

Oral History of
Miriam Kastner

Interview conducted by Laura Harkewicz

23 May 2006

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ABSTRACT:

Miriam Kastner was interviewed in her office at Sverdrup Hall on the campus of Scripps Institution of Oceanography (SIO) on May 23, 2006. Kastner was born in Bratislava, Czechoslovakia on January 22, 1935. She received both her bachelor's and master's degrees in geology from Hebrew University in Jerusalem, Israel in 1964. She received her Ph.D. in geosciences/earth sciences from Harvard University in 1970. She has received a number of awards and honors, served on many national, international, and advisory committees, and has held a variety of academic and administrative positions. These include: fellow, Geological Society of America, 2004; Hans Pettersson Medal, Royal Swedish Academy of Sciences, 1999; fellow, American Association for the Advancement of Science, 1993; Guggenheim Fellow, 1982; review panel, American Chemical Society, Petroleum Research Fund, 2004 – present; US representative, Euro-Margins Review Panel, 2002 – present; Methane Hydrate Advisory Committee member to the Energy Secretary, Department of Energy, 2001 – present; panel member, Sedimentary and Geochemical Processes, NSF Ocean Drilling Program; chairperson, SIO Faculty, 2001 – 2002; director, Geosciences Research Division, SIO, 1989 – 1994; and Curricular Group Coordinator, Geological Sciences, SIO, 1978 – 1982. She came to Scripps in 1972, becoming the second female faculty member at SIO and the first woman professor in the Geosciences Research Division, a position she holds today. The interview focused on her experiences at Scripps particularly in relation to difficulties locating funding support for her research, laboratory, and students as well as the apparent disinterest on the part of many current Scripps female scientists to become involved in committees that relate to the operations of the Institution. We also discussed her interests in teaching and lecturing to the general public. The interview included her experiences in the Deep Sea and Ocean Drilling Projects, covered current problems with the politics of science, and explained how scientific work can not only be monumentally important but also beautiful.

INTERVIEW HISTORY: The interview took place on a late spring morning in the office of Dr. Miriam Kastner in Sverdrup Hall on the campus of Scripps Institution of Oceanography in La Jolla, California. Kastner's small office was packed with scientific journals but made cozy by the presence of her King Charles spaniel, "Prince," his bed, and water dish. We talked for approximately ninety minutes and were not interrupted. A portion of this transcript was deleted as per the interviewee's request.

Laura Harkewicz
Oral Historian, SIO/UCSD
September 21, 2006



Miriam Kastner collecting water from 504 B, Deep Sea Drilling Project, Leg 92, 1983.
Scripps Institution of Oceanography, UC San Diego

INTERVIEW WITH MIRIAM KASTNER: 23 May 2006

Harkewicz: ##¹ This is May 23, 2006. I'm Laura Harkewicz in the office of Dr. Miriam Kastner in Sverdrup Hall. Good morning, Dr. Kastner.

Kastner: Good morning.

Harkewicz: My first question is what made you decide to go into a career in oceanography?

Kastner: It's a difficult question. I was an undergraduate in earth sciences and I came to Harvard to do my Ph.D. and just—I mean oceanography is not a topic that students got exposed to in high schools or even in some classical earth science departments early on. But at Harvard we had some connections with Woods Hole and, if one is interested in the world, and the oceans occupy two-thirds of the Earth's surface, so Woods Hole offered an opportunity to engage in the topic, which is not available everywhere. That opened up an opportunity to do some research in a frontier of science, so that's how it came about.

Harkewicz: So, when you were a student at Harvard and in Israel, in geology, you were interested in oceanography even at that time?

Kastner: I was interested in how the Earth functions, but opportunities in oceanography at that time in Israel were very limited. They had limited opportunity. And then I came to Harvard, and through my supervisor I began communications with Woods Hole.² My supervisor had close contacts with Woods Hole so I got involved my first summer at Harvard in a project with Woods Hole. Woods Hole wasn't very open to women at that stage, I couldn't go out to sea with Woods Hole but I could get samples. At that time, at Scripps, women already did go to sea, so Scripps was a bit ahead of Woods Hole. Oceanography is a very expensive field and very few places had it. Even Harvard just had an association with Woods Hole which, of course, gave me the opportunity.

Harkewicz: Okay.

Kastner: Yeah.

Harkewicz: So, how were you recruited by Scripps?

Kastner: It was very unusual. While a postdoctoral fellow at the University of Chicago, I received call from Scripps letting me know that they had a position available and asking if I would like to come for an interview. I knew most of the faculty

¹ The symbol ## indicates that the tape or a section of the tape has begun or ended. For a guide to tapes see the final page of this transcript.

² Woods Hole Oceanographic Institution (WHOI), founded in 1930 and located in Woods Hole, Massachusetts.

members at Scripps because while I was at Harvard they came either for sabbaticals or just for a visit. That's how it happened.

Harkewicz: I see. Did they give you any special hiring package or guarantee you career advancement or anything?

Kastner: No. I was the first woman on the faculty at Scripps and when I came, what younger women don't realize today is there were no special perks for women, women were an oddity at that stage, especially in the top institutions. I didn't get startup money. I got an empty laboratory and I was happy with that, at least I got a laboratory. [*Laugh*]

Harkewicz: Yeah. I guess that's something.

Kastner: And since every beaker, every little item, spatulas, etc. I used in the laboratory I had to purchase. Startup money really helps these days. NSF³ as well was not very helpful to women scientists. They were rather discouraging, I suppose because they didn't expect women to succeed. So, nowhere did women have support as they have today. It was a very lonely and different atmosphere than now.

Harkewicz: So you . . .

Kastner: And the lab.

Harkewicz: You didn't feel any support from any of the faculty that you had met at Harvard when they came to visit or anything like that?

Kastner: I meant financial support. At Scripps some of the faculty members were much more supportive. After my arrival, I did get invited by two faculty members to participate in ongoing projects in their laboratories, which was very flattering because both were highly established and very famous geochemists. But, I decided to build my own career. I kept in good relations with the two and I worked on developing an independent laboratory, which in the long run turned out really beneficial.

Harkewicz: Would you like to mention their names?

Kastner: I can mention them. They were Drs. Craig and Ed Goldberg.⁴ They're both very well known people. Dr. Craig was involved in the fascinating GEOSECS⁵ project, and when I came to Scripps it was at the very early stages and he offered

³ National Science Foundation.

⁴ Harmon Craig (1926 – 2003), Scripps geochemist; Edward D. Goldberg (1921 -), professor of marine chemistry at SIO.

