On the Local Climatological Survey in Aizu and Inawashiro Basins

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by

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I Introduction

Aizu and Inawashiro Basins are in the southern part of Northeastern Japan and respectively in the west and south sides of Bandai-san Volcanic Group. Aizu Basin extends about 12 km from east to west, about 32 km from north to south and there are hilly mountains around the basin, except Nekoma Volcano (1405 m) which is to the north-east. The rivers rising in the surrounding mountains, join one another in the central-western part which is the lowest place of the basin, the bottom being 170 m~ 240 m in height. But Inawashiro Basin adjacent to the southeast of Aizu Basin, is surrounded by Bandai-san Volcano (1819 m) and other mountains of over 900 m. Moreover, Lake Inawashiro shaped like a circle of about 12 km in diameter, occupies the greater part of its bottom and influences the temperature of the narrow fields along the lake shore. The annual mean temperature of Inawashiro Basin is about 2.0°c colder than that of Aizu Basin, owing to the range of about 300 m between the heights.

In these basins, however, there are only a few meteological observatories and so the data are too scarce to make clear the local climate related with the micro landform or an artificial and natural covering of the ground surface. In the present survey, eight or seven temporary observatories were distributed in the following three districts : the central-southern part of Aizu Basin, the narrow fields around Lake Inawashiro and the southern slope of Bandai-san Volcano. But eight or seven observatories for each district were still scarce and moreover, the period of observation was too short, as only a day was spent for each district. Therefore, it is clear that the results of the observation is insufficient to be considered about, and the present paper will deal with only the main phenomena which appeared in the results.

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II Method

The method of local climatological survey are generally as follows: 1) moving observation, 2) observation at a regular time at a fixed place, 3) observation by self-recording machines. The author took up the second method and made it possible to move the apparatus readily. That is, a set of two thermometers was suspended from a bar supported by two bamboo-sticks and the mercury bulbs were at 150 cm above the ground.(1) After observation, it was very easy to remove and carry it to another point. The set of two mercury thermometers with a graduation of 1/2°c or 1/5°c was employed as a wet and dry hygrometer and a simple ventilative sunshade(2) was put on the mercury bulb to be free from the effects of the direct rays and radiation of the sun. Wind direction was observed by reading the direction indicated by a streamer such as a silk-thread and a tape. A class of wind velocity was decided only with the naked eye.

Temperature, humidity and wind direction were observed at every five minutes from 4^h00 or 5^h00 to 17^h00 or 19^h00. The data presented in this paper are principally shown as an hourly or half hourly mean. The observatories were located on the narrow borders between the patches of fields which are the widest covering of ground surface in Aizu and Inawashiro Basins, for their locations must be in the same condition. But on the southern slope of Bandai-san Volcano, the seven observatories carried our observation respectively at several points from the lake shore up to 1050 m, as the covering of ground surface changes with height.

III Results of Observation and General Remarks

1) Aizu Basin

The observation was executed on July 11 when it was fine almost all day long. But it had been rainy or cloudy till the previous day and it was just after the rainy season in Japan. On that day, a thick fog covered all over the basin till 7^h00 and a distant roll of thunder was heard over the southern mountains at about 17^h00.

(1) Miho Daigo : A Micro meteolology in a cultivated field 1948 pp. 156~157

(2) This device by Prof. Mutsuo Katô

a) Temperature

The following consideration is based upon the diurnal variation of the temperature distribution (Fig. 1, 1 - 5). The minimum temperature appeared from 4h00 to 5h00 early in the morning. Aoki at the lowest place of the basin (175 m) showed 17.9°c and the temperature gradually grew higher, as the places were situated nearer to the margin of the bottom. That is, Asô (210 m) and Takano (220 m) showed respectively 19.5°c and 19.6°c, and the temperature inversion of 1.7°c at maximum range was clearly recognized till 7h00. The east side of the basin began to receive bright sunshine and showed a temperature about 1.5°c higher than the west side from 7h00 to 8h00, as the thick fog covering over the basin moved toward the west. After 8h00, the observatories in the central and lower part of the basin showed higher temperatures than the marginal ones. Namely, Aoki, Kanamichi and Shôjô, and Aoki, Shibajô and Shôjô were respectively the centers of the areas which showed a high temperature from 10h00 to 11h00 and from 12h00 to 14h00. At the time of maximum temperature from 12h00 to 14h00, the range was 3.5°c between 31.1°c at Shôjô and 27.6°c at Asô. That is the phenomenon quite opposite to the inversion distribution early in the morning. But after then, the temperature

