



## History of Japan–U.S./High Pressure Mineral Physics Seminars: 1976 to 2012



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### ABSTRACT

Under the auspices of the U.S.–Japan Cooperative Science Program between the U.S. National Science Foundation and the Japan Society for the Promotion of Science, the first U.S.–Japan joint seminar on High Pressure Research Applications in Geophysics was held in Honolulu, Hawaii, 5–8 July 1976 and was attended by 47 scientists. Originated as bilateral U.S.–Japan seminars on high-pressure research applications in geophysics by Murli Manghnani and Syun-iti Akimoto, this series continued at 5-year intervals under those auspices from 1976 to 1996 [1981 in Hakone, Japan 1986 in Turtle Bay, Hawaii, 1991 in Ise, Japan, and 1996 in Maui, Hawaii], with venues alternating between Hawaii and Japan. In the 21st century, as a result of growing international interest in high-pressure mineral physics, the seminar series was re-envisioned with a broader focus “more international” focus than the original U.S.–Japan bilateral series. The first of the new meetings entitled “High Pressure Mineral Physics Seminars” [HPMP-6] took place in Verbania, Italy on August 26–31, 2002. More than 84 scientists from Asia, Australia, the Americas and Europe attended. HPMP-7 took place in Matsushima, Japan on May 8–12, 2007 and was attended by 134 scientists from throughout the world. In this paper, we review this history culminating with the HPMP-8 at Lake Tahoe, California in July 2012, which was held jointly with the Annual Meeting of COMPRES: Consortium for Materials Properties Research in Earth Sciences.

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### Introduction and background

In the 1960s, high-pressure laboratories utilized two basic types of apparatus for static experiments above pressures of 5 GPa: in Japan, multi-anvil apparatus [MAA] was dominant, for example in the laboratories of Syun-iti Akimoto in the University of Tokyo, Naoto Kawai in Osaka University and Mineo Kumazawa in Nagoya University; and in the U.S., diamond-anvil cells [DAC], for example in the laboratories of William Bassett and Taro Takahashi at the University of Rochester, and Ho-kwang Mao and Peter Bell at the Geophysical Laboratory of the Carnegie Institution of Washington. An example of the synergy of MAA and DAC approaches is the synthesis of silicate spinel specimens in Akimoto's laboratory and the investigation of their  $P$ – $V$ – $T$  equations of state by Mao for his Ph.D. research in the laboratory of Bassett and Takahashi. The evolution of these two styles of apparatus in the last half of the 20th century has been recounted in recent reviews by Bassett (2009) and Liebermann (2011). This progress has also been recorded in the archival papers in the proceedings of the U.S.–Japan bilateral seminars on high-pressure mineral physics; see details below.

During an Asian-Pacific conference in the early 1970s, Akimoto and Murli Manghnani from the University of Hawaii discussed the desirability of convening a joint Japan–U.S. meeting to share technological and scientific advances in their countries [see Fig. 1a]. The first U.S.–Japan seminar was held in Honolulu, Hawaii in June 1976. Over the subsequent 36 years, 7 more seminars have been held. The first 4 of these [1976 in Honolulu, 1981 in Hakone, Japan, 1986 in Turtle Bay, Hawaii, and 1991 in Ise, Japan] were co-convened by Manghnani in collaboration with Akimoto [Fig. 1b] and later Yasuhiko Syono under the auspices of the international programs office of the Japan Society for Promotion of Science and the U.S. National Science Foundation [NSF]; a few scientists from other countries were also represented.

As a result of growing international interest in high-pressure mineral physics, the seminar series was re-envisioned with a broader focus than the original U.S.–Japan bilateral series. While on study leave at the Bayerisches Geoinstitut in the late 1990s, Yagi discussed with David Rubie the idea of expanding the representation of countries. The first of the new meetings was convened by Rubie and an international team from Europe, Japan and the U.S. and entitled “High Pressure Mineral Physics Seminars” and took place on the shores of Lago Maggiore in Verbania, Italy on August 26–31, 2002. To maintain the historical and intellectual connection with the Japan–U.S. seminars, Rubie and Yagi decided to introduce the term “High Pressure Mineral Physics Seminars” and designated

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**Fig. 1a.** Syun-iti Akimoto and Murli Manghnani, the original conveners of the Japan–U.S. high-pressure seminars, at the Institute for Solid State Physics of the University of Tokyo in the 1970s [courtesy of Murli Manghnani].

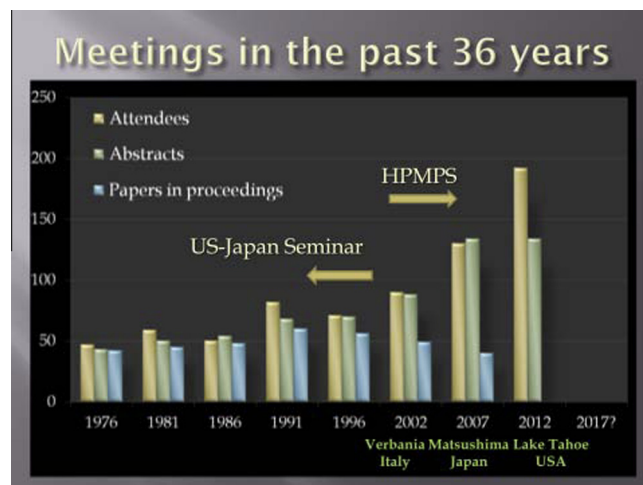


**Fig. 1b.** At the U.S.–Japan seminar in Turtle Bay, Hawaii in 1986.

the 2002 meeting as HPMP-6. More than 84 scientists from Asia, Australia, the Americas and Europe attended.

Subsequent HPMP seminars were held in Matsushima, Japan in 2007 and Lake Tahoe, California in 2012. By the time of the HPMP-7 and 8, the use of the MAA and DAC high-pressure technologies had spread throughout the world and in both directions across the Pacific; for example, the post-perovskite phase of  $\text{MgSiO}_3$  was discovered at SPring-8 in Japan using a DAC by Kei Hirose's group [see Murakami et al., 2004] and the Deformation-DIA [D-DIA] apparatus was developed by Yanbin Wang, Don Weidner, William Durham and Ivan Getting at the National Synchrotron Light Source of the Brookhaven National Laboratory [see Wang et al., 2003].

The cover pages of the program booklets for the 8 seminars may be seen in the Appendix below. Each of these seminars has been followed by a published volume of scientific and technological papers; many of the papers in these volumes have not appeared elsewhere. Consequently, these volumes have served as archival repositories of progress and development in high-pressure mineral physics for the past 36 years, and have been read by more than two generations of young and senior scientists. The 1998 and 2004 volumes were dedicated to Akimoto-sensei. See cover pages of these



**Fig. 2.** History of number of attendees, abstracts of papers presented and papers published in subsequent volumes for HPMP series in the past 36 years [courtesy of Yanbin Wang].

published volumes in the Appendix below; Akimoto and Manghnani (1982); Manghnani and Akimoto (1977); Manghnani and Syono (1987); Manghnani and Yagi (1998); Ohtani et al. (2009); Rubie et al. (2004); Syono and Manghnani (1992).

Furthermore, this seminar series has an excellent record of fostering the professional careers of young scientists in Japan and the U.S. and of underrepresented groups [especially women]; see the group photos below. Many of these young scientists have gone on to play leading roles in high-pressure mineral physics in the world [e.g., Ian Jackson, Raymond Jeanloz and Takehiko Yagi from the first seminar in 1976].

In this paper, I review the history of the High Pressure Mineral Physics seminar series from 1976 to 2012. In Fig. 2, a summary is presented of the numbers of attendees, abstracts of papers submitted, and papers published in subsequent volumes. To honor the seminal contributions of Murli Manghnani to this seminar series, I would like to dedicate this paper to him.

## 1976

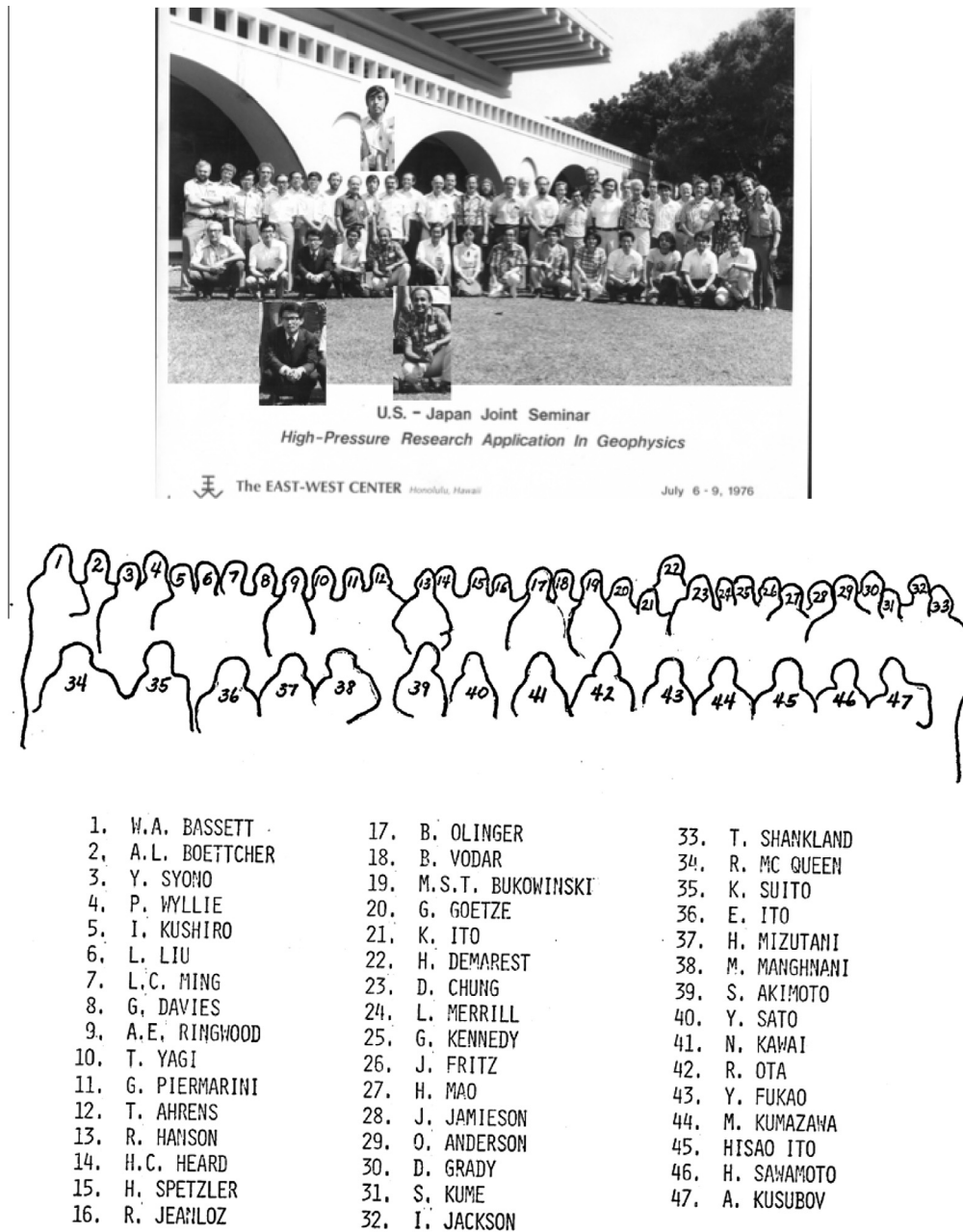
The first U.S.–Japan seminar was convened by Manghnani and Akimoto at the University of Hawaii in Honolulu; see group photo in Fig. 3a. Only three people have attended all 8 of the HPMP seminars: Eiji Ito, Murli Manghnani and Takehiko Yagi [see inserts in Fig. 3a]. I missed the first seminar due to the birth of our son, but have attended all the others.

Yagi was the youngest attendee from Japan in Honolulu, Raymond Jeanloz was the youngest from the U.S. and Ian Jackson was the youngest from Australia. Among the attendees from other countries were A.E. (Ted) Ringwood and Lin-gun (John) Liu from the Australian National University in Canberra; they are pictured with Eiji Ito from Okayama University and Akimoto in front of the Hawaii Institute of Geophysics in Fig. 3b.

Field trips to interesting geological sites and to high-pressure laboratories have been a feature of many of the HPMP seminars. In 1976, the field trip was to the Kilauea volcano on the big island of Hawaii; see photos in Fig. 3c and Fig. 3d.

