

“Asia monsoon rainfall change for 19-21st century evaluated by a rescued tea garden’s observational data and future simulation”

- Fund: Grant for Environmental Research Projects 2017, Sumitomo Foundation
- Period (estimated): Nov. 2017 ~ Nov. 2019
- Member:
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  - Dr. Pradip Baruah, Tocklai Tea Research Institute, India
  - Dr. Parijat Bogohain, Cotton University, India
  - Dr. Taiichi Hayashi, Kyoto University, Japan
  - Dr. Toru Terao, Kagawa University, Japan
  - Dr. Fumie Murata, Kochi University, Japan
  - Dr. Masashi Kiguchi, University of Tokyo, Japan
  - Dr. Yusuke Yamane, Tokoha University, Japan
  - Dr. Masashi Tanoue, Shibaura Institute of Technology, Japan
  - Dr. Hideyuki Kamimera, National Research Institute for Earth Science and Disaster Resilience, Japan

# Number of the stations used for IMD4(Gridded daily rainfall data by IMD)

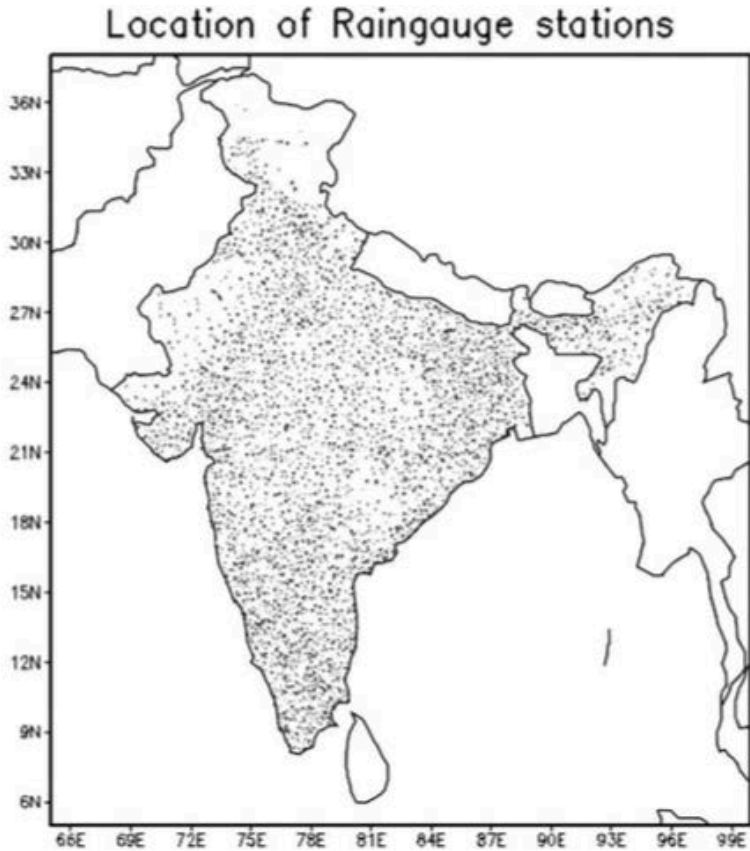


Fig. 1. Network of 6955 rain gauge stations used for development of IMD4

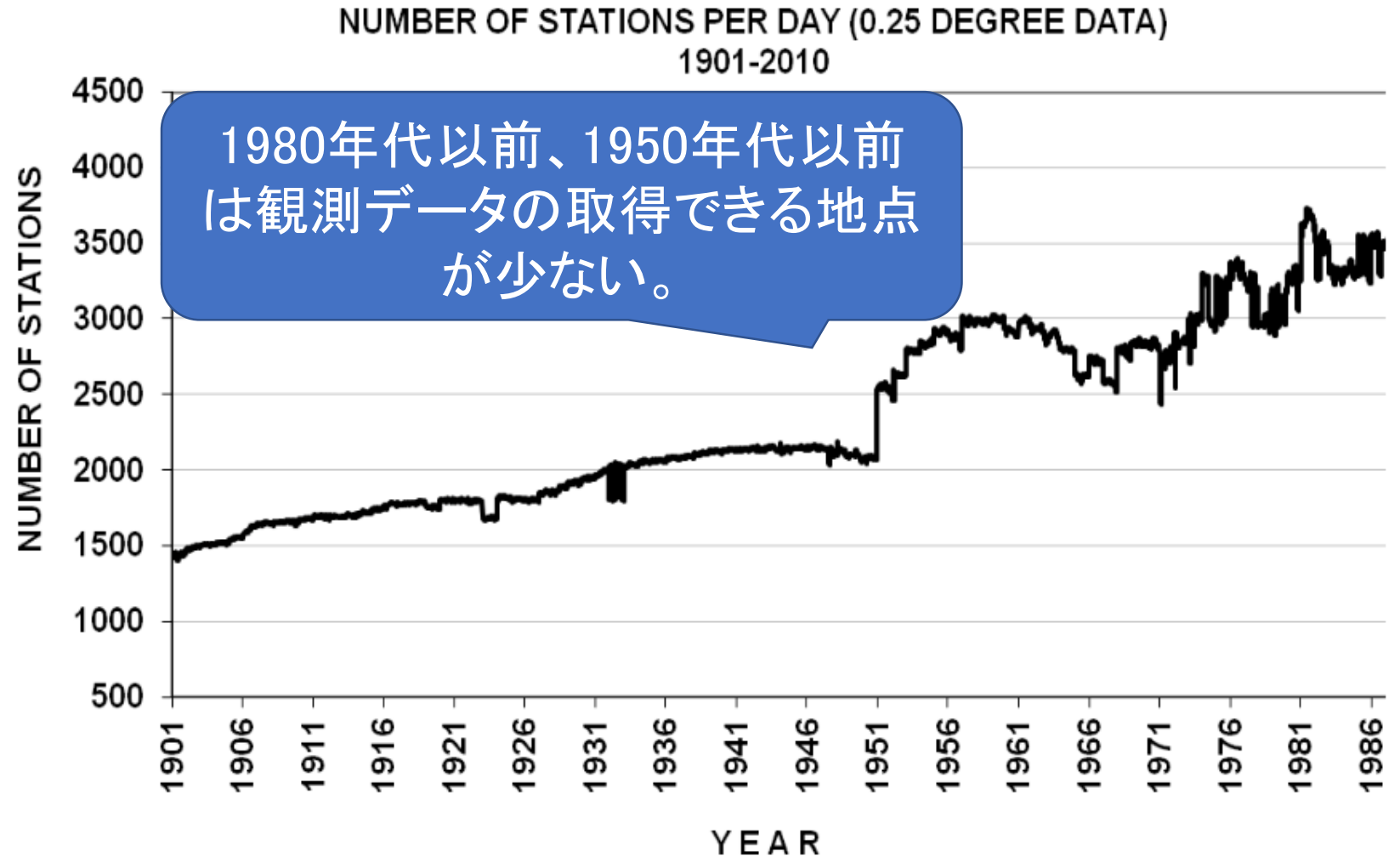
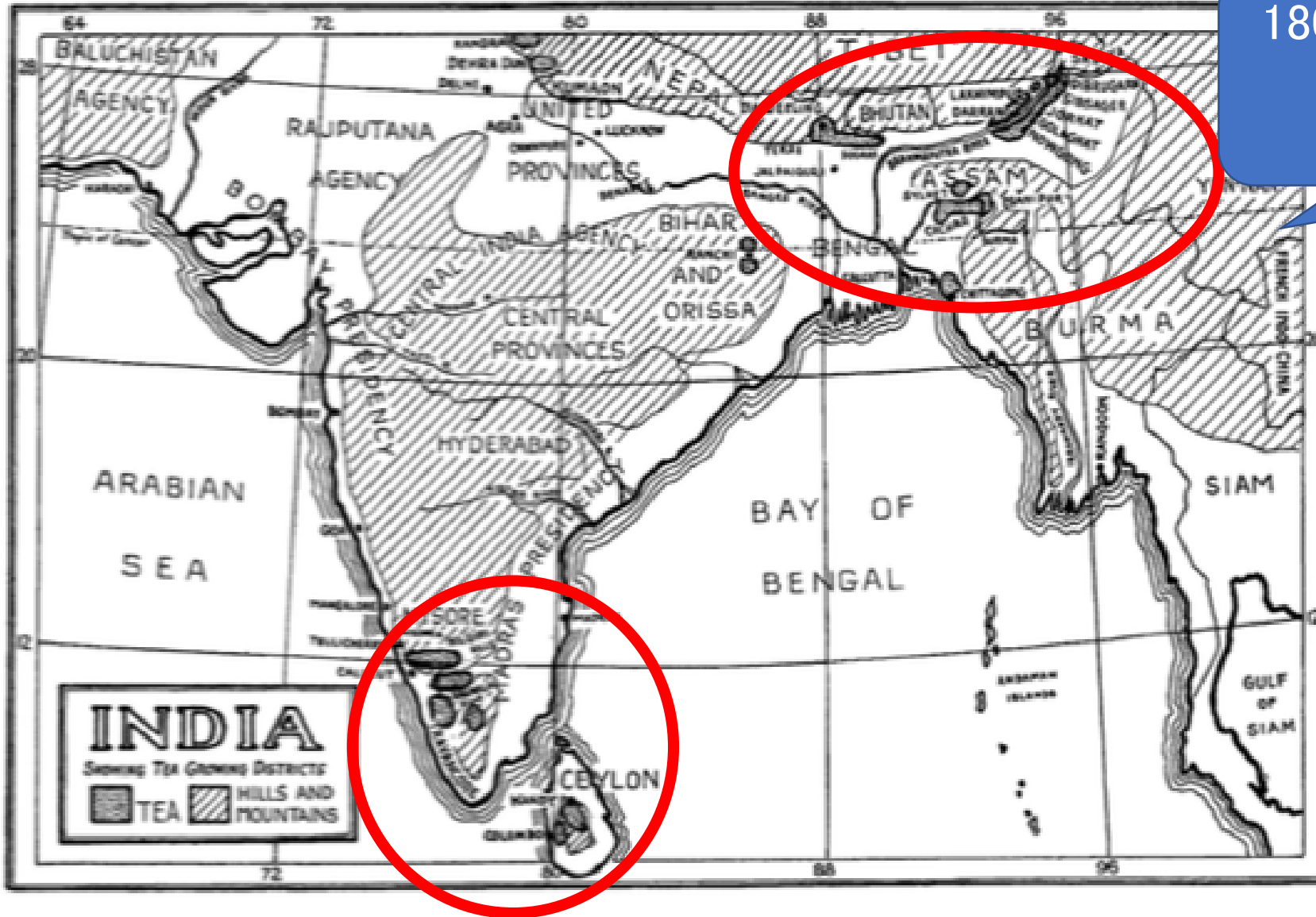


