

## VATLY NEWSLETTER

*There is no clear-cut boundary between basic research and applied research. There is only research of very high quality and research of less high quality.*

Kurt Wüthrich

(at the July Quy Nhon Conference on Fundamental Science and Society)

### CONTENT

This twenty-fourth issue of the **VATLY NEWSLETTER** opens with the traditional **NEWS FROM THE LABORATORY**. This first half of the year has seen the pursuit of intense analysis work with several new publications. Tuan-Anh and Hoai tell us about a new chapter of stellar astrophysics that we have been starting to explore: **STAR AND PLANET FORMATION**. Nhung tells us about recent trends in the evolution of **THE USTH MASTER ON SPACE AND APPLICATIONS**. Former Minister of Science and Technology, Nguyen Quan, who just completed his five year term, kindly accepted to be interviewed by Diep and Nhung who report for us on **VIEWS OF A FORMER MINISTER ON VIETNAMESE S&T**. In early June, the Institute organised for the staff **A LONG WEEK END HOLIDAY IN THE SOUTHERN ISLAND OF PHU QUOC**; Phuong remembers for us the good time they had on this occasion. A few days ago, a **WORKSHOP ON ASTRONOMY DEVELOPMENT IN VIETNAM: CHALLENGES AND OPPORTUNITIES** was held in Quy Nhon, Nhung reports. In early July, Quy Nhon also hosted the celebration of the 50<sup>th</sup> anniversary of the Rencontres de Moriond, in the form of **A CONFERENCE ON FUNDAMENTAL SCIENCE AND SOCIETY** about which Bac Pierre reports. With the aim of better understanding the organisation of the Space programme in Viet Nam, Diep, Nhung and Pierre paid a visit to the Remote Sensing Centre of the Ministry of Natural Resources and Environment. They briefly tell us about **EARTH OBSERVATION FROM SPACE IN VIET NAM**. Diep has been involved in various events in relation with Space and Astronomy in ASEAN countries and tells us about **CONTACTS WITH MALAYSIAN AND THAI ASTRONOMERS**. Next comes the **ADDRESS**

delivered by Bac Pierre on the occasion of his acceptance of the Phan Chau Trinh award for educational and cultural development. Finally, Tuan-Anh and Thao report about our participation in **THIS YEAR'S STEM DAY** (Science, Technology, Engineering and Mathematics) and the issue closes with the traditional **PHOTO ALBUM**.

### NEWS FROM THE LABORATORY

*Under this heading we review briefly the progress of the work of the team and the main events in its life.*

Most of the time in this first half of the year has been spent on analysing data, writing articles and submitting a proposal for ALMA observations. In addition to pursuing our analyses of open access ALMA data (W Aql,  $\pi^1$  Gru, Mira Ceti, L1527, GG Tau, RX J0911.4+0551), Hoai studied RX Lep, an AGB star observed at the VLA in neutral hydrogen (HI), in relation with an earlier work by Thibaut le Bertre and Lynn Matthews suggesting the possible presence of a detached shell. L1527 and GG Tau are young protostars, to which Anne Dutrey has introduced our team. Tuan-Anh and Hoai tell us more elsewhere in this issue. Much time needs to be spent at answering referee comments and requests from copy editors. Most referees are friendly and make useful comments that help improving the presentation of the work; however, it happened, in a very few occasions, that we sensed some arrogance revealing discontentment to see us analyse and publish open access data before the proponents of the observations. As we are not prepared to pay page charges (the scale is at least 100 USD per page, much too high for us), we must exclude Astronomy & Astrophysics (A&A) as well as the Astrophysical Journal (ApJ), and essentially limit ourselves to the Monthly Notices of the Royal

Society (MNRAS) and Research in Astronomy and Astrophysics (RAA).

The proposal for ALMA observations that we had submitted was to observe the gas and dust components of a far-away ( $z=2.3$ ) galaxy, at a time where star formation was reaching its maximal rate. ALMA devotes a small fraction of its observation time to proposals submitted by scientists who do not belong to the countries of the partnership, a very generous policy, well in line with the open-mindedness of this collaboration. Of course, competition is fierce and our chances of being retained were teeny-weeny, but we felt that it was an interesting enough experience to give it a try. We learned a few days ago that the proposal had not been retained. We probably will try again next year.



*Diep and colleagues from Thailand and Malaysia in front of our SRT*

An important event of our participation in the life of the Institute has been a meeting to which the Directorate invited us, and where we had a chance to present our most pressing needs. We obtained this way an allocation of 60 MVND (2800 USD) to cover expenses related to activities such as attending or organising conferences. Diep has been active with fostering contacts with ASEAN countries: MoUs with NARIT/Thailand, organisation of a South-East Asia Astronomer Network (SEAN) meeting in Ha Noi in December this year, etc, about which he reports elsewhere in the issue. Under our pressure, he also has been appointed by the directorate to organise a monthly seminar series. The idea is for the members of the Institute to know what their colleagues are doing. The June seminar was by Pham Thi Thanh Nga, who gave a very interesting

presentation of the analysis of open access satellite radar data on precipitations in Viet Nam, in particular in relation with typhoons and tropical storms. The July seminar was by Hoai on evolved stars and protostars.

We have kept good and close contact with Yannick and the Space and Application Master of University of Science and Technology of Hanoi (USTH). Many questions are currently being raised concerning its future, which topics it should develop in priority, which research should be favoured by the department, etc. These are difficult questions that imply having a good understanding of the needs of the country as well as a good vision of the progress of science and technology in the relevant fields. Nhung, who is associated with this reflexion, comments about it elsewhere in the issue. A young scientist, with experience in climate studies, Ngo Duc Thanh, has been recently appointed as co-director of the department.

Meanwhile, we are welcoming four USTH master students to work with VNASC on a two months internship this Summer, of whom three are with us, one working on a protostar with Hoai and two with Tuan-Anh, one on high  $z$  galaxies and the other on interferometry.



*Phuong with jury members after her master thesis defence*

Diep and Phuong spent some time fixing the jammed arm of the small radio telescope and Thao took care of training sessions using it. We are eager to find someone from USTH who can take care of the instrument, its operation and maintenance.

Phuong has obtained her master degree in July and is now preparing for her PhD under joint supervision between Ha Noi (Diep) and Bordeaux (Anne Dutrey). Rather than the Institute of Physics, as was the case before, it is now GUST

which takes care of the doctoral school on the Vietnamese side. GUST is the Graduate University for Science and Technology, of which we interviewed the rector in our last issue, closely related to VAST, the Viet Nam Academy of Science and Technology to which we belong. We were hoping that the bureaucracy associated with joint supervision PhD theses would get simpler with time, but we have not yet seen any encouraging sign of it, on the contrary. Phuong has been invited by Anne to spend a month in France in October, half-time in Bordeaux and half-time in Grenoble where she will attend the IRAM school and visit the Plateau de Bure Interferometer. Speaking of Plateau de Bure, we learned that the request for additional observations of RS Cnc that Thibaut Le Bertre had submitted had not been retained.



