*Curriculum Vitae*

INDRANI DAS

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Marine Geology and Geophysics
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**Education:**

2007: **Ph.D (Physics (Atmospheric Sciences group))** Indian Space Research Organization (affiliation: Gujarat University, India), **Title**: **Characterisation of Marine Aerosols using satellite data**

1998: **M.Sc. (Physics; specialization Particle Physics)** 1st Class, 4th rank holder within the regional University and its affiliated colleges. Gauhati University, India

1995: **B.Sc** (**Physics (Honors)**, Chemistry, Mathematics), 1st Class, Cotton College, Gauhati University, India

**Work experience:**

08/16/2016-continuing: **Lamont Assistant Research Professor,** Lamont Doherty Earth Observatory, Columbia University, NY, USA

02/01/2013- 08/15/2016**: Associate Research Scientist,** Lamont Doherty Earth Observatory, Columbia University, NY, USA

01/23/2010 - 01/31/2013: **Post Doctoral Research Scientist,** Lamont Doherty Earth Observatory, Columbia University, NY, USA

06/01/2007 – 05/14/2009**: Post Doctoral Fellow,** University of Alaska Fairbanks, USA.

08/13/2004 - 05/30/2007: **Scientist C,** Snow and Avalanche Study Establishment (Defence Research and Development Organization), Chandigarh, India

**Research interests:** My research interests involve understanding the critical processes that control surface mass balance of ice sheets and glaciers. I use a combination of remote sensing (airborne and satellites) and modeling techniques to understand the impact of climate on ice mass change, particularly due to ice-atmosphere interaction. My study areas include Antarctic and Greenland ice sheets, Alaskan, Patagonian and Himalayan glaciers.

I am currently working to improve the surface mass balance estimates over East Antarctica. I am also using Ice Sheet System Model (ISSM) to understand the changes in ice dynamics due to present and future variations from RCP projections of surface mass balance. Over Greenland I am collaborating with the JPL ISSM group to use dated radar data and ice sheet model to assess the history of accumulation rates up to the late

Holocene. I am also developing a positive degree day mass balance model that will be used to estimate surface melt over Greenland Ice Sheet and constrain the impact of surface albedo and melt-water retention in firn. These two surface processes are becoming more important with warming climate and have important feedback effects that further enhance surface melt. The positive degree day melt model will be used to link paleo data with the present mass balance of South American glaciers.

I also have a strong field background with expertise in specialized field instruments such as airborne laser altimeter, ice penetrating radars, and ground based spectro-radiometer and sun-photometer.

**Ph.D work:** I worked on a complex radiative transfer model based on scattering of infrared radiation in the atmosphere for satellite retrieval of marine aerosols. I used it for detecting aerosols using India's ocean color monitor IRS P4. I used a ship-based sunphotometer for validation of the radiative transfer model and also studied the characteristics of marine aerosols with respect to atmospheric humidity and wind speed. (Ph.D supervisor: Dr. Pranav Desai, Retd. Chief Scientist, Space Applications Center, Indian Space Research Organization).

**Publications in prep/review:**

Bell, R., Chu, W., Kingslake, J., **Das, I**., Tedesco, M., Tinto, K, Zappa, C., Frezzotti, M., River Drains Destructive Meltwater Preventing Nansen Ice Shelf Collapse for Decades (*resubmission pending, Nature*)

Kingslake, J., Ely, J., **Das, I**. and Bell, R. "Widespread active surface hydrology in Antarctica" *(in review, Science)*

Chu, W.*, **Das, I**., Frearson, N., Dhakal, T., Bell, R "Radar reflectivity indicates basal conditions of Ross Ice Shelf" *(under prep for JGR)*
**Student paper*

**Das, I.,** Schlegel, N., Larour, E., Seroussi, H. "Relative contribution of surface mass balance and basal melt on ice discharge rates over Recovery Ice Stream, East Antarctica using an ice sheet system model" (under prep *for JGR*)

**Publications:**
**Das, I.**, Scambos, T., Koenig, L., van den Broeke, M.R., Lenaerts, J. "Extreme wind-ice interaction over Recovery Ice Stream, East Antarctica" ***Geophysical Research Letters***. 42, **2015.**

