

Indian Polar Research Network



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- You work in Arctic, Antarctic or Himalayas
- You wish to visit/work at these places in future
- You are concerned about what's happening in these regions
- You are interested to know about polar science
- Our membership is **FREE**



GPR measurement near fast ice in Quilty Bay

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Going through the final draft of the current issue of Polar Bytes at Maitri research station, Antarctica, it feels great elation to communicate with readers. Antarctica, this summer witnessed unprecedented melting creating various problems for all and sundry. Ice accretion through blizzards and drifting or blowing snow has been sporadic. Indo-Norwegian MADICE team had to be extricated along with their participating piston bully vehicles, sledges and trailers, as it got stuck in melting ice water channels. But at the end, it's sheer human endeavour to tide over all such crisis as Antarctica has been posing time and again. Waiting for more such challenges to overcome. I as the leader of the 36th Indian Antarctic Expedition team at Maitri seek your blessings to do it. Enjoy this issue of Polar Bytes.

yours truly
DEBDIP CHAKRABORTY, Editor

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Feature

Warm Memories of the Coldest Continent *by Maya Suryawanshi*

I remember the time during my college days when I came to know about the phenomenon of "Aurora Australis" or "Southern Lights". That time I asked my teacher "who can get an opportunity to see it in real?"- I became the answer of this question myself last year when I participated in 35th Indian Antarctic Expedition. I am thankful to all my mentors- Jayaprasad P., Dr. Sandip Oza, D. Ram Rajak for giving me the opportunity to become a part of 35th ISEA.

Objective of Participation

I along with Rajendra Sijwali (Scientist/Engineer E) from Space Applications Centre (SAC), Ahmedabad was chosen to participate in the 35th ISEA. The objective behind participation was to gather data using Ground Penetrating Radar measurements on various Antarctic ice features like: - Ice sheet (Continental ice), Ice shelf (extended cantilever part of ice sheet), Ice berg (chunk of ice separated from Ice shelf), Sea Ice (ice made up of Ocean water) etc. to understand the stratigraphy of ice up to few meters depth and to measure sea ice thickness. We had preselected GPR measurement points based on variable RISAT-1 (Indian Satellite) Signatures. Total 17 locations (including Bharati and Maitri) were selected-out of which we were able to take measurement on 16 locations remaining was left because of safety issues, also did aerial surveys over Amery Rift (deformation through entire thickness of ice shelf) and along coastline between Bharati and Davis Station and took meteorological observation during voyage.

Journey from Ahmedabad to Bharati Station, Larsemann Hills, Antarctica

We started our journey from Ahmedabad on 14th December and reported to NCAOR for completing some initial formalities. On 18th of December we started from GOA-ABU DHABI-JOHANNESBERG-CAPE TOWN route and finally on 19th landed in Cape Town. I had travelled most of my life by road but then almost for 18hrs in air and after that for three months on ship. I found bag of my experience kept on ever expanding with each passing days. We embarked on our voyage towards Antarctica on 24th Dec 2015 onboard IVAN PAPANIN an ice class vessel. We bid adieu to the picturesque city of Cape Town as we set sailing ourselves the next nine days in the dark blue turbulent Southern Indian Ocean. We started to feel being taught us what is waving, a complete understanding of the term - Sea Sickness. Day by day (getting closer and closer to Antarctica) crossing roaring forties, furious fifties we finally entered into screaming sixties. In this transition, we witnessed our **first ice berg at 590S** which seemed like an Antarctic guard warning us "Beware you are entering our territory!!!" followed by sudden welcome by whales and small chunks of sea ice called marginal sea ice zones. And suddenly all sea ice vanished as we entered into "Polynya" (water body in sea ice). Leaving behind marginal ice zone