Vietnam School of Astrophysics's group photo

Much has been going on in Quy Nhon this Summer. At the beginning of July, Bac Pierre attended a workshop on fundamental science and society and took part in a round table discussion on *The Importance of Pursuing Basic Science in Emerging Countries*. He reports about it elsewhere in the issue. In the last week of July, Tuan-Anh and Phuong have attended a conference on star formation followed by an astrophysics school (July 31<sup>st</sup> to August 6<sup>th</sup>), while most of the team took part in the *Blowing in the Wind* conference organised by Pierre Lesaffre. We shall report about these conferences in the next issue of the Newsletter. Tuan-Anh has been invited to report on the work of the team at the Physics in Collisions conference in September (13<sup>th</sup> to 18<sup>th</sup>).

Between the star formation conference and the astrophysics school, a three day workshop on *Astronomy development in Viet Nam: challenges and opportunities* brought together those of us

interested in the issue. Nhung, who helped, together with Diep, with the organisation reports elsewhere in the issue.

In 2018, we shall organise a conference on *Cosmic cycle: dust and gas from old to young stars*, bringing together star formation and AGB/planetary nebulae experts. Anne is leading the organising effort.

Hoang Anh will move to Nha Trang where she is in charge of following the installation and exploitation of an optical telescope and a planetarium. In Ha Noi, the programme of gaining experience with the optical telescope of the Ha Noi National University of Education has not been successful, partly because of bad weather, partly because of administrative obstacles. VNASC has put together an "Optical group" who will reception the Hoa Lac 50 cm telescope this Autumn and will start working with it. Thao is a member of the group and will look after science issues.



Tuan-Anh showing to school children meteoric craters on the surface of the Moon on STEM day

Our requests for support from Belgium (collaboration with Ghent university) and from France (CNRS PICS) have both been rejected. We are resubmitting the PICS proposal with Pierre Lesaffre as PI on the French side. If it is retained, we would later extend it to include our collaboration with Anne and Stéphane in Bordeaux. Recently, Paris Observatory opened to competition support for short stays of foreign scientists, financed by vacant positions of French astronomers working abroad. Tuan-Anh applied for a one month stay, with the idea to spend some time with Thibaut and Pierre Lesaffre and to learn from Pierre some rudiments of hydrodynamic allowing him to use standard codes. In early July we were happy to learn that his application has been retained.

Hoai, who obtained her doctor degree from France at the end of last year, is not yet through with the assault course implied by current regulations to obtain her Vietnamese degree, a real shame for the country.

We kept interest in supporting outreach activities, in particular on the occasion of STEM day about which Tuan-Anh and Thao report elsewhere in the issue. The TV programme with which Tuan-Anh was associated as consultant did not get financial support and has been abandoned.



Recipients of the Phan Chau Trinh prize in HCM city together with writer Nguyen Ngoc

Bac Pierre was awarded the Phan Chau Trinh prize for educational and cultural development in a ceremony that took place in Ho Chi Minh City in March. The address which he delivered on this occasion is reproduced later in the issue. Tia Sang collected articles of his and published them in an English/Vietnamese bilingual volume. On the occasion of the ceremony for the award of the Ta Quang Buu prize (of which Bac Pierre was a jury member), a copy of the book was offered by NAFOSTED, our funding authority, to each of the several hundred attendants to the ceremony. In June, Bac Pierre gave a seminar at the Institute of Mathematics on “*Physics and Mathematics*”.

In May, we invited the leading members of the Tia Sang editorial team, Pham Tran Le and Van Thanh, for lunch. The idea was to discuss with them the possibility to devote two pages of the journal to articles dedicated to the young generation, giving them opportunities to express their needs and their views. They agreed to the idea in principle and it is now up to us, in particular to Diep, to make concrete proposals on how this can be implemented in practice.

We also had the pleasure to share a lunch with other friends: Yannick Giraud-Héraud and Alain Maestrini; Hoang Chi Thiem, a theorist working in Canada at the Canadian Institute for Theoretical Astronomy who had given a seminar at USTH on *Magnetic fields in the Universe*; and our long-time friend Tran Viet Phuong who told us about Le Duan and the early days of the Republic.

In June, we celebrated the 15<sup>th</sup> anniversary of the birth of VATLY with a dinner at a restaurant specialised in Hue’s gastronomy. We invited for the occasion former VATLY friends, Dong, The and Thieu, and our wives and husbands.



VATLY members in front of a Hue restaurant on the 15<sup>th</sup> anniversary of VATLY

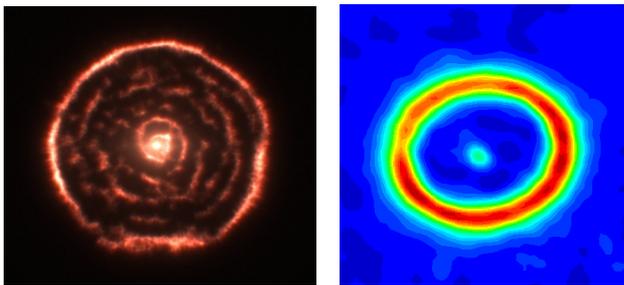
Let us end this brief report with three happy events: Hoai is now pregnant and the birth is expected for mid-September, Tuan-Anh got married in July with Dang Minh Ngoc, our best wishes of happiness to them! and Khoi, Diep’s son, spent a week with us in June, bringing happiness and smiles to the working atmosphere of our office.

### **STAR AND PLANET FORMATION**

*Tuan-Anh and Hoai introduce us to the new field of star and planet formation that we have been starting to explore.*

It was Thibaut Le Bertre who introduced us to evolved stars, it has been Anne Dutrey who introduced us to protostars. The former are old stars that have burned enough of their hydrogen into helium for growing a core deprived of hydrogen that has become so hot that its electrons disconnect from the nuclei to which they were bound and form a Fermi gas, leaving the helium nuclei aggregate into carbon and oxygen nuclei. In parallel, the stellar envelope around the core blows

up to gigantic sizes, at the scale of hundred astronomical units, cooling down to temperatures in the ten to a few hundred Kelvins range, where molecules emit at millimetre and sub-millimetre wavelengths. This is the emission that we study, in particular from the rotation of CO molecules. After a few hundred thousand years, the circumstellar envelope dilutes into space, forming a Planetary Nebula and ultimately disappears, leaving the core alone – a White Dwarf – but having enriched the interstellar matter with new nuclides that can be used later on to form new stars. Protostars are to some extent the time reversed process: molecular clouds, which happen to be in an interstellar region where important gravity – and therefore temperature and density – fluctuations are present, start collapsing, gas falling in toward the cloud centre. Conservation of angular momentum causes the rotation velocity to increase in the process and a disc forms; its temperature and density become so high that atoms ionize and hydrogen nuclei start fusing into helium to form a new star.



Left: *R Scl*, an AGB star. Right: *GG Tau*, a protostar

Similarities between the two processes are many, in particular in the circumstellar envelopes that we observe in the millimetre and sub-millimetre range. For example, in both cases, dust plays a very important role. In evolved stars, it absorbs the light emitted by the central star, radiation pressure producing a wind that causes the growth of the circumstellar envelope, gas being dragged outward by collisions with the dust, which appears therefore as the main motor of expansion. In protostars, cool dust accumulates in the disc plane onto which gas molecules freeze out, forming an ice mantel. Some dust grains aggregate to form larger and larger bodies, ultimately planetesimals and planets. Interestingly, planet formation is the subject of a very abundant literature while the fate of planets in dying stars does not seem to interest astronomers very much.

