

The U.S./Japan Cooperative Agreement on Snow and Avalanche
Research ; A Perspective and Goals for the Future

T. Nakamura

Nagaoka Institute of Snow and Ice Studies, National
Research Institute for Earth Science and Disaster
Prevention, Niigata, Japan

R. Decker

Department of Civil Engineering, College of Engineering,
University of Utah, SLC, Utah, USA

Mr. chairman, ladies and gentlemen, it is a great honor for me to present a joint paper with Prof. R. Decker entitled "The US-Japan Cooperative Agreement on Snow and Avalanche Research: A perspective and Goals for the Future".

I appreciate many friends, especially friends in the States who made the efforts, so I could attend this Snow Science Workshop. Their efforts have enabled me to attend to this Workshop. These friends are Mr. Stan K. Bones, chairman of the Workshop, Prof. R. Brown, chairman of the papers committee of this Workshop, Profs. Ted E. Lang and Jim Dent of the Montana State U., and Prof. Rand Decker of the University of Utah.

At first we should review our snow group's activities in the last decade under the US-Japan Cooperation for non-energy matters as well as the former activities before the start of the agreement . Some sheets on the OHP show the chronological features of our activities.

- 1972 Tsutomu NAKAMURA visited Dr. P. Martinelli, Jr. at the US Forest Service Rocky Mt. Experiment Station, Fort Collins, Colorado, (on Aug. 25) to see the activities of his snow research group.
- 1978 In May Dr. Masao TAKEUCHI, Civil Engineering Research Institute, Hokkaido Development Bureau, attended to the 2nd International Symposium on Snow Removal and Ice Control Research, held at Dartmouth College, Hanover, N. H., and discussed the exchange of the snow researchers and the possibility of the joint research projects with Dr. R. D. Tabler and Dr. R. A. Schmidt at the Rocky Mt. Forest and Range Experiment Station, USDA.
- 1978 In November the US President proposed at first to the Japanese Prime Minister Mr. Fukuda that the Japanese Government should make a contribution to the development of science and technology, especially from a fundamental point of view, as the US Government has been doing.
- 1979 In April the US proposed 23 projects. ("Snow management, snow avalanches, and landslide prediction and control" was proposal NO.22. The former title was "Avalanche control, Snow Management, and Tree disease".)
- 1979 Dr. M. TAKEUCHI stayed at the Rocky Mt. Forest and Range Experiment Station (Laramie Branch, Aug. 2, 1979 to Jan. 24, 1980) and carried out joint researches on the

amount and the vertical distribution of blowing snow and also made a comparative study of the snow fences in both the States and Japan.

1979 The Symposium "Snow in Motion" was held at Fort Collins from Aug.12 to 17 to which Mr. Yutaka YAMADA, INSTITUTE OF SNOW AND ICE STUDIES, NRCDP attended and presented a paper entitled " Gear-type glide-meter as an instrument for forecasting full-depth avalanches". Dr. TAKEUCHI also presented a paper on blowing snow. He also lectured on "The present activities on snow management and blowing snow in Japan" at the Institution of Snow and Ice Control at the Wisconsin University, (Oct. 8-9).

1979 In Sept. Dr. Frank Press, a leader of a US mission of 20 members visited Japan. We had the 1st meeting in Tokyo (T. Nakamura attended to the Working Group No.5 meeting with Drs. S. UEHARA and N. OHYAGI on Sept. 20, 1980).

1980 In May the President of the United States and the Prime Minister of Japan signed an agreement authorizing scientific and technical exchange between the two countries on non-energy matters.

"Snow management, snow avalanches, and landslide prediction and control was one of the specific subject matter areas mentioned in the agreement. Dr. M.

Martinelli, Jr., of the Rocky Mt. Experiment Station, USDA Forest Service, and Mr. Naruto OHHIRA, Director General, NRCDP were named the US and Japanese points of contact for this project.