IvanPapanin_35thISEA

entered into Pack ice zone (big ice floe –drifting sea ice) with loud dashing sound as our vessel was breaking this floe in order to reach Larsemann Hills, where our latest Indian Antarctic Station **Bharati** is situated. Later on the third sea ice zone viz. Fast ice zone almost stopped ship movement and it took around two weeks to cover ~100km distance. Here we started with our GPR measurement on fast ice (sea ice fastened to coast); definitely it was exhilarating feeling to be on 1 to 2m thick frozen layer of 6km deep southern ocean. For GPR measurements on Sea ice we have to go down on the sea ice with the help of crane which was available on ship. The bucket/cage was attached to the crane we entered into bucket along with our instruments and then crane operator slowly lowered us on sea ice along with voyage leader and his deputy. First a survey of the area was done after which we were allowed to proceed for GPR measurements. During measurements, couple of penguins came in close proximity to us bewildered by visible human presence in this icy wilderness and imagining close resemblance to them as creatures able to walk on two legs. This experience unleashed a series of memorable experiences which we had while taking GPR measurement on various Antarctic ice



GPR measurement Maitri on Icesheet



Pancake

almost 31knots which we found consistent with ASCAT wind product data.

Voyage to Maitri (Schirmacher Oasis-150km inside coast) and Ship stay at India Bay

It took almost six days by ship to reach Maitri (Second Indian Antarctic Station). We pioneered to take GPR measurement on iceberg, this being the first time in Indian expedition GPR measurements were taken on iceberg. Nor could I forget taking measurements over India Bay as it was extremely windy and cold. By this time day started waning and sky started turning dusky. Finally we saw pitch dark sky with twinkling stars decorated in special pattern called Milky Way. With lengthening of nights, a very spectacular phenomenon called “southern lights” or to be more precise “Aurora Australis” –a curtain of light comprising of visible spectrum colors was seen visible wafting through entire sky. It was mind-boggling and left me speechless. I thought this could be the end of all exciting things but I was grossly mistaken as more was there in store for me. As we started for return voyage, ocean started freezing and we saw frazil ice, grease ice and then pan cake looking like ice plates i.e. sea ice metamorphosis. As the ocean surface was getting filled up with this pancake structures, it was time to bid adieu to magnificent Antarctica and returned back to main land with our instruments, memory card filled with data, photographs and our minds filled with awesome experiences.

Truly, it was a great feeling to observe all ice features in real which so far was known to me academically. Last but not least, it definitely enriched my understanding vis-à-vis ice studies. I must gratefully acknowledge my thankfulness to all my fellow voyage members as they were all instrumental to discover my ANTARCTICA.

features.

Ship Stay at Bharati

After reaching Bharati we took GPR measurements on various Antarctic ice features (as per plan) and took data over 8 locations. Along with this we were involved in various Antarctic Sciences with balloon launch of VSSC, field activities with Wild Life Institute of INDIA, BSI and observed fauna and flora of Antarctica. GSI participants enlightened us of “Theory of Plate Tectonics”. GPR survey on continental ice sheet and snow pit observations and much more entirely encompassed my mind interspersed with bits of interesting scientific facts. On around 12th Feb we left Bharati shores and started our next phase of voyage to reach MAITRI station. Enroute MAITRI we had to take GPR measurements and to undertake rift survey too. At Bharati we witnessed blizzard on 30th Jan 2016 and wind speed reached



