

Fracture line profiles in Japan

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EXTENDED ABSTRACT: Numerous studies have been conducted on snow pack characteristics associated with avalanches formation, mainly in North America and Europe. In recent years, the scientific analysis about structural weakness has developing. These recent studies had performed based on the experiences of avalanche forecasters and numerous data corrected from those regions. Furthermore, these studies have developed by relating with snow climate.

However, since modern avalanche safety operations don't exist, there is no accumulation of the experience and data for snowpack analysis in Japan. Therefore, these snow pack characteristics in Japan had not confirmed. We had examined these characteristic by comparing fracture line profile collected in Japan with present study results.

Results of the analysis of 21 fracture line profiles in Japan are as follows.

-Most of avalanches had related to persistent weak layer, however that had related with precipitation particles are not rare.

-It suggested that critical points of fracture depth, weak layer thickness, hand hardness difference, grain size difference, are important also in Japanese snow climate.

-Both of maritime and continental climate snow pack characteristics are found in closed area (Maritime: Japan sea side of main island, Continental: Pacific side of main island and inland of Hokkaido).

-Weak layers consist of precipitation particles are often formed both of Japan sea side and Pacific side of main island of Japan by snowfall related to synoptic cyclones. However, subsequently dense snow slabs are formed for only Japan sea side region by effect of the winter monsoon (Japan Sea effect snowfall) and brings Avalanche cycles only the region.

KEYWORDS: Snowpack stratigraphy, Weak layer, Structural weakness, Snow climate, Avalanche forecasting

Table 1 Collected fracture line profiles

No.	Date of		Trigger	Injurd	Killed	Inclin (°)	Slab T (cm)	Weak layer				Difference		Data sources
	occur	investigate						F	E (mm)	R	T (cm)	E (mm)	R	
1	1/28/98	1/29/98	?	-	1	34	83	FC	1.3	4F	1.5	0.6	※1	H.A.
2	2/19/00	2/23/00	A	-	3	30	61	FC+DH	1.8	-	-	-	-	author
3	2/15/01	2/15/01	A	-	-	35	37	PP/mfc	1.8	F	-	1.3	4	author
4	1/5/02	1/6/02	N	-	-	35	156	FC	1.3	4F	1	0	2	author
5	1/14/05	1/19/05	N	-	-	40	80	DH	1.8	F	24	1.6	4	author
6	1/23/05	1/24/05	A	-	1	38	63	RG/WG	-	-	-	-	-	NIED
7	1/28/06	1/29/06	A	3	-	38	49	FC	0.8	4F	3	0	2	author
8	4/9/06	4/10/06	N	-	-	42	45	PP	1.5	4F	-	-	3	SPIN
9	4/9/06	4/9/06	A	-	-	40	36	PP	0.4	F	-	-	2	SPIN
10	4/18/07	4/20/07	A	-	1	30	42	FC	0.4	4F	2	0.4	2	author
11	11/13/07	11/17/07	A	1	-	30	38	DH	1.3	1F	2	0.2	※3	ARTH
12	11/23/07	12/11/07	A	1	4	-	80	DH	1.5	-	-	-	-	ARTH
13	2/1/08	2/2/08	A	-	-	35	29	PP	2	F	5	-	0	SPIN
14	2/8/08	2/10/08	?	1	-	40	57	FC	0.8	4F	4	0.3	1	ARTH
15	2/28/08	2/29/08	N	-	-	35	192	RG/RG	-	-	-	0	0	author
16	3/2/08	3/3/08	N	-	-	50	54	FC	1	4F	1	0.8	3	author
17	1/14/09	1/14/09	N	-	-	35	43	FC	0.2	4F	2	0.6	3	author
18	1/23/09	1/29/09	A	-	-	38	35	DH	3	F	4	2.4	3	author
19	1/25/09	1/26/09	A	1	-	40	54	PP	1.8	4F	2	1.6	1	author
20	3/7/09	3/7/09	A	-	-	42	50	PP	2	4F	-	1.2	1	SPIN
21	4/2/09	4/4/09	A	-	1	39	30	PP	-	-	-	-	-	NIED

A.H.: Hachikubo, A., A study of an avalanche at Niseko, Japan. ISSW 1998 proceedings, pp. 291-293.