From a pure scientific point of view, it is not clear why; the reason seems rather to be that we are more interested in learning about our birth than about our death... Another similarity between the two cases is the importance of symmetries. In the case of protostars, one starts from a cloud that has no reason to present important symmetries and ends up with a perfect sphere; in the case of evolved stars, the opposite happens. In both cases how this comes about is a central issue, with many unanswered questions. For example, magnetic fields are expected to play an important role, but exactly which role is often unclear. Also, in both cases, binaries, which constitute an obvious source of symmetry breaking, attract much interest. In the case of old stars, one of the companions evolves first and when the other companion evolves, its older brother has become a white dwarf. Much of the symmetry breaking in moving from red giants to AGB stars and from AGB stars to Planetary Nebulae is blamed on binaries. In the case of protostars, GG Tau, the star on which Phuong is now working, is famous for giving evidence for a binary (in fact a tertiary) in its centre. To quote just one more example of a phenomenon that affects both protostars and evolved stars, we may mention the importance of periodic oscillations, taking the form of pulsed accretion in protostars and of thermal pulses in AGB stars.

It is partly the presence of so many similarities that gave Anne the idea to organize a conference mixing both fields and bringing together the associated communities of scientists. It will take place in Quy Nhon in August 2018 with the title: *Cosmic cycle: dust and gas from old to young stars*.

Yet, if it is interesting to review such similarities with the candid eye of newcomers to the field, one cannot push the argument too far when one starts looking into details. One important difference is that protostars are being formed in a more opaque environment, implying optical thickness at many wavelengths, making observation more difficult. This was particularly the case for L1527, the first protostar that we have studied, with the collapsing cloud in the foreground obscuring the picture. On the contrary, evolved stars expand essentially in empty space, making the observation of their circumstellar envelopes easier.

## **THE USTH MASTER ON SPACE AND APPLICATIONS**

*Nhung, who is in close contact with the teaching and research programme of USTH, reports about progress that has been recently achieved.*

The University of Science and Technology of Ha Noi (USTH) is a public university established in Ha Noi in 2009 under intergovernmental agreement between Vietnam and France. Together with the Vietnam-German and Vietnam-Japan universities, it is one of the excellence universities promoted by the government in collaboration with foreign countries. Often called an international university, or a new model university, it is under direct rule of the Ministry of Education and Training (MOET) with the mission to become a world-class university. As such, USTH enjoys a special status giving it greater autonomy than standard Vietnamese universities. Special regulations for the management of its human and financial resources give it some independence in operation; an international council plays an important role in defining its strategic direction; it is directed by a French rector assisted by two Vietnamese deputy-rectors; it follows the Bologna teaching and degree system, where the bachelor degree is obtained in 3 years instead of 4 in most Vietnamese universities (even 5 in the Hanoi University of Science and Technology); the French participation to teaching is organised in the form of a large consortium of universities.

The period that had been allocated for the development of the new model and the establishment of specific policy rules has now reached an end. In April 2016, USTH was transferred from MOET to the Vietnam Academy of Science and Technology (VAST), a long tradition scientific research organization under direct supervision of the Prime Minister, meant to support the university on its way to high performance and reputation.

USTH proposes 6 master programmes with master degrees co-habilitated by both France and Vietnam. The master “Space and Applications” was created in 2012 with Pierre Encrenaz and Yannick Giraud Héraud as main initiators. Courses are delivered by French lecturers from the consortium with additional support of the Vietnam

Space Technology Institute (STI), the Vietnam National Satellite Center (VNSC) and Vietnamese universities. We, from the VNSC Department of Astrophysics, take an active part in the training programme with tutorials, lectures and the organisation of some lab work.

Master students are trained in two specialities: Space sciences and Satellite technologies. At the beginning, the programme for Space sciences devoted a major part to astrophysics, which was natural due to the influence of its initiators and collaborators. Recently, the heads of the department of Space and Applications have recognized the need to strengthen human resources in the field of Earth observation all over the country. Action was taken immediately: starting in 2016, the master programme has changed its name to “Space: Earth Observation, Astrophysics, Satellite Technologies”. The syllabus has been modified accordingly with a new focus on Earth observation. Early this year, the department recruited a first full time researcher, Dr. Ngo Duc Thanh, formally from Hanoi University of Sciences, an expert on climatology, meteorology and remote sensing.

USTH is now in the process of developing laboratories of international standard to respond to the needs of the research staff and students. A working group has been formed for the Space department to identify potential research lines of the future laboratory which should fit into three areas: Remote sensing for Earth observation, Satellite technologies and Astrophysics. The working group includes lecturers and researchers from French and Vietnamese universities associated with the Space department. A subgroup of the working group, called the expert group, will consider the proposed research lines in some detail and identify research areas to be retained. For astrophysics, it consists of Daniel Rouan (Observatoire de Paris-Meudon), Yannick Giraud-Héraud (Paris Diderot University) and myself. We have been asked to prepare a report on what could be the main research field for the Astronomy & Astrophysics unit of the future space laboratory, including suggestions of possible collaborations. We consulted representative members of the Vietnamese A&A community to collect their views and advice and probe collaboration possibilities. A challenge is to find an experienced scientist who

could lead the research effort. The report is currently in the process of being written. USTH is the only university in Vietnam having a master programme in A&A. This asset should help it with playing an important role in boosting the progress of the field in the near future.

### **VIEWS OF A FORMER MINISTER ON VIETNAMESE S&T**

*Nhung and Diep have interviewed former Minister of Sciences and Technologies, Nguyen Quan, and have asked him questions of central interest to the development and progress of science and technology in the country. We are deeply grateful to him for the very responsible stand he took in this interview, evading no difficult question but providing instead answers that give us courage and hope for the future.*



*Former Minister Nguyen Quan during the interview*

**VATLY:** We are working in a field, astrophysics, which is one of the most dynamic in today's science. In developed countries, it attracts scientists from many different fields, it has been collecting about a third of all physics Nobel prizes in the past several decades. The major puzzling questions of modern physics (Planck scale, dark energy, inflation, dark matter) are in its domain. In developed countries, essentially each science university has a department of astronomy and astrophysics. In Viet Nam, none has one. We are often still teaching science topics as they were taught fifty years ago in developed countries. What do you think could be done to accelerate progress?