⁵ GEOSECS was a series of scientific research cruises in the 1960s and 1970s that consisted of the first integrated chemical, isotopic, and hydrographic studies of the world's oceans.

me a certain portion of that. It was interesting scientifically but not the best for my future career. I have never regretted that I didn't do it.

Harkewicz: So, rather than working for these two individuals you set out on your own, then?

Kastner: Yes.

Harkewicz: Okay.

Kastner: I kept good relations with them and other colleagues and I just developed my own laboratories.

Harkewicz: I wanted to ask you a little bit more about the fact—you know, you mentioned you were the first woman faculty member here at Scripps. And I know that you were one of the few female graduate students at Harvard in the geology department.

Kastner: I think for the first three years I was the only one in the department.

Harkewicz: Okay.

Kastner: Yes.

Harkewicz: Do you feel your experiences as a scientists have been framed by the fact that you're a woman or limited in any way by that?

Kastner: Not really because, luckily, I wasn't born here nor did I grow up here. In that stage, I grew up in Israel and Israel is a very different society where women had early on a different status; for example, women had to serve in the army. When I grew up the notion that women cannot achieve certain positions did not exist. When I was an undergraduate, I majored in geology with a minor in physical chemistry. I had great women professors in almost every topic: for example, in physical chemistry, in biology, and in statistics. At the Hebrew University although there were not as many women professors as men professors, women professors were not an oddity as in the United States at that time. When I arrived at Harvard, I knew that upon completing my Ph.D. I could return to Israel and have a job. At Harvard I very much enjoyed the great education but from a social point of view it seemed to me like the U.S. was in the Middle Ages compared with Israel. But it didn't affect me because I had a different background and I had a way out. I could return to Israel and have a career.

Harkewicz: But then you ended up staying here?

Kastner: I ended up staying here because once I was offered the opportunity at Scripps, which is the best oceanographic institution in the world, I accepted it. When I came to Harvard, my supervisor told me, "You may not get the opportunity you

deserve." I was determined, and didn't want to go to Texas A&M. Or go to Mississippi, or go to somewhere else just to stay in the United States. And oceanography in Israel was not very developed. Once I had the offer to join Scripps, staying in the U.S. was an obvious choice.

Harkewicz: So, you came here. You had an empty lab and an opportunity and then what happened? Were you your own supervisor? Did you have people that you had to hire or things like that?

Kastner: Well, at the beginning, I didn't have any money to hire anybody. [*Laugh*] And I started working with students. I inherited a student who was working with someone else and wanted to move and whom I did not have to support. The second student was a foreign student. Both students had some support, so early on I had two Ph.D. students. But I didn't have anybody in the laboratory. Eventually, the director's office agreed to give me some funding so I could buy some equipment for the empty laboratory. I think it was on the order of \$10,000. That was it. Yeah, I think that was it. It was about \$10,000 dollars. So, I could buy some basic things for the laboratories—bottles, beakers, and some assays, and things like that so we could start working. Subsequently, I received bits and pieces of money from the Academic Senate but not from NSF, at first, because at that stage NSF was not eager to support a woman scientist. In order to get funding, NSF wanted the scientist to already show some results, which was very difficult for a beginner. So I got bits and pieces of money from the Academic Senate. In addition, there was a research laboratory of Chevron in La Habra and they were interested. To support my research, they gave me \$5,000 to \$10,000 yearly for several years. Once we started to get some results, I started to get funding from NSF. So, it was a build-up situation, and eventually I received funds for a mass spect.⁶ but, it was a slow process. Eventually I got a volunteer in my lab and she is still my lab assistant today.⁷ She really wanted to work with me. She did her undergraduate work at San Diego State. I didn't have any money, so she volunteered and that was great. Eventually, once I got money, I hired her, and so she has stayed with me ever since.

Harkewicz: You must have had an incredible vision for yourself or drive that you could put up with this empty lab, and no money, and work your way up?

Kastner: Yes. I just had to build myself up. I'm trying to tell the women students of today how it was and that they're very spoiled today. Women have special grants at NSF, they receive a considerable amount of startup money, but some still complain. [*Laugh*] I think the women of today receive a golden carpet, which is really helpful to their career, but they should realize it wasn't always like that.

Harkewicz: Well I noticed that you have worked out programs where several female teachers and undergraduate students have gone on shipboard trips and things like that? Do

⁶ Mass spectrometer.

⁷ Gretchen Robertson (1951 -), staff research associate, SIO.

you feel a certain obligation, so to speak, to bring more women out to sea or to get teachers physically involved?

Kastner: Well, I don't specifically get women out there. I think our obligation is to teach the young bright students regardless of gender. In my career I had about the same number of male and female Ph.D. students. I didn't want to have any preference one way or the other. Interestingly, of my first two, one was a woman and one was a man. As for seagoing, for undergraduates to have the opportunity to join an expedition and experience hands-on what's going on at sea is exciting and they see how research is being done. It gives them an experience they're going to remember all their life. The UCSD and Scripps students are fantastic students and, at sea, they help you a lot, they work very hard, they are like troopers. I love to work with and teach young students, especially with the very bright ones. They are our future.

Harkewicz: It's not a gender related thing?

Kastner: It's not gender related.

Harkewicz: Okay.

Kastner: No. And, actually, as a woman, I know if I easily recognize a woman who is not taking her professional opportunities as seriously as she should, women that expect special treatment because of their gender, I just tell her that's not the case. She should just take off. [*Laugh*] Because women like that are a detriment to the future of all women.

Harkewicz: Okay. I can see what you're saying. You said that when you first came here, the women that you encountered in America had strange social habits . . .

Kastner: I said philosophies.

Harkewicz: Philosophies? I see. But, did you do any socializing with Scripps faculty or their wives, or other people when you first . . .

Kastner: Socially, Scripps is not a very intimate place. Some, however, may feel differently. My husband and I felt that some social life is important so we invited people more often to our home than we were invited, which was okay with us because we enjoyed the dinner parties to our home.

Harkewicz: When you came here did they still have the meetings where everybody from different divisions would all congregate together and learn what was going on in each others' groups, or was that already beyond that time period when you got here.

Kastner: What meeting?

Harkewicz: Well, I know that some of the older faculty, or the people that were here in the forties and fifties talked about how there was a time when Scripps was small enough that people from all the divisions got together and they knew what was going on throughout the whole institution.

Kastner: No. But, at faculty meetings, all the professors from all the disciplines meet.