Maya with other expedition team mates

LET US KNOW ABOUT VARIOUS MEMBERS OF CRYOSPHERE FAMILY

- **Cryosphere and Constituents of Cryosphere:** - Earth's all snowy and icy regions are together referred as Cryosphere-a word derived from Greek word Krios meaning cold. Snow cover, sea ice, freshwater ice, the large ice masses (ice sheets, ice shelf, glacier, ice bergs etc.) and permafrost (frozen land) are various constituents of cryosphere. Ice can mainly be categorized into two types: - 1.Precipitation Ice 2. Sea Ice. Precipitation ice is made up of fresh water i.e. originated due to snow fall and doesn't contain any brine. While when ocean water temperature reduces to -1.80°C it gets freeze to form Sea ice. Ice sheet, glacier ice shelves, ice tongue, ice berg, ice rise made up of precipitation ice. While frazil Ice, grease ice, pan cake, floe, fast ice, first year ice, multiyear ice are made up of sea ice.
- **Constituents of Cryosphere made up of Precipitation Ice:**
 1. Glacier: - Glacier is made up of fallen snow that, over many years, compresses into large, thickened ice masses. Glaciers form when snow remains in one location long enough to transform into ice. Or Glacier is defined as an accumulation of ice and snow that moves under its own weight.
 2. Ice sheet: Mass of ice covering more than 50000 km² of land bigger than ice shelves
 3. Ice tongue:-Long and narrow projection of ice flowing away from coast: origin similar to ice shelf generally formed where valley glacier flows out into a Sea or lake.
 4. Ice shelf:-These are extended cantilever part of ice sheet which floats on ocean is referred as Ice sheet
 5. Ice berg:-These are masses of freshwater ice separated from glacier or ice shelf and fallen into sea or that have been produced as a result of the breaking up of larger ice bergs.
 6. Ice rise:-Locally grounded feature in ice shelf is called as Ice rise.
- **Sea Ice Zone:** - 1.Marginal Ice Zone (MIZ):- This predominant sea ice zone located adjacent open ocean. New ice is produced in this zone mainly consist of frazil ice or grease ice and greatly influenced by ocean waves 2.Pack Ice Zone: - consolidated ice zone mainly consist of ice floe. Ice physically more stable than MIZ 3.Fast/coast ice zone:-Ice in this zone is oldest and thickest. This ice is fastened to the coast hence referred as Coast ice or Fast Ice zone.
- **Sea Ice Type**
 1. Frazil Ice:-Early stage of sea ice formation which are needle like shaped crystals or fine speckles of ice suspended in water
 2. Nilas: - A thin sheet of smooth level ice less than 10cm thick which appears darkest when thin.
 3. Pan cake: - It is a form of ice that consists of round pieces of ice with diameters ranging from 30 centimeters (12 in) to 3 meters (9.8 ft), depending on the local conditions that affect ice formation. It may have a thickness of up to 10 centimeters (3.9 in).
 4. First Year Ice:-Sea ice of not more than one winters growth.
 5. Multiyear Ice: - Sea ice that survived at least two summers melts.
 6. New Ice: - general type of sea ice; earliest stage of sea ice growth.
 7. Young Ice: - a general category of ice that represents the transition between Nilas and first-year ice; usually 10 to 30 centimeters (4 to 12 inches) thick.
 8. Brash Ice:- small, floating fragments of sea ice or river ice.
 9. Porridge Ice: - Unconsolidated or partly consolidated ice forming a slushy layer at the surface of the sea which impedes the progress of small boats.
 10. Frost Flower:- Frost flowers are ice crystals commonly found growing on young sea ice and thin lake ice in cold, calm conditions.
 11. Melt pond: - Melt ponds are pools of open water that form on sea ice in the warmer months of spring and summer. The ponds are also found on glacial ice and ice shelves. Ponds of melted water can also develop under the ice. Melt ponds are superficial and will not penetrate through entire thickness of ice else would lead to polynya or lead structure on sea ice
 12. Lead:-Straight opening in ocean water
 13. Polynya:-Non linear opening in ocean water
 14. Ice floe:-large sheet of sea ice which floats and drifts on ocean
 15. Grease Ice:- During the formation of sea ice frazil ice coagulated to form soupy layer on the surface reflects little light giving sea matte appearance.
- **Note:-** Snow is freshly fallen material and having density in range 10 to 50kg/m³.While Ice is the most compact (most dense) form of snow with density 917kg/m³ and intermediate stage is referred as Firn(Don't confuse with Fern(botanical term)).
- **References:-**
 1. "Remote Sensing of Snow and Ice" by W. Gareth Rees
 2. "Study of Polar Ice Processes in relation to climate change using microwave remote sensing data" thesis by Rajkumar Kamaljit Singh
 3. Antarctic Sea Ice and Iceberg (Chapter 19) by Robert G. Onstott
 4. Website: - <https://nsidc.org/cryosphere/seaiice/index.html>

Polar News

The State and Fate of Himalayan Glaciers

A study published in 2012 in Science ([DOI: 10.1126/science.1215828](https://doi.org/10.1126/science.1215828)) provides a significant review of the state of knowledge about key characteristics, current extent, and changes of Himalaya and Karakoram glaciers since the mid-19th century. Projections of possible future changes are also discussed, summarizing important implications for water resources and natural hazards, and provided a framework for integrated cryosphere research needed to fill the most critical gaps in Himalayan knowledge.