Fig. 2. Daily Variation of number of stations used for the development of IMD4

# Tea cultivation regions in India (Ukers, 1935)



1800年代後半以降、インド北東部とインド南部の各地で茶農園が開拓された。

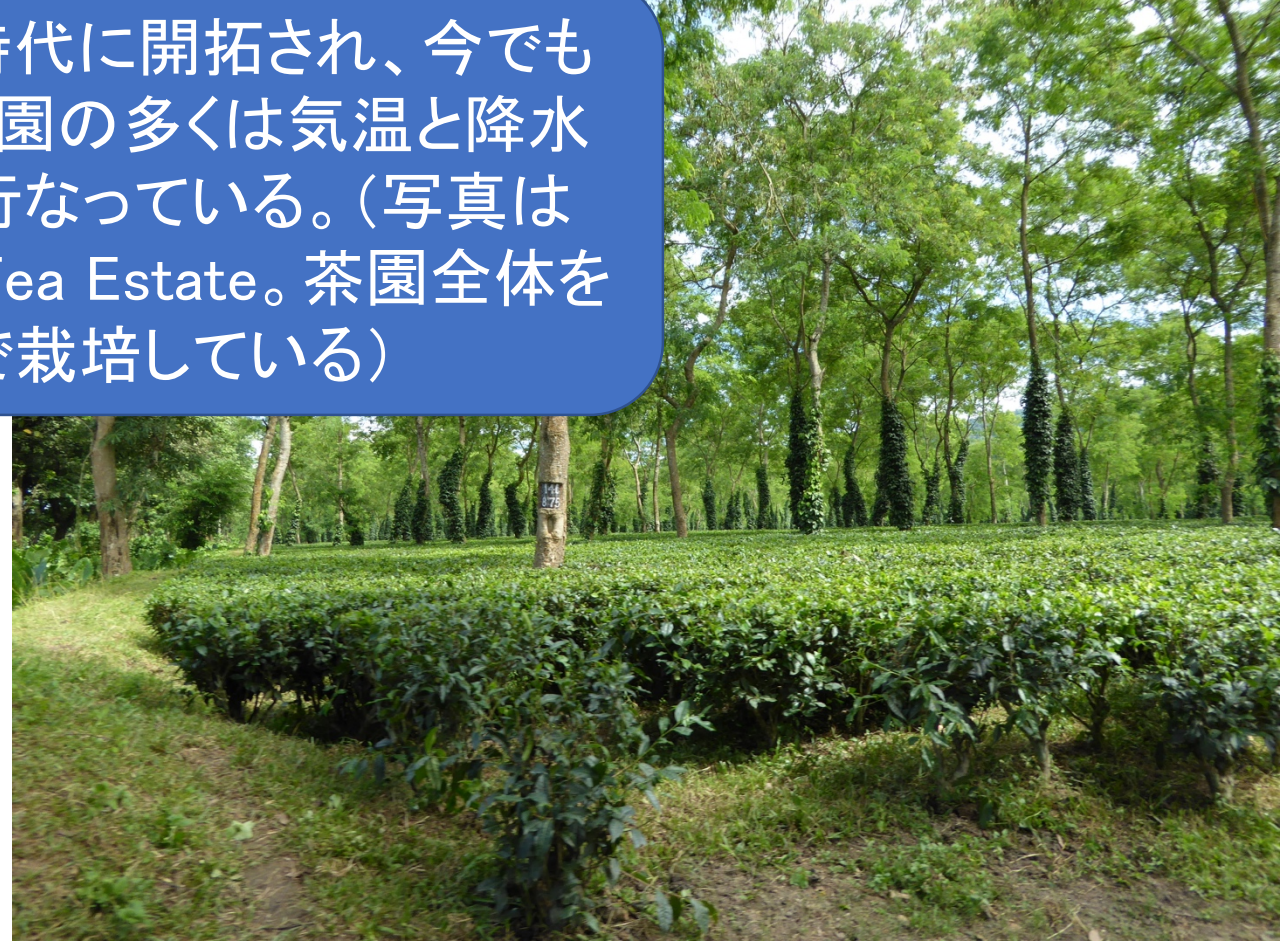
Sylhet (Bangladesh) and Northeast States of India were included in Assam state during the British India

A meteorological observation in the Tea Estates, Assam

→ Long-term data availability & collaboration with agricultural sector



インド北東部で、英領時代に開拓され、今でも経営の続く大規模茶農園の多くは気温と降水量の観測を慣例的に行なっている。(写真はアッサム州のHathikuli Tea Estate。茶園全体を有機農法のみで栽培している)