**Mr. Nguyen Quan:** What you say is true. The main cause is that we paid insufficient

attention to the training not only of astronomers, the case you are concerned about, but also of scientists active in fields such as nuclear energy, environmental ecology and other high tech domains. At the time of Doi Moi, when the decision was taken to switch to market economy, we were still a poor country having undergone many years of wars and hardship; our priority was then to cope with the short-term, without a vision for the long-term. Even for those who were aiming at having a vision of the future, the urgency of the present was preventing them to do so. We did not succeed to free ourselves from the legacy of these times; in their wake the training provided by our universities has kept following the demand of the market. Students are attracted by fields such as law, economy and finance rather than by fields that are more important for the development of the country. In particular, basic research in fields such as mathematics, physics, chemistry, Earth sciences, but also human sciences such as philosophy and archaeology fail to trigger sufficient interest. Even in domains that are crucial for the development and the progress of the country, like in the nuclear power and space sectors, we fail training a competent workforce. In the sixties, seventies and eighties, the planning of higher education implied sending many students in Eastern European countries and in Russia to study mathematics, physics, and more generally basic natural sciences. Those who benefited from such training are playing today a leading role in the science community. But today, the number of Vietnamese students who study basic sciences, whether abroad or at home, is very small and even keeps decreasing. This should be urging the government to edict rules aimed at inciting the young generation to do basic research. But we are not yet there, we are still leaving things develop as they like, without proper guidelines or instructions. As a result, talented young students having a passion for basic science choose a different orientation where they can be better paid and take good care of their families. We need to attract students to fields that contribute significantly to the economy of the country, such as sciences and technology and in particular basic sciences by offering them favourable wages and social positions. We have not yet been able to do so. We lack a proper remuneration policy. It has become urgent to

reform higher education training with such concerns in mind in order to bring coherence and foster progress. We must remember that without basic research, there is no successful applied research. Both must be supported in a properly balanced way.

**VATLY:** What we need most to progress is support to attend conferences and schools, to spend short visits in laboratories abroad with which we collaborate, to invite foreign scientists to Viet Nam, etc... We find it difficult to get this kind of support, while we see large sums of money being spent in buildings and/or instruments that seem to us of a much lesser priority. One reason is a lack of familiarity with fundamental research, its culture and its requirements. What do you think could be done to improve the situation?

**Mr. Nguyen Quan:** Currently, in Vietnam, financial support to basic research is provided exclusively by the government. Accordingly, it is subject to constraining rules and regulations. But the main problem is the lack of recognition of the importance of basic research in the country. While there is no good applied research without basic research, the time lag between a fundamental discovery and its applications may be as short as a few years or as long as several decades. Without a long-term vision, one tends to neglect basic research and to think that one might as well leave it to other countries to learn about Mars or about comets. This is the way many decision makers think: why should we spend time and resources on basic science when what we need are applications? Very few accept the idea that we must do basic research if we want to be successful in applied research and that basic research is essential for a higher education of good quality.

This situation led MOST to create the National Foundation for Science and Technology Development (NAFOSTED), which has been for us an essential step forward, but very difficult to take. The idea received no support at the beginning: while the foundation was established in 2003, it did not start operation before 2008. A major drawback of the present system is the long time lag between the decision to support a project and the allocation of the required funding: the administrative path from MOST to the Finance Ministry, then to the Prime Minister and back to MOST is governed by inadequate regulations,

which may take as long as a year. MOST has been promoting new regulations to overcome this difficulty, making it possible for NAFOSTED to advance the funding and to report on its use after the fact. Fighting for NAFOSTED has taken MOST much of its energy, but its existence has meant a significant improvement for research. While there are still some obstacles to overcome, scientists can now apply for funding to attend international conferences, for assistance with publications in international journals, for the payment of fees to get patents, for support to organize international scientific conferences in Vietnam or for hiring foreign experts. At least in principle; in practice there may still exist some difficulties. The new S&T regulations allow for provinces to create provincial foundations working on the same model as NAFOSTED does at national level: they could support young scientists to attend conferences, pay for publications or apply for patents. However, these new regulations have not yet been accepted fully by the Ministry of Finance and some of provincial Administrations. In general, the rigid attitude of some ministerial and provincial agencies has been counteracting MOST efforts to improve governmental support to scientists. It is even preventing the allocation of private funds from enterprises to institution and university research.

**VATLY:** We used to be hosted in a nuclear physics institute and now we are part of a space science and technology institute. In both domains, of major importance in developed as well as developing countries, we have been surprised to see that many different institutes work independently from each other without someone at the top in charge of the nuclear power and respectively space programmes. We have the feeling (we may be wrong) that many resources, both human and material, are being wasted this way. What do you think could be done to improve this situation?

**Mr. Nguyen Quan:** Indeed, power and resources are too much scattered among different units. A same task is given to several of these. If MOST had been given exclusive responsibility in the nuclear power domain, the situation would be much better today than it currently is. VAST, VNU and MOET take care of manpower training, the Ministry of Finance takes care of the budget, the

Ministry of Planning and Investment of the equipment, the Ministry of Internal Affairs of the personnel, MOST of projects. Too many organizations do a same task: solving a problem, whether small or big, implies overcoming all kinds of obstacles and consensus can never be reached. Without better coordination and clear assignments of tasks, we shall never progress.

Concerning space science, MOST proposed to the government the creation of a committee where decisions could be exclusively made. Viet Nam Space Committee was founded and the government appointed the MOST Minister as chair, with the idea to centralise the management of the programme; however, in practice, the vice chairs are from other ministries, the sources of budget are scattered, budget is not allocated through the committee but directly to relevant organizations such as VAST or VNU; the net result is that the committee is counteracted and cannot make financial decisions. Like in the nuclear case, we lack coordination and coherence.

As a result, when an international organization comes to work with Vietnam they do not know who is in charge of the nuclear issues and whom to work with. The nuclear power plant projects have been delayed because the preparation and training did not meet the requirements. Many young scientists and engineers who have been trained in Russia or in other foreign countries and came back home are now working in different fields because of our inadequate remuneration policy.

**VATLY:** In many international circles, a special effort is being made to give the young generation new opportunities to express themselves, to take initiatives and to be given a chance to exert their talents. In Viet Nam, we find it very difficult to identify a body that could help. In particular, the science societies are not very active along such a line, possibly because VUSTA (Vietnam Union of Science and Technology Associations), from which they depend, does not sufficiently encourage them to be. Which advice would you give the young generation to make themselves better listened to?

**Mr. Nguyen Quan:** To be listened to, the young generation need to impose themselves. Demonstrating a passion for science is not enough; they have to convince the society of the usefulness

and necessity of their research. I know how difficult it is today without enjoying sufficient governmental support. This is why associations such as the Youth Union, the Vietnam Student Association, the Vietnam Young Entrepreneurs Association, and other S&T associations need to be more active and acquire an identity and a substance that are presently lacking. This is a prerequisite for them to play a role in giving support to the young generation, whether moral or material. Today, these associations, including VUSTA, are unable to pay sufficient attention to the problems of the young generation, not to mention to listen to them or to create favourable conditions for them to do good science.

### ***LONG WEEK-END VACATION IN THE SOUTHERN ISLAND OF PHU QUOC***

*Phuong reports on a few days' vacation organised by VNSC last June.*

Last June, the Institute organized for us a few days' vacation in a nice resort near a beach in Phu Quoc. We all went, apart from Bac Pierre, together with families. Phu Quoc is a large island off the Cambodian coast, near the south-western corner of Viet Nam.