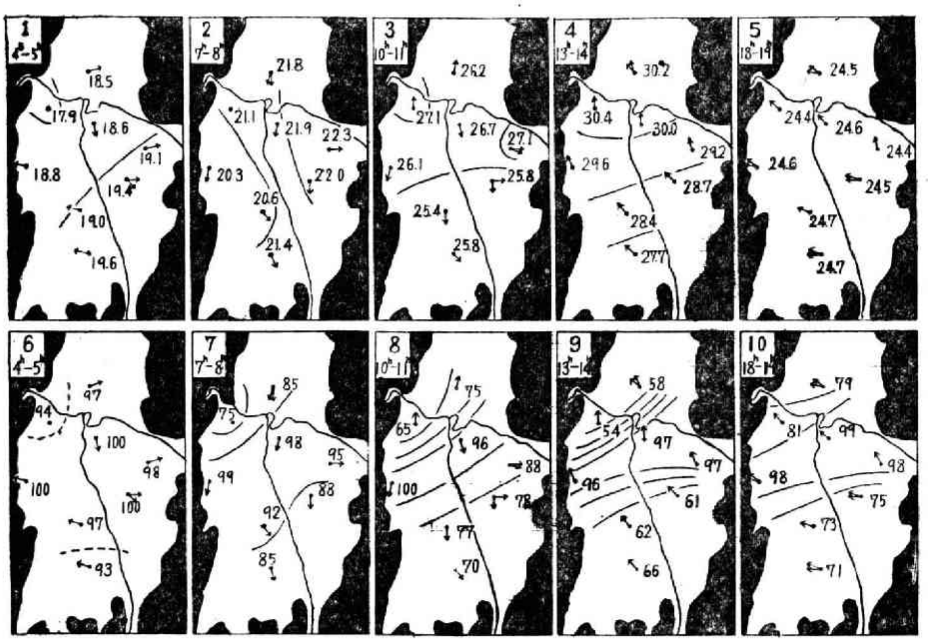

Fig. 1 1 - 5 Distribution of Temperature °C
6 - 10 Distribution of Relative Humidity %

declined gradually and showed the homogenious distribution from 17h00 to 18h00. And the inversion distribution began to appear slightly from 18h00 to 19h00.

The mean temperature distribution for fifteen hours scarcely shows the areal difference, but the distribution of the diurnal range (Fig. 2, 8) indicates a gradual change from 12.5°c at Aoki to 8.7°c at Asô.

In other words, though the range of elevation is only below 50 m, the isopleth of diurnal range of temperature fairely coincides with the contour of the bottom. Further, a variation of temperature distribution, in accompany with that of wind direction, was hardly recognized.

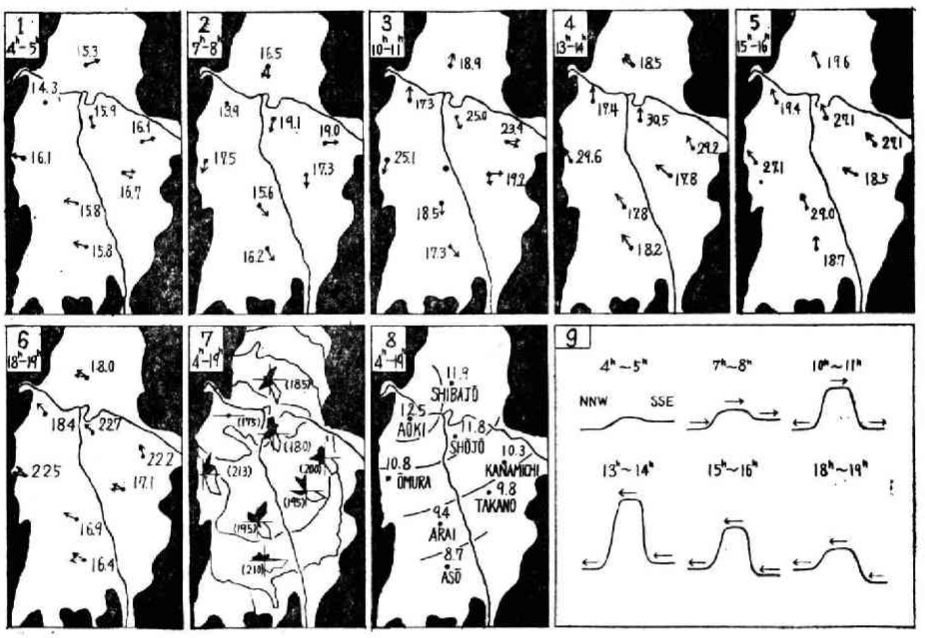

Fig. 2 1-6 Distribution of Vapour Tension (mm)
7. Frequency of Wind Direction (Black part shows the wind direction prevailing in the morning and white part in the afternoon) & Contour Line (every 20 m)
8. Diurnal Range of Temperature
9. NNW-SSE Profile of Vapour Tension Distribution

b) Humidity

Commonly a relative humidity changes in inverse proportion to temperature, but the results showed an abnormal diurnal variation. (Fig. 1, 6-10, Fig. 2, 1-6) When the temperatures were minimum early in the morning, Aoki and Asô showed 94% and 93%, and the observatories between them registered

97 %~100 %, showing nearly saturation points. That is, the observatories which showed the highest or the lowest temperature, registered a little lower humidity. And at that time, the wind directions were changeable and the wind velocities were almost 0. After then, the humidity descended in accompany with rising of temperature at five observatories, except three observatories of Kanamichi, Shôjô and Ômura. At the time of maximum temperature, these three obsrvatories registered respectively 97%, 97% and 96%, though Asô and Aoki showed fairely lower humidities such as 54% and 66%. And at last, these abnormal high humidities remained disappeared all day long. While, in general, the north-west wind prevailed from 4h00 to 14h00, Aoki and Shibajô on the windward showed lower humidities than Asô and Arai on the leeward. But after 17h00, the south-east wind prevailed and the latter showed lower humidities. Then, although it is unable to determine whether the fact as above mentioned results from the existence of an area of abnormally high humidity or not, its existence may still be able to be supposed, as the same phenomenon appeared in the diurnal variation of the vapour tension. Namely, Fig. 2, 9 represents the NNW-SSE profile of vapour tension disribution for fifteen hours showing the fact that the observatories on the leeward registered high humidities, —— always higher humidities than those on the windward. But the assumption is difficult to be strongly supported, since the humidity distribution showed a remarkable change for a short distance and its cause was not accounted for, based on the present data only.