Image courtesy: Koji Fujita-Nagoya University



The North Pole is an insane 36 degrees warmer than normal as winter descends

<https://www.washingtonpost.com>

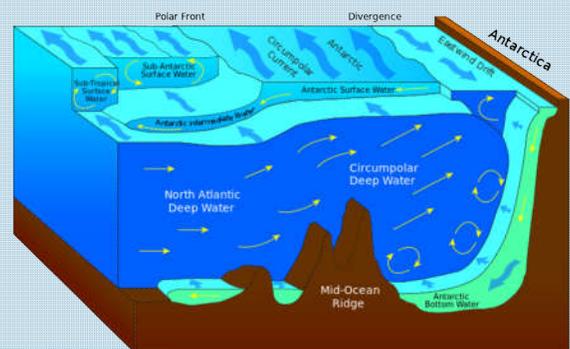
Arctic sea ice extent shrank to its second lowest record this year, and is unusually low this winter. The ice is freezing up again in winters but it isn't doing so as rapidly as usual. The area of ice cover is even lower than the record-low during 2012. It's about 36° Fahrenheit warmer than normal over most of the Arctic Ocean.

Image source: FloridaStock/Shutterstock (<https://goo.gl/AS1NgX>)

Accelerated freshening of Antarctic Bottom Water over the last decade in the Southern Indian Ocean

According to a recent published study ([DOI: 10.1126/sciadv.1601426](https://doi.org/10.1126/sciadv.1601426)), Antarctic Bottom Water (AABW) continues to become fresher, warmer and less dense. With recent observations made in the Australian-Antarctic Basin, the study shows a particularly striking acceleration in AABW freshening from 2007 to 2016 ($0.008 \pm 0.001 \text{ kg/g decade}^{-1}$) as compared to the tenure from 1994 to 2007 ($0.002 \pm 0.001 \text{ kg/g decade}^{-1}$). Warming and freshening of AABW have important consequences beyond the Southern Indian Ocean as it is a key component of the global overturning circulation.

Image source: https://en.wikipedia.org/wiki/Antarctic_Bottom_Water



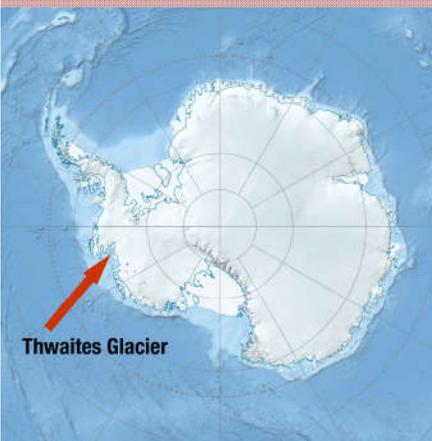
Polar News

Dramatic mass loss in extreme high-elevation areas of a western Himalayan glacier: observations and modelling

A recent study ([DOI: 10.1038/srep30706](https://doi.org/10.1038/srep30706)) shows that rapid climate change at high elevations has accelerated glacier retreat in the Himalayas and Tibetan Plateau which is contrary to various other studies proving mass gain in the western Himalayan domain. It investigates recent mass loss of the Naimona'nyi Glacier in the western Himalayas and reconstructs a 41-year (1973/74–2013/14) equilibrium line altitude (ELA) and glacier-wide mass loss. Through in situ glaciological observations, the study indicates significant annual mass loss (~0.73 m water equivalent) even at 6000 m above sea level during the past 9 years.



Image source: Yogita Garbyal (member IPRN)



Connected subglacial lake drainage beneath Thwaites Glacier, West Antarctica

A study published in *The Cryosphere* ([DOI: 10.5194/tc-11-451-2017](https://doi.org/10.5194/tc-11-451-2017)) reveals that Thwaites Glacier is sliding unstopably into the ocean, mainly due to warmer sea-water lapping at its underside. Researchers at the University of Washington and the University of Edinburgh used data from the European Space Agency's CryoSat-2 to identify a sudden drainage of large pools below Thwaites Glacier. The study finds four interconnected lakes drained in the eight months from June 2013 and January 2014. The glacier sped up by about 10 percent during that time, showing that the glacier's long-term movement is fairly oblivious to trickles at its underside.