## 1981

The second Japan–U.S. seminar was convened by Akimoto and Manghnani in Hakone, Japan; see group photo in Fig. 4.



**Fig. 3a.** First U.S.-Japan high pressure seminar at University of Hawaii in June 1976. (a) Group photo of attendees. Pullouts are for the three people who have attended all 8 of the seminars from 1976 to 2012 [Eiji Ito, Murli Manghnani and Takehiko Yagi]



**Fig. 3b.** Eiji Ito, A.E. (Ted) Ringwood, Lin-gun (John) Liu and Syun-iti in front of the Hawaii Institute of Geophysics.



**Fig. 3c.** Field trip to Kilauea volcano on island of Hawaii in July 1976. Crater of Kilauea volcano on big island of Hawaii.





Fig. 3d. Gaspar Piermarini, Murli Manghnani and John Jamieson at Kilauea.

This seminar featured a geological field trip to the Hakone volcanic area led by Kenzo Yagi, during which the hikers got caught in a freak snowstorm [Figs. 5a and b]. On another trip around Lake Ashinoka, we were able to observe young Japanese women and men celebrating their coming of age; Manghnani was fortunate enough to have his picture taken with one of the young women [see Fig. 5c].

The seminar ended with a night spent at the Hakone Prince Hotel with wonderful view of Fuji-san and a special banquet [see Fig. 5d].

After the seminar, many of the foreign attendees made tours of the high-pressure laboratories of Mineo Kumazawa in Nagoya [Figs. 5e and f]. and Osamu Fukunaga [Fig. 5g] and Masao Wakatsuki in Tsukuba.

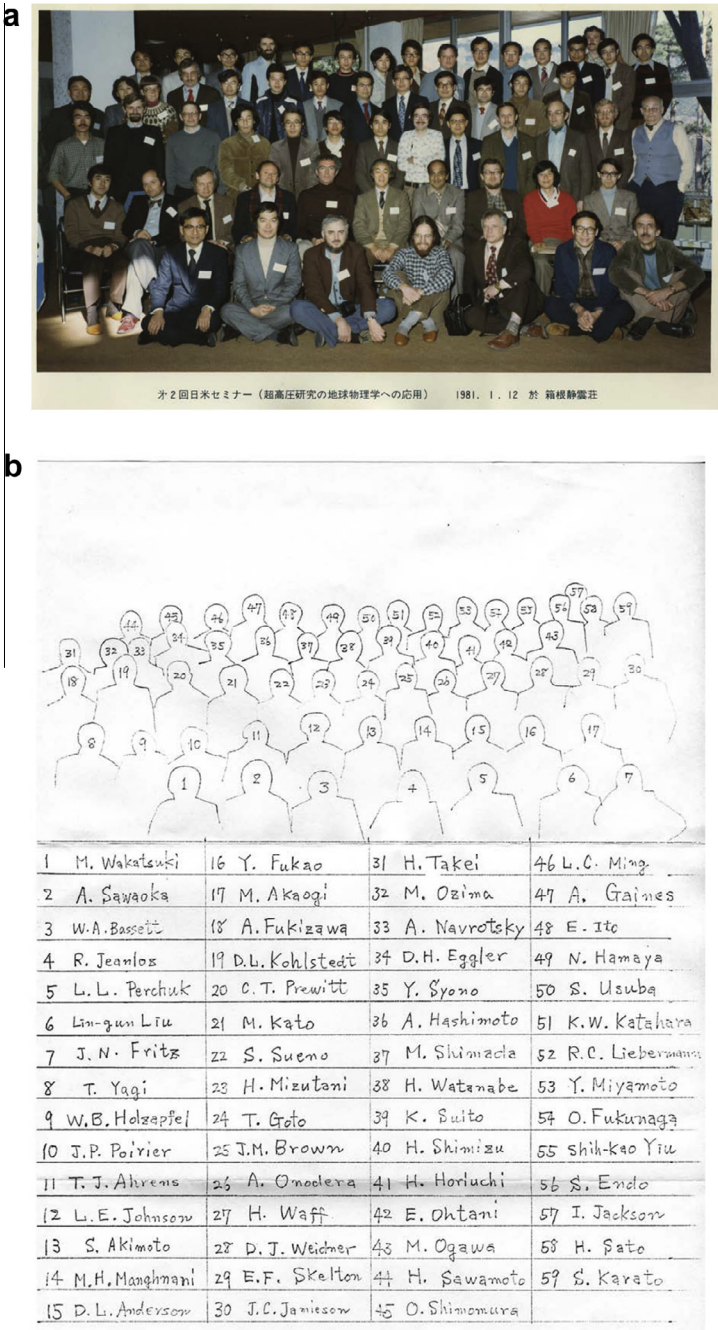


Fig. 4. Second Japan–U.S. seminar at Hakone, Japan in January 1981; group photo of attendees.





**Fig. 5a.** Hakone in 1981: field trips in volcanic area, conference banquet and visits to experimental laboratories. (a) Don Anderson, William Bassett, Jean-Paul Poirier and Mineo Kumazawa at beginning of field trip.



**Fig. 5b.** Thomas Ahrens, David Eggert, Ian Jackson, Raymond Jeanloz and Murl Manghnani in snowstorm at end of “field” trip.

1986

The third U.S.–Japan seminar was convened by Manghnani and Akimoto at Turtle Bay on the island of Oahu, Hawaii [see group photo in Fig. 6a]. During the seminar, a field trip was conducted to the laboratory of Manghnani at the Hawaiian Institute of Geophysics [see Fig. 6b].

This was the last U.S.–Japan seminar attended by Ted Ringwood; see Figs. 6c–e for photos with his colleagues from Japan.

1991

The fourth Japan–U.S. seminar was convened by Yasuhiko Syono and Manghnani in Ise on the Shima peninsula, Japan; see group photo in Fig. 7a. For the first time, two Russian scientists were invited: Sergei Stishov and Vladimir Zharkov.

During that meeting, a tradition from Hakone in 1981 was revived: each night, one room in the conference hotel was designated



**Fig. 5c.** Murl Manghnani with young Japanese woman near Lake Ashinoka on “young peoples” day in January 1981.



**Fig. 5d.** Don Anderson, Kenzo Yagi, Raymond Jeanloz and the Akimotos at the banquet in the Hakone Prince Hotel in 1981.

as “Club 309” because that was the number of Osamu Fukunaga and Osamu Shimomura’s room at Hakone where serious scientific discussions took place each night [as well as some sumo wrestling]; see Figs. 7b and c.

After the seminar, many U.S. scientists visited high-pressure laboratories at of Eiji Ohtani and Yasuhiko at Tohoku University in Sendai [Figs. 7d and e] and Akimoto at the Institute for Solid State Physics [ISSP] in Tokyo [Figs. 7f and g].



**Fig. 5e.** Mineo Kumazawa with 17,000 ton hydraulic press used to drive his newly designed multiple-anvil-sliding-system [MASS] at Nagoya University.



**Fig. 5f.** Charles Prewitt and Donald Weidner inspecting guideblock for MASS device.



**Fig. 5g.** Osamu Fukunaga demonstrating his 14,000 ton hydraulic press at the National Institute for Research in Inorganic Materials [NIRIM] in Tsukuba.

1996

The fifth U.S.–Japan seminar was convened by Manghnani and Syono on the island of Maui in Hawaii; see group photo in Fig. 8a and conference site in Fig. 8b.

There were no tours of laboratories but a group of Japanese and U.S. scientists rented a car and drove to a beach to snorkel and swim [Fig. 8c]. At the seminar banquet, all attendees were presented with leis [Fig. 8d–f] and were led in hula dancing by Surendra Saxena [Fig. 8g].

2002

The first high-pressure mineral physics seminar held outside of the U.S. or Japan was convened by David Rubie, Denis Andrault, Yingwei Fei, Murli Manghnani, Eiji Ohtani, Donald Weidner, and Takehiko Yagi at the Hotel Castagnola on Lago Maggiore in Verbania, Italy. More than 84 persons attended this first seminar held outside of Japan or the U.S. [Figs. 9a and b].

The program included many interesting oral talks [Fig. 9c] and poster presentations [Fig. 9d]. There were several excursions for social events, the most memorable of which was across the lake and up a chair lift to a restaurant at the top of a small mountain [Fig. 9e] for the conference dinner at which Wendy Mao was presented with an award for an outstanding student presentation [Fig. 9f].



Row1: Y. Sato-Sorenson, M. Kanzaki, A. Gaines, R. Jeanloz, A. E. Ringwood, W. Bassett, M. Manghnani, S. Akimoto, M. Kumazawa, T. Ahrens, Y. Syono, Y. Ida, L.-c.Ming

Row 2: E. Takahashi, M. Ozima, M. Akaogi, T. Yagi, M. Brown, H-k. Mao, G. Will, R. Liebermann, H. Sawamoto, D. Anderson, A. Navrotsky, R. Hemley, N. Nakagiri, Y. Kim, G. Zou

Row 3-4: E. Knittle, O. Fukunaga, O. Shimomura, D. Weidner, M. Wakatsuki, S. Urukawa, T. Ashida, E. Ohtani, N. Mori, R. Kovach, D. Heinz, H. Arashi, S. Endo, Y. Matsui, T. Kikegawa, M. Bukowski, M. Seal, H. Watanabe, P. Bell, E. Ito, S. Ozaki, J. Bass, S. Karato, R. Burns, R. Boehler.

**Fig. 6a.** Third U.S.-Japan high pressure seminar at Turtle Bay on the island of Oahu in January 1986; group photo of attendees.



**Fig. 6b.** Shiv Sharma conducting a tour of Manghnani's laboratory at the Hawaiian Institute of Geophysics in 1986 for Jay Bass, Russell Hemley, Peter Bell and Takehiko Yagi.



**Fig. 6c.** Photos from banquet at U.S.-Japan seminar in Turtle Bay in 1986. Akimoto and his wife with Ted Ringwood.





**Fig. 6d.** Ringwood and Takehiko Yagi in serious scientific discussion.

2007

The High Pressure Mineral Physics Seminar #7 was held in Matsushima, Japan in May 2007 and was convened by Eiji Ohtani, Denis Andrault, Michael Brown, David Rubie, Yanbin Wang and Takehiko Yagi. The three persons who have attended all of the Japan–U.S./HPMPS series are indicated by the pullout in the photo—Takehiko Yagi, Murli Manghnani and Eiji Ito. [see Fig. 10a—by coincidence or not, all three are sitting together].

Entertainment was provided by the conveners [Fig. 10b] and “field trips” included a boat trip amongst the islands off Matsushima, one of the wonders of Japan [Figs. 10c–e].

2012

The High Pressure Mineral Physics Seminar #8 was held at the Granlibakken Resort and Conference Center on Lake Tahoe, California and attended by almost 200 persons [Fig. 11a]. This seminar was held jointly with the Annual Meeting of COMPRES: Consortium for Materials Properties Research in Earth Sciences.

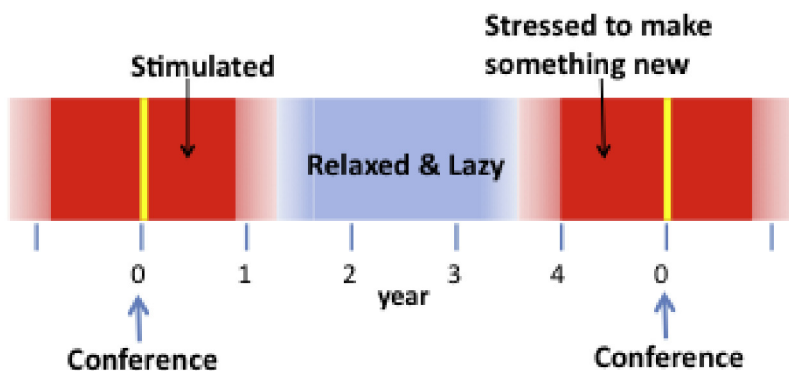
To recognize and acknowledge the longevity and commitment of Eiji Ito, Murli Manghnani and Takehiko Yagi to the high-pressure mineral physics seminar series over the past 36 years, we invited each of them to make a special presentation reflecting on the influence of the seminar series on their careers. The reflections of both Manghnani and Yagi have been incorporated in the introduction and background section of this paper.

Eiji Ito gave a very thoughtful and insightful talk, which is summarized in the following paragraphs.

