogenic Activities in Antarctica and its Impact on Environment"
Mr. Laxmikant Bharadwaj (PT) A11231916002.

"***Microbial analysis of Antarctic consortium for Bioremediation of heavy metals"***
Ms. Ankita Sahrawat (FT) A11232016004 (July-2016 Batch)
*Ms Ankita is currently working at Toxicology center in Canada, Saskatoon

Summer training/Dissertation:

M.Sc. Students:

1. ***Statistical Assessment of Heavy Metal's Presence in Air and Water Bodies in Antarctic Region*** under the supervision of Dr. Anoop Tiwari and Prof. Tanu Jindal
Akanksha Kaushik

2. Statistical Assessment of Presence of Ions in Air and Water Bodies in Antarcticunder the supervision of Dr. Anoop Tiwari and Prof. Tanu Jindal**a**
Ankita Sahrawat

B.Sc. Students:

1. ***Bacteriological Analysis of Lake water samples collected from Antarctica***
   Aayushi Joshi

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Conference and Events Organized

- "Polar Ecotoxicology- Arctic, Antarctic and the third Pole Himalaya" Technical session conducted during International Conference on New Insights & Multidisciplinary Approach in Toxicological Studies as 36th Annual Conference of Society of Toxicology (India), August 3-5, Amity University, Noida
- Science and Geopolitics of Artic-Antarctic-Himalaya in association with Light Research Foundation, 29-30, September, 2015 India habitate center
- Ozone day celebrated focusing on Ozone hole over antarctic region were discussed, 2015.
- Ozone day celebrated focusing on Ozone hole over antarctic region were discussed, 2017

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

CONFERENCE/EVENTS

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Conference attended:

National:

National Conference on Polar Science organized by National Centre for Antarctic and Ocean Research, MOES, GOA May 16-17, 2017.
On Thin Ice: Artic, Antarctic and the Himalayas organized by School of Environment Science, JNU November 29-30th 2016.

International:

XIIth international symposium on Antarctic Earth Science, July 12th-17th, 2015. Goa

Session proposed:

Session on "Polar ecotoxicology" proposed for 7th SETAC World Congress/SETAC North America 37th Annual Meeting in Orlando, Florida, 2016

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Project Sanctioned:
Screening of Indigenous Heavy Metals Tolerant Algal Strains from Recent Indian Station, Bharati, Antarctica for Bioremediation and Hydrogen

Production Funding Agency: CSIR

Status: Withdrawn (One Faculty was made PI to encourage and make her responsible for research component added in her field of expertise, Prof. Tanu Jindal and Dr. Abhishek Chauhan were CO-PI in spite of conceptualization having their research component also in the project)

Screening of microorganism from Indian sector of Southern Ocean for antimicrobial activity with their molecular characterization

NCAOR, MOES

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Presentations

Bhardwaj LK, Chauhan A, Ranjan A, and Jindal T (2017) Assessment of Microbes and Xenobiotics in Lakes of Larsemann Hills Area Over East Antarctica, National Conference on Polar Science organized by National Centre for Antarctic and Ocean Research, MOES, GOA May 16-17, 2017.

Chauhan A, Ranjan A and Jindal T (2016) Assessment of Coliform and Faecal Coliform Bacteria in Lake Water Samples Collected From Larsemann Hills Area Over East Antarctica. 7th SETAC World Congress/SETAC North America 37th Annual Meeting in Orlando, Florida

Jindal T and Chauhan A (2016) Environmental Toxicants around Indian Antarctic Stations: Bharati and Maitri and Their Impact Assessment. International Conference on New Insights & Multidisciplinary Approach in Toxicological Studies as 36th Annual Conference of Society of Toxicology (India) 2016, August 3-5, Amity University, Noida.

Chauhan A, Bhardwaj L, Ranjan A and Jindal T (2016) Antarctic Microorganisms: Occurrence and Pathogenicity. International Conference on New Insights & Multidisciplinary Approach in Toxicological Studies as 36th Annual Conference of Society of Toxicology (India), August 3-5, Amity University, Noida

Chauhan A, Bhardwaj L, Ranjan A and Jindal T (2016) Coliform and Faecal coliform Bacteria in Lake Water Samples Collected from Larsemann Hills Area over East Antarctica. International Conference on New Insights & Multidisciplinary Approach in Toxicological Studies as 36th Annual Conference of Society of Toxicology (India), August 3-5, Amity University, Noida

Bhardwaj LK, Chauhan A, Ranjan A and Jindal T (2016) Anthropogenic Activities and Environmental Contamination in Antarctic Regions. International Conference on New Insights & Multidisciplinary Approach in Toxicological Studies as 36th Annual Conference of Society of Toxicology (India), August 3-5, Amity University, Noida

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Publications

Chauhan, A., Bharti PK, Goyal, P., Verma, A and **Jindal, T** (2015). Psychrophilic pseudomonas in antarctic freshwater lake at stornes peninsula, larsemann hills over east Antarctica, Environmental and Earth Science, SpringerPlus,4:582. **(Scopus Indexed).**