However, "Imochi" (a sort of rice plant disease caused by a bacteria) caused much damage to the plants in the basin from the beginning to the end of July, 1950. According to an expert in agriculture, "Imochi" often breaks out under strong sunshine just after a long spell of rainy or cloudy weather, though the conditions of fertilizer, soil, rice plants and so forth, are sometimes the causes of its occurrence and the degree of their influences changes according to the kinds of "Imochi". The occurrence in Aizu Basin began at the end of the rainy season and spread all over the basin, with the exception of the valleys in the surrounding mountains.

But the area where "Imochi" broke out in the beginning and which suffered from the greatest damage, was nearly limited to the central-southern part of the basin, fairely overlapping the high humidity area mentioned above. Therfore, it is indeed unable to assume the direct causality between these areas, but the existence of such a high humidity under the high temperature of over 30°c may have been one of the causes of its occurrence.

Table of Results

Table I

Aizu Basin

Date of Observation July 11

Weather Sunny, Screened by thick fog till about 8h00 and thin clouds after about 18h00

Location \ Time		400 500	500 600	600 700	700 800	800 900	900 1000	1000 1100	1100 1200	1200 1300	1300 1400	1400 1500	1500 1600	1600 1700	1700 1800	1800 1900	Mean	Max.	Min.	Range
Asô	WD	SSE	NNE	—	NNW	W	WNW W	NW	—	NNW	SE	SE	S	E	ESE	ESE E	—	—	—	—
	T	19.6	19.5	20.5	21.4	23.1	25.0	25.8	26.5	27.5	27.7	27.6	28.2	26.4	25.7	24.7	24.6	28.2	19.5	8.7
	RH	93	94	90	85	77	72	70	68	65	66	68	66	70	69	71	74	94	65	29
	VT	15.8	16.0	16.1	16.2	16.2	16.9	17.3	17.5	17.7	18.2	18.7	18.7	17.9	16.9	16.4	17.1	18.7	15.8	2.9
Arai	WD	SSE	NNE	NNE	NW	NW	NW NE	N	N	WNW	SE	SSE	SSE	SE	SE	ESE	—	—	—	—
	T	19.0	19.0	19.6	20.6	22.6	24.3	25.4	27.0	28.0	28.4	27.9	27.9	26.3	25.9	24.7	24.4	28.4	19.0	9.4
	RH	97	96	95	92	82	75	77	73	64	62	69	68	71	70	73	78	97	62	35
	VT	15.8	16.0	16.2	15.6	16.7	16.9	18.5	19.3	18.0	17.8	19.2	19.0	18.0	17.4	16.9	17.4	19.3	15.6	3.7
Takano	WD	W NW	NW	N	N	W NW	NW	N W	NW	NNW N	SE	ESE	ESE	ESE	ESE SE	E ESE	—	—	—	—
	T	19.4	19.3	20.0	22.0	22.8	24.8	25.8	27.2	28.2	28.7	29.1	28.0	26.3	25.8	24.5	24.8	29.1	19.3	9.8
	RH	100	100	98	88	81	77	78	76	66	61	59	66	69	70	75	78	100	59	41
	VT	16.7	16.6	17.0	17.3	16.7	17.9	19.2	20.4	18.7	17.8	17.7	18.5	17.5	17.3	17.1	17.8	20.4	16.1	3.8
Kanamichi	WD	WSW	NW NNW	W	W	W	SW NNW	W WNW	WNW NW	W	SSE	SE	SE	E	SSE	S	—	—	—	—
	T	19.1	19.3	20.2	22.3	23.9	25.7	27.1	27.9	29.1	29.2	29.4	27.9	26.2	25.4	24.4	25.1	29.4	19.1	10.3
	RH	98	98	98	95	93	90	88	92	95	97	96	97	99	99	98	96	99	88	11
	VT	16.1	16.5	17.2	19.0	20.5	22.1	23.4	25.7	28.4	29.2	29.2	27.1	25.0	23.8	22.2	23.0	29.2	16.1	13.1
Shôjô	WD	NNW	N	N	NNE	NNW	NNW	NNW	N	NE SSW	S	S	SSE	SE SSE	SSE	SE	—	—	—	—
	T	18.6	18.9	20.0	21.9	23.9	25.1	26.7	28.1	30.4	30.0	28.9	27.9	27.0	25.9	24.6	25.2	30.4	18.6	11.8
	RH	100	99	98	98	96	96	96	95	95	97	96	97	99	99	99	97	100	95	5
	VT	15.9	16.2	17.0	19.1	21.1	22.7	25.0	26.8	30.6	30.6	28.4	27.1	26.2	24.5	22.7	24.6	30.6	15.8	4.7
Ômura	WD	SSE	NNE SE	NNE	NNE	NNE	ENE	ENE	NE	—	SSE	SE	SE	SE	ESE SE	ESE SE	—	—	—	—
	T	18.8	19.2	19.7	20.3	23.3	24.6	26.1	27.6	29.0	29.6	28.7	28.1	26.3	26.0	24.6	24.8	29.6	18.8	10.8
	RH	100	100	100	99	99	100	100	100	100	96	96	96	97	96	98	99	100	96	4
	VT	16.1	16.3	17.0	17.5	21.0	23.0	25.1	27.4	29.7	29.6	28.1	27.1	24.6	24.0	22.5	23.3	29.7	16.1	13.6
Shibajô	WD	WSW SW	—	NNE	N NNE	SW	SSW S	SSW	SW WNW	NNE SSE	SE SSE	SE S	SSE	SSE	SSE	SSE SE	—	—	—	—
	T	18.5	18.9	19.8	21.8	23.3	24.7	26.2	28.0	30.4	30.2	28.9	27.5	26.6	25.5	24.5	25.0	30.4	18.5	11.9
	RH	97	97	93	85	81	79	75	72	58	58	64	72	74	77	79	77	97	58	39
	VT	15.3	16.0	16.0	16.5	17.2	18.3	18.9	20.2	18.7	18.5	18.9	19.6	19.1	18.7	18.0	18.0	20.2	15.3	4.9
Aoki	WD	—	E	N	—	—	S	S	SW	S	S	S SE	SSE	SSE	SE	SE	—	—	—	—
	T	17.9	18.6	19.8	21.1	24.0	26.0	27.1	28.5	29.6	30.4	29.2	27.8	26.9	25.6	24.4	25.1	30.4	17.9	12.5
	RH	94	88	79	75	74	64	65	63	60	54	61	70	71	74	81	72	94	54	40
	VT	14.3	14.5	13.6	13.9	16.4	14.2	17.3	18.2	18.5	17.4	18.4	19.4	18.7	18.0	18.4	16.7	19.4	13.6	5.8
Max.	T	19.6	19.5	20.5	22.3	24.0	26.0	27.1	28.5	30.4	30.4	29.4	28.2	27.0	26.0	24.7				
Min.	T	17.9	18.6	19.7	20.3	22.6	24.3	25.4	26.5	27.5	27.7	27.6	27.5	26.3	25.4	24.4				
Range of	T	±1.7	±0.9	±0.8	±2.0	±1.4	±1.7	±1.7	±2.0	±2.9	±2.7	±1.8	±0.7	±0.7	±0.6	±0.3				