Image credit: Ben Smith/University of Washington

Rift in Antarctica's Larsen C Ice Shelf

<http://earthobservatory.nasa.gov/IOTD/view.php?id=89257>

The Larsen Ice Shelf is situated along the northeastern coast of the Antarctic Peninsula, one of the fastest-warming places on the planet. The rift in Larsen C measures ~100 m in width and around 0.5 km in depth cutting completely through to the bottom of the ice shelf. The crack has grown quite rapidly in the month of January, 2017 and its heading to full split and is likely to break free in next few months. When that happens, Larsen C will shed a massive iceberg larger than Rhode Island.



Image source: NASA's IceBridge mission

Member's Corner

WINDS IN ANTARCTICA

by Atul Verma

Winds are the medium of transport of air mass from one place to another place within the earth's atmosphere. It contributes significantly to re-distribution of energy, received from sun, within the atmosphere and responsible for the movements of different weather phenomena.

One evening, while taking some measurements at Christensen ice-shelf, we had a sudden, literally in minutes, turn-around in weather. It was a sunny day and wind was near calm but suddenly picked up. The blowing snow was intense and up to almost 10-12 feet from the ground. Nearly all of us in the group became anxious to get back to Bharati station, that's where we're residing. The anemometer was showing a wind speed of 80kmph. Such phenomenal change in weather in Antarctica is common and the most important element is wind.



Atul Verma

The Antarctic air mass transportation is mainly governed by outward flowing katabatic winds and meridonal circulation between Antarctica and sub polar latitudes.

Katabatic (Greek word "kata" used for "downward") winds can be traced at any latitude of the globe as soon as cooled air flow through a significant slope but Antarctica's katabatic winds are special. Antarctica can be visualized as a dome of ice in its interior sloping down towards coast. It is the coolest place on the planet and one of the reasons is that any warming radiation from sun is largely reflected back in to space by ice and snow. Antarctica's katabatic wind is caused by the shape of the land. Cold and dense air mass flows down the slope to sea through generally steep coast lines, under the influence of gravity. Cold and dense air mass continues to gain velocity and generally reaches at maximum before a certain distance to the coast and produces strongest and most enduring katabatic winds than any other continent on the planet. These winds vary depending on the location but generally are far devastating in the coastal regions. Wind speed of 150 km/h is not uncommon in these regions. With such an overwhelming influence on the climate of Antarctica, katabatic wind is most important than any other single meteorological parameter over entire continent.

Radiative cooling, due to high reflectivity of the surface; Thermal inversion, blocking any rising circulation; and Gravity flow, pouring of heavier and air near surface than that of free air at the same altitude; are three major phenomenon contributing to katabatic flow. High directional consistency and close relation of wind direction to underlying terrain are significant evidence to identify katabatic flow.

The nearly continuous low level out flow of high interior of ice dome implies that the atmospheric mass continuously being removed from the Antarctica. To replenish the cold air removed via the katabatic wind regime, the meridonal circulation must become established between Antarctica and sub polar latitudes. Warmer air originating over southern ocean rises and moves southward at higher tropospheric levels. Such meridonal circulation is more intense during non summer months when katabatic wind regime is stronger and more enduring. Summer time wind cannot be expected to contain a significant katabatic component, owing to enhanced solar heating of the ice slopes and not so strong thermal inversion.

Member's Corner

Surrounding Antarctica, there is normally a belt of low pressure, the circumpolar trough, containing multiple low centers. Low-pressure systems near the Antarctic coast can interact with katabatic winds to increase their strength. Resulting wind speeds can exceed 150 km/h for hours with gusting well over 200 km/h at many places near the coast. Air over the interior of Antarctica is usually subsiding and dry, resulting in little cloud there. Around the coast more moisture is available and low-pressure systems have a greater influence, so cloudy conditions are more common. Blizzards are said to occur when strong winds are accompanied with freezing temperature and very low visibilities. Such conditions are very dangerous and disruptive for outdoor activities. Sometimes blizzards persist for days.

One of the most important characteristic of katabatic winds is a high variability of the wind speed. Radiative cooling of the surface is a sure thing during non summer months (March to November), but this process varies in intensity due to change in cloudiness and strength of inversion etc. Antarctica's surface winds diverge as the air moves towards coast. Thus dense air of the basin builds up and drains quickly causing high speed wind and it generally takes time to fill up basin before the next katabatic wind takes off down slope. Therefore persistent katabatic flow only exception this makes it a very uncertain element of the Antarctic weather.