“In the early 1970s, I debuted on the stage of high pressure mineral physics with X-ray profiles which showed the break-down of  $\text{MgSiO}_3$  enstatite into  $\beta$ - or  $\gamma$ - $\text{Mg}_2\text{SiO}_4$  and  $\text{SiO}_2$  (stishovite). So the late Akimoto-sensei nominated me as one of Japanese participants of the first U.S.–Japan Seminar.”

“Thanks to the seminar, soon I could synthesize  $\text{MgSiO}_3$  perovskite and confirmed the post-spinel transformation in August, which offered me research topics for the next ten years.”

**By attending to the every 5 year conferences I have been put into a cyclic working pattern with a 5 year period.**



**If no HPMPs conference, all my research life must have been painted in blue.**

**In conclusion, I have been much stimulated and grown by attending the conferences.**

**Here I'd like express my hearty thanks to all the progressive participants and organizers.**

**I also sincerely hope further development of the COMPRESS and HPMPs in the future.**



**Fig. 6c.** Yagi and his colleague Mitsuko Ozima.



**Fig. 7b.** Vigorous discussions in “Club 309” at conference hotel in Ise in 1991. Starting in Hakone in 1981 when Osamu Fukunaga had Room 309, each Japan–U.S.-seminar has designated one of the guest rooms as “Club 309” as a hospitality suite for evening discussions. Can you find Kei Kusaba, Russell Hemley, Charles Meade, Tomoo Katsura, Don Weidner Ann Chopelas, Charles Prewitt, Vladimir Zharkov, Bob-san, Osamu Shimomura, Yuh Fukai, Toshuyuki Atou?



US–Japan Seminar on High Pressure Research in Mineral Physics. Ise, 15–18 January 1991.

First row [left to right]: R. Liebermann, J. Sawamoto, T. Yagi, K. Akimoto, T. Duffy, T. Ahrens, S. Akimoto, V. Zharkov, M. Manghnani, Y. Syono, C. Prewitt, D. Presnall, J. Smyth, S. Stishov, J-P. Poirier, A. Navrotsky, Y. Matsui.

Second row: I. Maeda, J. Xu, T. Yamanaka, H. Hirai, M. Kanzaki, T. Kawasaki, T. Irifune, D. Weidner, E. Ito, R. Boehler, A. Chopelas, S. Rigden, Y. Syono, A. Mao, H. Murasawa, J. Hama, A. Yoneda.

Third row: Y. Kudoh, J. Susaki, H. Sato, S. Endo, Y. Fukai, K. Fujino, C. Meade, R. Cohen, E. Knittle, T. Akamatsu, E. Ohtani, S. Ozawa, M. Brown, W. Nellis, T. Katsura, K. Kusaba, N. Hamaya.

Fourth Row: K. Morooka, Y. Uchiyama, A. Yasuda, S. Kume, K. Suito, O. Ohtaka, S. Urakawa, W. Utsume, R. Hemley, H. Green, G. Wolf, M. Kurosawa, M. Kato, S. Tsuneki, O. Shimomura.

Fifth row: Y. Miyoshi, M. Yamakata, Y. Hirayama, T. Atou, M. Kitamura, T. Kato, Q. Williams, T. Kikegawa, Y. Yamada, R. Jeanloz, T. Kondo, M. Akaogi, H-k. Mao, T. Inoue, E. Takahashi.

Not present for photo: K. Kondo, K. Kurita, A. Ohsawa, S. Ozaki, H. Shimizu, C. Wallace.

**Fig. 7a.** Fourth Japan–U.S. high-pressure seminar in Ise on the Shima peninsula in Japan in 1991, the last seminar attended by Akimoto-sensei; group photo of attendees.

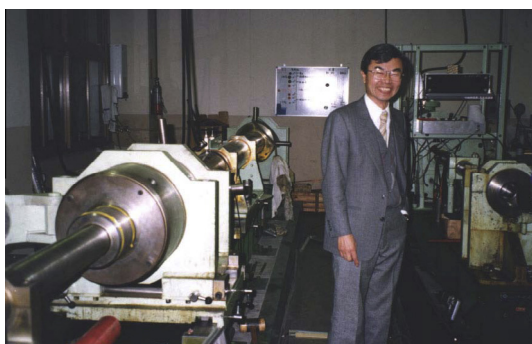




**Fig. 7c.** Joseph Smyth, Charles Prewitt, Tomoo Katsura and Ann Chopelas waiting for the sumo wrestling to begin in Club 309 at conference hotel in Ise in 1991.



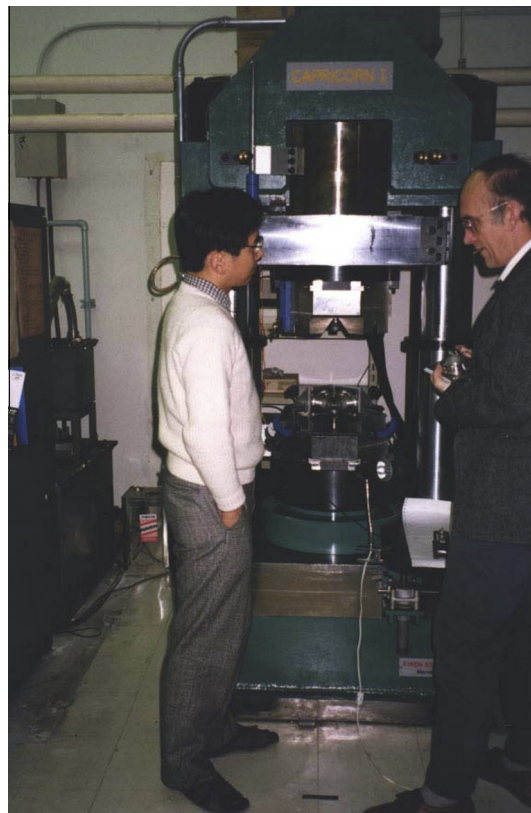
**Fig. 7d.** Laboratory visits in 1991. Bob Liebermann and Don Weidner in high-pressure laboratory of Eiji Ohtani at Tohoku University in 1991.



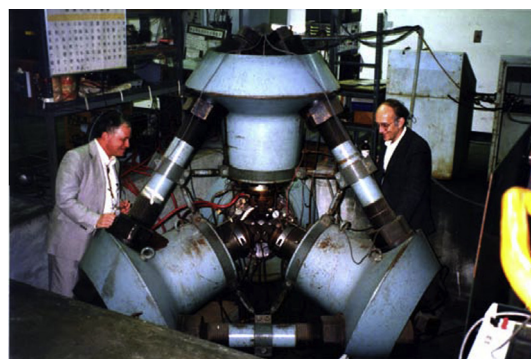
**Fig. 7e.** Yasuhiko Syono in his shock-wave laboratory at Tohoku University in 1991.

In addition to these 3 people who have attended all 8 of the HPMP seminars from 1976 to 2012, 4 others have attended 7 of the 8 high-pressure seminars from 1976 to 2012; Masaki Akaogi, Raymond Jeanloz, Bob Liebermann and Donald Weidner.

The environment of the Granlibakken Conference Center, set among the evergreens of the Sierra Nevada Mountains and on the shores of Lake Tahoe, gave rise to many personal interactions and memories [Figs. 11b–d].



**Fig. 7f.** Don Weidner and Wataru Utsumi with CAPRICORN apparatus at ISSP.



**Fig. 7g.** Bob and Don Weidner with tetrahedral anvil apparatus in lab of Akimoto at ISSP.

### Closing remarks

From the inception of the U.S.–Japan bilateral meetings in 1976 to the 8th High Pressure Mineral Physics Seminar in 2012, the spirit of these seminars has been sustained by a succession of generations of mineral physicists, starting with Murli Manghnani and Akimoto-sensei and continuing to the international convener team assembled by Yanbin Wang for the Granlibakken meeting [David Dobson, Guillaume Fiquet, Tetsuo Irifune, Zhenmin Jin, Tomoo Katsura, Eiji Ohtani, Bob Liebermann, and James Tyburczy].

We close with two illustrations from the HPMP-8 meeting in July 2012 at the Granlibakken Conference Center in Lake Tahoe, California: (1) Hawaiian sunrise from Murli Manghnani's





Row 1: S. Saxena, E. Ito, C. Prewitt, T. Yamanaka, R. Cohen, R. Hemley, T. Yagi, M. Manghnani, Y. Syono, T. Ahrens, T. Irifune, H-k. Mao, E. Ohtani, A. Jephcoat, R. Reichlin, O. Anderson, D. Rubie

Row 2: P. Conrad, Y. Fei, Y. Tateyama, O. Shimomura, Y. Wang, M. Rivers, H. Green, R. Liebermann, C. Meade, Y. Fukai, S. Ozaki, K. Ozaki, J. Parise, K. Kondo, E. Takahashi, D. Weidner, M. Chai, K. Kingma

Row 3: R. Jeanloz, B. Li, S. Urukawa, A. Shen, V. Sidorov, L-c. Ming, D. Heinz, R. Secco, T. Katsura, K. Fujino, T. Kondo, T. Nagai, C. Agee, T. Okuchi, K. Leinenweber, W. Bassett, L-g. Liu

Row 4: K. Kusaba, W. Utsumi, T. Kato, K. Gallagher-Holland, K. Kuroda, Q. Williams, A. Suzuki, D. Weill, O. Ohtaka, T. Suzuki, N. Hamaya, S. Endo, T. Ohsawa, M. Matsui, Y. Kudoh, J. Mundy, M. Akaogi, P. Naasch, L. Stixrude.

**Fig. 8a.** Fifth U.S.-Japan high-pressure seminar on the island of Maui in 1996; group photo of attendees.

reflections on the advent of the seminar series – Fig. 11e; and (2) a proverb from Confucius cited by Yanbin Wang in his introductory talk – Fig. 11f.



**Fig. 8b.** View of beach from conference hotel on Maui in 1996.

## Acknowledgements

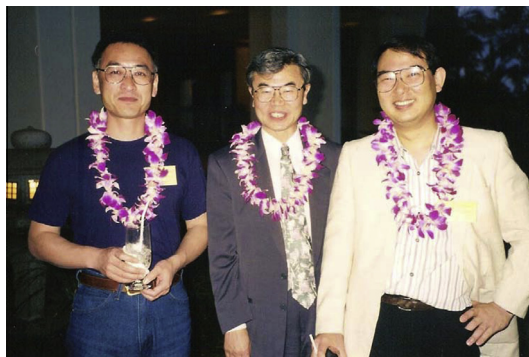
I thank many colleagues for assistance in identifying the attendees in the group photos taken at the seminars from 1976 to 2007



**Fig. 8c.** Osamu Shimomura, Takaya Nagai, Don Weidner, Nozomu Hamaya, and Takehiko Yagi setting off for snorkeling at beach in Maui in rented car [Osamu Ohtaka and S. Urukawa seated].



**Fig. 8d.** Seminar banquet in Maui in 1996. All with leis. Tetsuo Irifune, Murli Manghnani [co-convener], Eiji Ito and Don Weidner.



**Fig. 8e.** Nozomu Hamaya, Yasuhiko Syono [co-convener] and Eiichi Takahashi.



**Fig. 8f.** Yanbin Wang, Harry Green, Surendra Saxena, David Rubie and Orson Anderson.



**Fig. 8g.** Surendra Saxena and Hawaiian ladies giving instruction on hula dancing to Agnes Mao, Harumi Yamanaka and Quentin Williams.









**Fig. 9b.** View of the Italian Alps from Hotel Castagnola on Lago Maggiore in Verbania, Italy: site of HPMP5-6, first seminar outside of Japan or U.S.