In-press

Bhardwaj LK, Chauhan A, Ranjan A and **Jindal T**. Persistent Organic Pollutants in Biotic and Abiotic Components of Antarctic Pristine Environment. Submitted to Earth System and Environment (***Springer)***

AMITY CENTER FOR ANTARCTIC RESEARCH AND STUDIES

Future Plans

Participating in 10th Indian Scientific Expedition to Southern Ocean

Duration: 03-12-2017 to 08-02-217

Scientific Members: Dr. Abhishek Chauhan
Mr. Laxmikant Bhardwaj

M.Sc. Desertions: Two M.Sc. Students

Artic Project: Planning to submit project on Emerging Pollutants

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COMPLETED PROJECTS

Projects	Funding agency	Total amount (Rs)
Pesticide residues in water near Paddy, Cotton and Vegetable Growing Farms	Ministry of Environment and Forests (MOEF)	36,86,408
Dissipation, leaching and persistence of chlorpyrifos three types of soils with different pH	Department of Science and Technology (DST)	37,97,000
Study of contamination of soil and water through heavily loaded unlined drains in Delhi	Ministry of Earth Sciences (MOES)	56,31,900
Dissipation, leaching and persistence of Imidacloprid, Sulfosulfuron and Endosulfan in three types of soils with different pH	Department of Science and Technology (DST)	20 ,00,000

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MOU between Amity Institute of Environmental, Toxicology, Safety and Management and Toxicology Centre University of Saskatchewan

AMITY UNIVERSITY

UNIVERSITY OF SASKATCHEWAN
Toxicology Centre

Memorandum of Understanding (MOU)
Between
Amity Institute of Environmental Toxicology, Safety and Management,
Amity University Uttar Pradesh
And
Toxicology Centre, University of Saskatchewan

The Amity Institute of Environmental Toxicology, Safety and Management, Amity University Uttar Pradesh (herein after referred as "AIETSM") situated at Sec-125, Noida (U.P.), India of the FIRST PART and the Toxicology Centre, University of Saskatchewan (herein after referred as TCUS) having its registered office at 44 Campus Drive, Saskatoon, Saskatchewan S7N 5B3, Canada of the SECOND PART, collectively referred to as Parties and individually referred as Party, are pleased to enter into a non-binding agreement to promote academic cooperation and collaborative research, and to identify areas where faculty, staff and students of both institutions can work together to promote academic excellence in research, teaching and training in higher education through, but not limited to, the following activities:

a) Joint development and/or teaching of courses, especially short courses and compressed format courses, and of other short-term student training programs (e.g., summer programs);
b) Collaborative research projects in the areas of environmental and biomedical toxicology;
c) Joint application for new collaborative research funding;
d) Exchange of students, both graduate and undergraduate, for short-term research and/or training opportunities;
e) Training of faculty members and scientists in new techniques and approaches;
f) Jointly supervised Ph.D. students and associated dissertation work;
g) Co-hosting and participating in national and international conferences, symposia and seminars;
h) Any other activity that is mutually agreed upon and is beneficial to both parties.

General Terms of the MOU

a) The MOU shall come into effect from the date of last signing and shall remain valid for five years. It may be further renewed by mutual agreement in writing.
b) Amendments and additions may be made to the MOU subject to the written consent of both parties. The MOU can be terminated by either party with a minimum of 90 days prior notice in writing to the other party.
c) The MOU does not imply any financial obligations or legal binding on either party.
d) Financial obligations with regard to any programs and exchanges shall be discussed and acted upon by the parties through separate agreement(s) in writing.
e) Both parties shall respect the confidentiality and intellectual ownership of information shared between them for academic co-operation.
f) Each party shall respect the image and reputation of other party and consult other party before any publicity or external reference to this MOU is made. Any publications that may arise from the collaboration will be jointly authored as appropriate and such publications will be scrutinized by both parties to ascertain quality of work prior to publication.
g) In the event of any dispute arising out of this MOU, such dispute shall be settled mutually in an amicable manner.
h) Both parties hereby agree, under this MOU, to indemnify and hold each other harmless.

Notices and Contacts

a) Any and all notices, consents, claims, requests, and/or other communications required or permitted to be given under any of the provisions of this MoU shall be in writing and properly delivered by registered mail or an express delivery service or facsimile to:

In case of AIETSM:	In case of TCUS
Prof. Tanu Jindal Director Amity Institute of Environmental Toxicology, Safety and Management Amity University Uttar Pradesh Sector – 125, Noida-201313 Uttar Pradesh India	Prof. Karsten Liber Director Toxicology Centre University of Saskatchewan 44 Campus Drive Saskatoon, Saskatchewan S7N 5B3 Canada

b) Each Party will appoint a contact person and inform the other Party. Initially, those individuals will be Prof. Tanu Jindal (AIETSM) and Prof. Karsten Liber (TCUS). Should there be any change in the contact person, the concerned Party shall inform the other Party immediately.

Miscellaneous

This MOU is prepared in English language and two original copies signed. Each party will receive one signed original copy.