Biodiversity in Third Pole

Knowing Better a Lesser Known Himalayan Landscape by Ankita Bhattacharya

Nothing can match the magnanimity which the Himalaya, the largest mountain range of the world, provides. Its elements be it biodiversity, environment or culture, the third pole showers with unique presents which are mysterious yet appealing. In India, these mountain ranges span from Jammu and Kashmir in the west till Arunachal Pradesh in the east. Thus, it renders a vast beautiful stretch of inter-cultural and ecological admixture waiting to be absorbed more and more by the mass. In Uttarakhand, the land of Gods, the Himalaya invites reverence from people, more than as mere vacation spots or peaks for mountaineers to scale. High peaks here are worshipped as deities for different religious beliefs. For years together, people have journeyed through these tough and rugged mountainous stretches to



Ankita Bhattacharya

explore, reside or research. On account of that, several places have become important tourist destinations hordes of people throng year long. Among these, the lesser known landscapes provide more of the rustic flavor of the mountains than the common tourist hubs. These are places that have not become commercialized yet to suffice for the people visiting in multitudes, maintaining their traditions. One such landscape is the Askot landscape in the Pithoragarh district of Uttarakhand. It is located at the trijunction of Nepal, Tibetan Autonomous Region of China and India. The landscape is quite unique in case of culture, history, bio-geography as well as bio-diversity. Here, one gets the mixed flavor of elements from the western Himalaya, the central Himalaya and the Tibetan plateau. It is indeed outstanding to notice the assortment of bio-diversity and cultural blend of the three countries surrounding it. The landscape is a catchment of the Kali River, which forms an international border between India and Nepal. Tributaries of this river, Gori, Dhauli and Kuti form three major valleys of the landscape – the Johaar, Darma and Byans. Each valley brings a distinct flavor of its own, having unique set of traditions. A scheduled tribe community called the Bhotiyas reside here, though they refrain themselves to be called so and prefer to be called Shokas and Rangs instead.

The unique location of the landscape forms an admixture of the Shivaliks, the lesser Himalayas, the Greater Himalayas and the Trans-Himalayan regions. Altitudinal and climatic variation gives it a unique physiography giving it flavors of the sub-tropical to alpine to nival zones. Thus, one can get here the wilderness of dense mixed forests of Pine, Oak and Rhododendron species with shrubs of Hill bamboo or Ringaal. This makes the habitat for Barking Deer, Goral, Asiatic Black bear, Himalayan Serow, Sambar, Cheer pheasant, Satyr Tragopan, Koklass pheasant and many more faunal species. The eastern most limit of the Western Assamese macaque in India falls here which is a restricted habitat for these species. Further up, one finds subalpine and Krumholtz zones of shrubs, Rhododendron campanulatum, Firs, Bhojpatras, blue pines and Danthonia grasses beginning from the tree line till the alpins. This is home for the Himalayan Monal, Goral, Sambar, Black bear, Red fox and recently found records of tigers as well. The highest reaches belong to vast stretches of lush green alpine meadows and brown barren areas of the Trans Himalaya filled up with Brahma Kamal, several medicinal herbs, wild rose, Hippophae species and poplars planted from Ladakh, harboring Snow leopards, Black Bears, Wolves, Snow partridges, Chukar and Himalayan Snowcocks. Thus, with an altitudinal class ranging from 600 metres to about 7000 metres, the landscape becomes an abode for a variety of bio-diverse elements, with some of the rare, elusive and endemic species of the Himalaya. All these vegetation are subjected to NTFP collection keeping the residents warm during winters as well as supplying fuel for their daily meals. It is an orchid hotspot, containing about 47% of the Himalayan North Western Orchid flora and an Important Bird Area (IBA). The biodiversity differs valley wise as well with the Johaar valley being the richest and greenest while the other two having more edge towards the Trans Himalayan aspects.