Table II

Inawashiro Basin

Date of Observation July 14

Weather Fine, Cloudy sometimes

Location \ Time		400 500	500 600	600 700	700 800	800 900	900 1000	1000 1100	1100 1200	1200 1300	1300 1400	1400 1500	1500 1600	1600 1700	1700 1800	1800 1900	Mean	Max.	Min.	Range
On the Lake	WD	—	NNE N	NNW	NNE	WNW NNE	ESE NNE	E ESE	ENE E	ENE E	NE	NE	ENE E	SW WNW	WNW	WNW	—	—	—	—
	T	—	18.0	18.3	19.3	21.4	22.0	21.6	22.0	22.8	23.4	24.0	25.3	24.3	23.3	22.3	22.0	25.3	18.0	7.3
	RH	—	92	90	81	71	69	74	72	66	65	65	60	67	75	77	73	92	60	32
Higashi-tazura	WD	WSW	W	WSW NNW	WSW	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	W	W	NW	—	—	—	—
	T	16.3	16.7	18.0	20.4	21.4	22.1	22.9	23.4	24.2	25.4	25.5	26.0	25.0	23.6	22.0	22.6	26.0	16.7	9.3
	RH	99	96	93	80	80	79	78	76	74	70	69	65	69	74	76	77	99	65	34
Akai	WD	—	W	NNW N	N	N	E	E	E	E	SW W	WSW NNW	W	W	W WNW	WNW	—	—	—	—
	T	17.1	17.1	17.3	18.8	20.1	22.5	22.6	23.3	24.3	25.8	26.0	25.5	24.5	22.6	22.1	22.3	26.0	17.1	8.9
	RH	99	99	99	92	85	78	77	76	71	60	64	69	72	79	82	79	99	65	49
Shinzaike	WD	WNW NNW	E WNW	WNW	WNW	SSW	SSW WSW	S SSE	S SSE	S SSE	S SSE	S SSE	WSW	WNW	WNW	WNW	—	—	—	—
	T	16.4	17.2	18.7	20.5	21.8	22.3	23.1	23.9	25.0	25.7	26.1	25.6	24.3	22.5	22.2	22.8	26.1	17.2	8.9
	RH	97	94	89	83	74	74	74	73	68	64	63	66	72	80	83	76	97	63	34
Kaneda	WD	ENE NE	NNE NE	N NNE	NNE	S	SSW	SSE	SSE	SSW	SSW	SW SSW	SSE SSW	SSW	WNW	WNW	—	—	—	—
	T	16.0	16.5	17.1	18.9	20.6	21.5	22.4	23.6	24.6	25.7	26.3	26.2	24.8	23.7	22.1	22.4	26.3	16.5	9.8
	RH	99	97	91	85	83	82	79	74	71	66	62	62	70	78	84	77	99	62	37
Jôko	WD	E	NE S	NW WNW	WNW	W	E	E	ESE	W	W	WSW WNW	W	E ESE	WNW	W WNW	—	—	—	—
	T	17.3	17.5	18.3	19.2	20.3	21.5	22.3	23.6	24.9	25.6	26.1	26.5	24.9	23.9	22.2	22.6	26.5	17.5	9.0
	RH	96	93	91	85	82	77	77	70	65	64	61	61	73	77	83	76	96	61	35
Funazu	WD	S	S	N	NNE	N	E N	ENE	NE	N	N	N	N	NW	NW	NW	—	—	—	—
	T	17.7	18.0	18.6	19.2	21.4	22.1	22.1	23.5	24.3	25.1	26.0	25.9	26.2	24.0	22.3	22.8	26.2	18.0	8.2
	RH	94	92	89	89	79	80	76	70	68	66	65	64	64	74	77	75	94	64	30
Nakahama	WD	W	W SSW	SSW NW	NNE	NE	NNE NE	ENE	NE	NE NNE	NE E	NE NNE	NNE NE	N	NNW	N	—	—	—	—
	T	16.7	17.2	18.2	19.6	21.7	22.5	23.1	23.5	24.0	25.2	25.8	25.9	25.5	24.2	22.4	22.4	25.9	17.2	8.7
	RH	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
T. of Lake W.		20.5	20.7	21.1	21.5	22.0	23.0	23.1	22.5	22.8	23.1	23.3	23.5	23.2	22.6	22.3	22.4	23.5	20.5	3.0
Max.	T	17.7	18.0	18.7	20.5	21.8	22.5	23.1	23.9	25.0	25.8	26.3	26.5	26.2	24.2	22.4				
Min.	T	16.0	16.5	17.1	18.8	20.1	21.5	22.1	23.3	24.0	25.1	25.5	25.5	24.3	22.5	22.0				
Range of	T	±1.7	±1.5	±1.6	±1.8	±1.7	±1.0	±1.0	±0.6	±1.0	±0.7	±0.8	±1.0	±1.9	±1.7	±0.4				