**Fig. 9e.** Seminar banquet in Verbania in 2002. Chair lift to restaurant at top of mountain.



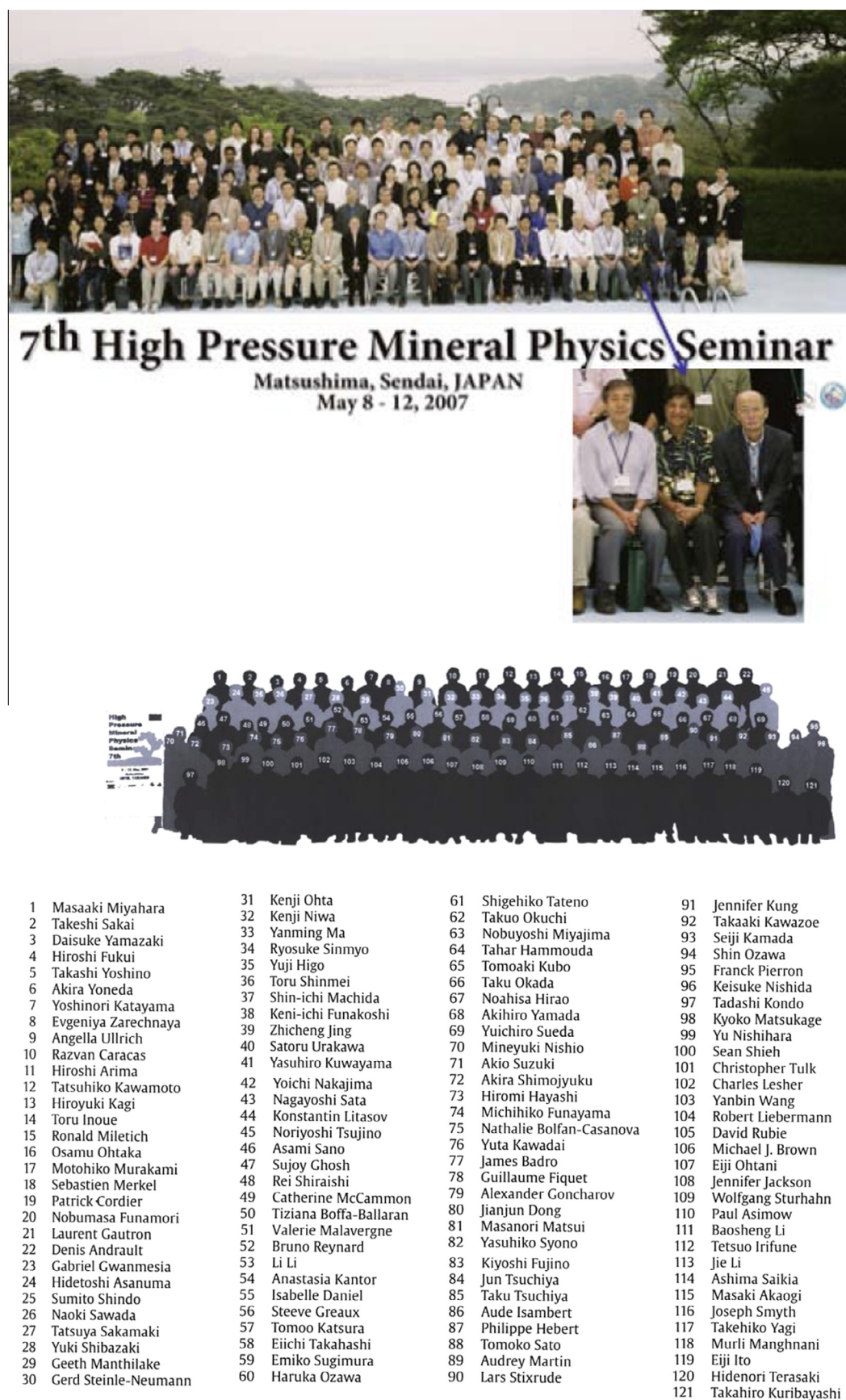
**Fig. 9d.** Shun Karato explaining his poster to Hélène Couvy and Patrick Cordier.



**Fig. 9f.** Wendy Mao receiving an outstanding student award from David Rubie, the principal convener of HPMP5-6 in Verbania.



**Fig. 9c.** Scientific sessions at Verbania in 2002. Audience at oral talk in 2002 at Verbania.

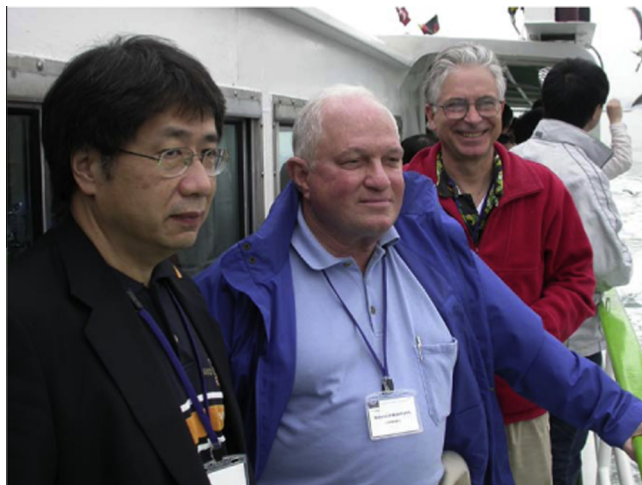


**Fig. 10a.** Seventh High Pressure Mineral Physics Seminar-7 HPMP-7 in Matsushima, Japan in 2007; group photo of attendees. The pullout shows the three persons who have attended all 8 of the Japan-U.S./HPMP seminars from 1976 to 2012 [Takahiko Yagi, Murli Manghnani, and Eiji Ito].





**Fig. 10b.** Social events and “field” trips at Matsushima in 2007. Members of organizing committee “singing”?



**Fig. 10c.** Tetsuo Irifune, Bob Liebermann and Mike Brown on boat excursion among islands of Matsushima.



**Fig. 10d.** Gabriel Gwanmesia and Toru Inoue on excursion to Shinto shrine at Matsushima in 2007.



**Fig. 10e.** Preeti Manghnani “relaxing” on walk on islands off Matsushima, Japan in 2007 [photo courtesy of Barbara Liebermann].



NOTE: In addition to the 3 people who have attended all 8 of the HPMP seminars from 1976 to 2012, 4 others have attended 7 of the 8 seminars: Masaki Akaogi, Raymond Jeanloz, Bob Liebermann and Donald Weidner.

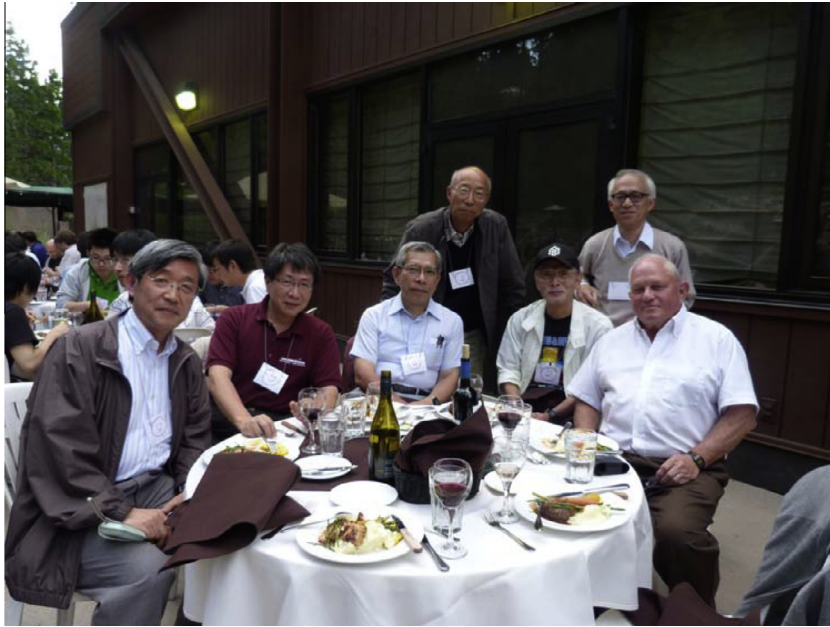
Photo also used as a Happy Holiday card in 2012 from Jay Bass, President of COMPRES to the mineral physics community.



**Fig. 11a.** Eighth High Pressure Mineral Physics Seminar HPMP-8 at Granlibakken Lodge, Lake Tahoe, California in July 2012; group photo of attendees [courtesy of Steve Hurst].



**Fig. 11b.** Informal activities at Granlibakken in 2012. Principal convener Yanbin Wang presenting gift from convener team to Chong-hwey Fee, Administrative Coordinator for COMPRES at University of Illinois at Urbana-Champaign with COMPRES President Jay Bass looking on.



**Fig. 11c.** Bob-san with Japanese yakuza: L to R: Eiji Ohtani, Tetsuo Irifune, Kiyoshi Fujino, Masanori Matsui, Eiji Ito and Masaki Akaogi.



**Fig. 11d.** Frédéric Bézina, Misha Bystricky, Gabriel Gwanmesia and Tetsuo Irifune at breakfast with Barbara Liebermann.

[including Masaki Akaogi, Russell Hemley, Charles Lesher, Yasuhiko Syono, David Walker, Quentin Williams, and Takehiko Yagi]. I also thank Stefan Keyssner for providing the photos from the HPMP5-6 meeting in Verbania in 2002. I thank Eiji Ito, Murli Manghnani, Yanbin Wang and Takehiko Yagi for permission to quote from their introductory presentations at the HPMP58 meeting in 2012. As indicated above, I would like to dedicate this paper to Murli Manghnani to honor his seminal contributions to this seminar series.

I have also shared the original draft of this paper with the principal conveners of the seminars and appreciate their constructive

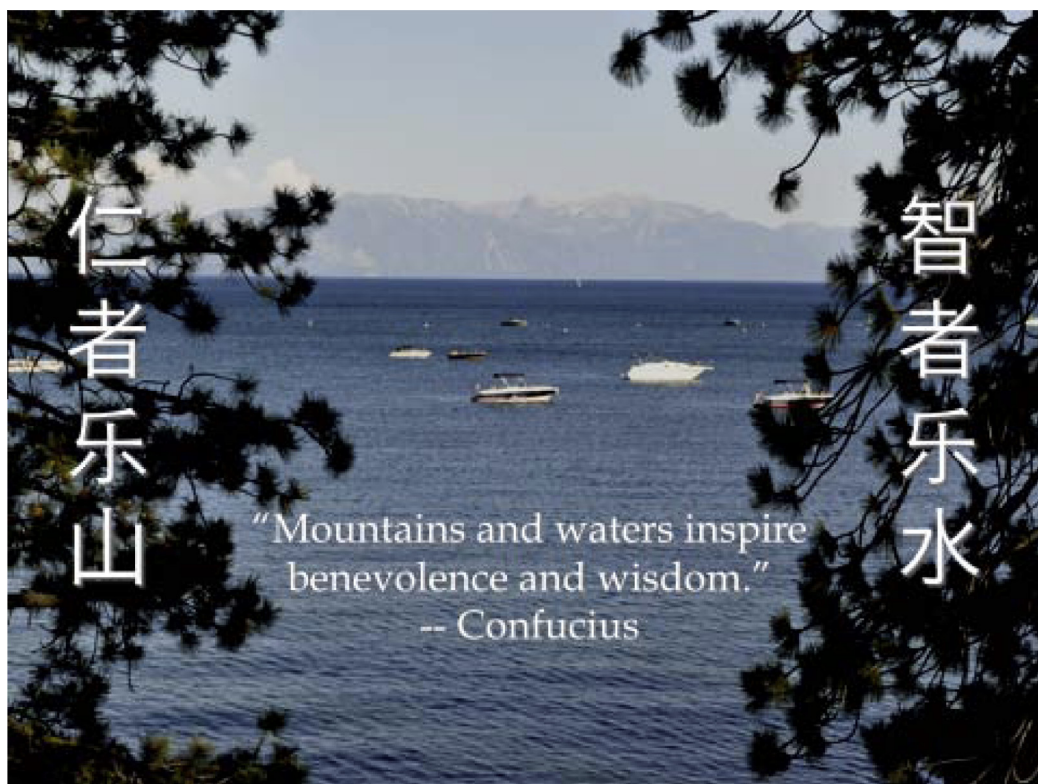
comments and suggestions [including Murli Manghnani, Yasuhiko Syono, Takehiko Yagi, David Rubie, Eiji Ohtani and Yanbin Wang]. However, I am responsible for any misrepresentations or errors in recounting this history.

I also thank the editors of this special issue of PEPI [Yanbin Wang, James Tyburczy and Baosheng Li] for encouraging me to undertake the task of preparing this historical review. The preparation and writing of this review paper was supported by grants to the author from the National Science Foundation [EAR 06-35651 and GEO 11-07155 and the U. S. Department of Energy DENA0001815. MPI Publication No. 496.





**Fig. 11e.** Hawaiian sunrise “The Dawn of U.S.–Japan Series In High Pressure Mineral Physics” in 1976 [courtesy of Murli Manghnani].