People here are considered descendants of Bhots from Tibet and thus the name comes Bhotiya. There are different Bhotiya communities settled across the three valleys, each having their own tales of descendance and thus, refrain themselves from being labelled as Bhotiyas in general. In Johaar, the Shokas say they are presumably descendants of the Rajputs. They do follow much of the Hindu traditions followed all over the country. The Rangas and Khampas of Darma and Byans, however, have much more similarities with the Tibetan culture in their society, language, food and deities. Pre 1962, there was a definite salt trade between India and Tibet where the Khampas, the nomadic traders, played important role bringing in lots of antique merchandize to India from China and Tibet. Post 1962, after the declaration of Tibetan Autonomous Region of China and the Sino-Indian war, the trade drastically dissolved with fewer amounts of jewelry, goods and other merchandise flooding into the valleys. One can still find ancient relics in the houses of the residents and hear the old aged reminiscing about the grandeur from the past. People across the three valleys are migratory where they migrate to their summer villages at the upper reaches for six months during summer and descend back in late winters. The houses at the upper reaches still have the ancient art etched on their doors and walls and gives a quintessential feel of visiting a place from ancient India. The main livelihood of people is Cordyceps collection or Keedajadi which acts as an aphrodisiac and has high market value in China. Though the trade is illegal but major chunk of their money comes from this trade every year. Other medicinal plants like Kutki, Gandhrayan, Hattajadi are also collected for home use and commercial purpose. Livestock grazing forms the second most important livelihood where people from the entire landscape and other states like the Gaddis from Himachal pursue as a traditional source of income. Tourist and mountaineering destinations like Milam Glacier, Ralam Glacier, Nanda Devi and Panchachuli Base camps, Om Parvat, Adi Kailash and the routes to Kailash Mansarovar has given another choice of livelihood for these people. Though these places are less popular compared to other places in Uttarakhand, they do attract international tourists, researchers, trekkers and vacationers in a big way. Residents here are warm hearted in nature and one gets the real feel of the mountains by staying with them in their homes, tasting the local cuisines, understanding the local language and traditions. Thus one gets to the core of the societies. With overall similarities, it is quite evident from the social structures and traditions the difference and divide across the valleys. Intermingling does happen in the present, but there is a clear divide by forbidding intervalley marriages and considering their own traditions superior. A simple example is the use of local made liquor which is an important aspect of mountain societies even in religious purposes. In Darma and Byans, it is more of a tradition to offer guest liquor first and then tea as it is considered holy while in Johaar they will offer you liquor only on demand. All these people are quite religious in nature and perform rites to their respective deities before coming back in winters. It is quite a sight to stay in these villages during these rites as the deities and religious performances are different valley wise. Johaar signifies the beautiful Nanda Devi peak as its main deity and every year performs Nanda Ashtami puja before returning in winters. In Darma they have pujas in five or ten years with their deities having Tibetan names of Lord Shiva.

The impact of people residing here is huge on the bio-diversity. Whether it is negative or positive, it is yet to be decided, as the Himalaya itself forms a natural conservation site through its tough and rugged terrains and harsh conditions only suitable for the particular species to survive. It is also interesting to see how geographical barriers create a difference in lifestyle, traditions and culture. As an ensemble, if one wants to get the true rugged Himalayan flavor, the quiescence of the mountains without expecting much luxury, this a place to go to where people and biodiversity have still not changed utterly from their own self.



Biodiversity in Third Pole

The Role of Bats in Himalayan Ecosystem by Sangay Tshering



Sangay: Trapping of bat in its roosting site (Himalayan cave of Bhutan)

Despite being the most advantageous flying mammals on earth, bats have been cursed as an evil spirit and vilified as an ugly creature in many parts of the Himalayan region. However these vilifications are not taken on equal footing everywhere. In Bhutan they are believed as the sign of wealth and good luck. The majority of Himalayan bats still remain undiscovered and least concerned although they provide essential ecological services that are vital to Himalayan natural ecosystems management. Some bat species such as Great Himalayan leaf-nosed Bat (*Hipposideros armiger*) prey on diverse insects ranging from night flying insects to agricultural pests eventually making them primary predators. The insect preys comprises of some night-flying beetles, moths, mosquitoes and so on. The studies have shown that some of bats feed on these

insects up to more than “70% of their body weight each night.” A single little brown bat can eat up to 1,000 mosquito-sized insects in a single hour’,

states Bat Conservation International (BCI). Bats not only play significant roles in controlling diverse insect’s population including mosquitoes, the bat’s dropping (called guano) also provides some of the primary nutrient for natural ecosystem.

