[FY 2008]

Solicitation of plan for establishing COE (for overseas referees)

Institution Name	**Kobe University**	Institution number	14501	Serial number	G-024
1. Applicant (Univ. President)	(Name) NOGAMI, Tomoyuki				
2. Application field Circle appropriate field	F <Medical sciences> G <Mathematics, physics, earth sciences> H <Mechanical, civil engineering, architectural and other fields of engineering> I <Social sciences> J <Interdisciplinary, combined fields, new disciplines>				
3. Program title	**Foundation of International Center for Planetary Science**				
<Research field>, (keywords)	< Earth and Planetary Science (Earth & Planet. Sci.)> **(planets) (planetary systems) (origin) (evolution) (diversity)**				
4. Departments of graduate school Underline the core department	Department of Earth and Planetary Sciences, Graduate School of Science				

5. Program members: Total of 20 members

Name	Affiliated department, position title	Specialized field, Academic degree	Division of roles (In first fiscal year's plan)
(program leader) NAKAGAWA, Yoshitsugu	Department of Earth and Planetary Sciences、Graduate School of Science, Professor	Planetary Science, Ph.D.	Chair of Management Commission, Leader of *Social Interchange Coordination Group (CG)*
TAKEUCHI, Taku	Department of Earth and Planetary Sciences ,Graduate School of Science, Assistant Professor	Astronomy, Ph.D.	Dynamical theory of origin of planetary systems Member of *Infrastructure CG*
AIKAWA, Yuri	Department of Earth and Planetary Sciences , Graduate School of Science, Associate Professor	Astronomy, Ph.D.	Chemical theory of origin of planetary systems Leader of *School Program*
ITOH, Yoichi	Department of Earth and Planetary Sciences , Graduate School of Science, Associate Professor	Astronomy, Ph.D.	Observations of protoplanetary disks and exoplanets Member of *Practical Training Program*
MUKAI, Tadashi	Department of Earth and Planetary Sciences , Graduate School of Science, Professor	Planetary Science, Ph.D.	Experimental study on the origin of planetary systems Leader of *International Cooperation CG*
FUJIMOTO, Masayuki	Center for Planetary Science , Graduate School of Science (Department of Cosmosciences, Hokkaido University), Professor	Astrophysics, Ph.D.	Theory of nucleosynthesis in stars Leader of *Theory and Modeling Group*
KATO, Kiyoshi	Department of Cosmosciences, Hokkaido University, Professor	Nuclear physics, Ph.D.	Theory and data archive of nuclear reactions Member of *International Cooperation CG*
TOMEOKA, Kazushige	Department of Earth and Planetary Sciences , Graduate School of Science, Professor	Planetary Science, Ph.D.	Experimental study of evolution of planetary materials Leader of *Mission and Experiment Group*
NAKAMURA, Akiko, M.	Department of Earth and Planetary Sciences , Graduate School of Science, Associate Professor	Planetary Science, Ph.D.	Experimental study of evolution of planetary materials Leader of *Practical Training Program*
YAMAMOTO, Tetsuo	Center for Planetary Science , Graduate School of Science, (Institute of Low Temperature Science, Hokkaido University) Professor	Planetary Science, Ph.D.	Theory of evolution of planetary materials Leader of *Future Conception CG*
KOUCHI, Akira	Institute of Low Temperature Science, Hokkaido University, Professor	Planetary Science, Ph.D.	Experimental study of evolution of planetary materials Leader of *Education and Research CG*
HAYASHI, Yoshi-Yuki	Department of Earth and Planetary Sciences , Graduate School of Science, Professor	Geophysical Fluid Dynamics, Ph.D.	Theory and simulation of diversity of planetary atmospheres, Leader of *Infrastructure CG*
IWAYAMA, Takahiro	Department of Earth and Planetary Sciences , Graduate School of Science, Associate Professor	Geophysical Fluid Dynamics, Ph.D.	Theory of diversity of planetary atmospheres Member of *Education and Research CG*
HASHIMOTO, George, L.	Organization of Advanced Science and Technology, Assistant Professor	Planetary Science, Ph.D.	Theory and observations of diversity of planetary atmospheres, Member of *School Program*
WATANABE, Shigeto	Department of Cosmosciences, Hokkaido University, Professor	Space Science, Ph.D.	Experimental study of diversity of planetary atmospheres and magnetospheres, Leader of *Exchange Program*
YAMANAKA, Manabu, D.	Department of Earth and Planetary Sciences , Graduate School of Science, Professor	Atmosphere-Hydrosphere Science, Ph.D.	Theory and observations of diversity of planetary Atmospheres and hydrospheres, Member of *Exchange program*
KURAMOTO, Kiyoshi	Department of Cosmosciences, Hokkaido University, Professor	Planetary Science, Ph.D.	Theory of diversity of planetary atmospheres and interiors, Leader of *Educational Program*
OTOFUJI, Yoichiro	Department of Earth and Planetary Sciences , Graduate School of Science, Professor	Geophysics, Ph.D.	Modeling of diversity of planetary interiors Member of *Mission and Experiment Group*
SEAMA, Nobukazu	Department of Earth and Planetary Sciences , Graduate School of Science, Associate Professor	Geophysics, Ph.D.	Experimental study of diversity of planetary interiors Member of *Mission and Experiment Group*
GUNJI, Yukio	Department of Earth and Planetary Sciences , Graduate School of Science, Professor	Theoretical Life Science, Ph.D.	Theory and laboratory simulation on diversity of planets Member of *School Program*

1. Outline of plan for establishing COE
Provide an overall description of your COE-establishment plan.

○ **Background and strategy**

The planetary science group of Kobe University had been accepted as a participating member of the "21st-Century COE Program" (2003–2007), which was a predecessor of the present Global COE program. The program of our group entitled "Origin and Evolution of Planetary Systems" (COEPS) conducted numerous activities such as observations of extra-solar planetary systems and Kuiper-belt objects and theoretical researches associated with the observations, development of the laser altimeter onboard the *Hayabusa* spacecraft and the early analysis of the *Hayabusa* data, laboratory analyses of primordial planetary materials and analogue experiments for resolving their original states, theoretical researches regarding planetary atmospheres, *etc*. Among those diversified activities, our principal strategy had been to avoid mutual non-interference between the individuals of different research methods, but to encourage communications between them to make a crossover approach in our study on the origin and evolution of planetary systems.