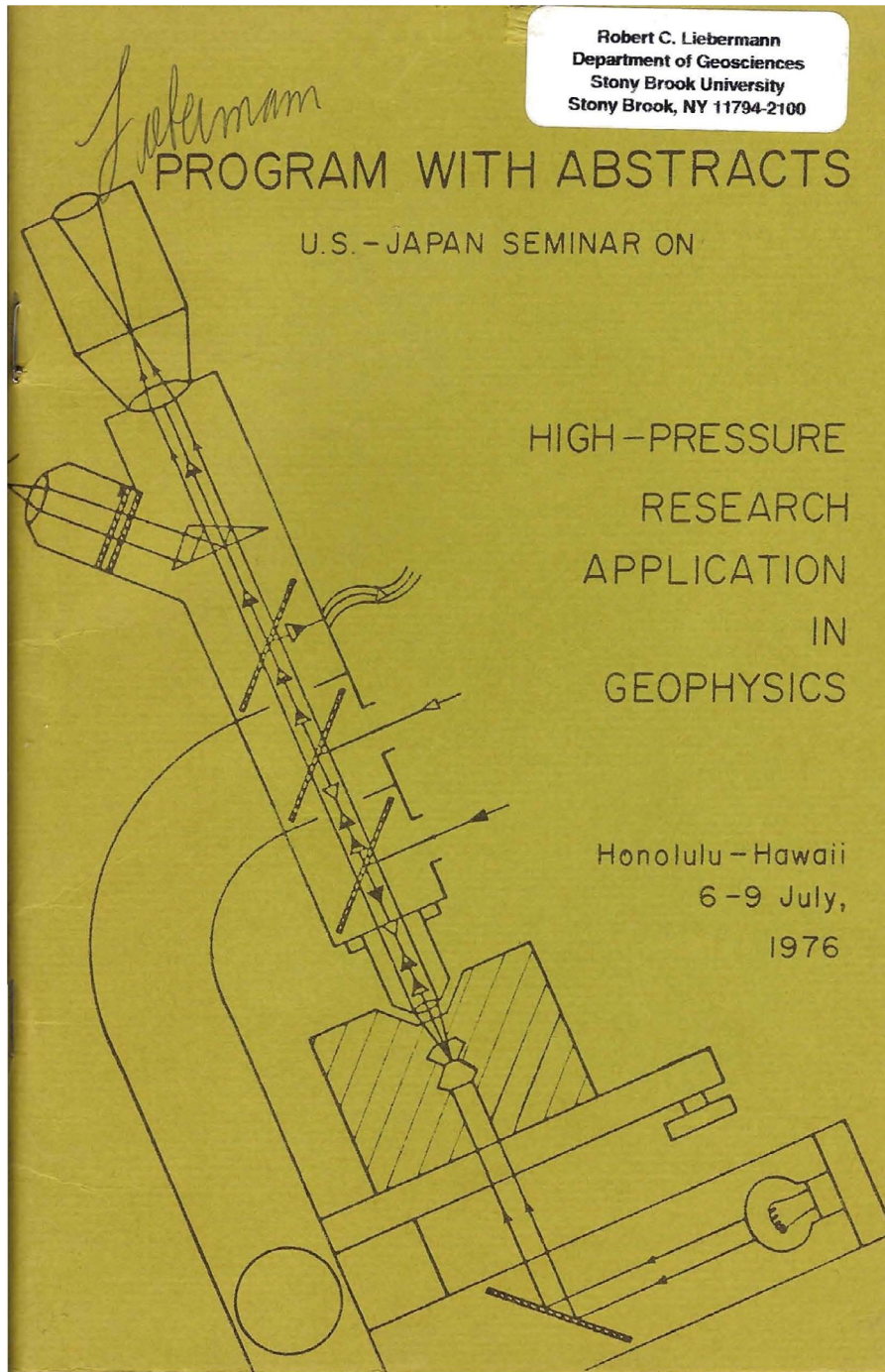


**Fig. 11f.** Closing slide from seminar introduction by Yanbin Wang at HPMPs-8 meeting at Lake Tahoe in July 2012.

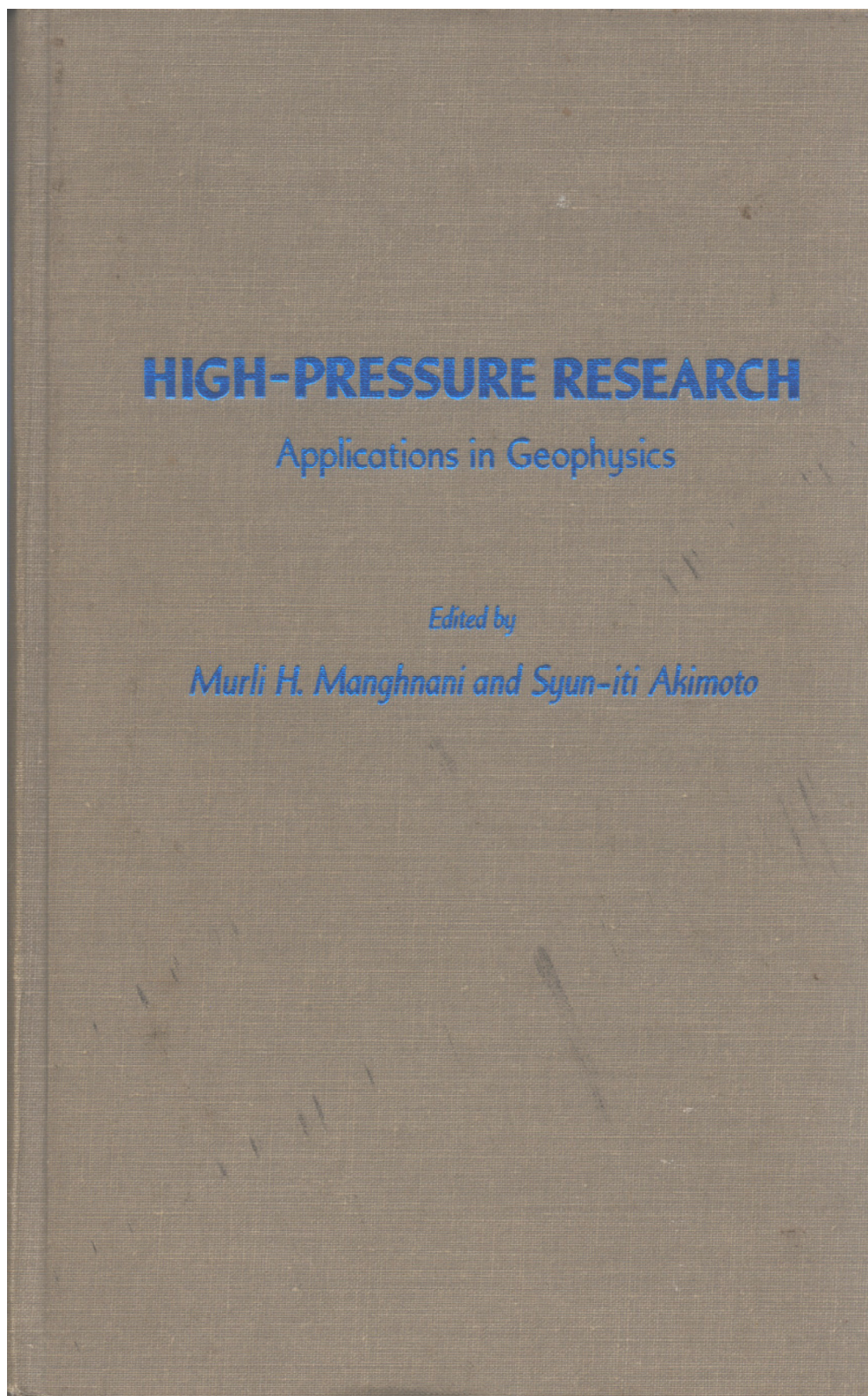
**Appendix A.**

Covers of program/abstracts and published volumes from the Japan–U.S./High Pressure Mineral Physics seminar series.

A1a. First U.S.-Japan Seminar [HPMPS-1] at the East West Center, Honolulu, Hawaii, July 1976. Conveners: Murli Manghnani and Syun-iti Akimoto. Program booklet and published volume.