Koenig, L. and 21 others "The importance of understanding and quantifying surface processes over the cryosphere for improved climate and sea level rise predictions" ***White Paper*** submitted to NASA's Decadal Survey for Earth Science and Applications from Space, **2015.**

Koenig, L., Ivanoff, A., Alexander, P., MacGregor, J. A., Fettweis, X., Panzer, B., Paden, J., Forester, R., **Das, I**., McConell, J., Tedesco, M., Leuschen, C., Gogineni, P. "Annual Greenland accumulation rates (2009-2012) from airborne snow radar" ***The Cryosphere (in press)***, 9, **2015.**

**Das, I.,** Hock, R., Berthier, E., and Lingle, C. S., "21st century increase in glacier mass loss in the Wrangell Mountains, Alaska from airborne laser altimetry and satellite stereo-imagery", Vol 60, 283-293, ***Journal of Glaciology*, 2014.**

Bell, R.E., Tinto, K., **Das, I**., Wolovick, M., Chu, W., Creyts, T., Frearson, N., Abdi, A., Paden, J. D. "Warming deformation and softening of the Greenland Ice Sheet by refreezing meltwater", ***Nature Geoscience***, 7, 497–502, **2014**.

**Das, I**., Bell, R.E., Scambos, T., Wolovick, M., Creyts, T., Studinger, M., Nicolas, J., Frearson, N., Lenaerts, J., van den Broeke, M. R. "Influence of persistent wind-scour on the surface mass balance of Antarctica", vol 6, 367-371, ***Nature Geoscience*, 2013.**

Bell, R.E., Ferraccioli, F., Creyts, T., Braaten, D., Corr, H., **Das, I**., Damaske, D., Frearson, N., Jordan, T., Rose, K., Studinger, M., Wolovick, M, "Widespread Persistent Thickening of the East Antarctic Ice Sheet by Freezing from the Base", ***Science***, Vol 331, 1592-1595, **2010.**

**Das, I.** and Sarwade, R. N., "Snow depth estimation over North Western Indian Himalayas using AMSR-E", ***International Journal of Remote Sensing***, **DOI:** 10.1080/01431160701874595, 4237-4248, **2008**

**Das, I**., Shukla, A. K., and Mohan, M., "Aerosols in the north east Arabian Sea during the Indian winter monsoon: a study using sunphotometer measurements", ***Current Science***, 86, 9, 1304-1307, **2004**.

**Das, I**., and Mohan, M., "Detection of marine aerosols using ocean colour sensors", ***Mausam (Special issue)***, 54, 1, 327-334, **2003**.

**Das, I.,** Mohan, M., Krishnamoorthy, K., "Detection of marine aerosols with IRS P4-Ocean Colour Monitor" ***Journal of Earth Sciences System***, 111, 4, 425-435, **2002.**

Satheesh, S.K., Krishna Moorthy, K., and **Das I**., " Aerosol Spectral Optical Depths over the Bay of Bengal, Arabian Sea and Indian Ocean", ***Current Science***, Vol. 81, No. 12, 25th December, **2001.**

**Conferences and workshops:**

**Das I.,** Scambos T., Koenig, L., van den Broke, M., Lenaerts, J. The role of winds in reducing surface mass balance of East Antarctica. ***Invited talk*** **at AGU**, 13-18 Dec, 2015.

Scambos, T., Vornberger, P., Bohlander, J., Klinger M., Pope, A., **Das, I.** Surface roughness and snow accumulation in East Antarctica. ***Invited talk at AGU***, 13-18 Dec, 2015.

**Das, I.** and the ROSSETA team. Studying surface snow processes over Ross Ice Shelf, Poster at AGU, 13-18 Dec, 2015.

**Das I.,** Scambos T., Koenig, L., van den Broke, M., Lenaerts, J. The role of winds in reducing surface mass balance of East Antarctica. ***Oral presentation at New England Glaciology Meeting,* 16-18April, 2015.**

**Das I.,** Scambos T., Koenig, L., van den Broke, M., Lenaerts, J. Complex wind-induced variations of accumulation rates over Recovery Ice Stream, East Antarctica. ***Oral presentation at PARCA,* 2015.**

**Das, I.** Using IceBridge laser altimetry data and a positive degree day melt model to capture present day mass balance rates of Russell Glacier, Greenland. Poster at PARCA, 2015.