Harkewicz: How has your job changed over the years that you've been here?

Kastner: Changed? I wouldn't say it has changed. I don't understand the question. You have more responsibilities. You have more students. There are bigger labs. But, I mean as a whole I don't see how—I don't understand exactly the question.⁸

Harkewicz: Well, you came here with very little support. Is it easier to get support now that you've established yourself?

Kastner: From Scripps? No. I get support from outside but not from Scripps.

Harkewicz: Is that unusual? I mean, do you find . . .

Kastner: I know some people who got more support. I didn't get very much financial support from Scripps for research, but once in a while I got some matching funds, depending on the director. Presently, however, you can't get much because of the financial situation. I would say that I still feel surprised about the little support I received from Scripps for my students despite the fact that I had a relatively large number of students, more than many others colleagues. For some reason some of my colleagues, who had a maximum of one student at a time once in a while received more student support as student fellowships for several years such as and ARCS fellowships,⁹ which my students never received. I never understood why. For example, a high-level full professor, who probably had maybe two or three students in his career and one of his students got such a fellowship. Maybe because *he is a he and I am a she*.

Harkewicz: Do you feel like it was because you were a woman?

Kastner: I don't know. I just see men colleagues getting it, but, maybe the young women receive it as well now. I really don't know. It seems logical that someone that supports more students should get a bit more recognition. But, I really don't know how such decisions are being made.

Harkewicz: Did you ever get so frustrated that you wanted to go elsewhere?

⁸ Kastner later added, "Scripps has grown but the faculty still meets together when needed."

⁹ ARCS (Achievement Rewards for College Students) are provided by the ARCS Foundation, Inc., a national women's organization that provides graduate scholarship support for students in the natural sciences, medicine, and engineering.

Kastner: No. I mean, well, the problem is when people move up in the oceanographic institutions there's no place to go. That's why you don't see people here going elsewhere. Some go to other places, you do see people moving, but where do you move to?¹⁰

Harkewicz: So, do you have any regrets that you got involved in oceanography?

Kastner: No. I enjoy every minute of it. Why should I have regrets? Support for students from Scripps is a detail. It doesn't affect my research or my life. So, why should I have regrets?

Harkewicz: Okay.

Kastner: What is important is the total independence researchers have at Scripps and the facilities available. The recognition of women at Scripps is pitiful. At present, there are no women in leading positions at Scripps, which is unfortunate. Several years ago I was chair of GRD.¹¹ Some, one or two members, old guardians, resented having a woman as a chair at that stage, but how many of the division chairs at SIO today are women? When I was GRD chair, at the weekly meetings we had in the director's office, besides myself, the only other women in the room were secretaries. Presently, only about fifteen percent of faculty are women. And, so I wonder if a woman could become the director of Scripps sometime in the future, I don't know. [*Laugh*] I'm saying that the reality here is that women are not in the leadership.

Harkewicz: How did you get that division head chairmanship?

Kastner: Well, within the division people decide who shall be the next chair. And, even if you have one or two conservative colleagues, they don't carry all the weight. Why I was chosen, I don't know.

Harkewicz: So, did you notice a difference within your division yourself and the greater Scripps?

Kastner: I don't understand the question.

Harkewicz: Did you still feel . . .

Kastner: When I look at Scripps I'm surprised they have only fifteen percent of women on faculty. We have more than fifty percent women working here now, but, I just don't see them in leadership positions.

¹⁰ Kastner later clarified, "I love working at Scripps. Professionally, there's no better place to go and women don't fare better elsewhere."

¹¹ Geosciences Research Division.

Harkewicz: Do you think that's by their own choice?

Kastner: I don't know. I really don't. Maybe. I do see that the young women are less willing to serve on committees than we used to be. We, early on, did more than our share as committee members in order to advance women. The younger faculty members don't feel the need to do the same because they think things are okay today, maybe because they received the start-up funds. They also receive special awards from NSF. We worked hard to help the future generations but many of the present young generation is less willing to help to further improve the professional status of women. The Committee on Committees on Committees on the upper campus Academic Senate is a particularly important committee for women to serve on.

Harkewicz: Committee on Committees?

Kastner: Yes. The Committee decides who's going to serve on which committees. I was on that too. And, I decided that two women from Scripps should be on various committees—at that time there was fewer women then we have now and you served for three years. But recently, when I looked at the results, I didn't see women serving, and I was very surprised. So I asked, "How come Scripps has no women on its Academic Senate's Committee? There always used to be and they were asked to be on it." And I was told, "Because some of the young women said that they don't want to serve." So, they thought that no women wanted to serve.

Harkewicz: Hmm.

Kastner: Which was very interesting, very revealing to me. I think that Guy Masters¹² who was on the Committee for Committees when I was told that most young female faculty members don't want to serve on Academic Senate committees.

Harkewicz: So then the problem isn't just with the institution?

Kastner: No.

Harkewicz: It's with women themselves not wanting to?

Kastner: Yes, to some extent. I still think that, in such cases, if they are invited, appointed, than they may serve. But, if you don't even invite them to serve . . .

Harkewicz: Yes. I understand.

Kastner: You know. So, at this stage it's up to you to be proactive. That's what Guy Masters told me. I actually heard the same thing from John Faulkner.¹³

¹² Thomas Guy Masters (1954 -), professor of geophysics at SIO.

¹³ David John Faulkner (1942 – 2002), professor of marine chemistry at SIO.

- Harkewicz:** Did your comments have any effect then? Did anything change after you said that?
- Kastner:** I don't know. At Scripps, much of it depends on the director. It depends on the director and what the atmosphere at Scripps is, and it certainly has changed since I first came here. I came when Nierenberg was director. Then we had Frieman as director.¹⁴ So, we'll see who the next one is. The whole atmosphere has changed. It depends very much on the top administration. At one time, I went to Charlie Kennel,¹⁵ when I was no longer the chair of GRD and no longer the SIO faculty chair, and I saw that all the leading positions at SIO were occupied by men. I went to Charlie and asked him "Charlie, how do you feel about getting, once a week, together with all the SIO heads of Division and other administrative positions and all the people in the room are men? I mean, it's a huge institution. There are women. How do you feel about it?" And his response was that he did not pay attention to it. And that was it. So, I think it depends on who the director is.
- Harkewicz:** So, that's how the institution is run but how do you think that affects your research personally?
- Kastner:** It doesn't affect it.
- Harkewicz:** It doesn't?
- Kastner:** No. How should it affect it? At Scripps we are very independent.
- Harkewicz:** Okay.
- Kastner:** No.
- Harkewicz:** Well, I guess that's good.
- Kastner:** No, we are very independent. I mean, how should it affect it? It would be nice to get student support like others get. But, it doesn't really affect our research. The research depends basically on outside funds.
- Harkewicz:** I know you've been involved in teaching students beyond research work. And, in the past, Scripps has had problems with reaching a good balance between research and instruction, do you feel like there's a good balance now or do you feel like there's been a balance throughout your career?
- Kastner:** More people are teaching undergraduates now than they used to, but, some still don't. It depends on the individual. Yes, I always felt that we should teach more

¹⁴ William Aaron Nierenberg (1919 – 2000), SIO director 1965 – 1986; Edward Allan Frieman (1926 -), SIO director 1986 – 1998.