*Having fun with VNSC members on the beach in Phu Quoc*

It has an interesting history. Originally part of the Khmer empire, today's Cambodia, it became, at the end of the 17<sup>th</sup> century, the trading centre of a Chinese merchant. In 1717, the man decided to join the Nguyen lords, who were ruling South Viet Nam at the time. Still inhabited by Cambodians during most of the 18<sup>th</sup> century, the island became famous for having hosted the catholic seminary of the French priest Pigneau de

Behaine, who gave refuge during the Tay Son uprising to Nguyen Anh, the future Emperor Gia Long, first of the Nguyen dynasty and founder of today's united Viet Nam. During the whole 19<sup>th</sup> century and the beginning of the 20<sup>th</sup>, Cambodians kept claiming sovereignty over Phu Quoc, which was however under Vietnamese rule. In 1939, during the French colonial regime, the Governor General of French Indochina decided, by drawing a line on the map, that Phu Quoc will remain under Vietnamese – at that time “Cochinchinese” – administration. In 1949, at the end of the Chinese civil war, with the Kuomintang pulling out of China mainland, 33'000 soldiers of the Jiang Jieshi's (Chiang Kai-shek's) army were based in Phu Quoc before moving to Taiwan in 1953. The day following Saigon's victory, May 1<sup>st</sup> 1975, a squad of Khmers Rouges took Phu Quoc. It was immediately taken back by Viet Nam but remained the object of attacks during the whole Viet Nam-Cambodia war. Cambodia dropped its claim on Phu Quoc in 1976 and an agreement was signed in 1982, reaffirmed in 1985, which settled the dispute. Today, Phu Quoc, the largest Vietnamese island, has become a major tourist destination in South-east Asia, with its own airport and many resorts.



*Nhung and Khoi on the coral observation and fishing boat trip in Phu Quoc*

Most of the time was free, with the exception of two mornings. The first morning, the Institute had organized a guided tour across the island and its artisanal products: pearl culture; *nuoc mam*, the traditional Vietnamese anchovy fish sauce, for which Phu Quoc is famous; “*sim*” wine, an alcoholic beverage based on rice alcohol mixed with rose myrtle syrup. But what interested me most was the visit of the prison. It was built by the

French in 1949, at the time of the Indochina war, and was used to jail Vietnamese who were considered particularly dangerous to the colonial regime. As in Poulo Condor, prisoners were often tortured and some were put in tiger cages, in which they could not stand up, and would often become paraplegic or blind. During the Viet Nam war, the Americans built there the largest prisoner camp (40'000 in 1973) in South Viet Nam, torture being again standard practice. Today, the prison has become a museum witnessing the crimes committed during the war. Visiting the prison and watching a documentary film about Vietnam wars was extremely instructive to me and taught me a lot about the pains and sorrow that our country had to endure before finally enjoying independence and freedom. It made us conscious of how indebted we are to the generation of our parents and grandparents who sacrificed their lives for us.



*From left to right: Dung, Phuong, Nhung, Tuan-Anh, Hoai and Son in Phu Quoc*

The second morning was spent on the beach, all VNCS members together. We had a lot of fun and very much enjoyed ourselves. A very nice banquet was served on the last evening. This was not only a chance for us to relax after hard work, but also an opportunity to learn about the history and local traditions of our country.

### **WORKSHOP ON ASTRONOMY DEVELOPMENT IN VIETNAM: CHALLENGES AND OPPORTUNITIES**

*Nhung reports on a Workshop on astronomy and astrophysics development in Viet Nam that took place in Quy Nhon a few days ago.*

A Workshop on “Astronomy Development in Viet Nam: challenges and opportunities”, was organized

in Quy Nhon from July 31<sup>st</sup> to August 2<sup>nd</sup>, jointly by Rencontres du Viet Nam and VNSC. Nguyen Trong Hien, a Jet Propulsion Laboratory (Pasadena) astrophysicist, who is particularly motivated by helping Viet Nam develop education and research in astrophysics, chaired the scientific organizing committee. On our side, Diep and I helped with the organization: I chaired the local organising committee and Vu Viet Phuong, our deputy-director, did his utmost to contribute to the success of the workshop by giving it VNSC's support and attending all presentations. Also very active in helping with the organisation, was Nguyen Luong Quang, another Viet Kieu astronomer, currently working in Japan. In addition to our small community of active researchers – Dinh Van Trung and Nguyen Quynh Lan from Ha Noi, Phan Bao Ngoc from Ho Chi Minh City, and our VNSC department of astrophysics – the workshop was attended by scientists from Taiwan, South Korea and Japan, the latter with a strong representation. It was for us the opportunity to meet long-time friends, such as Young Chol Minh from Korea and Kaz Sekiguchi from Japan, and to make new ones, such as Masa Hayashi, also from Japan, and Paul Ho, from Taiwan.



*From left to right: Diep, Dinh Van Trung, Paul Ho, Young Chol Minh, Masa Hayashi and Nobuo Arimoto answering questions during the workshop*

Flagship presentations were given by Masa Hayashi, Paul Ho and Young Chol Minh who sketched for us the history of the birth and rise of modern astronomy in their own country, underlining points that they consider essential for success and from which Viet Nam could be expected to learn useful lessons. On our side, Quynh Lan, Phan Bao Ngoc and Dinh Van Trung told us about their research and achievements,

Hoai and Tuan-Anh presented some of our results on high redshift galaxies, evolved stars and protostars, Diep summarized our last year report, stressing that top priority for our community is presently to grow in size and in skill, and Bac Pierre strengthened this point by spelling out what, in his opinion, is most needed as support from both Viet Nam and abroad to reach this goal. Kaz Sekiguchi told us about the help that IAU is giving to astronomy the world over and encouraged us to join as full member.



*From left to right: Paul Ho, Nhung, Hoai, Thao, Phuong (from Quy Nhon University) and Eijie Hiei*

The quality of the presentations and analyses, together with the many discussions held at coffee breaks on pertinent issues, made it possible to all of us, from Viet Nam and from abroad, to reach quickly a common understanding of both what should be aimed at and the specificities of today's scientific and academic environment of the Vietnamese landscape. While there is a long way to go, strong encouragements were expressed by our friends from abroad, who all stated their will to help. For example, Paul Ho offered a visiting scholar position in his institute in Taiwan (ASIAA) and an observer status for Viet Nam at EAO (East Asia Observatories). This observer status makes it possible for Vietnamese astronomers to make use of EAO facilities; there are no financial requirements, the idea is simply to start doing science together. For us, knowing that scientists abroad know and appreciate our efforts to progress is most rewarding, their encouragements are a major support, their recognition, which is somewhat lacking in the country, gives us the energy to keep hope and maintain the motivation that the task requires. I take this opportunity to tell

them how indebted we are to them for their support and to express our deep gratitude.

Other talks included reports on the scientific and instrumental achievements of installations such as ALMA, Subaru and other telescopes and arrays, with a host of remarkable achievements and results, demonstrating how rich is the future of astrophysics in the East and South-east Asian region, implying a strong incentive to foster new collaborations.



From left to right: Nhung, Kaz Sekiguchi, Paul Ho, Tuan-Anh, Bac Pierre, Hoai, Phuong and Dai at dinner in downtown Quy Nhon

Without trying to review all the work that has been presented, I still should like to mention Hoang Chi Thiem, working in Canada, pleading the cause of theoretical astrophysics, Dinh Van Trung describing the very nice work he has been doing on instrumentation and telling us about his future plans and Le Huy Minh, a scientist from the VAST Institute of Geophysics, showing beautiful results on atmospheric physics obtained from a very careful and detailed study of GPS data.