IN WITNESS THEREOF, the parties hereto set and subscribe their respective hands

Signature: 23.09.15	Signature: K. Liber.
Name of Official: Dr. B.L. Aryal	Name of Official: Prof. Karsten Liber
Designation: Registrar, AUUP	Designation: Director, TCUS
PARTY OF THE FIRST PART	PARTY OF THE SECOND PART
Date:	Date: Sept. 23, 2015
In presence of: 1. (Tanu Jindal) 2. Dharam (Admin Officer)	In presence of: 1. 2.

Registrar
AMITY UNIVERSITY
UTTAR PRADESH

Dr. TANU JINDAL
Director (AIETSM)
Amity Institute of Environmental Toxicology Safety & Management
Amity University Uttar Pradesh
Sector - 125, Noida - 201 301(U.P.)

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Workshop
Air, Water and Soil: Pollution Prevention Paradigm-2016
In association with
Southern Federal University, Russia

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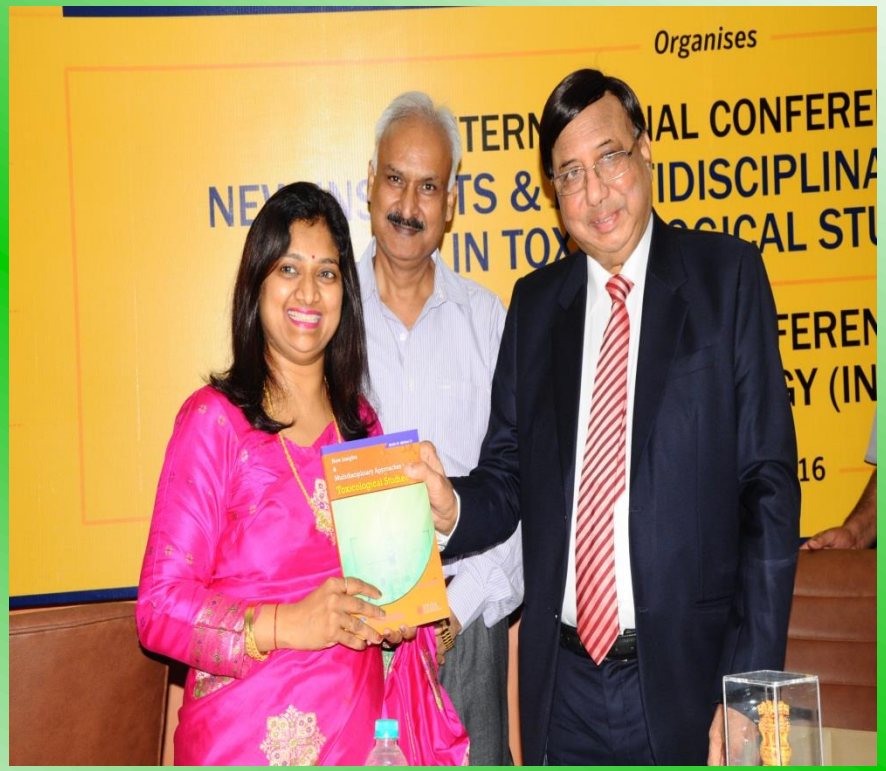
International Conference

New Insights & Multidisciplinary Approaches in Toxicological Studies"

36th Annual Conference of Society of Toxicology (India) 2016



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Earth Day-2015

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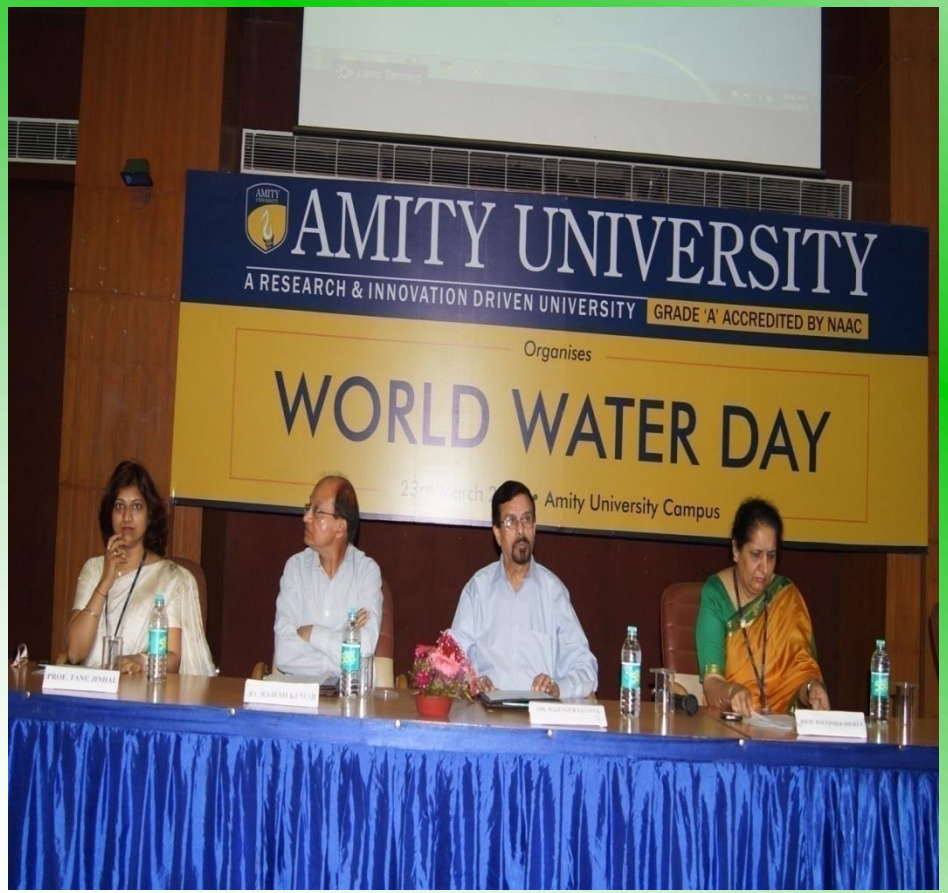
World Water Day- 2015