¹⁵ Charles Frederick Kennel (1939 -), SIO director 1998 – 2006.

undergraduates, but we should not have to do too much of it because we have other obligations that other departments at UCSD don't have. Our students on the upper campus are very bright and it is a pleasure to teach them. Some of them end up working in my laboratory and some get to go with me to sea. I just feel that interacting with bright young people is just wonderful. We are professors. We are here to both profess and to do research and we are not required to teach too much. To teach one undergraduate course per year is not too much—but some just don't do it. It's their choice. At Scripps, individuals are very used to doing what they want to do. Some have very few Ph.D. students, and some have more. So, it varied a lot. I think in the future everyone will have to teach one course because there's now a new rule that everybody has to teach one course. I wasn't too supportive of having this requirement because if someone doesn't want to teach and they teach a lousy course I don't think anybody gains. The administration wanted to have it on the books just to look good vis-à-vis the upper campus. From an educational point of view, it isn't the best idea.

Harkewicz: Okay.

Kastner: Yeah. So.

Harkewicz: Did you get involved in the Deep Sea Drilling Project when you first came here?

Kastner: Not immediately. Deep Sea Drilling was at Scripps at that stage. I don't remember in what year I got involved. I got involved at a certain stage because if you wanted to have sediments from the ocean which are older than just a few thousands of years, you have to go deeper down, and the only way you can get it is through the Ocean Drilling Program. The deeper and older sediments provide information on the history¹⁶ and the whole field of paleoceanography developed because of the Drilling Program. And, in the beginning, when I first came here it was still at Scripps, the Deep Sea Drilling Program.¹⁷ So, more of us were involved. So, I became involved and I then eventually went out to sea quite a lot and served on committees and panels and even chaired a panel and served on the planning committee.

Harkewicz: When did you go out on your first cruise?

Kastner: It was Leg 64. It was to the Gulf of Mexico. It was a hydrothermal leg. I don't remember the year.¹⁸

Harkewicz: But, I thought you came here in 1972, is that incorrect?

¹⁶ Kastner later clarified, "...the history of the ocean-atmosphere-lithosphere interactions."

¹⁷ Although scientists from SIO still participate in the Deep Sea Drilling Project [DSDP], it now operates out of Texas A&M University.

¹⁸ Kastner's response to this question sounded like, and was originally transcribed as, "like '64'" as in a year rather than what she actually said, which was "leg 64." The misinterpretation of a year prompted the subsequent question regarding clarification of the year that Kastner arrived at Scripps. The Deep Sea Drilling Project began in 1968. Leg 64 from Mazatlan, Mexico to Long Beach, California took place from December 1, 1978 to January 10, 1979.

Kastner: At the end of '72.

Harkewicz: So, were you with Scripps at the time when you were . . .

Kastner: Yes. I was here. But, I don't know when Leg 64 went out. It was after that. I was actually involved in this cruise both in serving to decide where to drill as well as going out on the ship.

Harkewicz: What was that like then for . . .

Kastner: Oh, it was fascinating. It was the *GLOMAR Challenger*.¹⁹ It was a smaller ship than the present drill ship. It was very nice and exciting. The drill ship is like a floating university. On these expeditions, as a young scientist, it is exciting to see how much is achieved in such a short time. So much is being done in a short time because you have experts from different fields on board. After the cores come up, each describes the preliminary observations, which puts the preliminary story together very quickly. It was a very exciting experience.

Harkewicz: I know that the drilling ships operated twenty-four hours a day, seven days a week. Were you involved in that kind of a situation?

Kastner: Yes.

Harkewicz: Did you go out for any long extended period of time?

Kastner: The first time I was out for just one month because it was a leg which was divided into two parts with different objectives. The latter legs were two months long.

Harkewicz: How did you feel about doing that?

Kastner: It's fine. While at sea, you're so busy and you're excited about what you are doing therefore the time passes quickly.

Harkewicz: Do you feel like it affected your personal life at all?

Kastner: No, it didn't affect my personal life. It was busy all the time. How would it affect your personal life?

¹⁹ The *Glomar Challenger* was the first research vessel specifically designed for drilling into, and taking core samples from, the deep ocean floor. The ship was designed by the National Science Foundation and The Regents of the University of California and operated by the Global Marine Drilling Company. The ship's name is both a tribute to the British oceanographic survey vessel, the HMS *Challenger* (1872 – 1876), and a recognition of its operating company— Glomar as in GLObal MARine. The *Glomar Challenger's* first expedition was a year-long scientific cruise that started in August 1968 and criss-crossed the Mid-Atlantic Ridge between South America and Africa as part of the Deep Sea Drilling Program. It was taken out of active duty in 1983 and later scrapped. Its successor, the *JOIDES Resolution*, was launched in 1983.

Harkewicz: Well, I know some people that had families and that it put some extra strain on their relationships.

Kastner: Well, my husband didn't particularly like it. [*Laugh*] Well, I called him from the ship. We didn't have email but we could call, so, we were in touch. I think men don't like their spouses to go out for such a long time but I think that by being away for an extended time they later appreciate their spouses more. [*Laugh*]

Harkewicz: I guess I have to agree with that.

Kastner: I think so. I mean, they don't like it, but they learn to live with it.

Harkewicz: Your husband was involved in science, wasn't he?

Kastner: Yes. Yeah. Yeah. He was a scientist.²⁰

Harkewicz: Did he go out on . . .

Kastner: Not on the ship. He was a land geologist. We divided the Earth.

Harkewicz: You took this and he took that?

Kastner: Yeah. [*Laugh*]

Harkewicz: That sounds good. I know that sometimes you can get information from the Deep Sea Drilling Project, or the Ocean Drilling Project, about energy sources and things along that line, and I was wondering how you felt about the tension between applied science and basic science?