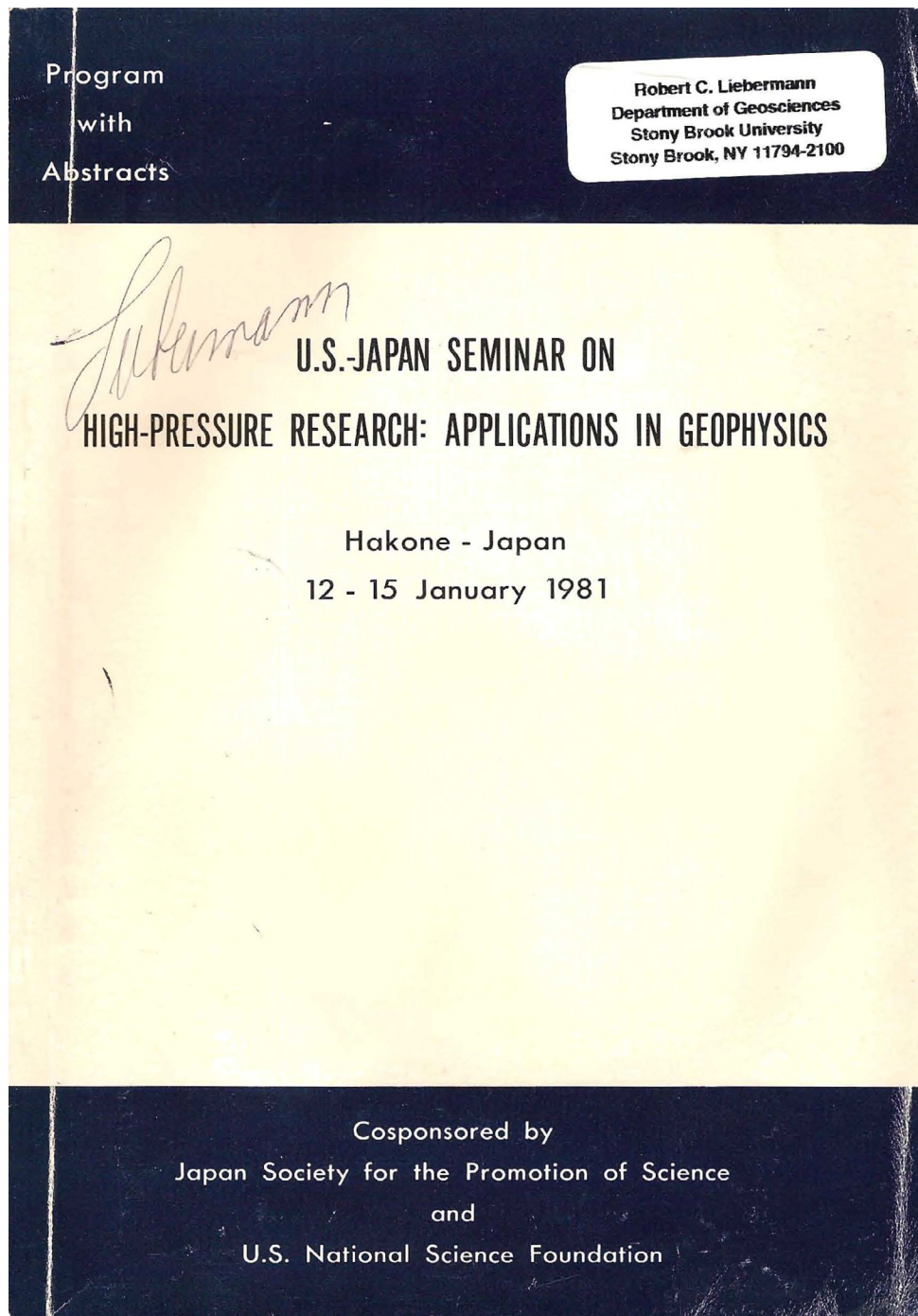




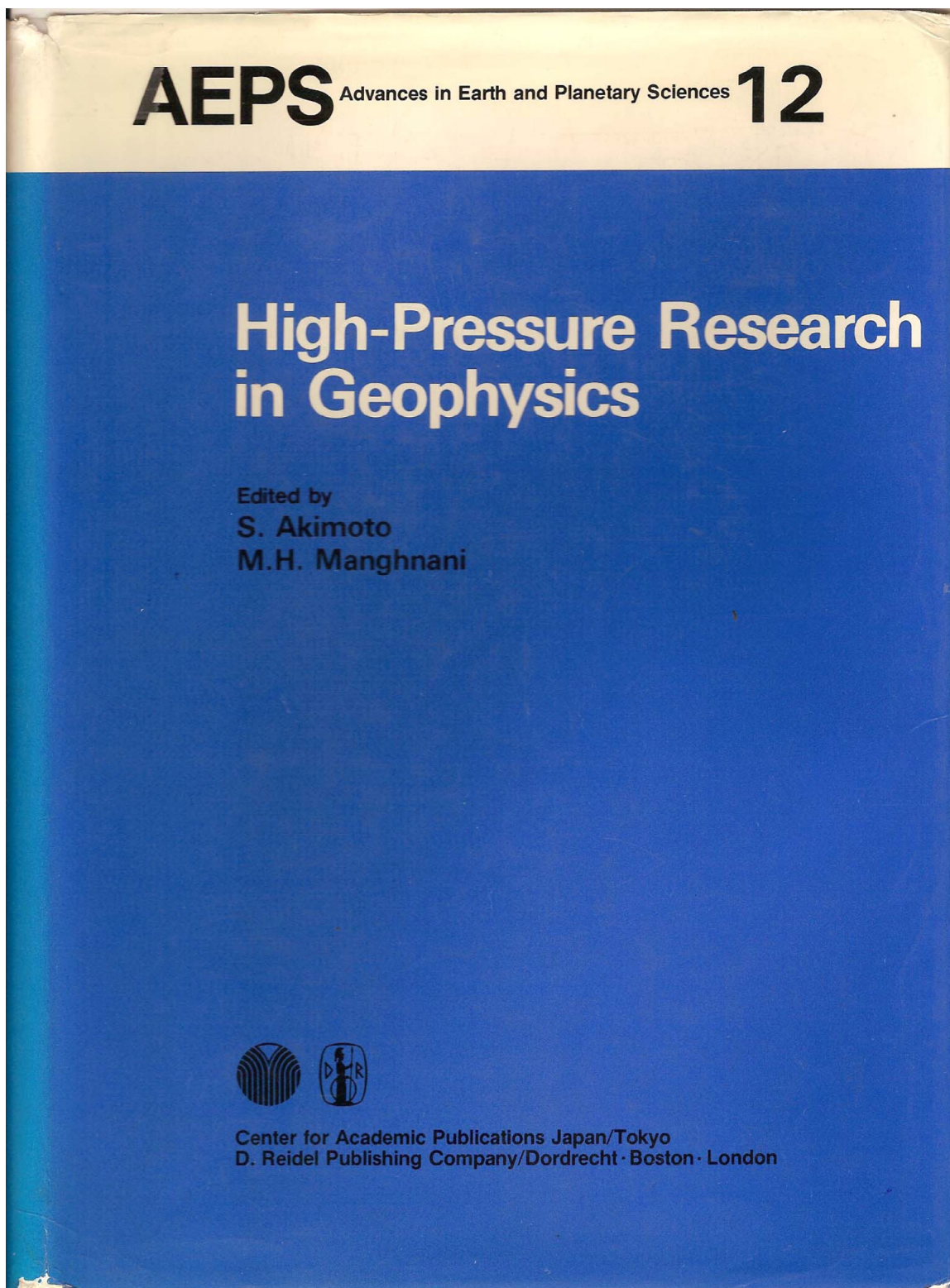


M.H. Manghnani, S. Akimoto eds.: *High-Pressure Research: Application in Geophysics* (Academic Press Inc., 1977).

A2. Second Japan-U.S. Seminar [HPMPS-2] at the Seiunso Hotel in Hakone, Japan, January, 1981. Conveners: Syun-iti Akimoto and Murli Manghnani. Program booklet and published volume.

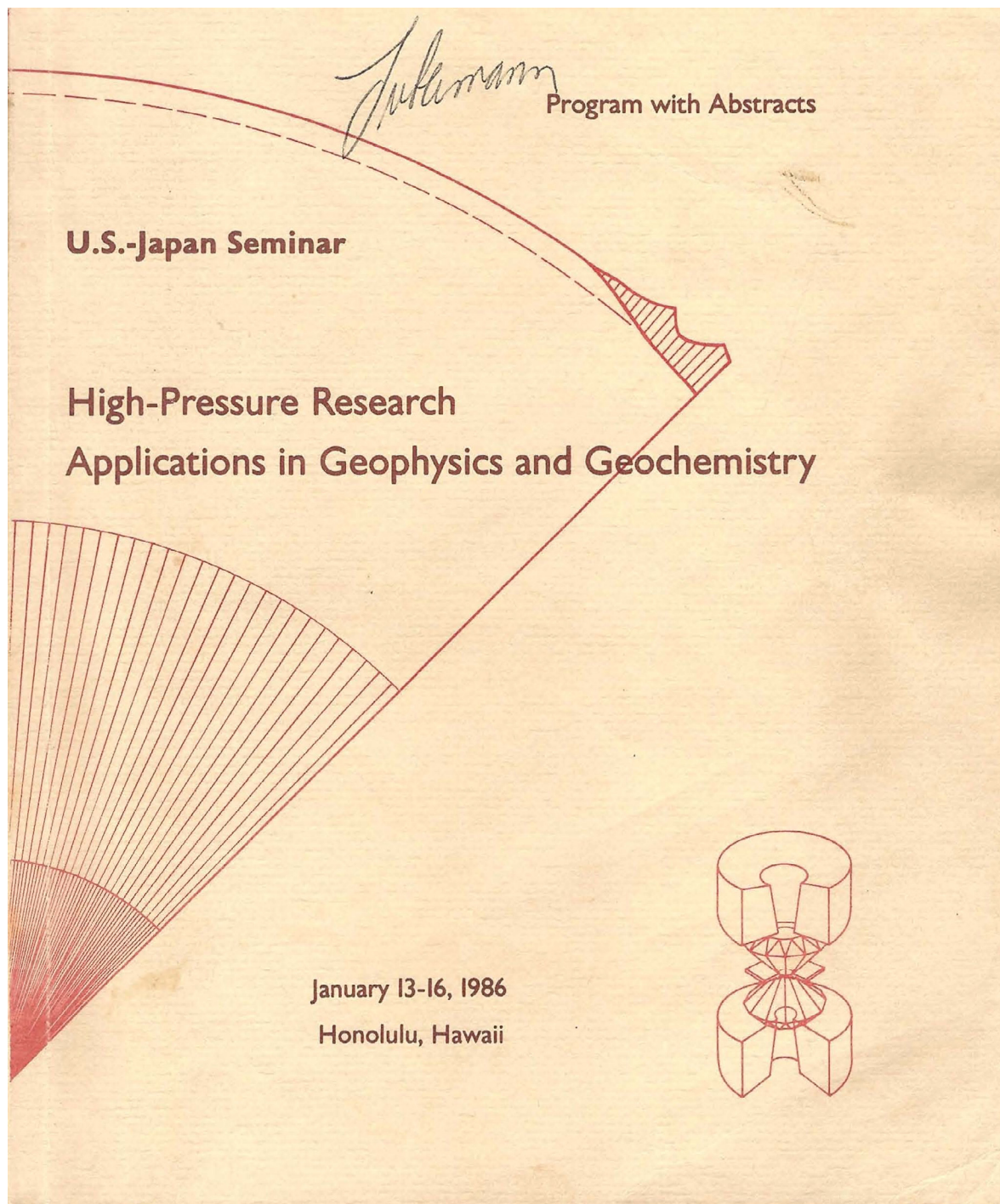




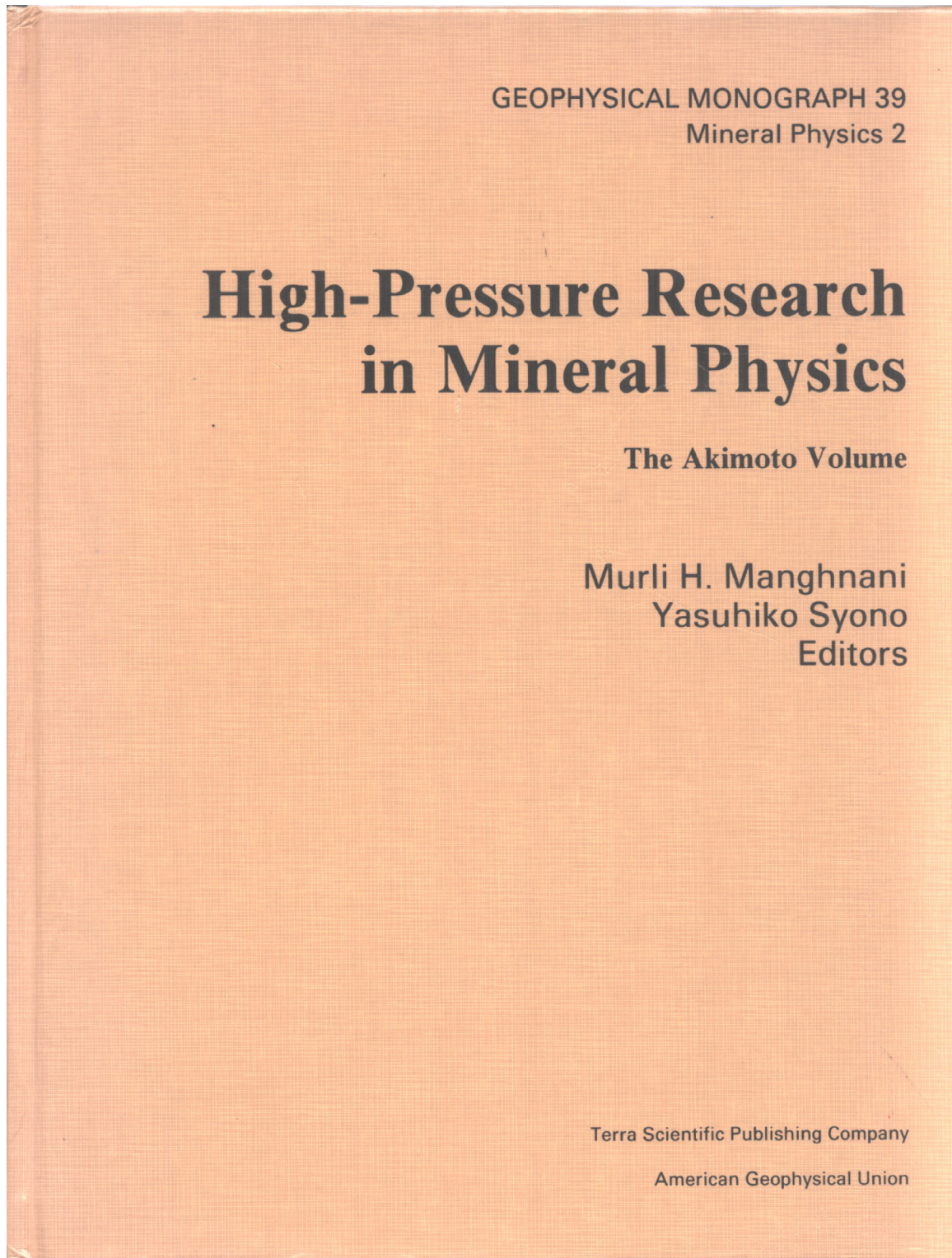


S. Akimoto, M.H. Manghnani eds.: *High-Pressure Research in Geophysics* (Center for Academic Publications, Tokyo 1982).

A3. Third U.S.-Japan Seminar [HPMPS-3] at the Turtle Bay Hilton, Honolulu, Hawaii, January 1986. Conveners: Murli Manghnani and Syun-iti Akimoto. Program booklet and published volume.