Table III

Southern Slope of Bandai-san Volcano

Date of Observation July 16

Weather Sunny, Screened by thin clouds after 15h15'

Time \ Location	1050 m			820 m			680 m			625 m			560 m			523 m			515 m			T. of Lake W.	Max. T	Min. T	Range of T
	T	RH	WD	T	RH	WD	T	RH	WD	T	RH	WD	T	RH	WD	T	RH	WD	T	RH	WD				
h' h'																									
500 - 530	—	—	—	19.5	—	—	18.2	—	NW	17.4	92	NNE	17.4	85	SW	16.0	100	—	16.4	94	—	21.0	19.5	16.0	3.5
530 - 600	—	—	—	19.9	—	—	18.6	78	NW	18.2	88	N	17.4	90	NW	16.2	99	—	17.4	93	—	21.2	19.9	16.2	3.7
600 - 630	—	—	—	20.9	66	ENE	19.8	78	WNW	19.7	83	S	18.6	84	SSE	18.0	91	—	19.0	88	E		20.9	18.0	2.9
630 - 700	—	—	—	21.6	64	NW	20.3	77	W	20.1	82	SSW	20.0	70	N	19.4	90	WSW	19.9	88	E	22.0	21.6	19.4	2.2
700 - 730	—	—	—	22.3	65	W	21.8	71	SW	22.2	72	SSE	22.0	42	SW	21.0	82	NNE	21.5	78	E		22.3	21.0	1.3
730 - 800	23.3	63	NNW	23.0	67	WNW	22.8	65	W	23.2	68	WSW	23.6	78	SW	23.7	73	ESE	23.5	73	S	23.5	23.7	22.8	0.9
800 - 830	24.6	61	N	22.8	64	WNW	23.8	64	W	24.2	66	W	24.7	62	WSW	23.8	77	WSW	25.0	60	SSW		24.7	22.8	1.9
830 - 900	25.4	62	S	23.6	63	W	24.7	59	SW	25.1	64	WSW	26.0	59	WSW	23.8	77	S	24.9	62	S	24.6	26.0	23.6	2.4
900 - 930	26.2	59	S	24.8	63	W	25.7	56	SW	26.3	59	SSW	26.8	69	SW	24.3	74	S	25.3	60	S		26.8	24.3	2.5
930 - 1000	26.5	60	—	25.1	60	WSW	26.3	52	SW	27.4	55	SW	27.8	55	SW	25.1	74	SE	25.5	61	S	26.5	27.8	25.1	2.7
1000 - 1030	26.9	57	S	25.3	59	W	26.7	52	SW	28.2	52	WSW	28.7	50	WSW	26.1	65	S	25.8	63	—		28.7	25.3	3.4
1030 - 1100	27.0	57	SSW	25.5	59	W	27.0	51	SW	28.3	53	WSW	28.7	22	WSW	26.7	32	SW	25.9	68	S	28.0	28.7	25.5	3.2
1100 - 1130	27.8	56	SSW	26.2	60	W	27.4	52	SW	28.7	54	W	29.0	53	WSW	27.2	59	W	27.2	65	W		29.0	26.2	2.8
1130 - 1200	28.0	55	SW	26.6	60	W	27.9	53	W	29.3	52	W	29.2	53	WSW	27.3	59	W	27.6	65	W	28.5	29.3	23.6	2.7
1200 - 1230	28.3	54	SW	26.8	60	W	28.3	54	SW	29.6	52	W	29.4	53	WSW	28.0	60	W	28.1	63	W		29.6	26.8	2.8
1230 - 1300	27.8	55	SW	27.3	59	W	28.3	52	SW	29.9	51	W	29.6	53	WSW	28.2	62	W	28.0	62	W	28.5	29.9	27.3	2.6
1300 - 1330	28.0	55	SSW	27.3	59	WSW	28.9	53	SW	29.8	50	W	29.7	54	W	28.3	60	W	28.6	62	W		29.8	27.3	2.5
1330 - 1400	28.7	52	SW	28.1	56	WSW	29.1	49	SW	30.4	49	WNW	30.5	52	WSW	28.5	59	W	28.9	62	WNW	27.7	30.6	28.1	2.5
1400 - 1430	27.4	54	SW	26.5	60	WSW	28.0	53	SW	29.4	49	WNW	29.5	53	WSW	28.7	60	W	29.3	60	WNW		29.5	26.5	3.0
1430 - 1500	25.0	95	—	25.9	66	WNW	27.2	57	NW	28.3	57	WNW	28.7	57	W	27.9	64	W	28.1	67	W	28.5	28.7	25.0	3.7
1500 - 1530	25.4	57	—	26.7	64	W	27.5	60	NW	28.0	59	WSW	28.6	50	W	—	—	—	27.3	72	—		28.6	25.4	3.2
1530 - 1600	24.8	69	—	25.5	71	S	26.9	63	SSE	26.9	67	SE	27.6	63	S	—	—	—	25.7	79	S	27.0	27.6	24.8	2.8
1600 - 1630	24.3	—	—	24.9	74	SSE	26.1	68	SE	26.4	—	—	27.4	—	—	—	—	—	25.5	82	S		27.4	24.3	3.1
1630 - 1700	23.9	—	—	24.3	76	ESE	25.4	71	E	26.0	—	—	26.8	—	—	—	—	—	25.6	81	S		26.8	23.9	2.9
Mean	—	—	—	24.6	—	—	25.3	—	—	26.0	—	—	26.1	—	—	—	—	—	25.0	71	—	—			
Max.	28.7	—	—	28.1	—	—	29.1	—	—	30.6	92	—	30.5	90	—	28.7	100	—	29.3	94	—	28.5			
Min.	—	52	—	19.5	56	—	18.2	49	—	17.4	49	—	17.4	50	—	16.0	59	—	16.4	60	—	21.0			
Range	—	—	—	8.6	—	—	10.9	—	—	13.2	43	—	13.1	40	—	12.7	41	—	12.9	34	—	7.5			