Kastner: I don't think there was any tension on the Drilling Project. I mean, even when we got involved with methane hydrates, the drilling did not emphasize the applied aspects. We were trying to pursue the basic science questions. How does it occur? How much of it is there? How does someone find it? What's its stability? How is it distributed? But, you're not doing the applied science. So, I didn't see any tension.

Harkewicz: You have no concerns about someone, say, if they could mine these methane hydrates but, there's environmental issues²¹ that arise from that, you don't see that as anything that you can really worry about, so to speak?

²⁰ Yaacov Bentor (1910 – 2002), research geologist. Bentor was one of the world's experts on the geology of the Middle East. He retired from Hebrew University in Jerusalem in 1977 and was associated with Scripps after that time.

²¹ According to an on-line article about methane hydrates and their potential use as an energy source, mining these sources pose the possibility of encountering several environmental hazards. For instance, as the hydrate layers give up their methane, the layers could crack allowing crude oil deposits that lay beneath them to seep to the surface and contaminate beaches. In addition, there is the potential for offshore landslides that may pose a hazard to beach

Kastner: I don't understand. It is a potential energy, and it is a clean energy. If a scientist should find that indeed marine gas hydrate is distributed in a way that it could be mined, if done safely, that would be great because it will have many positive outcomes. First of all, it's a cleaner energy than coal, much cleaner. So, that is much, much better. The second point is, that if we don't utilize it, global warming will eventually cause its decomposition with some negative effects on the ocean chemistry. I don't think much of it will ever reach the atmosphere but, depending on the rate of dissociation, it may have some effect on the ocean chemistry. And thirdly, if it will turn out to be an energy source, because it does occur in continental margins, the political distribution of energy is going to shift away from the Middle East, which will be a fantastic outcome.

Harkewicz: Well, that brings up a question that I've talked with some people about too, which is the political aspects of science or scientific discoveries, have you run into any experiences where politics is . . .

Kastner: I haven't run into it, however, politics and science are unfortunately deeply intertwined. Some of the politics in science is imposed by the scientists themselves. I don't appreciate the present atmosphere in science and politics and how the science funding situation has changed for the worse. In the present funding climate, quite often the best science is not funded but third and fourth-rate science is funded. Certain projects, like the Drilling Program need to have some earmarked funds because it involves operating an expensive ship. It is also an international program. But many of the other earmarked projects were developed by politically inclined pressure groups and these should be abolished. I see third and fourth rate scientists in some of these programs and they are taking away money from first-rate scientists that are not involved in the earmarked programs. The scientific community was told by NSF that by supporting the new initiatives new money will be provided to NSF, and that these programs will not be affecting the core programs but this is incorrect. Today science is prostitution. Scientists write proposals because they know there's money available. So, sometimes a scientist happens to write a proposal because she likes this kind of science. She would have written it anyway. But, let's assume that your science is different and you're just simply writing a proposal because you know there's money there. You would never write a proposal otherwise in this field. So, people are being directed by administrators and by power groups in a way which is very unhealthy, and the students. . . .##

Harkewicz: ## So you were talking about students getting funding?

Kastner: Many students begin their career by attaching themselves to big projects, they are beginning their career without thinking about original projects. Certain science has to be done in that way, but this does not apply to all the science that is being done that way today. So, the whole atmosphere is political. Some of it is imposed by politics in Washington, and some of it is imposed by the politics the scientists impose on themselves. So, there are two types of politics that we have there.

Harkewicz: Can you explain this politics that scientists impose on themselves?

Kastner: Scientists sometimes create a power group in order to get funding. The driving force is that they decide that not enough money is being directed into a certain topic therefore, they begin to develop a big science project. They first convince a funding agency that it is a very important science and then they publicize it through workshops where many scientists will sign on to the project. These days, it is essential to link a new proposal to one of the big projects in order to get funded.

Harkewicz: So, that's where you're going with that whole prostitution idea sort of?

Kastner: Absolutely.

Harkewicz: Have you ever had to do that where you wrote something just to get funding?

Kastner: I am guilty in the respect that I helped to develop one of them—the MARGINS program.²² I was one of the initiators of this program and we were very successful. I feel bad about it but we couldn't do our science otherwise. We were just dwindling. It's bad. So, I didn't prostitute myself in that respect because I was already working on this topic. But, I don't know about what others do.

Harkewicz: I see.

Kastner: When we developed the MARGINS program, we had only two subtopics, and now there are four others trying to join to be associated with it in order to get

²² The MARGINS program is a research initiative supported by the National Science Foundation to promote research strategies that redirect traditional approaches to continental margin studies. Continental margins are the location of the greatest population density as well as the Earth's principal site for producing hydrocarbon and metal resources and the loci for earthquakes, landslides, and hazards related to climate and volcanoes; yet little is known about the scientific processes that govern the margin areas. The MARGINS program seeks to understand the complex interactions of the processes that affect continental margin evolution through intense multidisciplinary programs of research involving an ongoing dialogue between field work, laboratory analysis, and computer simulation of these processes. In June 1997, MARGINS began a series of workshops at which site selection and experiment development were discussed in a forum open to the scientific community. Kastner was involved with the first workshop through the SEIZE (Seismogenic Zone Experiment) community. SEIZE is interested in the mechanics of seismic and aseismic megathrusts in subduction zones, which produce the largest and potentially most damaging earthquakes and tsunamis.

funding and one of the subtopic is very weak. I don't think it should be part of the program but it succeeded in getting in there.

Harkewicz: So, you think the problem is big science then? There's things that are just getting too big for . . .

Kastner: Some science has to be very big. If you work in margins, that you're geophysically surveying,²³ it costs multimillions of dollars to do that.

Harkewicz: So, where do you think this problem came from? Can you venture a guess?

Kastner: It came from—I am not certain. I think the research money available has not increased as fast as the number of scientists asking for money. In addition, each project became more expensive with time. We educate a lot of students and then, naturally, they compete with us, and Washington did not keep up with increasing NSF funding like NASA or NIH²⁴ did.²⁵ So, it has become very tight, especially in oceanography, which is unusual because of its dependence on soft science researchers, which in other fields you don't have. These soft scientists are draining the budgets of NSF because if a soft scientist sends in a proposal for the same science a hard money scientist sends in a proposal for, it costs twice as much for the soft scientist because his proposal includes his salary in the overhead. So, the pressure in oceanography has become intense, and as I said, money did not increase as much as the number of people requesting it. The lack of enough money for everyone caused tension in the community and some groups decided to bypass this tension and developed a power group. In addition, developing power groups gave the program directors more power. Before that they were just handling our proposals and panels, and now they're in charge.