The sessions were held in a large meeting room of Quy Nhon's university, with the exception of the afternoon of the second day where we were invited in the main auditorium of ICISE by Tran Thanh Van. Bac Pierre tells us about ICISE elsewhere in this issue, but I'd like to take this opportunity to express our deep gratitude to Van and his staff for the help they gave us. In the evening, a luxurious banquet was hosted on the lawn in front of the ICISE building, in a marvellous environment of hills and greenery, by the top executives of Binh Dinh province, whom ICISE owes much of its success.

Before closing, I also should like to thank Dr Nguyen Minh Phuong of Quy Nhon's university and Msc Le Minh Tan from Tay Nguyen

university, as well as colleagues of theirs, for the invaluable help they have been given us.

### ***A CONFERENCE ON FUNDAMENTAL SCIENCE AND SOCIETY***

*On July 7<sup>th</sup> and 8<sup>th</sup>, Bac Pierre was invited to attend a Conference in Quy Nhon on "Fundamental Science and Society". He reports below.*

On July 7<sup>th</sup> and 8<sup>th</sup> I attended a workshop in Quy Nhon on "Fundamental Science and Society", where I had been invited to take part in a round table discussion on "The Importance of Pursuing Basic Science in Emerging Countries". It was hosted in the beautiful International Centre for Interdisciplinary Science and Education (ICISE), of which Tran Thanh Van is the founding father. It was the occasion to celebrate the fiftieth anniversary of the Rencontres de Moriond, a prestigious international conference series, which Van and his wife Kim have tirelessly animated over the past half century. Van is indeed famous for organising top quality science conferences, including the Rencontres de Blois and the Rencontres du Vietnam, of which the present meeting was the twelfth edition. The workshop was honoured by the presence of many great names: Nobel laureates David Gross and Jerome Friedman (physics), Kurt Wüthrich (chemistry), Finn Kydland (economy), Fields medal laureate Ngo Bao Chau and many present or former directors of various international institutions, academies, etc. On the Viet Nam side, Deputy-prime-minister Vu Duc Dam came with the current and former MOST ministers, Chu Ngoc Anh and Nguyen Quan, and gave the opening speech, acknowledging the eminent role played by science and scientists in the construction of a better world and stating the determination of the Vietnamese government to support science as a high priority.

Speaking after Vu Duc Dam, David Gross gave a remarkable presentation of the arguments in favour of pursuing basic research, clear, crisp and covering all important points. He reminded the audience – some 150 scientists and deciders from all over the world – that scientific thinking is a legacy shared by the whole mankind and serving the whole mankind. Together with many other prestigious speakers he argued that emerging

countries will never emerge if they do not devote sufficient resources and effort to basic science; they would then become mere consumers of existing technologies without ever inventing any. He remarked that according to figures published by the World Bank, Viet Nam is spending only 0.21% of its GDP on R&D, ten times less than China, which is spending 2.1%.



Deputy Prime Minister Vu Duc Dam giving the opening lecture of Science and Society conference

The afternoon of the first day and the whole second day were shared between seven round table discussions: *Basic science and emerging countries; ...and sustainable development; ...and peace; ...and climate; ...and health; ...and the global facilitation education, knowledge and technology mechanism; ...and open education and collaboration economy.*

The first of these, to which I restrict the present report, had Lars Brink, former chair of the Nobel committee for physics, as moderator and Kurt Wüthrich as key-note speaker. Ngo Bao Chau, Yu Lu (Chinese Academy of Sciences), K.K. Phua (director of the Institute of Advanced Studies at Singapore) and myself contributed short interventions. Kurt Wüthrich insisted that there is no clear-cut boundary between ‘basic research’ and ‘applied research’, there is only one between ‘high quality research’ and research of lesser quality. He then made the following points, which I reproduce verbatim:

– *Each country, independent of the state of its emergence, must pursue high-quality research within the framework enabled by its economic status. Our discussions should therefore focus on how to organize high-quality research, rather than on whether or not it is of value for given countries.*

– *The present state of higher education and scientific research in Viet Nam calls for a “White Book” outlining a viable strategy for the future. This key task for the government must include ways and means to ensure high-quality education of medical doctors and engineers, so that healthcare of the population and a satisfactory infrastructure of the country can be ensured. In parallel, a few centres of excellence for high-quality research need to be established. The selection of the research themes should be guided on the one hand by their impact on the education of personnel in the medical services and on the engineering schools, and on the other hand by the availability of outstandingly well-qualified scientists to lead the centres.*

– *The number of research centres of excellence should be strictly limited, so that the available financial means would be sufficient to build up a functional infrastructure. This must include establishing positions for technical personnel to ensure high-level installation and operation of major equipment. Furthermore, it must be recognized that high-quality research in developed countries is based on full-time employment of graduate students and postdoctoral fellows. Fellowships must be created to enable the hiring of such personnel in the research centres of excellence.*

– *Pursuing high-quality research within a country provides a basis for fruitful collaboration with others.*

– *Being fluent in the language of science, presently and for the foreseeable future the English language, is a key asset for the upcoming new generations of scientists. The necessary language education must be offered in the schools which prepare students for university studies.*

– *To ensure the performance of high-quality research, a system needs to be established for evaluating research projects as well as the results obtained with the research support awarded. Especially in emerging areas it is of key importance that the peer review system includes seeking expert information from highly regarded members of the international community in the research area considered.*

Yu Lu and K.K. Phua referred to their experience in China and Singapore, which were quoted as examples by several of the other

speakers, and underlined the importance of a strong governmental support to fundamental science.



Part of the attendance at the Science and Society conference. On the first row, right to left: Deputy PM Vu Duc Dam, Minister Chu Ngoc Anh and two former Ministers Dang Huu and Nguyen Quan

Ngo Bao Chau insisted on the need for wages to be at a sufficient level for lecturers and researchers to dedicate all their time and effort to science; when it is necessary to take a second job to feed one's family and survive, the quality of the teaching and of the research suffers very much. He remarked that Vietnamese parents believe that if their children study science, they will have no guarantee to find a good job, at variance with learning economy or finance. He said that we need to change this widespread misconception and give as examples young scientists and engineers who have a relatively comfortable and more importantly meaningful life. He also made this very interesting and sound remark: *“In western countries, to a large extent, science won over superstition. This victory had a tremendous effect in liberating mankind from obscurantism. In a developing country such as Vietnam, this fight still needs to be fought. Doing science in a developing country has thus another noble meaning that is to pursue the enlightenment endeavour initiated by Isaac Newton.”*