c) Wind Direction

According to the frequency map of wind direction, (Fig. 2, 7) its tendency at every place was not clear. The places which were comparatively influenced by landform were Omura, Kanamichi, and Asô. The fact that the direction of the wind was to the south or to the north in the central part of the basin, may be owing to the shape of the bottom of the basin.

2) Lake Inawashiro

The degree of influence of lakes on climate is fairely great in the case of such great lakes as Lake Biwa, Lake Michigan, Great Lake etc. But even smaller Lake such as Inawashiro seems to show some difference between the temperature on the windward and that on the leeward of the lake, though the lake influence grows weak, owing to a high elevation of over 500 m. On the north shore of the lake, a westerly wind prevails almost through the year, blowing in through the narrow hollow leading to Aizu Basin. But on the south shore, a westerly wind turns into a northerly wind by the surrounding high mountains. The temperatures have been observed for over thirty years at Inawashiro (north shore) and Fukura (south shore), being at about the same distance from the lake shore. In summer, Inawashiro is about 1° c higher in the monthly mean temperature than Fukura, but Fukura is about 1° c higher than Inawashiro in winter. Moreover, according to the monthly mean

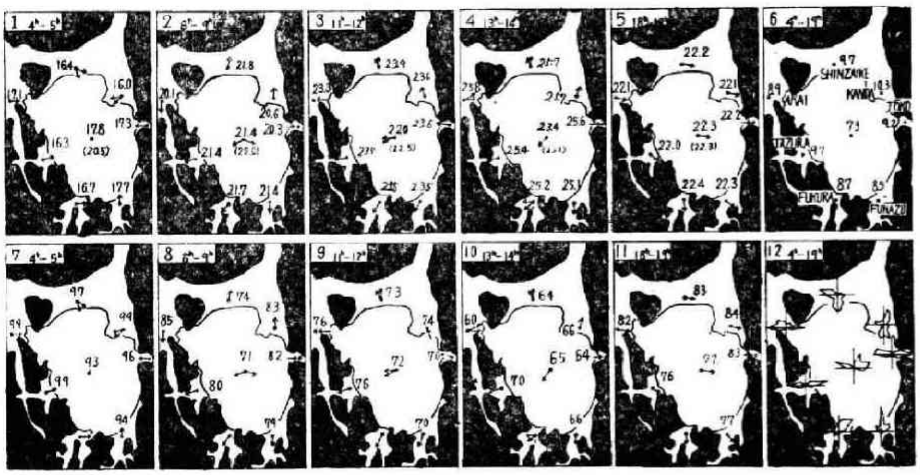

Fig. 3 1 - 5 Diurnal Variation of Temperature
6. Duirnal Range of Temperature
7 - 11 Diurnal Variatun of Relative Humidity
12. Frequeney of Wind Direction

of maximum temperature every year, the ranges of temperatures between them are sometimes over 2° c. Therefore, if only the days of strong influence of the lake are selected, the range will show a greater value.