Harkewicz: The program directors at NSF?

Kastner: At NSF. They are much more in charge now in what's going on and they're telling us what to do. In the past we told them what to do and now they're telling us what to do.

Harkewicz: And ultimately science suffers, doesn't it?

Kastner: Yeah. Absolutely. Some basic science is disappearing and it's not a very healthy situation. So, they're spending more and more money on science. I'm not certain we are getting better science. But science, especially oceanography, is very expensive and that is one reason why the budget increases did not keep pace with the costs. The question of how many students shall we educate in oceanography

²³ Kastner later added, “for example, doing a 3D geophysical survey.”

²⁴ National Aeronautic and Space Administration; National Institutes of Health.

²⁵ Kastner later noted that the NSF is the “main source of funds for basic science.” And funding competition has become more intense in oceanography, specifically, because in recent “years the Navy cut its funding for oceanography.”

is a very interesting philosophical question. How many scientists does a certain field need? Because if you look at it, it's an exponential growth. Is it necessary? Certainly, you try to do more and learn more and it's exciting. But, what can society absorb? Is that because we're growing in an exponential way? It's like the growth of population. If you don't control it it'll get out of hand but we don't control the population. And, should we? That's a question that no one wants to discuss.

Harkewicz: Yes. It's almost like population control. Nobody wants to talk about that either.

Kastner: It's not liked. Each one of us is producing more than two students. [Laugh] And if we are producing ten students almost like the population growth is in India, is in all these countries, and it causes problems. So, these are things that the community has to discuss but doesn't want to discuss.

Harkewicz: Well, let me ask you this though too because . . .

Kastner: You're going in a direction that you probably didn't expect?

Harkewicz: Yes. Well, not really. But, this sort of goes along—because I was interested to read that you, in 1993 and 1994, toured with a panel of scholars chosen by Phi Beta Kappa to go around the country and you talked to different people. You talked to university students, and—well, I have a couple different ways I want to—let's go one way because we're talking about limiting. I know that you've talked to university students and I know, in that case, it was about supporting careers, or that you emphasized or made reference to supporting careers like law and international relations, and environmental policy, supporting to oceanography?

Kastner: Not really. It was called the *Distinguished Lecturer Series* and the objective was to expose active scientists that were working on significant projects to college students. They sent us to different colleges that had very strong Phi Beta Kappa chapters and we just gave lectures and met with students. I had to choose a topic or two lecture topics and during the visits I met with students before and after the lectures. This was one good way to expose college students to new topics. At some colleges, the students were still not exposed to global change problems, for example.

Harkewicz: But, was there a point where you felt that information or knowledge of oceanography could be helpful in other career choices? Is that one of the things that you talked about or discussed?

Kastner: I talked about how to get involved in the earth sciences and oceanography, what people can do with the knowledge they acquire in college in the field besides becoming teachers and professors. We talked about the breadth of the field because it's not known to them. From archaeology to forensic work with lawyers,

or police. Because when people think about earth sciences, basic sciences, and chemistry, and oceanography they think in a certain direction. They just don't see how broad the applications are.

Harkewicz: So, that wasn't strictly an oceanography-type emphasis? It was more like earth sciences and how it can be applied to a lot of other . . . ?

Kastner: And geochemistry or science and oceanography.

Harkewicz: Okay. So, then I also know that you've talked to elementary school students and Rotary Clubs and things like that about oceanography, or the earth sciences, too, I suppose. What were your goals in that? I mean, we were just talking a minute ago about how oceanography's gotten probably too big for itself. So . . .

Kastner: Maybe it's great [that oceanography is getting bigger] because of the importance of the ocean and that's a frontier of science. Maybe it should be even bigger. But, if it should grow further, up to a certain level, then we will need to influence many of the legislators in Washington to support us better. The support we have at NSF is small and, apparently, we're not doing our public relations properly. I think we are to blame. We didn't do our public relations properly because other agencies like NIH and NASA have grown much more than we have. We are very small compared to them. Oceanography is an expensive field and we need much more financial support. The funding has not grown with the growth of the population of scientists.

Harkewicz: So, when you go out to these clubs or elementary schools, are you trying to do your public relations then for oceanography?

Kastner: Yes. I'm trying to do public relations. Some of them may become legislators later on. [*Laugh*] Definitely I am trying to tell them how important the field is. Because our future on Earth is the ocean. So, yes, I do public relations because I never know whom I'll capture. Today the public is really more aware about global changes than they were before. And once the public is aware, the legislators may be the next ones to pay more attention to it. It is an educational process and this field is not being taught in schools yet. And, as you know public money comes based on public support. So, we need to do more outreach.

Harkewicz: I see. A number of the interviewees I've spoken to have had similar viewings, like it's gotten too big for . . .

Kastner: For what is available.

Harkewicz: Exactly.

- Kastner:** Once more breathing space becomes available, people will not be at the throat of each other, new power groups will not develop, hopefully. But, when giving public lectures, you never know who will be captured.
- Harkewicz:** Have you gotten any feedback, good or bad, from colleagues about going out and doing these outreach type things?
- Kastner:** Yes, most, they love it but it takes a lot of time, a lot of effort. You have to travel. You have to prepare, therefore many scientists don't want to do it.
- Harkewicz:** But, I mean from your colleagues have they have had any . . .
- Kastner:** Scripps doesn't get involved in what we are doing—the scientists at Scripps decide what to do and that is great..
- Harkewicz:** Then, I guess, that's your take on the whole thing. As long as you can get the money to fund what you want to do you can do whatever you want?
- Kastner:** Scripps is socially a rather cold place. At least, that's the way I feel.
- Harkewicz:** Does that bother you in any way?
- Kastner:** It does bothers me sometimes. I felt it very strongly when my husband was ill before he passed away. No one from Scripps really cared.
- Harkewicz:** Really?
- Kastner:** Yes.
- Harkewicz:** That's unfortunate.
- Kastner:** Yeah.
- Harkewicz:** Do feel like you were singled out in any of this or do you think it's just the way they always do things?
- Kastner:** I don't think so. These are situations that are very private, but you expect someone to at least show some sympathy.
- Harkewicz:** I'm sorry to hear that. Is it any different at UCSD?
- Kastner:** I don't know. I don't know. It may have to do with the, with the size of Scripps, that it's less personal. It may have to do with some financial stress.
- Harkewicz:** Hmm.