# Instruments

Rain Gauge

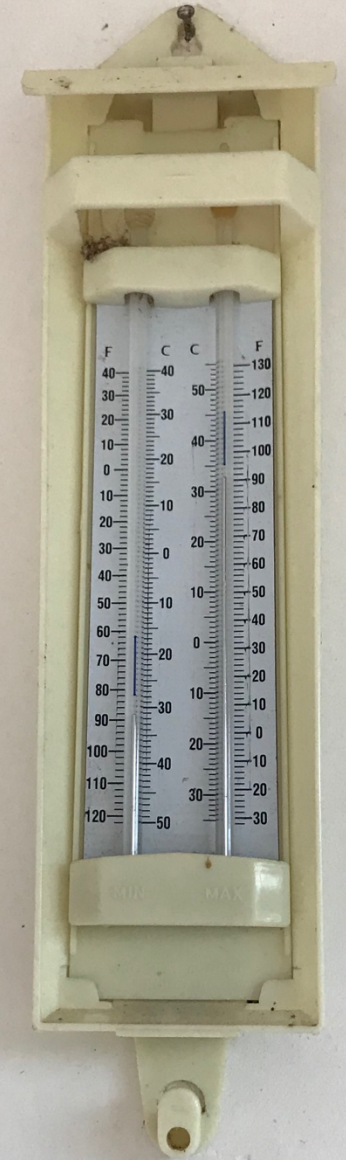
5-inch(12.7 cm) manual (water storage type) rain gauge

Thermometer

maximum-minimum thermometer (Six's thermometer)



使われている測器は多くの茶園で共通。雨量計は5インチのマニュアルタイプ(気象測器の歴史に詳しい人から見ても、珍しい型式だそう)温度計は最高最低温度計。



YEAR - 2018  
 RAINFALL RECORD  
 FOR THE MONTH OF APRIL 2018

Date  
 ↓

YEAR	2016	2017	2018
DATE	TODAY	TODATE	TODAY
1.4.2018	0.38	2.57	0.13
2.4.2018	0.17	2.74	0.29
3.4.2018	-	2.74	1.06
4.4.2018	-	2.74	0.24
5.4.2018	-	2.74	-
6.4.2018	0.33	3.07	0.16
7.4.2018	-	3.07	-
8.4.2018	-	3.07	0.17
9.4.2018	-	3.07	-
10.4.2018	0.42	3.54	-
11.4.2018	0.03	3.57	-
12.4.2018	0.21	3.78	-
13.4.2018	-	3.78	-
14.4.2018	-	3.78	-
15.4.2018	0.19	3.97	-
16.4.2018	0.16	4.13	-
17.4.2018	0.30	4.43	-
18.4.2018	0.28	4.71	-
19.4.2018	0.39	5.08	-
20.4.2018	0.82	5.90	0.09
21.4.2018	1.31	7.21	0.35
22.4.2018	0.59	7.80	0.53
23.4.2018	0.57	8.37	-
24.4.2018	0.25	8.62	0.48
25.4.2018	0.05	8.67	0.12
26.4.2018	0.15	8.82	0.28
27.4.2018	-	8.82	-
28.4.2018	0.12	8.94	-
29.4.2018	0.15	9.09	-
30.4.2018	0.15	9.24	-
7.02	23.34	3.80	20.90

May 2018

	2016	2017	2018
	Today	Today	Today
0P.	-	9.19	8.23
1.5.2018	-	9.19	0.42
2.5	0.61	9.80	0.47
3.5	-	9.80	0.28
4.5	-	9.80	0.46
5.5	-	9.80	0.46
6.5	-	9.80	0.29
7.5	-	9.80	0.29
8.5	-	9.80	0.08
9.5	-	9.80	0.75
10.5	-	9.80	0.08
11.5	0.79	10.59	0.08
12.5	-	10.59	0.43
13.5	-	10.59	0.71
14.5	-	10.59	0.71
15.5	0.79	11.38	0.71
16.5	0.70	12.08	0.71
17.5	0.79	12.87	0.71
18.5	0.31	13.18	0.71
19.5	0.67	13.85	0.74
20.5	1.07	14.92	0.74
21.5	0.17	15.09	0.74
22.5	0.90	15.99	0.74
23.5	0.08	16.07	0.74
24.5	-	16.07	0.56
25.5	0.36	16.43	0.66
26.5	0.04	16.47	0.66
27.5	-	16.47	0.66
28.5	-	16.47	0.66
29.5	-	16.47	0.66
30.5	-	16.47	0.66
31.5	0.27	16.74	0.87

データは手書きで  
 データブックに記録さ  
 れる。  
 前年、一昨年と比較  
 できるように、3年分  
 が同じページに記録  
 されている。  
 これもいくつもの茶園  
 で共通

The column of the data book set out to show the value of two or three years (temperature or rainfall) in the same page. To compare the relation between the weather or climate and production with the last couple of years, to manage it.