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World Ozone Day-2014

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National Conference
Earth and Environment: Pollution and Prevention
Ministry of Earth Science, January 28-30, 2014

Preserving the planet

With the presentation of 88 papers and 9 lectures, the national conference on environment initiated discussions on pertinent issues affecting our earth

What: National conference on 'Earth and Environment: Pollution and Prevention-2014'
When: January 28-30, 2014
Where: Amity University, Noida

A national conference on the pressing problem of environment pollution, was organised by Amity Institute of Environmental Toxicology, Safety and Management (AIETSM) in association with Ministry of Earth Sciences. Convener of the conference, Prof Tanu Jindal, director, AIETSM, highlighted the themes of the conference as land use and soil health, ocean and water resources and air quality, atmosphere and climate change.

Dignitaries with Maj Gen K J Singh, vice chancellor, AUUP

The conference was inaugurated by a galaxy of experts including Dr John Dunham, deputy chief, environment, science and technology affairs, US Embassy; Dr Vinod Babu, incharge, Hazardous Waste Management Division, CPCB; Dr RK Khandal, VC, UP Tech University; Dr Sanjay Bajpai, director/scientist 'F', Technology Mission Cell, Water & Solar Energy, DST. Dr Ashok K. Chauhan, Founder President, Amity Universe, conveyed his best wishes for the success of the conference and wished all the participants good luck.

A total of 88 papers and 9 lectures were presented during the conference, which served as a platform to sensitise the masses about the grave implications of environmental deterioration. Among the eminent guests who delivered talks were Prof RK Singh, CSIR, Lucknow; Prof Neera Kapoor, IGNOU, New Delhi; Dr RS Antil, HAU, Hisar; Dr Chirashree Ghosh, DU; Dr J Behari, professor (retd), Jawaharlal Nehru University; Dr RB Lal, deputy director, Impact Assessment Division, Ministry of Environment and Forests and Prof Rasik Ravindra, Earth System Science Organisation, Ministry of Earth Sciences, New Delhi.