- Kastner:** But, but I don't know. I cannot speak for other departments at UCSD.
- Harkewicz:** So, despite all your years here and all the things you've done, if you didn't get funding tomorrow, you feel like they would push you out the door?
- Kastner:** I don't know, possibly.
- Harkewicz:** That's rather discouraging.
- Kastner:** That's the way I feel, at least.²⁶
- Harkewicz:** I had a question here about some of your research that I was reading about in an article you had in *Science*, and, I wondered how you use this information about seawater sulfur deposited in ocean floor sediments to construct models about climate change?
- Kastner:** We don't construct models. We acquired the data and interpreted them. I don't know if it was published in *Science*.²⁷ There were actually two parts to it. We provided, for the first time, a high resolution sulfur isotope seawater sulfate record which was intensive labor, and we discussed the coupling between the exogenic sulfur, carbon, and oxygen cycles, and therefore a central component of the Earth's biogeochemistry. Because we are not modelers, others then used our data for modeling. I've never received so much positive feedback on a project as for that one via emails, telephone calls, letters, from world leaders and others, congratulating us on these records.
- Harkewicz:** Do you think it was important because of what you were able to demonstrate with your research or because other people could use it predictively for the future?
- Kastner:** Both. First of all, it was important to obtain and show the record. That made data available for others to model. Such records have a major impact on the science of chemical oceanography. I'll give you an example. In 1982, when the first strontium isotope curve of the ocean was published, it was a bombshell. Although it was just a record, it provided new insights on the history of weathering on Earth. Suddenly you saw the ocean atmosphere system working in different ways than you thought. Another example is the famous Dave Keeling's record²⁸ on the CO₂ in the atmosphere—that was a bombshell as well. If it's a good record, mean that the data are of high quality. That is something that stands forever and is going to be interpreted and reinterpreted and reinterpreted.

²⁶ Kastner later added: "I am hoping that a new director may change the atmosphere because, except for the social atmosphere, I love Scripps."

²⁷ Adina Paytan, Miriam Kastner, Douglas Campbell, Mark H. Thieme, "Seawater Sulfur Isotope Fluctuations in the Cretaceous." *Science* 304 (11 June 2004): 1663 – 1665.

²⁸ Charles David Keeling (1928 – 2005), Scripps geochemist. "Keeling's curve" showing carbon dioxide concentration vs. month and year has become an icon of climate change science.

Harkewicz: Did you get that data through the Deep Sea Drilling or Ocean Drilling Project? Was that involved with it?

Kastner: We had to analyze samples that were obtained from Deep Sea Drilling and Ocean Drilling programs. We published the data in two papers in *Science*. The first part was the record from the present to sixty-five million years ago to the K/T boundary where the dinosaurs became extinct.²⁹ And the second was extended to about 130 million years ago.³⁰ Without a drilling program, it is impossible to get continuous sediment records years.

Harkewicz: Do you personally feel like they are excited about what you got because of what you actually got at that moment or because of all the other things that could come from that kind of knowledge?

Kastner: I think both, in particular because of the cleanliness and the beauty of this record. It took a lot of work to get it. We struggled with how to a high resolution, “clean” record. It was hard, intensive laboring. But, it was just absolutely an amazing record to see and it was very satisfying. There were applications jumping out at us suddenly once we had such a thing. When once you see a sixty-five million year record, you see something that you really didn't anticipate.

Harkewicz: Those terms, "cleanliness" and "simplicity" or "beauty" are often used by scientists.

Kastner: Yes. Some data, depending on different labs and so forth, are not as precise. There is too much noise in there.

Harkewicz: I see.

Kastner: Then, the interpretation is not as clean. But, this was high resolution, high quality data from three different oceans, in each from three different locations, so that data points just fall on top of each other, you know, almost a straight line. Such data are most reliable, real, paleo-chemical records. “Clean” is not a precise word—precise and accurate from a scientific point of view—scientists use the terms “precision” and “accuracy.” So, “clean” is incorrect. “Clean” is a household term. [*Laugh*] The precision and accuracy with this data was great. And we knew we had data that was not affected by local processes, for example. Such data are beautiful, I mean, science is aesthetically beautiful, like music is beautiful. There are lots of similarities between science, music, and art. The composition of a painting, or the composition of music, can be put together in such a way that it's just beautiful. The same is true for science. Therefore, I can use the term, “beautiful.”

²⁹ Adina Paytan, Miriam Kastner, Douglas Campbell, Mark H. Thiemens, “Sulfur Isotopic Composition of Cenozoic Seawater Sulfate.” *Science* 282 (20 November 1998): 1459 – 1462.

³⁰ See note #27.

- Harkewicz:** But we know that *putting together* is kind of key, I think. I mean, we know that you don't really discover it is true but that, as a scientist, you have to do something in order to put those things together, to make them?
- Kastner:** Yes. It takes a lot of work.
- Harkewicz:** Right. So what kind of things did you have to do in order to . . .
- Kastner:** We had to, first, have an idea which certain mineral has a potential to reliably record the chemical history of seawater. Then, we first had to test and prove that this mineral is really recording seawater chemistry, and that is a long process. It took about a year or two just to prove that. And then, once we proved that, we had to develop a method to separate the mineral from the rest of the oceanic sediment. Then the mineral had to be analyzed for sulfur isotope ratios, which is a very labor intensive analysis done in duplicates and triplicates. So, it is a very long process. To acquire all these data it took almost two years.
- Harkewicz:** This was after you had collected the samples?
- Kastner:** Yes.
- Harkewicz:** Well, I think sometimes lay people think that you just come upon something.
- Kastner:** Yes. As if the process is easy. That's not the case. The sample preparation is time consuming and has to be done carefully. We published several *Science* and *Nature* papers on barite, this mineral because it was such a high profile project.³¹
- Harkewicz:** I see.
- Kastner:** And, once you go beyond that stage, you move to different components and so forth. And obvious one to move to. It was the fruition of a project of at least four years of research.
- Harkewicz:** So, this kind of choosing resolution and learning how to separate things, that's got to be something that you learn over years of experience? Right?
- Kastner:** Yes.
- Harkewicz:** Do you teach the protocol to others?
- Kastner:** You develop the protocols and you teach your students the protocol, yes. Then you publish it. Sometimes you don't have to develop protocols and you can use protocols from the literature. Protocol development is a very time consuming thing. Because you may have to change or modify— it's not something that just happens immediately. It's a development thing. And every step has to be tested

³¹ Kastner later added that this mineral, barite, was “a new proxy for chemical paleoceanographic studies.”

and verified. But you don't always have to do that. It depends on the project. Sometimes you can use established protocols.