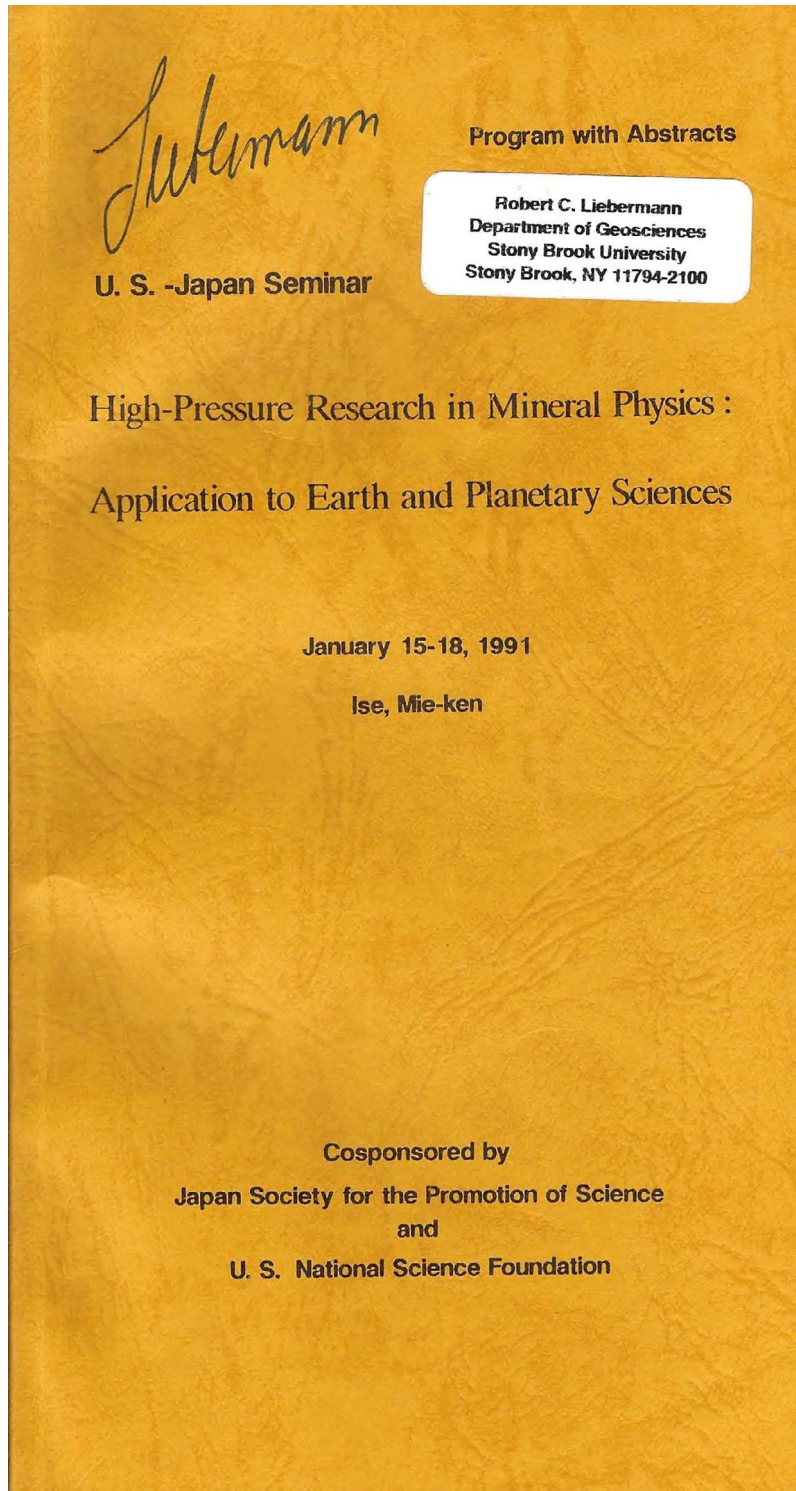




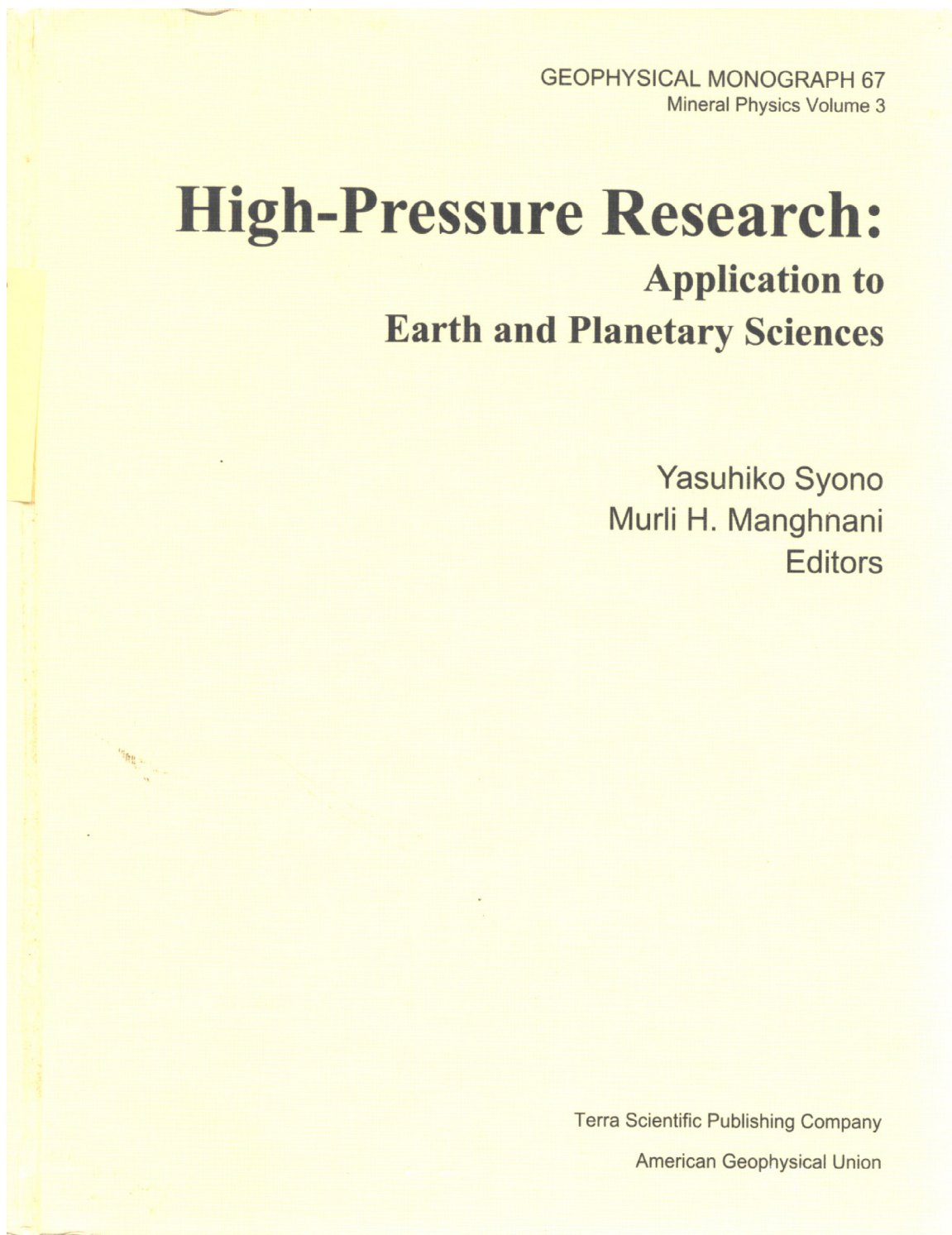


M.H. Manghnani, Y. Syono eds.: *High-Pressure Research in Mineral Physics* (TERRAPUB, Tokyo, 1987).

A4. Fourth Japan-U.S. Seminar [HPMPS-4] at the Mie Kosei Nenkin Kyuku Center in Ise on the Shima peninsula, Japan, January 1991. Conveners: Yasuhiko Syono and Murli Manghnani. Program booklet and published volume.

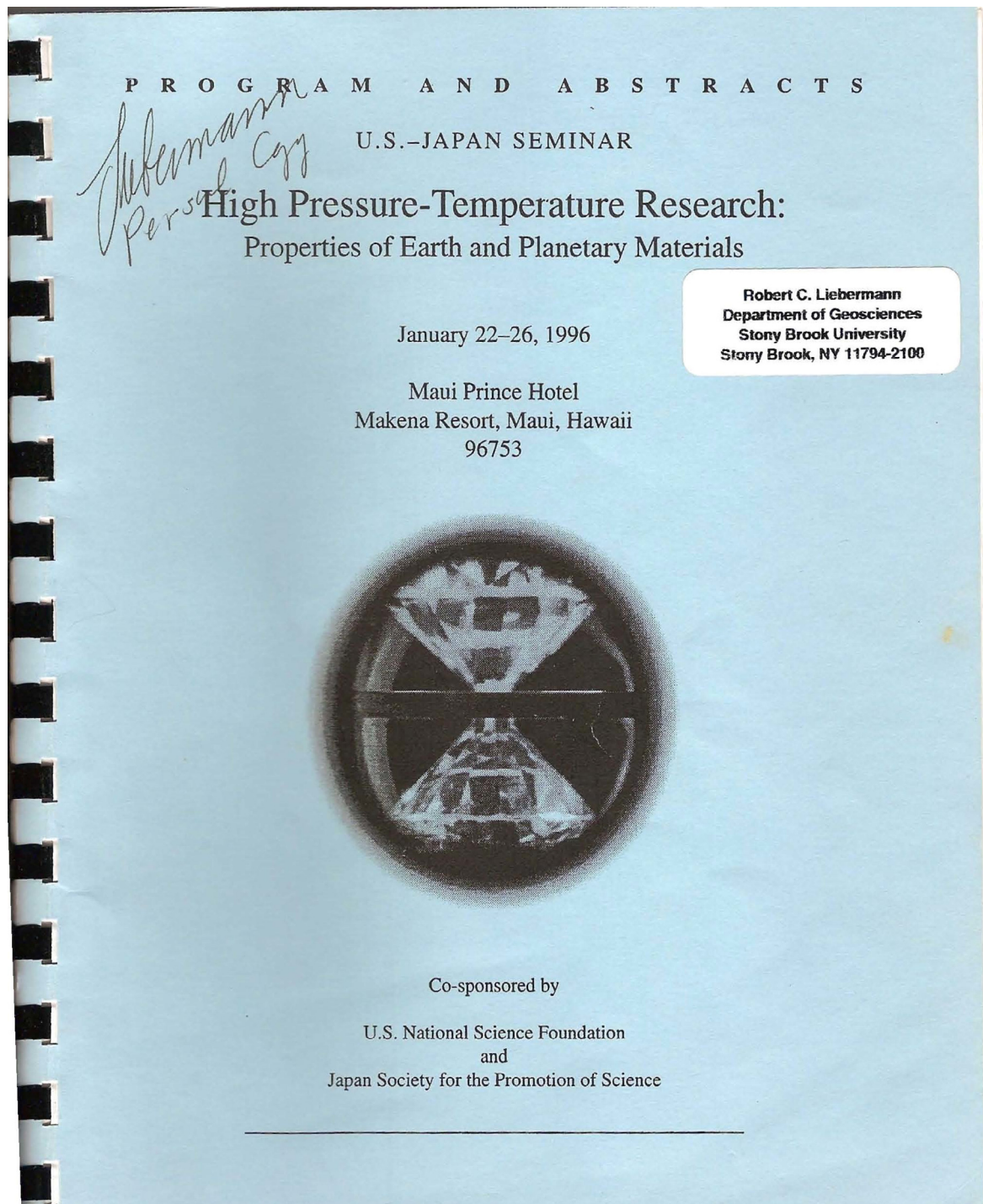






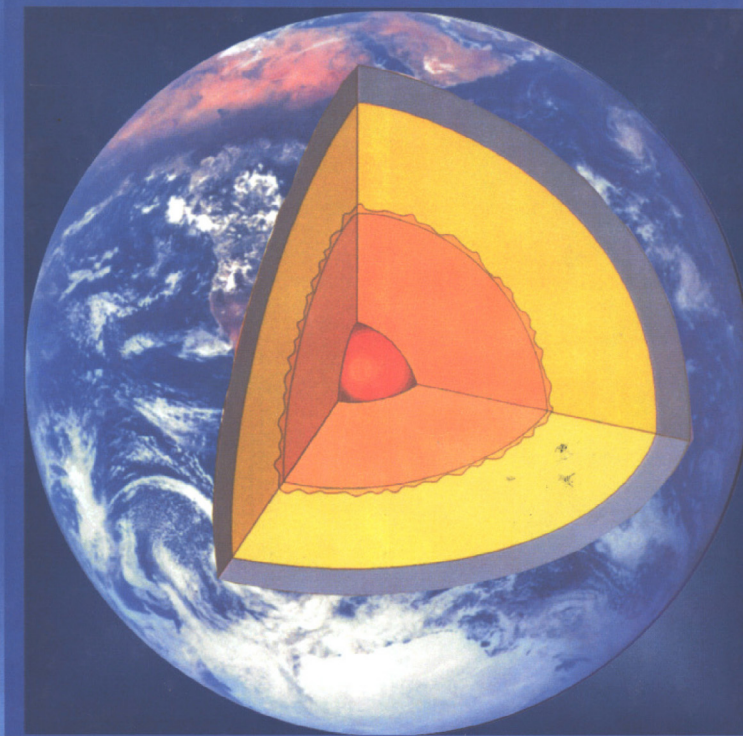
Y. Syono, M.H. Manghnani eds.: High Pressure Research: Application to Earth and Planetary Sciences (AGU, Washington, D.C., 1992).