1980 Dr. Tabler was invited by Japan to the Civil Engineering Research Institute , in Hokkaido and carried out joint researches with Dr. TAKEUCHI on blowing snow. (July 25, 1980 to Jan. 19, 1981)

1980 During the period Sept. 23-29, Dr. P. Martinelli, Jr., Project Leader, Mountain Snow and Avalanche Research, USDA Forest Service and Prof. J. Meiman visited Japan to meet with Japanese the contact person; Mr. N. OHHIRA, and other Japanese scientists to explore the possibility of a Scientific and Technical Exchange Program. Dr. Martinelli promised T. NAKAMURA to visit the Shinjo Branch, NRCDP at the next opportunity.

1981 Dr. Martinelli Jr. with five other scientists visited Japan to see snow and landslide scientists and exchange future visions in research. The five scientists are Prof. Theodore E. Lang, Montana State U., Prof. Harold S. Boyne, Colorad State U., Dr. Douglas N. Swanston, Principal Research Geologist, USDA Forest Service (Pacific Northwest Forest and Range Experiment Station), Prof. Dwight A. Sangrey, Carnegie-Mellon U., and Dr. Walter F. Megahan, USDA Forest Service, and they visited

Shinjo Branch, National Research Center for Disaster Prevention on Sept.3 and visited a snowy area and a landslide area around Shinjo in two groups. Also they visited the Civil Engineering Research Institute and the Institute of Low Temperature Science, Hokkaido U..

(From Aug. 31 to Sept. 2)

- 1982 In March Mr. OHHIRA visited US to promote the Cooperation and met with Dr. Martinelli.
- 1982 From Oct.19 to 30 International Snow Science Workshop was held at Montana State U. and Dr. Masao HIGASHIURA, Shinjo Branch, NRCDP attended to it and presented a paper there. Also he met Profs. T. E. LANG, R. Brown and others, and had discussions on snow research. He visited Rocky Mt. Forest and Range Experiment Station, US Forest Service in Fort Collins, Colorado as well.
- 1983 Prof. T. E. Lang was invited to Japan and stayed 6 months (May 7-Nov.7) at the Shinjo Branch, NRCDP. Cooperative research works were carried out at the Branch and the joint papers are seen in a separate sheet.
- 1983 Dr. Hiroshi TAKAHASHI succeeded the contact person in Japan due to the retirement of Mr. OHHIRA.
- 1984 During the period Feb. 25 to Mar. 15 Dr. Hideomi NAKAMURA, Shinjo Branch, NRCDP visited Dr. Sommerfeld at

the Rocky Mt. Forest Service and Range Experiment Station and exchanged ideas on snow avalanches, and also visited Prof. T. E. Lang at the Montana State U., in Bozeman, Montana and discussed mechanical properties of snowpack, especially computer simulation of the snowpack deformation.

- 1985 Dr. Frederick J. Swanson of the Pacific NW Experiment Station became the contact person in the US owing the retirement of Dr. Martinelli, Jr..
- 1987 Dr. M. HIGASHIURA attended to the Seminar on Blowing and Drifting Snow Problems held at Hawaii (Jan. 7 to 9) and exchanged ideas with Dr. Schmidt on these snow problems. Dr. TAKEUCHI also attended to the Seminar.
- 1988 Dr. R. A. Schmidt was invited by the Japanese Government and stayed at the Shinjo Branch, NRCDP from Feb.22 to Mar. 4, and discussed the development of the Snow Particle Counter. He also met with Dr. TAKEUCHI and others in Sapporo, and discussed blowing snow with them, and also visited the Blowing Snow Observatory (on Feb. 24).
- During Sept. 28 to Oct. 10 Dr. Takashi ISHIMOTO, Civil Engineering Research Inst. visited Buffalo, N. Y., introduced "The Defense Means to the Blowing Snow in Japan", and also met Drs. Schmidt and Tabler.