Harkewicz: I see.

Kastner: And then you publish it and others are using it.

Harkewicz: Right.

Kastner: Yes.

Harkewicz: What do you think has been the biggest change in science in your time as a scientist?

Kastner: It is not just one thing but a combination, and some of us were aware of it earlier but to most it was a new concept—the recognition that the Earth functions as a system. It was very obvious to some of us a long time ago. Also, over the past thirty years, the field of paleoceanography evolved into an important, almost new field with an important off-shoot in chemical paleoceanography. In other words, understanding the history of seawater chemistry by using multiple proxies. The Drilling Project was essential for both developments. More recently, the ice cores studies. The first publication from the ice cores showed the changes in CO₂ and methane in the atmosphere at the last glacial/interglacial period was a real breakthrough—a major impact on peoples' thinking on ocean-atmosphere processes in terms of short timescales versus long timescales. It was always thought in geology we have a lot of time and suddenly we realized that things can happen very quickly.

Harkewicz: So, that's why it's important to global climate change?

Kastner: Yes, the whole climate change situation. As I said, the Drilling Program and paleoceanography, chemical paleoceanography, and the ice core records—these were the main things. In addition, recent high quality atmospheric chemistry data such as the CO₂ Keeling data has shown that all these data are related to each other. So they those were the main impacts as I see it.

Harkewicz: But, that kind of stuff still probably hasn't gotten out into the public sphere, has it?

Kastner: I think much of it has. I think the *Keeling Curve*, which is rather recent, has become a classical diagram in textbooks. I hope so. The public is aware of global change despite the fact that some politicians claim it doesn't exist for political reasons. I think the public is much more aware today than it used to be. Outreach has improved, but I think we have a long way to go. It still has to improve. We need better public education so that we may receive more funding from Washington for this kind of research.

Harkewicz: Do you think the future of oceanography is in climate change and things like that?

Kastner: Not just that. There are other important fields, with high relevance to society, research on earthquakes, tsunamis, biology, food in the ocean, and others. It is not just global change. I think our future on Earth depends on the availability of various resources, in particular energy resources. So, it certainly isn't just climate change.

Harkewicz: You think it's important to have that public dimension? I mean, a public application somehow or other? I'm back into my basic science/applied science thinking again.

Kastner: When you don't advance basic science, you don't advance applied science. The idea that applied science could move on without basic science is very wrong. This is something that scientists must better explain to the public.

Harkewicz: Okay.

Kastner: It has to be explained to the public again, and again, and again!!! Unfortunately, even some educated and intelligent people in the public don't understand the difference between the two of them and why basic science research is so extremely important. I was just in Washington last week and I had lunch with someone who is working at Brookhaven Institute.³² He's a highly educated person and when we talked about basic and applied science and he told me "I don't know what the difference is." I was amazed.

Harkewicz: Hmm.

Kastner: Okay?

Harkewicz: Yes.

Kastner: Clearly, there are some things that are not as obvious to people as one might think and, if educated people don't understand it, it is not surprising that some of the legislators don't understand it, as well.

Harkewicz: Right. So how would you describe the difference then? I mean to you is it just taking basic science and applying it to other issues?

Kastner: No, if we don't have the basic information, we can't apply it. I mean, how can you explain to the Washington people about the atom bomb if they don't know that there are some particles in the atom. How do you know how to produce an atom bomb if you don't know what an atom is made up of? Sometimes science is used in a negative way and sometimes in a positive way but you can't stifle basic science because then you're stifling applied science.

³² It is assumed that Kastner is referring to Brookhaven National Laboratory located in Upton, New York.

Harkewicz: I see. Do you have any thoughts about Scripps investing in genomics at all?

Kastner: I don't know. I don't know enough about it and therefore I cannot intelligently comment on it. It's not my field.

Harkewicz: Okay.

Kastner: I have colleagues who do it, but I just know some of it. So. No. No.

Harkewicz: So, I have three final questions for you that I ask everybody, because I'm curious as to how people will respond.

Kastner: Yes.

Harkewicz: And, I always preface it with the fact that we may have sort of discussed this whole thing in the past hour and a half or whatever, but I'm going to ask you the questions anyways. So, what do you think, in your experience, has made Scripps successful?

Kastner: I think that the quality of the scientists, the quality of the students, and the resources that were available and also the freedom the scientists have. Unfortunately, some of these have changed recently. We don't have the resources we used to have. They allowed top scientists to do what they thought was the best, was the most important, and that's how science advances. And Scripps was known for that. Scripps is mostly an observational kind of an institution. It's not into much modeling. We provide high quality observations, which are important. And then Scripps scientists decide "What are the future important observations?" You can observe thousands of things but you have to decide what is important.³³

Harkewicz: The other side of that question, then, is what do you think has threatened Scripps' success?

Kastner: The recent leadership.

Harkewicz: And, do you want to elaborate on that?

Kastner: I don't. The combination of the recent leadership and the dwindling funds are unfortunate developments. ONR³⁴ used to fund us a lot, which is no longer the case; and this has a major impact on the funding at Scripps. The leadership and Navy support has dwindled. Finally, in my opinion, Scripps also made some quality compromises.

³³ Kastner later noted, "We simply don't have the resources we used to have. If this will last for a long time, the consequences for the future may be most unfortunate."

³⁴ Office of Naval Research.

Harkewicz: Quality compromises?

Kastner: I can't elaborate in details.

Harkewicz: Okay.

Kastner: The compromises are a small part of Scripps problems and the funding and leadership issues are the important part of its current problems.

Harkewicz: Okay. I would like to expand on one thing that you said before about the observational quality of Scripps. And I know that now a lot of times people use satellite information to make models. Do you see that as a threat in any way to . .

Kastner: No. I don't see it as a threat. I think it's great. With satellites we can get data that we couldn't get before. Satellite data are one type of data that are being integrated with ship data. Ships are essential because we need to acquire new types of data. Those that are suggesting that we don't need ships any more because of satellites are narrow-minded. That indicates that they don't understand what oceanography is all about.

Harkewicz: Okay. And then my final questions is, what has Scripps meant to you?

Kastner: Oh, a place that I could do high quality research and work with the future generation. Scripps is a wonderful place as a professional base. From the human point of view, Scripps is a very cold place.

Harkewicz: Well, thank you for taking the time to speak with me. It was a pleasure.

Kastner: You are welcome. ##

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