Besides its critical functions in Himalayan ecosystem management, many fruit and nectar feeding bats are crucial in pollination and seed dispersal of certain plants such as mangoes, bananas, guavas, peaches, papaya and many more. They support local economies through ensuring the agriculture production. As a pollinating and the seed dispersing agent, bats play a vital role in regeneration/ restoration of Himalayan ecosystems mainly in degraded and denuded areas. So it is in no doubt that Himalayan ecosystem would be different, if not poor, place to live without the bats.



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Polar Opportunities

PhD / Post-Doc / Internship Opportunities

- PhD (Oceanography/Ecology)**

Institution : University of Strathclyde APPLICATION

Country : Glasgow, UK DEADLINE:

Link : <https://goo.gl/vlo9if> 15-03-2017
- Postdoc (cryospheric science)**

Institution : Columbia University APPLICATION

Country : New York, US DEADLINE:

Link : <http://tinyurl.com/Lamont-Doherty-Postdoc> Open until filled
- Research Associate**

Institution : Bristol Glaciology Centre, University of Bristol APPLICATION

Country : Bristol, UK DEADLINE:

Link : <http://tinyurl.com/jcgrzrx> 09-03-2017

Workshop/Conference

- 23rd International Symposium on Polar Sciences**

Korea Polar Research Institute will hold the 23rd International Symposium on Polar Sciences in Incheon, the Republic of Korea on May 17-18, 2017. This Symposium serves not only to bring polar scientists together, providing an international forum to exchange views and ideas, but also provides an opportunity to discuss collaborative research with colleagues. Please submit your abstract no later than **17 March, 2017**. For further information, please visit: <http://symposium.kopri.re.kr/>.

- Polar 2018**

POLAR 2018 is a joint event from the Scientific Committee on Antarctic Research SCAR and the International Arctic Science Committee IASC. The SCAR meetings, the ASSW and the Open Science Conference will be hosted by the Swiss Federal Institute for Forest, Snow and Landscape Research WSL under the patronage of the Swiss Committee on Polar and High Altitude Research. The WSL Institute for Snow and Avalanche Research SLF is organising POLAR2018, which will take place in Davos, Switzerland from 15 - 26 June 2018. The closing date for abstract submission is 1 September 2017. For further information, please visit: www.polar2018.org.



Activities

ICECAPS Workshop 2016

Indian Polar Research Network (APECS-India) collaborated with Wildlife Institute of India-ENVIS centre on Wildlife & Protected Areas to celebrate the Antarctica Day by hosting **ICECAPS 2016 (Improving Communication Effectiveness and Capacity Addition in Polar Science)**, a science communication workshop for early career researchers and graduate students. The workshop was attended by about 50 masters and PhD students from biology, geology, and environmental science disciplines.

[Read more about ICECAPS here](#)



Group Photo during ICECAPS Workshop



Monica during ICECAPS Workshop



Devsamridhi introducing her research in Antarctica



Dr. Anil Joshi sharing his experiences

Shape the future of polar geosciences: Panel Discussion

A panel discussion titled “Shape the future of Polar Geosciences” was organised by Indian Polar Research Network (APECS-India) in association with Department of Geology, University of Delhi on 28th January 2017. The event was held to introduce polar geosciences to the undergraduate students and enhance knowledge of the postgraduate students. This panel discussion aimed at creating awareness among the students regarding the career opportunities in polar geosciences, the priorities of the polar research and their significance in the contributions to humanity. The panel discussion was attended by about 100 students along with the distinguished alumni and the faculty of the department.

[Read more about Polar Geosciences Panel Discussion here](#)

Popularizing Polar Science among school and college students

IPRN Science Outreach Team member, Dr. Sudipta Sasmal gave talks/presentations in schools, colleges and orphanages across West Bengal state. He shared his experiences of working in Antarctica with young students and guided them on the opportunities to become a Polar Scientist. Talks were given at Gomokpota Ginodhor High School (24 Dec 2016), Sristi NGO for orphans (28 Dec 2016), Khukurdaha Science Symposium at Vidyasagar University (29 Dec 2016) and SKB university (25th Jan 2017).



Sudipta talks about Antarctic Science