- 1989 Dr. Yukio HAGIWARA succeeded the contact person in Japan due to the retirement of Dr. TAKAHASHI.
- 1989 During Aug. 26 to Sept. 25 Dr. Atsushi SATO, Shinjo Branch, NRCDP visited Dr. Schmidt to develop the Snow Particle Counter. Dr. Schmidt proposed joint research work on the SPC.
- 1989 Dr. Rand Decker, research scientist from NASA, now a Professor at the University of Utah stayed at the NAGAOKA INSTITUTE OF SNOW AND ICE STUDIES, NRCDP with T. NAKAMURA and surveyed "The Snowpack Structure Data Set in Japan for Remote Sensing Snow Hydrology."
- 1989 Dr. Y. KAJIYA carried out a research project on the Road Maintenance System to reduce Snow Damages in cold Areas at the National Research Council, Strategic Highway Research Program.
- 1990 In March Dr. HAGIWARA, Japanese contact person visited the US and discussed the cooperative agreement with Dr. Swanson, US contact person.
- 1990 In May Mr. Douglas Abromeit, Director, USDA Forest Service Center of Excellence for Aval. Related Activities, Salt Lake District, Utah was named the practical contact person for the snow group of our US-

JAPAN Cooperation; "Snow Avalanche Management,
Landslide Prediction and Control".

IN FUTURE;

What and how should we develop the cooperation?

One promising event is the "Japan-US Symposium on Snow Avalanche Management, Landslide Prediction and Control" to be held in Sept. 30 to Oct. 2, 1991 at Tsukuba in Japan.

In addition to the Symposium, the following items can also be mentioned.

- 1 Exchange of the information, including scientific results which were printed out in journals or in any printed form.
- 2 To build up joint research projects. To date, some ideas on joint research projects have been proposed from Michigan Technological University and Montana State University, via Prof. R. L. Brown.
- 3 In my presentation with Dr. Rand Decker, we propose two broad areas for joint projects.

These two suggestions for joint projects are:

- 1) To establish a permanent snow avalanche study site in an area where avalanches occur often and explosives can be used to release them artificially, and
- 2) To develop a joint research program on the collection and archiving of snowpack data so that this data can be shared in near real time by snow researchers around the world. This second idea becomes more important when the

use of satellites to monitor the snowpack are considered. The difficulty of our US-JAPAN cooperation is that no specific fund are guaranteed. To get research fund we have to propose unique projects. Dr. Decker and I believe that this should be possible.

In conclusion, I would like to say to snow researches: We should remember snow problems and snow disasters, for example, on Mt. Nevados Huascarán at Andes, Peru in 1970.

For most people it is easy to forget snow problems and disasters, but snow people who work in snow businesses, like ski patrol people, rescue people, avalanche people, snow engineers, snow scientists etc. can not forget snow problems and snow disasters, and we should educate people who are not familiar or interested in snow problems and disasters.

I, personally, believe the present US-Japan cooperation should spread out internationally to include the many countries where there is snow, snow problems and a concern for snow.

Thank you for your attention.

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- 3)Theodore E. Lang and T. Nakamura (1984):Finite Element Computer Analysis of Snow Settlement. Research Notes of The NRCDP, No.59, pp.139-187.
- 4)Theodore E. Lang, T. Nakamura, J. D. Dent and M. Martinelli, Jr.(1985):Avalanche Flow Dynamics with Material Locking. International Glaciological Society, Annals of Glaciology 6, pp.5-8.
- 5)T. Nakamura, O. Abe, N. Numano and T. E. Lang(1985):Computer study of snow avalanche startup dynamics. International Glaciological Society, Annals of Glaciology 6, pp.15-18.
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- 7)Theodore E. Lang, H. Nakamura and O. Abe (1985):Settlement force on a beam in snowpack by computer modeling. International Glaciological Society , Annals of Glaciology 6, pp.95-99.

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