A5. Fifth U.S.-Japan Seminar [HPMPS-5] at the Maui Prince Hotel, Maui, Hawaii, January 1996. Conveners: Murli Manghnani and Yasuhiko Syono. Program booklet and published volume.





# Properties of Earth and Planetary Materials

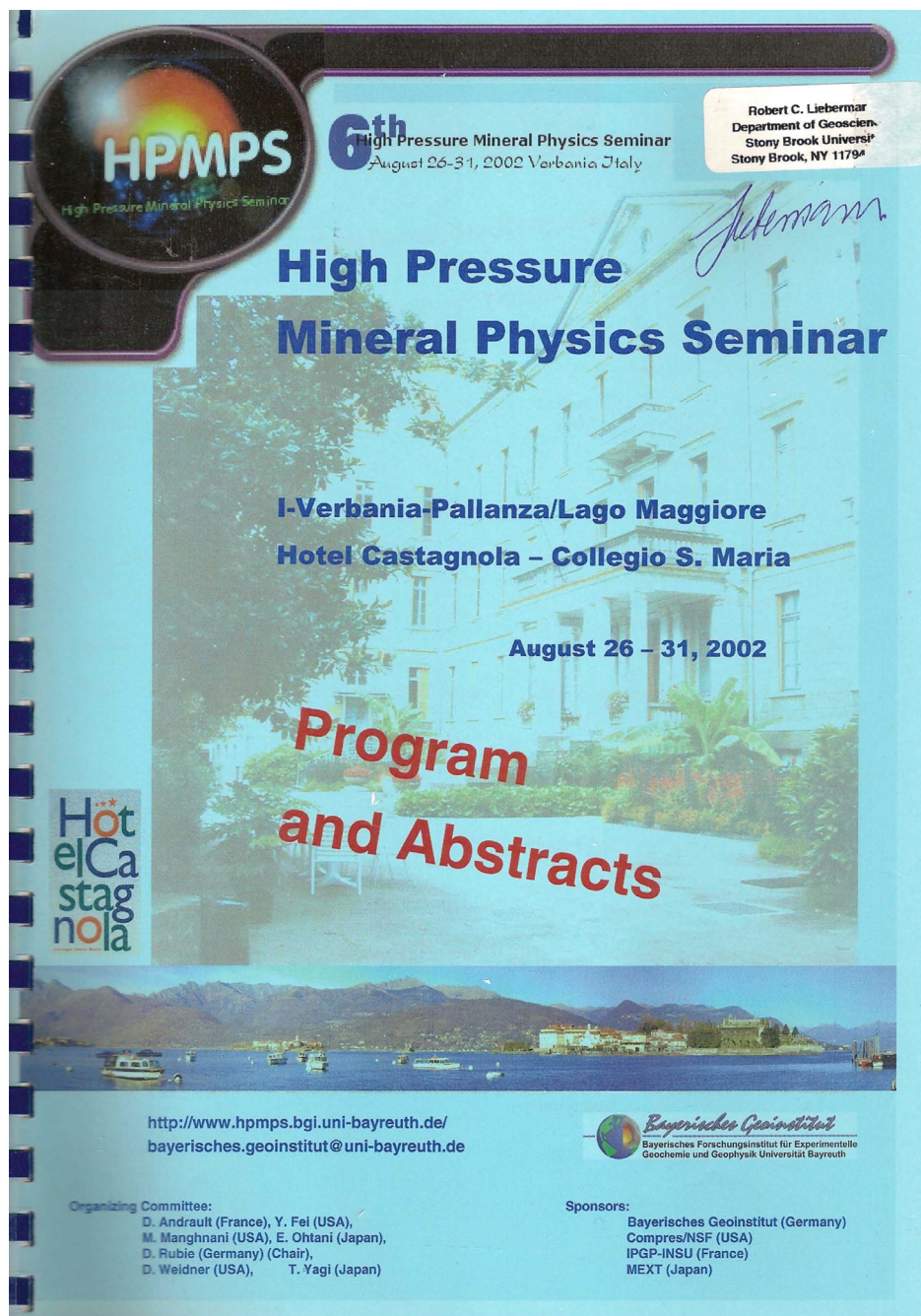


## at High Pressure and Temperature

**Murli H. Manghnani**  
**Takehiko Yagi**  
*Editors*

M.H. Manghnani, T. Yagi eds.: *Properties of Earth and Planetary Materials at High Pressure and Temperature* (AGU, Washington, D.C., 1998).

A6. Sixth High Pressure Mineral Physics Seminar [HPMPS-6] at Hotel Castagnola on Lago Maggiore in Verbania, Italy, August 2002. Conveners: David Rubie, Denis Andrault, Yingwei Fei, Murli Manghnani, Eiji Ohtani, Donald Weidner, and Takehiko Yagi. Program booklet and published volume.

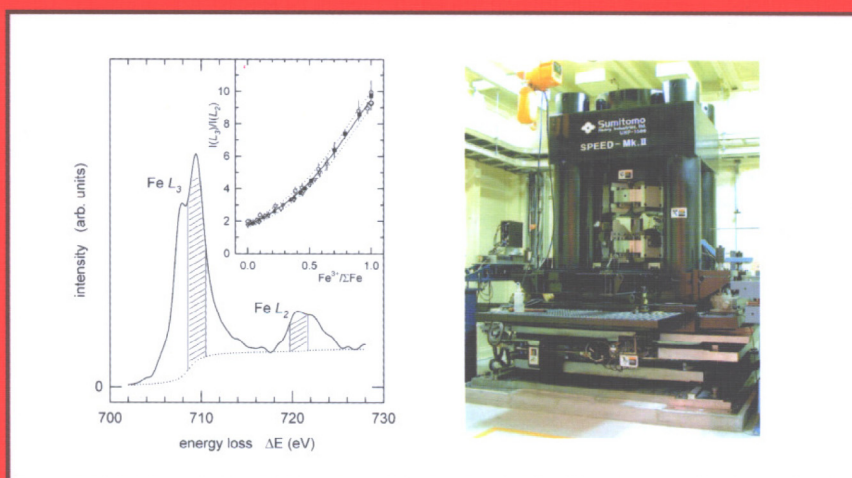






# NEW DEVELOPMENTS IN HIGH-PRESSURE MINERAL PHYSICS AND APPLICATIONS TO THE EARTH'S INTERIOR

D.C. RUBIE, T.S. DUFFY AND E. OHTANI  
(EDITORS)



D.C. Rubie, T.S. Duffy, E. Ohtani eds.: *New Developments in High-Pressure Mineral Physics and Applications to the Earth's Interior* (Elsevier, Amsterdam, 2004).

A7. High Pressure Mineral Physics Seminar [HPMPS-7] in Matsushima, Miyagi, Japan, May 2007. Eiji Ohtani, Denis Andrault, Michael Brown, David Rubie, Yanbin Wang and Takehiko Yagi. Program booklet and published volume.

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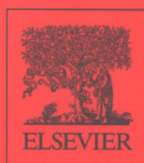
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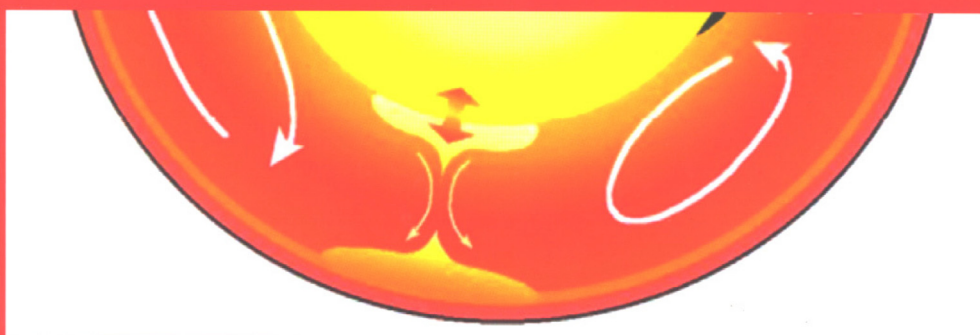
Volume 174, Issues 1–4, May 2009

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**PHYSICS OF THE EARTH AND PLANETARY INTERIORS**  
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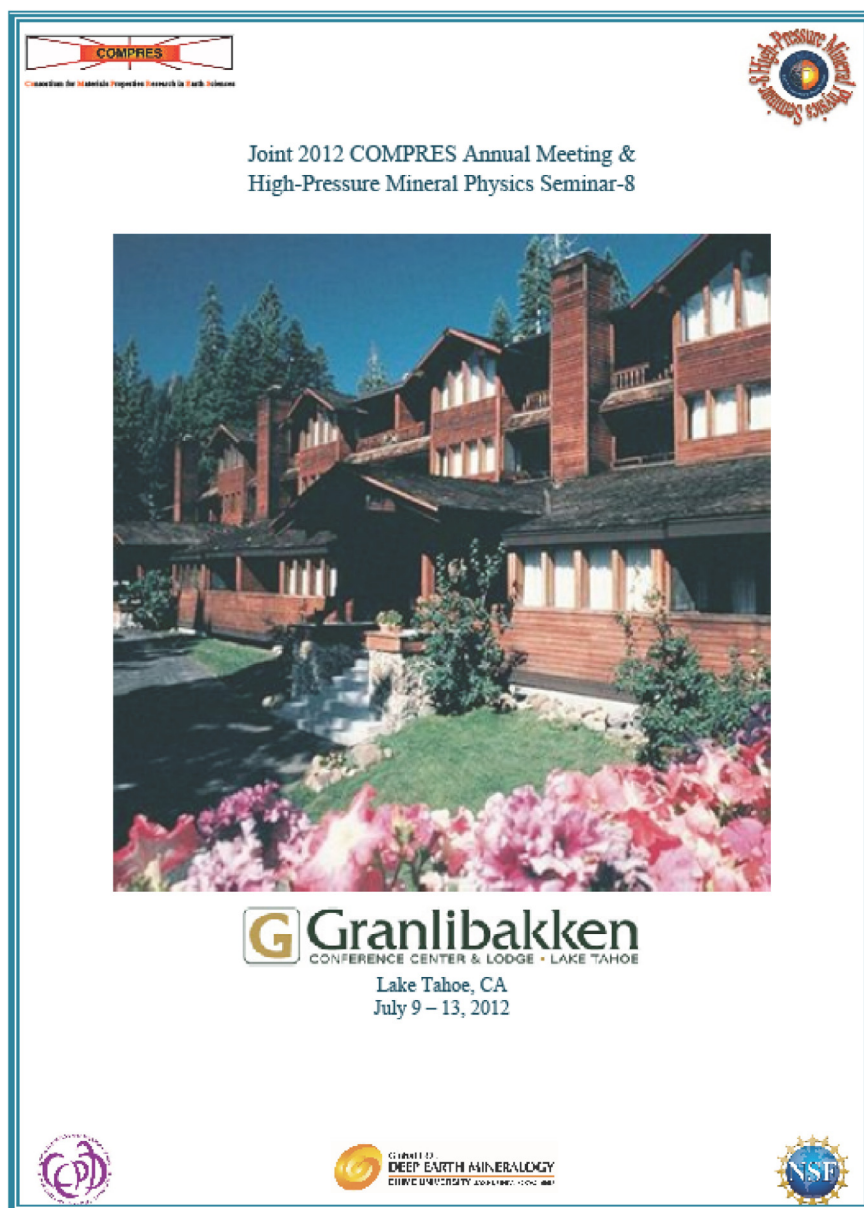
**E. Ohtani, D. Andrault, P. D. Asimow, L. Stixrude, Y. Wang**  
(Editors)



**HPMPS 7**  
7th High Pressure  
Mineral Physics Seminar

E. Ohtani, D. Andrault, P.D. Asimow, L. Stixrude, Y. Wang, eds. *Advances in High Pressure Mineral Physics: from Deep Mantle to the Core* (Elsevier, Amsterdam, 2009).

A8. Eighth High Pressure Mineral Physics Seminar [HPMPS-8] at Granlibakken Conference Center and Lodge, Lake Tahoe, California, July 2012. Conveners: Yanbin Wang, David Dobson, Guillaume Fiquet, Tetsuo Irifune, Zhenmin Jin, Tomoo Katsura, Eiji Ohtani, Bob Liebermann, and James Tyburczy. Program booklet.





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