**Das, I.,** Koenig, L., Scambos, T., van den Broke, M., Lenaerts, J., Understanding the role of wind in reducing the surface mass balance of East Antarctica. ***Oral presentation at AGU fall meeting,* 2014**.

**Das, I.,** Scambos, T., Koenig, L., van den Broeke, M., Paden, J., Sinisalo, A., Issaksson, E., Creyts, T., Bell, R.E., Lenaerts, J., Qunatifying surface mass balance over East Antarctica using ice penetrating radars and ice cores. ***Oral presentation at SCAR conference***, New Zealand, 25-28th August, 2014.

**Das I**., Bell R.E., Creyts T. and Wolovick, M. "Using Airborne Radar Stratigraphy to Model Surface Accumulation Anomaly and Basal Control over Deformed Basal Ice in Greenland" Poster at AGU fall meeting, 8-13th , December, 2013.

Bell, R. E., Tinto, K. J., **Das, I**., Wolovick, M., Chu, W., Creyts, T T., Frearson, N., Widespread refreezing of both surface and basal melt water beneath the Greenland Ice Sheet. AGU fall meeting, 8-13th, December, 2013.

**Das, I.,** Bell**,** R.E., Creyts, T., Wolovick, M., Tinto, K.J., Influence of basal freeze-on bodies in the surface accumulation over Petermann catchment, ***Oral presentation at PARCA Meeting in NASA Goddard Space Flight Center***, Baltimore, 29-30th January, 2013.

**Das, I**., Bell, R.E., Scambos, T., Wolovick, M., Creyts, T., Nicolas, J., Studinger, M., Frearson, N .Widespread wind-scour sites reduce total surface mass balance of East Antarctica. ***Oral presentation at AGU Fall meeting*, San Francisco**, 3-7 Dec, 2012.

Bell, R.E.,Tinto, K., Abdulhakim A., Creyts, T., Wolovick, M., **Das, I.**, Ferraccioli, F., Csatho, B., "Basal Freeze-on: An active component of hydrology from the ice divide to the margin" *AGU Fall meeting*, San Francisco, 3-7 Dec, 2012.

Tinto, K., Langley, K., Bell, R.E., Block, A., Sinisalo, A., Wolovick, M., **Das, I**., Creyts, T, "Basement structure and history of the ice flow over Recovery basins", *AGU Fall meeting*, San Francisco, 3-7 Dec, 2012.

**Das, I**., Bell, R. E., Scambos, T., Wolovick, M., Creyts, T., Nicolas, J., Studinger, M., Frearson, N. "High elevation wind induced accumulation hiatus over East Antarctica: Implications for continent-wide surface mass balance" ***Oral presentation at IGS conference*, Fairbanks, 24-29th June, 2012.**

**Das, I**., Bell, R. E., Scambos, T., Wolovick, M., Creyts, T., Nicolas, J., Studinger, M., Frearson, N. "Evidence for persistent surface ablation from surface morphology and ice sheet stratigraphy over Dome A, Antarctica" Poster presentation at *IPY conference*, Montral, Canada, 22-27 April, 2012.

**Das, I,** Bell, R.E., Wolovick, M., Creyts, T., Scambos, T., Frearson, N "Elevation change, Ice dynamics and surface roughness over Dome A, Antarctica using AGAP Aerogeophysical data" *AGU Fall meeting*, San Francisco, 5-9 Dec, 2011, Poster presentation.

Bell, R.E., Tinto, K., Wolovick, M., Block, A., Frearson, N., **Das, I,** Abdi, A., Cochran, J., Csatho, B., Baboni, G. "Icebridge Provides Novel Evidence for Thick Units of Basal Freeze-on Ice Along Petermann Glacier, Greenland". *AGU Fall meeting*, San Francisco, 5-9 Dec, 2011, Poster presentation.