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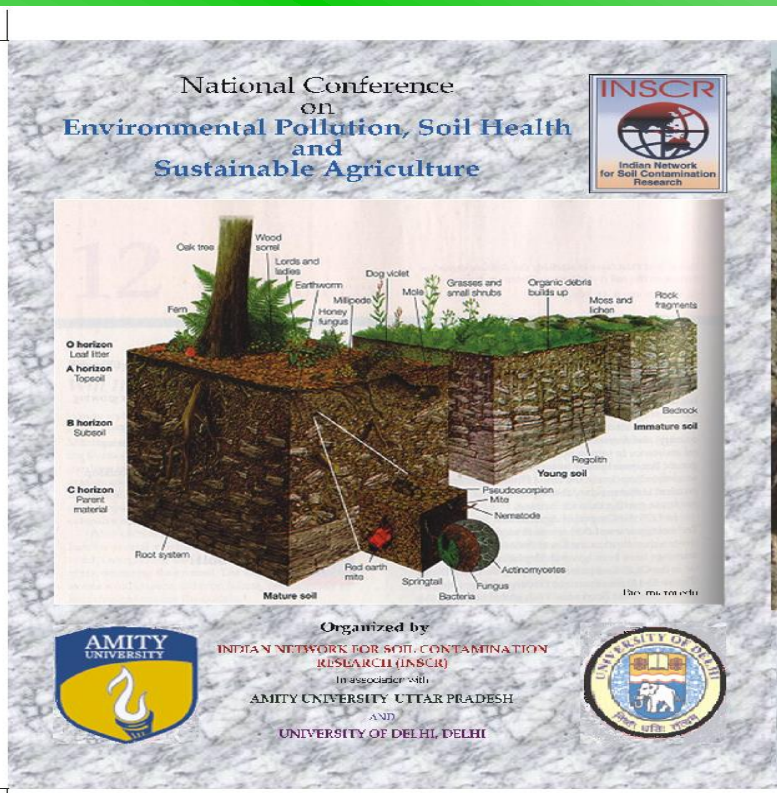
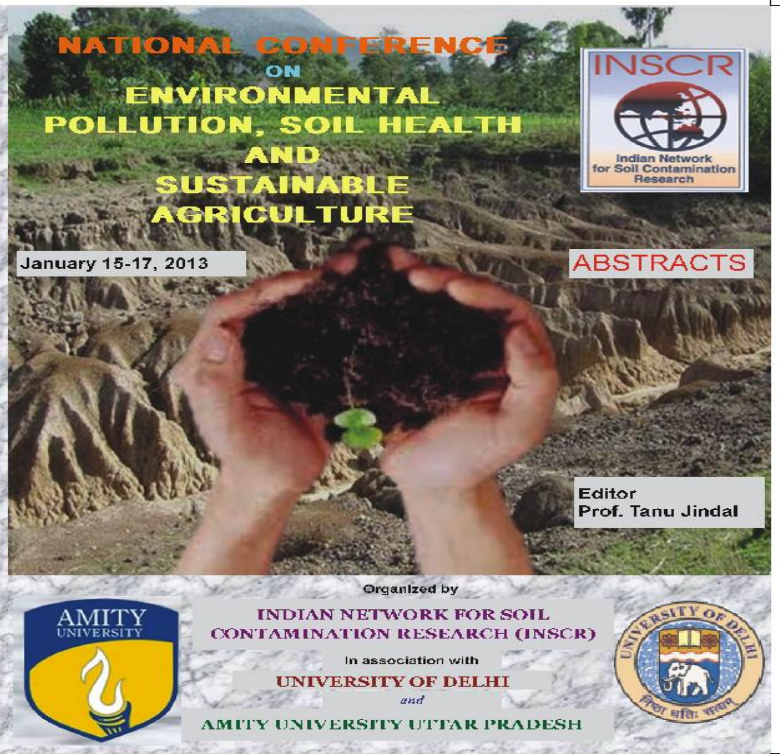
National Conference
Environmental Pollution, Soil Health and Sustainable Agriculture, Indian Network for Soil Contamination Research and Delhi University, January 15-17, 2013





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AMITY UNIVERSITY

National Workshop
Pollution Prevention Paradigm
Ministry of Earth Sciences, May 11, 2012

Fighting Pollution

National Workshop on Pollution Prevention Paradigm was a step by Amity University towards building a greener and safer world.

Amity Institute of Environmental Toxicology, Safety and Management (AIETSM) in association with Ministry of Earth Sciences organized a National Workshop on "Pollution Prevention Paradigm" on May 11, 2012 at Amity University, Noida

Founder President, Amity Universe Dr Ashok K Chauhan honouring Prof. Tanu Jindal, Director, AIESTM for her initiative along with Prof Saran, Prof.Agrawal and Vice Chancellor Maj Gen K J Singh

Amity Institute of Environmental Toxicology, Safety and Management

GAS CHROMATOGRAPHY

Amity Institute of Environmental Toxicology, Safety and Management

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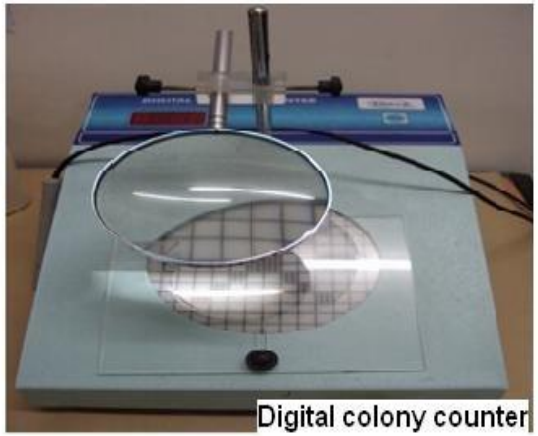
Centrifuge