The eight observatories were located on every field along the lake shore and at the center of the lake. The observation was executed on the fine day of July 14, but the significant influence of the lake did not appear, as wind direction changed two or three times a day and the wind did not blow constantly in a certain direction. In spite of the observation on such a peculiar day, its result still shows the following characteristics. (Fig. 3)

Early in the morning from 4h00 to 6h00, the land breeze which was a mountain wind by origin, blew towards the lake and the three observatories of Shinzaike, Higashi-tazura and Kaneda showed lower temperatures than any others. Above all, Kaneda showed 16.0°c~16.5°c and was 1.5°c~1.7°c lower than Fukura (17.7° c~18.0° c) being similar to the temperature at the lake center. As to humidity, Funazu showed 94% and was 5% lower than the others. Generally, the fields opening at their back tends to show lower temperatures than the fields enclosed with mountains at the back. The lake breeze towards the inland prevailed from 7h00 to 9h00, and a easterly wind prevailed from 9h00 to 13h00, changing into the north wind on the south shore (Fukura, Funazu) and the south wind on the north shore (Shinzaike, Kaneda). But so far as temperature and humidity are concerned, there were scarcely any difference among these observatories after 8h00, except the lake center, though some slight differences appeared sometimes. The west wind prevailed at Akai and Jôkô from 13h00 to 16h00, changing from the east wind in the morning, but the wind directions at the other observatories did not change. After 17h00, a westerly wind prevailed over the basin excepting the north shore. And, Fukura and Funazu showed higher temperatures than the others from 16h00 to 18h00, for the sunshine on the north shore was screened by the clouds.

Therefore, Funazu and Fukura on the south shore are under the influence of the wind passing over the lake surface, when the east or west wind prevailes, over the basin. When the east wind or a little stronger west wind prevailes, the wind direction in the basin is divided into the northward and southward from the E-W line which connects Jôkô with Akai and seems like a path of wind. Moreover, the diurnal range of temperature of the north shore (10.3°c~9.7° c) is greater than that of the south shore (8.7°c~8.5°c). Some difference in local climate between the north and south shores of Lake Inawashiro will be able to be guessed even from the results obtained by the survey.

3.) Southern Slope of Bandai-san Volcano

The southern slope of Bandai-san Volcano (over 1800 m in height) stretches to Lake Inawashiro and is cultivated up to about 600 m in height. The land utilization on the slope varies with height as follows (Fig. 4): a rice field extends from the lake shore up to about 530m, a dry field to about 600 m, a grass-land below about 700 m and a bush of about 1m in height above 800 m. The inclination of the slope varies, too, with height: nearly horizontal from the shore to 530 m, about 7 degree from 530 m to 600 m, gentle and steep slopes alternating with each other just like steps to 600 m or higher. The seven observatories were stationed from the lake shore to 1050 m: the 515 m observatory near the lake shore, the 523 m one on a border between rice fields, the 560 m one and the 625 m one on the dry field sloping southward with a gradient of 7°, the 683 m one on the grass land like a tableland commanding a fine prospect, the 820 m one on the lower bush zone also shaped like a table land, and the 1050 m one on the upper bush zone with a steep slope (over 30°) at the back.

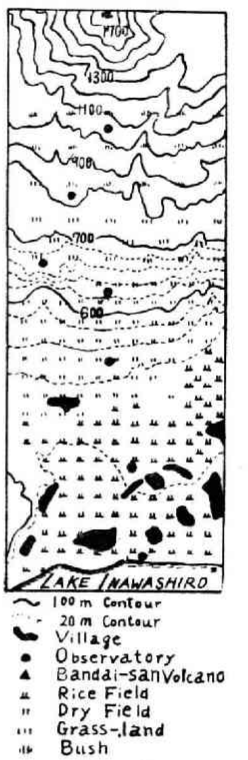

Fig. 4

In general, temperature on the slope of a mountain falls in inverese proportion to elevation and sometimes shows an inversion distribution early in the morning, due to falling down of cool air along the slope. But higher temperature does not always be shown at a lower part, for the ground covering of the slope is not monotonous. And the lake influences the temperature of the lowland near the lake. Therefore, the distribution often varies with not only weather and a season, but the other conditions above mentioned. The observation was executed during twelve hours from 5^h00 to 17^h00 on July 17 when it was fine as a whole.