ARTH: Avalanche Research Team in Hokkaido branch of JSSI: <http://glacier.ees.hokudai.ac.jp/snow/>

SPIN: Snow Profile Information Network (Japan Avalanche Network): <http://nadare.jp/>

NIED: Snow and Ice Research Center, NIED: <http://www.bosai.go.jp/seppyo/>

※: Estimated values

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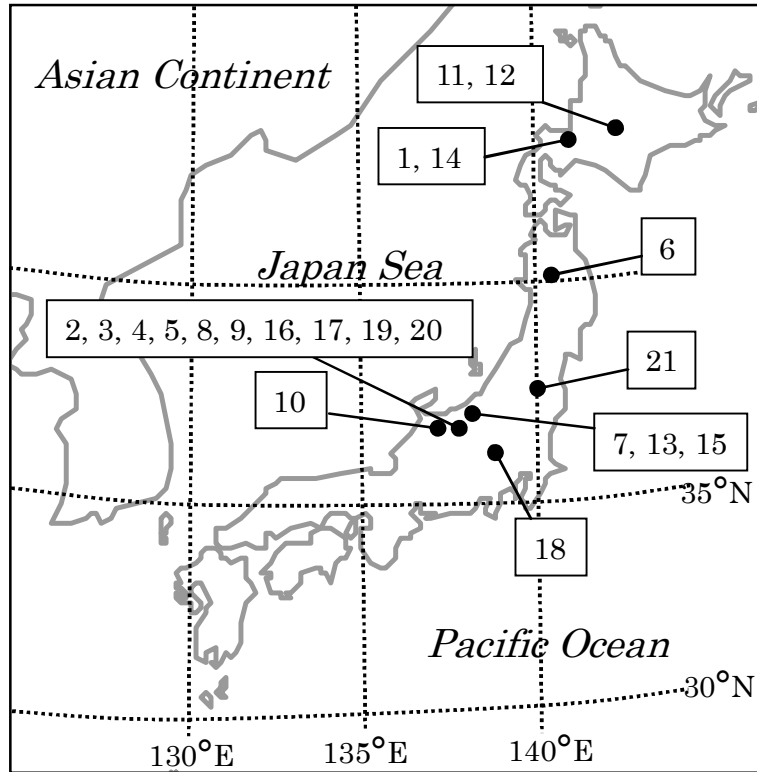


Figure 1. Map of Japan showing the sites in which observations were made.

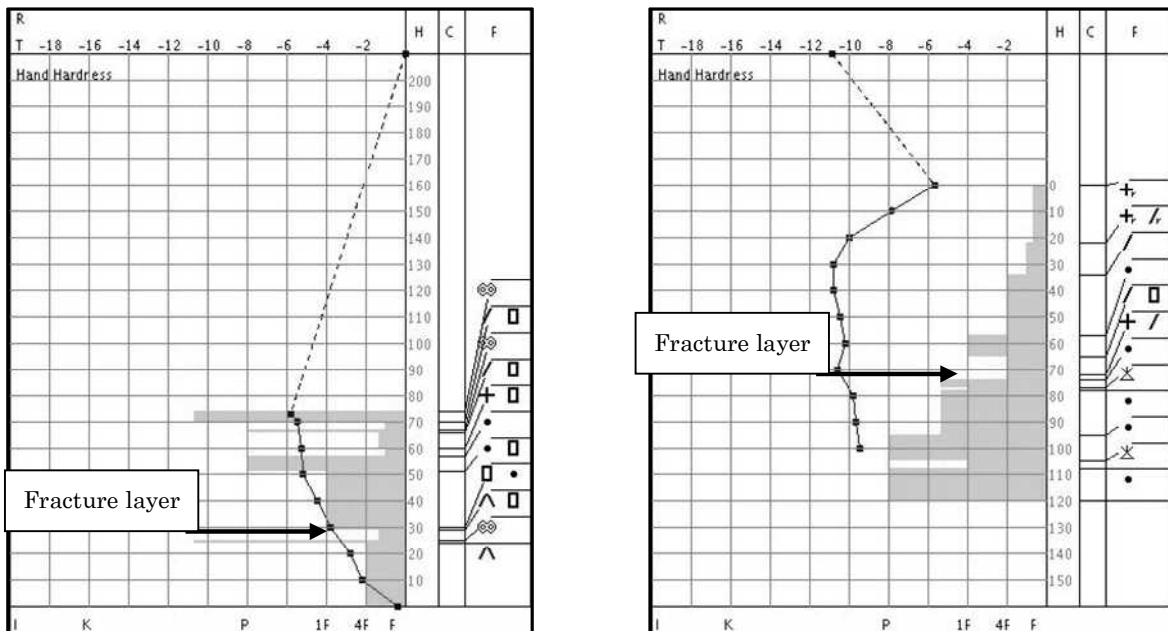


Figure 2. Snow profiles of No. 18 (left) and No.19 (right).