Turbidity meter

TDS meter

Conductivity meter

Compound microscope



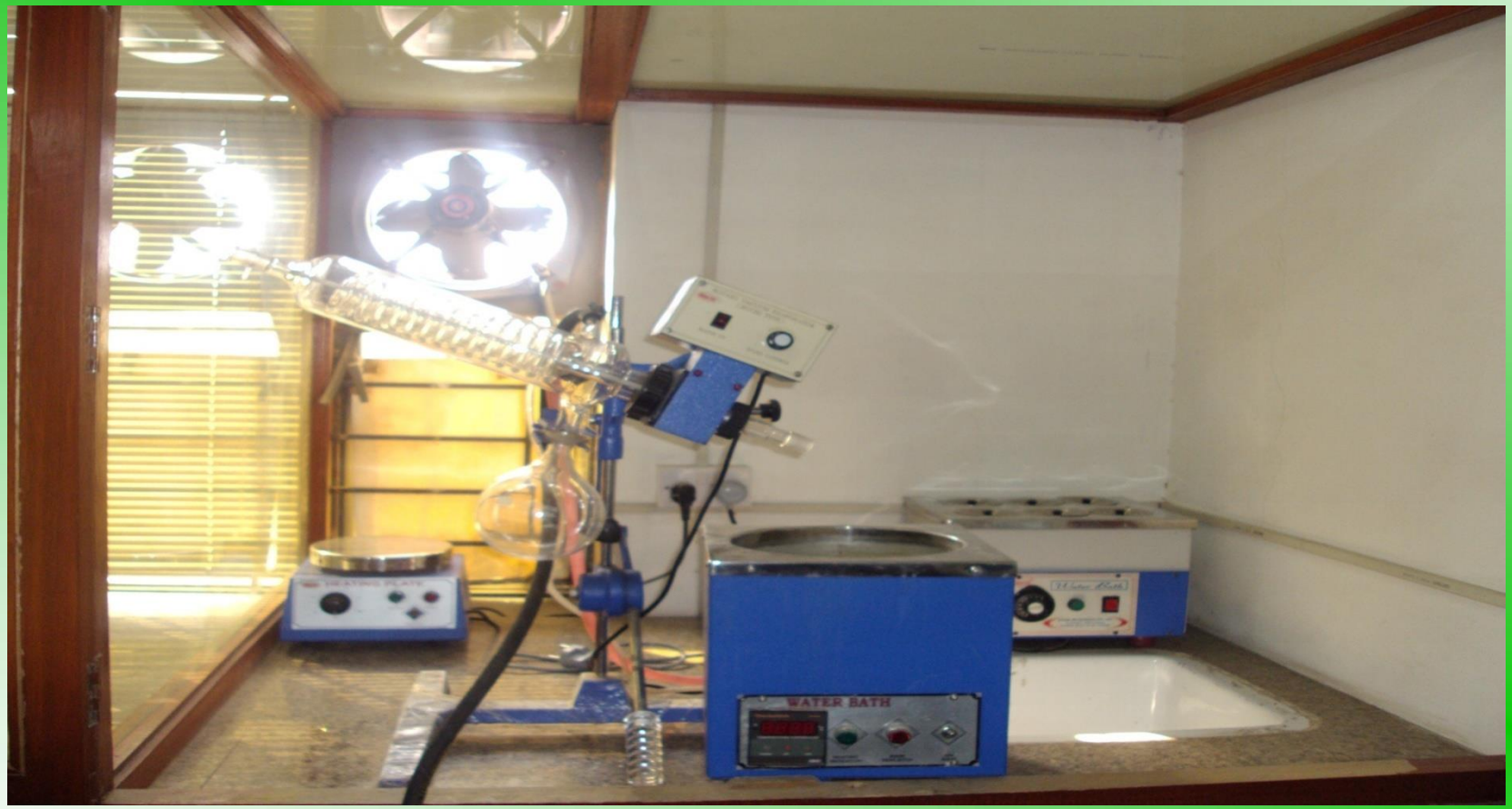
Digital colony counter

Amity Institute of Environmental Toxicology, Safety and Management

WET LABORATORY

Amity Institute of Environmental Toxicology, Safety and Management

Fume hood for Toxicological Analysis



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Soxhlet extractor

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UTTAR PRADESH

AMITY UNIVERSITY

Respirable Dust Sampler (PM_{10})

Amity Institute of Environmental Toxicology, Safety and Management

Microbial Laboratory

Amity Institute of Environmental Toxicology, Safety and Management

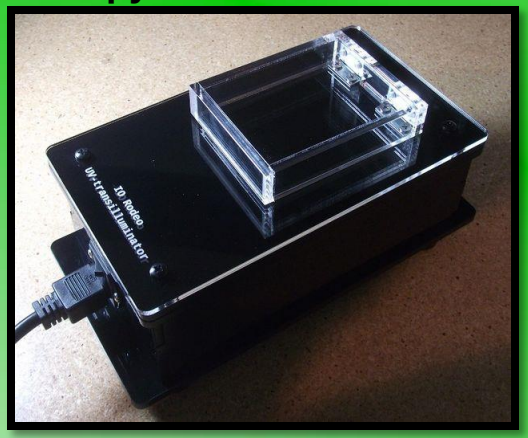
Molecular Toxicology Laboratory

Comet Assay

Fluorescent Microscopy

DNA Gel Electrophosis

SDS PAGE



Gel UV illuminator

CAAQMS PARAMETERS

बुधवार 04 जनवरी 2017

हिन्दुस्तान

नोएडा LIVE सिटी

प्रदूषण नियंत्रण बोर्ड फरवरी में सेक्टर-125 स्थित एमिटी विश्वविद्यालय में केंद्र स्थापित करेगा

देश का दूसरा पराबैंगनी किरण जांच केंद्र नोएडा में

नोएडा | सौरभ दीक्षित

प्रदूषण नियंत्रण बोर्ड नोएडा के सेक्टर-125 स्थित एमिटी विश्वविद्यालय के आर्किड पार्क में फरवरी में एनसीआर का पहला और देश का दूसरा पराबैंगनी किरण जांच केंद्र स्थापित करेगा।