The peculiar phenomena which appeared in the vertical distribution of half hourly mean temperature are as follows (Fig. 5): the significant temperature inversion between 523 m and 820 m early in the morning, the fairely high temperature at 560 m, 625 m and 1050 m in the daytime, the remarkable inversion between the two observatories at 515 m and 523 m and the other two at 560 m and 625 m, and some inversion between the first two observa-

tories. That is, at the time when the inversion appeared early in the morning, the lowest temperature was 16.0°c or 16.2°c at the 523 m point which was 0.4°c or 1.2°c lower than 16.4°c or 17.4°c at the 515m point nearest to the lake, and highest temperature was 19.5°c or 16.9°c at 820m. Thus, the great range of 3.5°c or 3.7°c was recognized between these two observatories whose range of elevation is about 300 m, and still the range of 2.9°c~2.2°c was shown from 6h00 to 7h00. After then, the temperature rose rapidly and

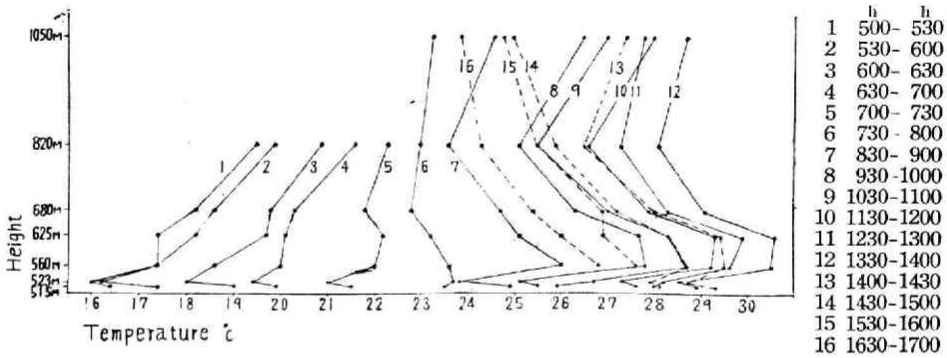

Fig. 5 Diurnal Variation of Temperature from 5h00 to 17h00.

the fairely high temperatures were observed from 10h00 to 14h00 at the two observatories of 625 m and 560 m on the dry field. Even at 17h00, the observatory of 560 m showed still the highest temperature. But the temperatures at 515 m and 523 m on the lowland were fairely low and the inversion which showed the maximum range of 2.8°c existed through the day between the first two observatories and the latter two. Further, the temperatures registered at the observatories of 820 m and 1050 m were nearly similar to the temperatures at the lowland in the daytime and were fairely high for their elevations. Though the vertical distribution of temperature was not normal all day long, it came at last to be normal after 14h00 at the points over 560 m, resulting from rapid decline of the temperature.

On the relative humidity, such significant phenomena as on the temperature did not appear. But still, the two observatories on the lowland always showed the highest humidity. Especially, while some inversion of temperature was recognized almost through the day between them, the humidity at 515 m was slightly lower till 9h00 and higher after 9h00 than the humidity at 525m.

The followng consideration is gained about the special phenomena mentioned above. The two observatories of 515 m and 523 m are on the lowland which is adjacent to the lake and is almost occupied by the rice field with

water of about 15 cm in depth. And the other two observatories of 560 m and 620 m are on the gently inclined plane of about 7 degree to the south where the dry field widely spreads with fairely naked ground surface. If these observatories are at the same elevation and on the ground with equal gradient, the latter observatories will show higher temperatures than the first, because the ground covering is more scarce and the influence of its ground on the temperature is more remarkable. In this case, the agencies which make higher the temperatures at the points of both 560 m and 625 m on the dry field and the inclination to the south, and make lower the temperatures at the points of both 515 m and 525 m near the lake, have been more remarkable than the agency of the range of elevation, about 40~110 m, between the former two observatories and the latter two ones. However, the fact that the low temperature at 525 m, lower than at 515 m, was shown not only early in the morning, but also often in the daytime, will not always depend upon only the direct influence of the lake. The fairely high temperature at 1050 m were shown till 14h30 and the true cause of the phenomena will not be accounted for beforethe movement of some micro air mass, which might be made on the land or the lake, is observed.

According to the comparison of the diurnal range of temperature, the observatories of 625 m and 560 m showed the maximum ranges of 13.2°c and 13.1°c and the observatories of 523 m and 515 m registered 12.7°c and 12.9°c. The minimum range was 8.6°c at the observatory of 820 m. Therefore, the dry field where the observatories of 560 m and 625 m was located, showed the most remarkable continental climate.

IV Conclusion

The significant phenomena which micro landform and ground covering give to a local climate, have been reported in this paper, based upon the temporary observations in Aizu and Inawashiro Basins. Though these phenomena and mechanisms are not sufficient to be considered about and some are not accounted for, the study in future will make them clear.

Aizu Basin showed the clear character of hollow of the bottom on the temperature and humidity. Above all, the area where the abnormal high humidities were observed, fairely coincided with the area in which "Imochi" broke out at the beginning of July and caused much damage, and the probable causality between both the areas is assumed.

The influence of Lake Inawashiro on the climate showed some difference between the north and south shores, especially on the temperature early in the

morning. It seems that the south shore is almost always on the leeward and under the influence of the lake. Lake breeze and land breeze appeared together clearly.

The climatological characteristics of the southern slope of Bandai-san Volcano are the remarkably high temperatures observed all day long at 560 m and 625 m on the gently inclined plane toward the south where a wide dry field spreads, and these made the vertical distribution of temperature abnormal. And the high temperature at 1050 m and the low temperature at the lowland adjacent to the lake made the vertical distribution more complicated.