Abdulhakim A., Wolovick, M., Tinto K, **Das I**, Creyts T., Bell, R. Mapping the Spatial Extent of Basal Frozen-on Ice in Greenland. *American Geophysical Union*, San Francisco, 5-9 Dec, 2011, Poster presentation.

**Das, I.,** Bell, R.E., Wolovick, M., Creyts, T., Scambos, T., Frearson, N. Surface morphology over Dome A due to Ice sheet- Bed- Surface Interaction, *West Antarctic Icesheet Meeting*, 21-23rd Sep, 2011,Colorado, USA, Poster presentation.

**Das, I.,** Bell, R.E., Studinger, M., Frearson, N., Wolovick, M., Tinto, K., Creyts, T, Surface expressions of subglacial accretion under Dome A, Antarctica, *West Antarctic Icesheet Meeting*, 23-25th Sep, 2010, Pennsylvania.

**Das, I.,** Bell, R.E., Studinger, M., Wolovick, M., Frearson, N., Characteristics of the ice surface over the Gamburtsev Mountains, Antarctica from airborne laser altimetry, *AGU Fall meeting*, San Francisco, 13-17 Dec, 2010, Poster presentation.

**Das I.,** Hock, R., Schuler, T., Lingle, C., Zirnheld S., and Larsen, C. To determine the mass balance of the Wrangell Mountains using Laser altimetry data. , *MOCA conference*, Montreal, Canada, 19-29th July, 2009.

**Das I.,** Hock, R., Schuler, T., Lingle, C., Zirnheld S., and Larsen, C. To determine the mass balance of the Wrangell Mountains using Laser altimetry data and climate model, *IGS Conference*, Ireland, 17-22nd August, 2009.

**Das I.,** Hock, R., Schuler, T., Larsen, C., Lingle C., and Zirnheld, S. Recent Acceleration of glacier wastage in the Wrangell Mountains, Alaska from Airborne Laser Altimetry and a model of Orographic precipitation , Poster presentation at *American Geophysical Union*, 2008.

**Das, I.,** Hock, R., Schuler, T. V., Larsen, C., Lingle, C.S., and Zirnheld, S. Mass balance and precipitation modelling of the Wrangell Mountains, *Northwest Glaciology Meeting*, 16-18 Oct, 2008, University of Washington, Seattle, USA.

**Department Seminars:**

Melting or blowing: Atmospheric impact on the mass balance of ice sheets and glaciers. Montclair State University, May 17, 2016

Ice-atmosphere interaction: Implications for mass balance of ice sheets and mountain glaciers. Climate Institute, Rutgers University, May 4, 2016

Ice-atmosphere interaction: Implications for mass balance of ice sheets and mountain glaciers, Lamont Doherty Earth Observatory, May 27, 2016

Extreme ice-atmosphere interaction in East Antarctica: Implications for mass balance and accumulation rates from ice cores, MGG/SGT seminar series, Lamont Doherty Earth Observatory, 2015

Glaciers and their response to climate change. New York University GSTEM program, July 9, 2014

Class room lecture on Aerosols and radiative transfer to M.Tech students in U.N. sponsored CSSTE AP candidates on satellite meteorology, Indian Space Research Organisation, India, 2007

**Review Panels:**

- Served on NASA proposal review panel for Cryosphere, 2014
- Referee for Journal of Glaciology, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, The Cryosphere, International Journal of Remote Sensing.