केंद्र में करीब एक करोड़ रुपये की लागत से प्रदूषण और पराबैंगनी किरणों से ओजोन परतों को होने वाले नुकसान की जांच होगी। अभी तक देश में सिर्फ महाराष्ट्र के पुणे में ही पराबैंगनी किरणों की जांच की जा रही है।

शहर में अभी तक सेक्टर-62 स्थित मौसम विभाग के केंद्र में हवा और मौसम की जांच की जा रही है। अब एमिटी विश्वविद्यालय के परिसर के भीतर भी इसकी स्थापना की जाएगी। इसमें आधुनिक उपकरण सभी मापदंडों पर 24 घंटे स्वतः ही हवा और पैराबैंगनी किरणों की जांच करते रहेंगे। इसकी रिपोर्ट मौसम विभाग की वेबसाइट पर भी दी जाएगी। केंद्र के बाहर एक बड़े डिस्प्ले बोर्ड पर भी प्रदूषण और पराबैंगनी किरण के मापदंडों को प्रदर्शित किया जाएगा।

एमिटी विश्वविद्यालय प्रबंधक शशिता मेहता ने बताया कि इस केंद्र के माध्यम से छात्रों को मौसम के बदलाव और पराबैंगनी किरणों के दुष्परिणाम पर शोध करने का लाभ मिलेगा।

एमिटी विश्वविद्यालय में यहीं पर पराबैंगनी किरण का जांच केंद्र स्थापित होगा।

ये किरणें हानिकारक है

वायुमंडल में मौजूद ओजोन परत पराबैंगनी किरणों से रक्षा करती है। जहां ओजोन परत प्रदूषण से खराब हो रही है, वहां सूर्य की हानिकारक पराबैंगनी किरणें धरती तक पहुंच रही हैं। ये किरणें स्वास्थ्य के लिए बेहद नुकसानदायक हैं। इनसे त्वचा संबंधित विभिन्न बीमारियों के साथ कैंसर तक का खतरा रहता है।

एमिटी में फरवरी तक प्रदूषण और पराबैंगनी किरण जांच केंद्र स्थापित किया जाएगा। इसकी तैयारी अंतिम चरण में है।

-डॉ. तनु जिंदल, डायरेक्टर, एमिटी इंस्टीट्यूट ऑफ एनवायरमेंटल टॉक्सीकोलॉजी सेफ्टी मैनेजमेंट

Climate Research Laboratory has been established in collaboration with (i) (Indian Institute of Tropical Meteorology –New Delhi Unit (IITM-DU) and (ii) Aryabhatta Research Institute for Observational Sciences (ARIES), Nainital.