On my side, I expressed my deep conviction that cultural and educational development is a prerequisite to progress and said that the best reason for which we need to foster science education and research in the country is because science is a school of the very virtues that the country needs in order to progress: moral and intellectual rigour, respect for knowledge, professionalism, rejection of arguments of

authorities, excellence. I insisted that, in order to succeed, we need to trust the young generation much more than we are presently doing and I developed this important point in some detail. I concluded by underlining the role of scientists in restoring moral and intellectual rigour, respect for knowledge, for integrity, for the primacy of serving the interests of the community over serving one's own interests: *“We should have the ambition to learn from other cultures as much as to give our own as an example to the world. Such an attitude of curiosity, of rigour, of tolerance and of foresight is inherent to science and we, scientists, must be committed to it. We must feel responsible for promoting a science without border. We must feel the duty of fighting for a restoration of these intellectual and moral values that contribute to the elevation of human dignity. The true wealth of a nation is in the brains and hearts of its people, not in the safes of its banks”.*



ICISE conference centre

Before closing this short report, allow me to say a few words about ICISE, which has now taken off as an international conference centre of top quality. It is quite an achievement, which must be commended. With strong support from Binh Dinh province, the centre was inaugurated three years ago. Located in a beautiful site, between hills and beach, it hosts a large auditorium of 350 seats, a conference room of 150 seats, two seminar rooms of 40 seats each, a cafeteria and offices. A Science Centre, including a Planetarium and an Exploratorium, is being built next to it and will soon attract general public to the region. One can reach Quy Nhon by plane from Ha Noi and Ho Chi Minh City, it takes only one-and-a-half and one hour respectively. Between June and December this year, no less than fifteen conferences and

schools follow each other nearly non-stop. Even more are being planned for 2017. Van's present dream is to establish at ICISE a permanent research team, manned half by Vietnamese and half by foreign scientists. This is a very ambitious enterprise, but Van has already shown that he is able to do miracles. Vietnamese scientists should be encouraged to make the best possible use of the Centre by organising there conferences and schools.

### ***EARTH OBSERVATION FROM SPACE IN VIETNAM***

*Diep, Nhung and Pierre paid a visit to the Remote Sensing Centre of the Ministry of Natural Resources and Environment. They take this opportunity to sketch for us the Vietnamese Space Programme.*

Being part of VNSC, which is a Space S&T institute, and being close to the Space and Application Master at USTH, we became naturally interested in understanding, in broad lines, how the Vietnamese Space Programme is organized. In 2006, the Prime Minister approved a *Strategy for Space Research and Applications until 2020* implying several ministries. However, like in the case of the Nuclear Power programme, he did not appoint anyone in charge of the overall coordination. The main bodies involved in the programme are: the Ministry of Science and Technology (MOST), the Ministry of Natural Resources and Environment (MONRE), the Vietnam Academy of Science and Technology (VAST), the Ministry of Information and Telecommunications (MIT), the Ministry of Defence (MOD) and The Ministry of Agriculture and Rural Development (MARD).

The first priority is to learn how to make good use of satellite technology to help with solving the most crucial problems that the country is facing. At the same time, one should create human and material resources for Vietnam to become progressively as independent as possible from other countries in its management of the space programme.

Telecommunication is the domain of MIT (VNPT) and uses two satellites, VINASAT-1 and VINASAT-2 that have been bought as turnkey

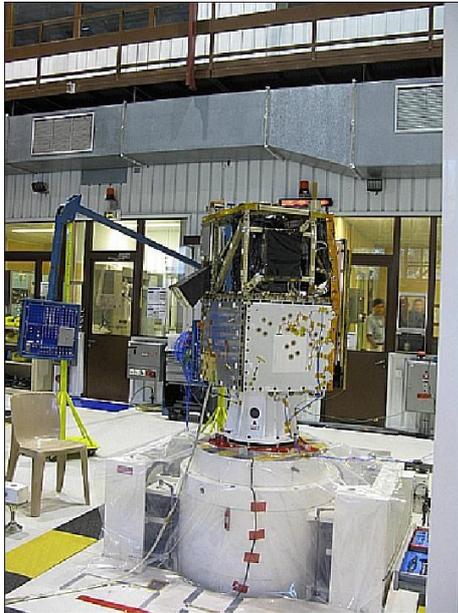
from Lockheed MSS and launched in 2008 and 2012 respectively.

Among the most important issues to be addressed, leaving aside defence issues (MOD), we find management of disasters (floods, typhoons, landslides), mitigation of the effects of global warming and deforestation, coastal management (destruction of mangroves and salt infiltration). These are mostly the domain of MONRE and MARD and make ample use of a satellite, VNREDSat-1, dedicated to such tasks. We come back to it below.

The roles of VAST and MOST have been defined by MOST (as chair of a space committee common to MOST and VAST) in a roadmap covering the term 2012-2015, full of wisdom but very ambitious: we are still a long way from reaching its goal and it has been essentially renewed for 2016-2020. In VAST, two institutes share the work on space technology and applications: the Space Technology Institute (STI) and the Vietnam National Satellite Centre (VNSC) to which we belong. STI shares its time between the control of VNREDSat-1 and image analyses. MONRE is in charge of receiving and exploiting the VNREDSat-1 images but STI also does some of it for research. In very many different institutes, there exist teams working on the analysis of satellite images, either VNREDSat-1 or others (some in open access, but many need to be bought).

VNSC is mostly responsible for the construction of the future Space Centre in Hoa Lac, funded by Japanese loans. They also train staff on space technology and on applications in collaboration with Japan. They are constructing in Japan, under supervision of Japanese engineers, a satellite (MicroDragon) that should be launched in 2018 and be controlled and exploited from Viet Nam. In parallel they construct a smaller satellite "made in Viet Nam" (NanoDragon) to be launched in 2019. Both of these have as main goal to train the staff and give them a chance to increase their skills in the field. The recent addition of our team (Department of Astrophysics) and of the Vietnam Southern Satellite Technology Application Centre in Ho Chi Minh City (VSSTAC, also a new department) has given VNSC a good position in terms of producing publications in international journals, an asset that it was otherwise lacking.

VSSTAC has its origin in the HCMC institute for geographic resources, which is part of VAST; it focuses on research, development and application of satellite technology and other related technologies such as remote sensing, GNSS (Global Navigation Satellite System), and GIS (Geographic Information System).



*VNREDSat-1 in its assembly-integration-test phase at Astrium*

In VAST, in addition to STI and VNSC, a third team is in charge of a study for a successor to VNREDSat-1, called VNREDSat-2, again working independently from VNSC and STI. The project is currently on a halt by lack of available financial resources. Nobody in VAST is in charge of overlooking and coordinating the work of the three units.

In addition to its Earth Observation missions, MONRE is also host to the National Hydro-Meteorological Service (HMS), itself host of the Met office, the National Centre for Hydro-Meteorological Forecasting (NCHMF), making heavy use of satellite data. MONRE is therefore a major actor on the space scene, possibly the main actor, and we paid a visit to its Department of National Remote Sensing (DNRS) in order to better understand and learn about their work. We were welcomed by Dr. Chu Hai Tung, the Vice Director, who told us about the historical development and role of the Department, which largely reflects the development of remote sensing in the country.

The foundation of the DNRS was based on the former Centre for Remote Sensing of the National Agency for Geodesy and Cartography (1980-1993). Since 2003 it is part of MONRE, currently consisting of about 300 staff members including 6 doctors, 33 masters, engineers and graduate students.