**Synergistic activities:**

- **Member of Organizing Committee:** Workshop on Surface Mass Balance of the Greenland Ice Sheet, Lamont Doherty Earth Observatory, 7-8 September, 2016
- **Lead convener and Chair AGU fall meeting session:** Big challenges in constraining surface mass balance on ice sheets and mountain glaciers, 2015
- **Working Group membership:** NASA surface mass balance working group, 2015
- **Steering committee member :** Regional HPDC super computing network for Polar Sciences, 2015

**Workshops:**

Invited to NASA Goddard pre-PARCA (Program for Arctic Resources Climate Assessment) workshop on Greenland surface melt, January, 2015

Invited to lead and organize a session entitled "(Big) Science Challenges in Polar Sciences" in the Polar HDPC workshop at Rutgers University, Dec 4-5, 2014

**Funded proposals:**

- Improved Surface Mass Balance Mapping of Antarctica by Quantifying Wind-Blown and Sublimated Snow, **PI**, NASA Cryospheric Research, 2014-2017, $299,996.
- A peek at the past of the Greenland ice sheet using radar layers and modeling (**Lamont PI**: Indrani Das; PI Eric Larour, JPL), NASA Cryospheric Research, 2016-2019
- A systems approach to understanding linkages between the Ross Ocean and ice shelf environment, and Tectonic setting through aerogeophysical surveys and modeling (ROSETTA-Ice), **co-PI**, NSF, 2015-2019
- Developing a positive degree day mass balance model for regional mass balance estimates of Patagonian glaciers, **PI**, Climate Center, Lamont, 2014

**Education Outreach participant:** LDEO outreach at AMNH, 2015; World Science Day, NY, 2011, 2012, 2013, 2015; Polar weekend at Baltimore Science Museum, Nov 12-13, 2010; Lamont Open House, Palisades, NY, Oct 2, 2010,2011,2013, 2014

**Field work:**

- Antarctic field work Oct -Dec, 2015
- Deployed with IcePod team to Schenectady march 20-21, 2014. Responsible for lidar calibration.
- Participated in a 3 weeks field work to Antarctica with the IceBridge team, October, 2011
- Participated in a month long field work to Greenland with the IceBridge team, spring, 2010
- Participated in month-long airborne laser altimetry data collection over Alaskan glaciers in 2007.

- Participated in three ship based field work onboard ORV Sagar Kanya for collection of data regarding aerosols using sunphotometer over Indian Ocean, Bay of Bengal and Arabian Sea in 2000, 2001, 2003.

**Undergrad interns supervised:**

I supervised undergraduate interns each from Dartmouth University and Physics Dept., Brown University in the summer, 2016, 2013 and two undergrads from Columbia University.

**Awards and honors:**

**Travel grant to New Zealand,** to present paper at the SCAR conference, NZ, 2014

**NASA Group Achievement:** For participating in NASA'S IceBridge campaign over Antarctica in 2011.

**Young Scientist Financial Award: Das, I** and R. N. Sarwade, Snow depth estimation over North Western Indian Himalayas using AMSR-E, Paper accepted for oral presentation at European Geosciences Union (EGU GA), Vienna, Austria in April, 2007.

**Best Paper Award: Das** Indrani, Snehmani and J. K. Sharma, "Monitoring Snow Depth over Indian Himalayas using AMSR-E", Oral presentation at Indian Conference on "Microwave, Antenna Propagation and Remote Sensing", Dec 20 to 22$^{nd}$, Jodhpur, India, 2005

Recipient of national level merit scholarship for High School results for the entire tenure of Pre Degree course.

Recipient of national level merit scholarship for Pre Degree results for the entire tenure of Degree course.

Recipient of national level merit scholarship for Pre Degree results for the entire tenure of Masters Course.

Recipient of Fellowship for entire Ph.D tenure from Indian Space Research Organisation.

**Memberships**
Member of American Geophysical Union (AGU)
Life Member of Indian Society of Remote Sensing (ISRS)
Annual Member of Indian Meteorological Society, Ahmedabad Chapter (IMSA)

**Technical skills and programming languages**

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| **Operating Systems** | : Unix, Linux, Windows |
| **Programming Languages** | : Fortran, MATLAB |
| **Image Processing and GIS** | : ERDAS Imagine, Arc GIS, ENVI, Geosoft |

**Large data sets and gridded data sets** : NCEP, ERA 40, satellite, airborne laser altimetry and ice penetrating radar data, Regional Atmospheric model datasets.

**Field instruments handled** : Laser Altimeter, Microwave Radiometer, Multi Spectral Radiometer, Sunphotometer, Moisture-meter, albedometer and other ancillary instruments for Meteorological data collection.