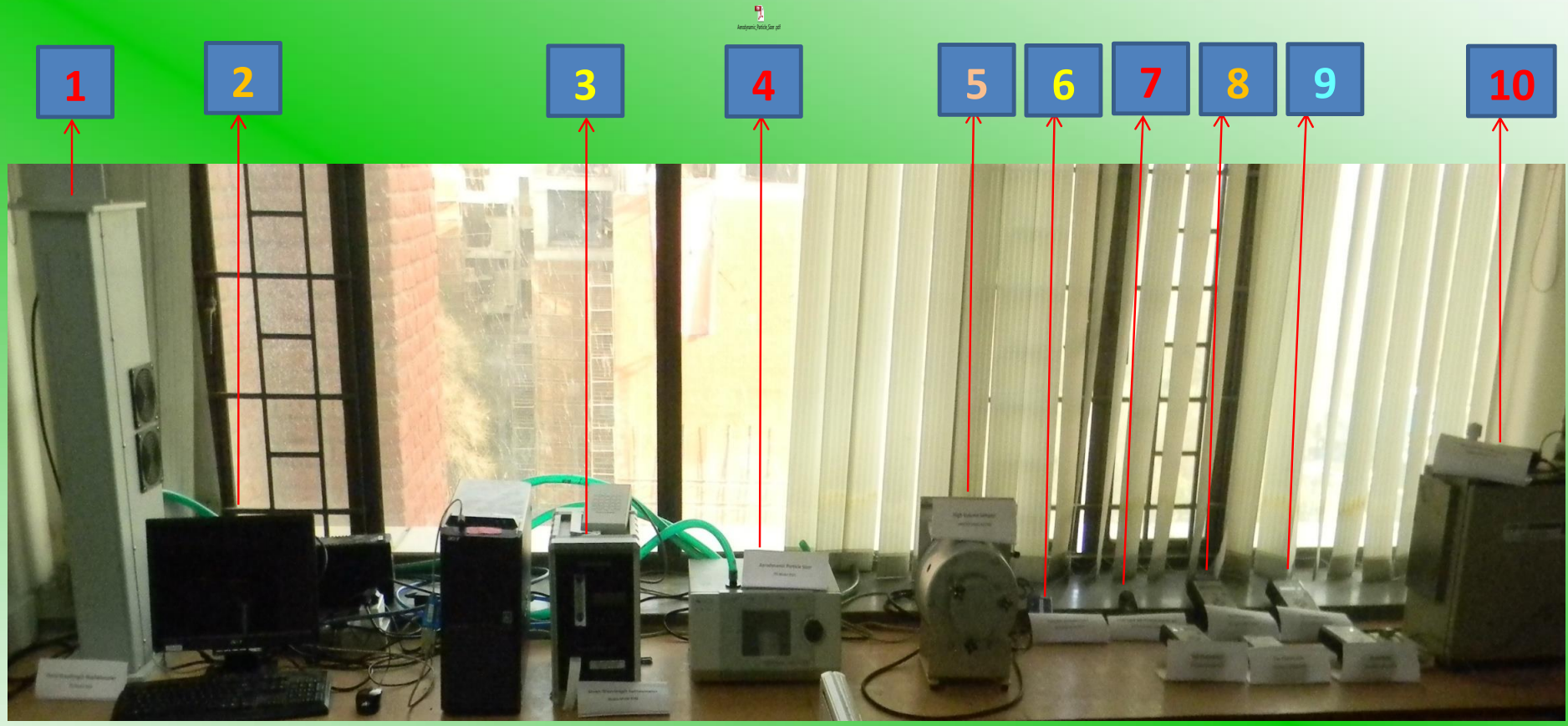


Figure: Climate Research Laboratory (CRL) at AUH, Panchgaon

(1) Three-Wavelength Nephelometer, (2) Dedicated Computer for On-line Parameter-Setting and Data Display, (3) Seven-Wavelength Aethalometer, (4) Aerodynamic Particle Sizer, (5) High Volume Sampler, (6) Micro-Aethalometer, (7) Portable Weather and Environmental Meter, (8) Multi-Wavelength Sun-Photometer, (9) Multi-Wavelength Ozonoe and Water Vapor Monitor, and (10) Aerosol Particle Counter

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Research Scientists and Research Scholars

Dr. Abhishek Chauhan (Technical Manager)
Qualification: Ph.D.
Area of Specialization: Environmental Microbiology, Bioactive compounds, Algal, Fungi and bacterial identification , NABL ISO, GLP and FSMS

Name: Dr. Anuj Ranjan (Scientific Assistant)
Qualifications: Ph.D (Environment Sciences) Pursuing
Ph.D Topic: Physico-chemical and biochemical Assay of Organophosphorus pesticides for Human risk assessment

Name: Laxmikant Bhardwaj (Scientific Assistant)
Qualifications: Ph.D (Environment Sciences) Pursuing
Ph.D Topic: Anthropogenic Activities in Antarctica and its impact on Environment

Name: Neha Singh (JRF)
Qualifications: Ph.D (Environment Sciences) Pursuing
Ph.D Topic: Biological Correlation and EMF

Name: Dr. Khushbu Gulati (Scientific Assistant)
Qualifications: Ph.D (Environment Sciences)
Ph.D Topic: Lysimetric Studies To Access The Risk Of Soil And Groundwater Contamination By Chlorpyrifos In Sandy Loam Soils With Different pH

Name: Dr. Shalini Thakur (Scientific Assistant)
Qualifications: Ph.D (Environment Sciences)
Ph.D Topic: Contamination of Water Bodies through Pesticide Usage in Major Crops

Name: Anuj Suresh (JRF)
Qualifications: Ph.D (Environment Sciences) Pursuing
Ph.D Topic: Development of cost effective Lysimeter and Method for Leaching studies to estimate the risk assessment of Groundwater contamination

Name: Ankita Sahrawat
Qualifications: Ph.D (Environment Sciences) Pursuing
Ph.D Topic: Microbiological Analysis of Antarctic Consortium for Bioremediation of Heavy Metals

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Staff

Name: Naresh Kumar
Designation: Technical Assistant
Qualification: BCA and CCC (Course on Computer Concept)

Name: Mariamma Joseph
Designation: Secretary
Qualification: Higher secondary

Name: Shikha Malhotra
Designation: Stenographer
Qualification: B.com

Name: Vikas Juneja
Designation: Office Assistant
Qualification: B.com

Name: Sushma Bartwal
Designation: Secretary
Qualification: B.com

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Earth, sky, water, air and fire
Constitutes our body, existence and attire
We must bow, appreciate and admire
Love of our mother earth
Do not pollute with endless dearth
Let's awake and bring back its worth
Restore, rejuvenate and give rebirth
To our wounded and exhausted Earth

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AIETSM
Mandates and vision
Is environmental restoration
Extending in all the spheres
With hope and speculations
Bringing enduring solutions
for environmental problems
Global warming, melting glaciers
Climate change and rising sea levels
India is facing lot of problems
Urbanization and city development
Is great challenge for settlement
Of such migrating huge population
Comfortable home for everyone
With reasonable job and income
Sports facilities and good education
Is requirement of grown ups and children
Libraries at every nook and corner
Special games for ladies fitness
Open attitude for comfortable dress
Liberalization to remove stress
Clean environment for freshness
Large number of parks and greenness
Community activities for healthy relations
Making participation important than success
Mixing of all the cultures with respect and grace
Having one religion of humanity to save human race

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THANK YOU

"Save earth to bring worth for the new birth"