# Tea garden data list(digitized) : Provided by IITGuwahati, Prof. Sarma

IITGのSarma教授らのグループが、すでに茶園で観測された日降水量データのデジタル化に取り組んだ(110箇所)。今後協定等を結び、共同研究を計画している。

Meta-Data for Climatic Data Collected Under Prof Arup Kumar Sarma, B.P Chaliha

No.	Name of TE	District	Digitized data	Not digitized data
1	Rupai	Tinsukia	1992-2010	
2	Koomsong	Tinsukia	1994-2010	
3	Ledo	Tinsukia	1995-2010	
4	Panitola	Tinsukia	2005-2010	
5	Deohall	Tinsukia	1995-1998	
6	Rupai	Tinsukia	1992-2010	
7	Powai	Tinsukia	2007-2016	
8	Deamoolie	Tinsukia		1998-2015
9	Namdang	Tinsukia	1979-2015	
10	Powai	Tinsukia	2007-2016	
11	Digulturrung	Tinsukia	2012-2016	
12	Ethelwold	Dibrugarh	1999-2010	
13	Mancotta	Dibrugarh	1993-2010	
14	Namrup	Dibrugarh	2005-2016	
15	Jalannagar	Dibrugarh		1993-2010
16	Moran	Dibrugarh	1994-2010	
17	Basmatia	Dibrugarh	1982-2015	
18	Borhat	Dibrugarh	2006-2016	
19	Nahortoli	Dibrugarh		2006-2015
20	Azizbagh	Dibrugarh		1985-2015
21	Chubwa	Dibrugarh	2005-2010	
22	Dilli	Dibrugarh	2006-2015	
23	Keyhung	Dibrugarh	1980-2015	
24	Santi	Dibrugarh	2014-2016	
25	Maud	Dibrugarh	2016	
26	Madhuting	Dibrugarh	2012-2016	
27	Thanai	Dibrugarh	2006-2010	
28	Chabwa	Dibrugarh	2005-2011	
29	Khuawang		2003-2010	2011-2015
30	Nahorkutia	Dibrugarh/Naharkutia	2010-2015	
31	Sepon	Sivasagar	1994-2010	
32	Rukmani	Sivasagar	1994-2010	
33	Lukuwa	Sivasagar	1994-2010	
34	Mackeypore	Sivasagar		2006-2010
35	Ligripookrie	Sivasagar		1993-2010
36	Madoorie	Sivasagar		1993-2010
37	Towkok	Sivasagar		2001-2010
38	Manjushree	Sivasagar		2001-2010

39	Khumtai	Sivasagar		
40	Borahi	Sivasagar		
41	Khagorijan	Sivasagar		
42	Borhat	Sivasagar		
43	Deha	Jorhat		
44	Kakojan	Jorhat		
45	Duklingia	Jorhat		
46	Kharikatia	Jorhat		
47	Shyam	Jorhat	No data	
48	Boisahabi	Jorhat	1989-2015	
49	Hoolungooree	Jorhat	2015	
50	Naganijan	Jorhat	2005-2010	
51	Ouphulia	Charaideo		1995-2015
52	Sundarpur	Charaideo	2006-2015	
53	Bokhial	Golaghat	1996	
54	Doria	Golaghat	1960-1980	
55	Halmira	Golaghat	1995-1998	2001-2010
56	Nahorjan	Golaghat	2003-2010	
57	Rajabari	Golaghat		2010-2011
58	Abhoyjaan	Golaghat	1996-2016	
59	Udayjyoti	Golaghat		2008-2015
60	Borsapori	Golaghat	2014-2015	
61	Diffloo	Golaghat	2009-2015	
62	Borjan	Golaghat	2006-2015	
63	Dalowjan	Golaghat	2006-2018	
64	Furkatting	Golaghat	2006-2015	
65	Hathikhuli	Golaghat	2006-2015	
66	Murphuloni	Golaghat	2006-2015	
67	Nitinnagar	Golaghat	2006-2015	
68	Pabhojan	Golaghat	2006-2015	
69	Rungamatty	Golaghat	2006-2015	
70	Rongagora	Golaghat	2006-2015	
71	Socketing	Golaghat	2006-2015	
72	Nahorjan	Golaghat	2006-2015	
73	Dholaguri	Golaghat	2006-2015	
74	Marangi	Golaghat	2006-2015	
75	Arin	Golaghat	2011-2016	
76	Koomtai	Golaghat	2007-2015	
77	Nandapur	Golaghat	2011-2016	