The strategy will be retained in the present program focused not only on advancing further in our quest for understanding the origin, evolution, and diversity of the planetary systems but also on their integration and universalization. We will pursue the education and research activities by establishing cooperative relationships with both domestic and foreign scientists, with an aim for constructing an integrated model that provides comprehensive understanding on the origin, evolution and diversity of planetary systems, which shall be called a "pan-planetary system model".

○ **Foundation of the "international education and research center for planetary sciences"**

The main purpose emphasized in this program is the foundation of an organization in Japan which will promote cooperation of education and research activities among planetary scientists belonging to different institutions and will provide a stage where people from various fields of planetary sciences assemble and where knowledge and information are accumulated.

Our plan is to expand the "Center for Planetary Science (CPS)", which was launched at Kobe University under COEPS, to function as a coordination center that has the capacity to oversee project planning and management, information orientation, international cooperation, *etc*. As a coordination center, the CPS will act as a catalyst for personnel trainings and research activities in the community and will function as a platform for a comprehensive understanding of the expanse of planetary science. In order to ensure the functional enhancement of the CPS to be the real basis of interuniversity activities, the present program is planned and will be carried out in close cooperation with Hokkaido University which has a largest group of active planetary scientists in Japan with common awareness of the issue.

2. Objectives, significance and prospective impacts of proposed COE
1) *Describe the disciplines to be covered by the proposed COE. Be concise and specific*.

The field of study covered by this program is planetary science.

2) *Describe the proposed research activities and how their implementation will create a top world-level research hub capable of pioneering novel scientific disciplines. Describe also the concepts, objectives and direction of your plan for establishing the COE, and explain why its establishment is needed.*

○ **Necessity**

With the continuous expansion of the frontier in planetary science and sophistication of the specialized fields, it is becoming increasingly more difficult to balance our efforts for gaining a comprehensive understanding of the origin, evolution, and diversity of planetary systems with those for maintaining the high level of expertise in specialized fields. In order to continue producing results with significant impacts on the field through the integration of the ever-expanding and specializing research fields, radical steps must be taken to fortify the system so that it will provide us

with an overall view of the field and enable inter-field education and research. It is the opinion of the planetary scientists at Kobe University and Hokkaido University, that we have reached a point where there is an urgent need for an organization on the interuniversity basis which will allow a systematic coordination of activities such as the development of research activities, accumulation and dissemination of advanced knowledge, and personnel training to provide the human resources that will bear the load of such activities.

○ **Objective and direction**

We plan to expand the CPS into a coordination center which will fulfill the role as a core hub for supporting networking of education and research activities for both domestic and foreign scientists and groups in the planetary science field. The center will be expected to oversee planning and management, information orientation, international cooperation, *etc*. As a coordination center, the CPS will act as a catalyst for personnel training and research activities in the planetary scientific community. The center will be a place where human resources from various fields of planetary science will assemble to accumulate knowledge and information. It shall also function as a platform for gaining a comprehensive understanding of the expanse of planetary science.

Within the 5-year period, we hope that the CPS will be transformed into a global center for international collaboration in education and research activities in planetary science. The purpose for creating such a center is to establish its name as one of the internationally-recognized centers where domestic and foreign scientists may assemble and where information will be concentrated.

○ **Action concepts**

* **Establishing the function of coordination:** We will set up coordination groups (CGs) that will provide multilateral support for the networking of various education and research activities in the planetary science community. These are education and research (meetings and schools), infrastructure (utilization of information technology), international cooperation, social interchange (cooperation with private enterprises), and future conception. See pp.6–7 for the details.

* **Open management:** In order to establish a community-based governance, in addition to the expansion of the faculty lineup with the cooperation of Hokkaido University, we will request the participation of scientists in other universities as management commission observers. The project management will be operated and integrated by utilizing the Internet.

* **Various human resource educations:** The educational programs including school program, practical training program, and exchange program will be developed with the support of the CGs and the cooperation from the planetary science community obtained through such support. We will encourage exchange of human resources in order to promote not only domestic but also international collaborative activities. With these educational activities, we will realize the CPS for the accumulation, access and development of knowledge and information in planetary science. See p.7 for the details.

  In addition, we will encourage young scientists and graduate students to participate in the establishment and management of the CPS as the coordination center. This will give them an opportunity to cultivate a wide range of skills associated not only with research abilities, but also with those needed for planning, organization, management, and infrastructure construction required for the future advancement of planetary science.

* **Promotion of research toward the construction of a pan-planetary system model:** We will strive to construct a pan-planetary system model by taking advantage of such a facility of the CPS and the human resources made available through it, by promoting a spectrum of research which will span the origin, evolution, and diversity of the planetary systems. The pan-planetary system model is the ultimate goal for the integration and universalization of our understandings of the planetary science, and it should lead to the understanding of the universality and peculiarity of the solar system and earth in the universe.