87	Anand	Lakhimpur		
88	Bhelaguri	Biswanath	2004-2015	
89	Dekorai	Biswanath	2004-2015	
90	Halem	Biswanath	1996-2015	
91	Deckiajuli	Sonitpur	1977-2010	
92	Sonabeel	Sonitpur	1925-1948	
93	Inkharia(Debiajuli)	Sonitpur		2006-2010
94	Durrung	Sonitpur	2013-2016	
95	Nahorani	Sonitpur		2007-2015
96	Arun	Sonitpur	1997-2016	
97	Bholaguri	Sonitpur	No Data	
98	Harchurah	Sonitpur	1990-2015	
99	Sapoi	Sonitpur	1957-2015	
100	Tezpore Gogra	Sonitpur	1994-2015	
101	Mazbat	Udalguri	1982-2010	
102	Beteli	Udalguri	1928-2016	
103	Lamabari	Udalguri	2005-2016	
104	Kopati	Darrang	1992-2015	
105	Achabam	Nahorkotia	2005-2016	
106	Bisa	Changlang	2015-2016	
107	Longai	Karimganj		2011-2015
108	Kokrajhar TE	Kokrajhar	2001-2010	
109	Ashabam	Naharkatia	2005-2016	
110	Lanku Camp	Dima Hasao	1986-1994	
111	Agriculture Dept Monthly Data	All Districts	2004-2011(April)	
112	Bisa T.E	Arunachal Pradesh (Situating at Tinsukia & Arunachal Border)	2015-2016	
113	AAU	Jorhat		

# 2018年11月16日

# セミナー開催

## Seminar on Environmental Issues and Social Problems of the Tea Gardens in Assam, India

Date: 16 Nov. 2018, 13:30-16:00  
Venue: Conference room1, East Bldg., Center for Southeast Asian Studies (CSEAS), Kyoto University

Many big tea estates, established at the end of the 19th century in Assam, India, have the ground meteorological observation of rainfall and temperature. Usually, the data have used to analyze the variation of the tea yields. Meteorologists are trying to elucidate the long-term variation of the precipitation from these records. To share and utilize the results between the researchers and the industry, it is needed to learn about the environmental issues and its background facing the tea industry of Assam. We invite 2 speakers, the professionals in that field from India, and conduct this seminar.

### Lecture 1

*"History of tea gardens in Assam"*

Dr. Pradip Baruah  
Chief Advisory Officer  
Tocklai Tea Research Institute, India

### Lecture 2

*"Social and economic problems of the tea garden workers in Assam"*

Dr. Parijat Borgohain  
Associate Professor, Department of Geography, Cotton University, India



**Access**  
4 min walk from  
Jingumutamachi Station  
(Keihan Line)  
6 min walk from Kojinguchi  
Bus Stop (City Bus No. 4, 7,  
20S) About 30 min from  
Kyoto Station

**Contact**  
Yusuke Yamane, Tochoa University  
Azusa Fukushima, Kobe Gakuin University  
azfuku@human.kobegakuin.ac.jp



Pradip Baruah氏、Parijat Borgohain氏を招いてセミナーを開催  
参加者9名

アッサムでの茶園開拓史や茶園労働者の労働環境などについてお話しいただいた。  
茶栽培史の核心に迫るようなご質問もあり、盛況に終わった。



ご協力誠にありがとうございました！