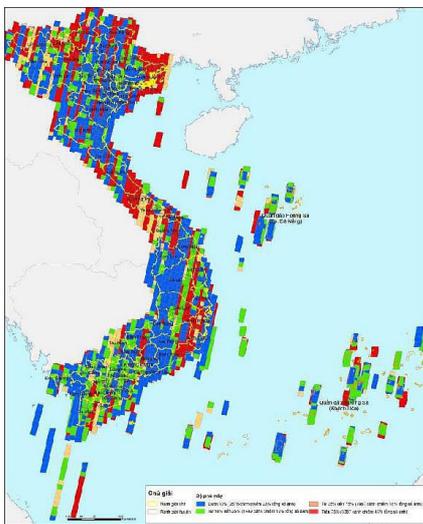
In the late seventies and early eighties, our participation in the Intercosmos Programme of the former socialist countries provided a basis for Vietnam to host and develop remote sensing S&T. During this period a small team had the duty of making R&D on remote sensing S&T as well as of archiving and maintaining remote sensing data. Their first task has been the study of aerial multispectral images for the calibration of topographic maps at a scale of 1:25'000. In 1982, the group became the Department of Remote Sensing; their role was to collect, preserve and provide remote sensing data as well as to analyse and interpret images (mainly for mapping purposes but also for topical maps used for resource management and environment monitoring).

Since 2003 the DNRS has been transferred to MONRE. In its new position, the department is providing services in many different domains: help with the enquiry and monitoring of resources and environment using remote sensing technology; making efficient use of domestic and foreign investments to modernise technology; training manpower with the aim of becoming a strong National Centre in the region.

As remote sensing technology have applications in many domains of interest to the country, the Department keeps growing and developing. The use of remote sensing technology is becoming an objective demand providing real and efficient services for activities in science, economy, national security and defence. Typical projects handled by the Department include “Building database for basic topographic information system for flood protection and development of socio-economy of the Mekong delta”; some projects in the environmental domain such as mapping inundated land in coastal regions, or mapping environment sensitive regions for assessing the environmental impact; making maps and databases for three key regions of Vietnamese economy; identifying the origins of marine oil spills; applying to concrete cases advanced

technologies such as digital image processing and interpretation, LIDAR and GIS technologies, etc.

The Department has carried out a national project called “Building a system for the monitoring of natural resources and environment in Vietnam” using official development assistance from France of ~19.3 million euro and 50 billion VND. One of the important outcome of this project is the construction and operation of the Vietnam Ground Station which is able to receive optical and RADAR images from satellites; this has been an important step for MONRE to enable Vietnam to receive Earth observation images from French and ESA satellites such as SPOT and ENVISAT, and to process and provide images for different ministries and provinces, for the first time on its own. It also gave it opportunities to train 30 high level engineers for managing and operating the station, analysing images and training a staff of 267 on remote sensing applications. By now there exist 15 application centres adequately equipped in instrumentation and software for the use of remote sensing data.



Acquired imagery of VNREDSat-1 over Vietnam as of October 31, 2015

One of the tasks of the Department is to centralize the requests for Earth observations using VNREDSat-1, STI being later on responsible to satisfy as many as possible of these requests taking into account the constraints imposed by the satellite control. VNREDSat-1 (<https://directory.eoportal.org/web/eoportal/satellite-missions/v-w-x-y-z/vnredsatsat-1>) is a 130 kg Earth observation satellite that was built by Astrium (France) and launched in

May 2013 with an expected ~5 years lifetime. Its telescope captures optical images of ground with a resolution of ~2.5 m.

To satisfy the demand for a clearer national management policy, the Department has been active in issuing legal regulations and guidelines; inspecting and monitoring the use of remote sensing applications for the development of socio-economy and national security and defence; developing remote sensing technologies for resource management and environment protection; managing the national database system and infrastructure for receiving, saving, analysing and exchanging information on remote sensing. The Department assists the Minister of MONRE in managing and carrying activities in this field, drawing development plans, boosting the applications of remote sensing in resource management and environment protection to satisfy the demand.

### CONTACTS WITH MALAYSIAN AND THAI ASTRONOMERS

*Diep has been active in maintaining good relations with our neighbour ASEAN countries. He reports here about contacts established with Malaysia and Thailand.*

In 2010, as soon as we learned about the existence of the South East Asia Young Astronomers Collaboration (SEAYAC) and the South East Asian Astronomers Network (SEAAN), we immediately joined both. They are the only international organizations dedicated to the development of astronomy and to the encouragement of scientific exchanges of junior and senior astronomers among the eleven ASEAN countries. Since then, members of the team have regularly attended the yearly meetings of both SEAYAC and SEAAN. Last year, the 7<sup>th</sup> SEAAN meeting was organised in Thailand, Tuan-Anh and I were the only Vietnamese attending. Previous meetings had taken place in Thailand (in 2007 and 2015), Malaysia (in 2013), Indonesia, and Philippines (in 2010 and 2014). We reported about these in earlier issues of the Newsletter.

In April this year, following our invitation made at last year’s meeting, Dr. Zamri Zainal Abidin, from the Radio Cosmology Research Lab

of University of Malaya, and Dr. Phrudth Jroenjittichai, accompanied by two engineers, from the National Astronomical Research Institute of Thailand (NARIT) visited our lab. The idea was to gain some familiarity with our respective activities in order to pave the way to possible future collaborations. I presented our research work on high-*z* galaxies and evolved stars as well as what had been done in terms of research and training using our 2.6 m radio telescope.



*Dr. Phrudth Jroenjittichai presenting Thai radio astronomy in the VNSC conference room*

Dr. Abidin told us about the past, current and future development of radio astronomy in Malaysia. It all started when he came back home after having obtained his PhD degree from Manchester and started pushing for the development of radio astronomy in the country. Today, the astronomy group at University of Malaya includes 3 researchers, 7 PhD students/lecturers and 8 master students. They are working on various topics: construction of a 7 meter radio telescope, observations of the Sun and of galaxy clusters, giving contributions to space weather and to dark matter surveys. They plan to build a radio telescope to be used in interferometry with Australian antennas and to join the Square Kilometer Array (SKA) through in collaboration with China. Dr. Jroenjittichai told us about NARIT's 2.4 m optical telescope and their extensive public outreach programme with 7 regional observatories across the country equipped with 50-cm telescopes. In radio astronomy, they study pulsars in the wake of his PhD work in Germany, they are building a 4.5 m radio telescope and have plans to build three large antennas to form a Thailand VLBI Network (TVN). They plan to start construction of the first telescope in 2018 and have it in operation in 2021.

In addition to these presentations, we listened to a young USTH master student who told us about a team of amateur astronomers who have been assembling two low cost SRTs in Ho Chi Minh City. What this small team has achieved is quite remarkable given the absence of any official support. In addition to performing the standard HI measurements on the disk of the Milky Way, they have given one of their telescopes to a high school in central Vietnam for education purpose. Their group is led by a senior engineer from South Viet Nam, whom we met in Quy Nhon on the occasion of the workshop on the Development of astronomy and astrophysics which is reported elsewhere in this issue. They are planning to assemble yet another telescope to be operated in interferometry mode with the first one.



*Having lunch with Thai and Malaysian friends*

As all of us, Thais, Malaysians and Vietnamese have experience with small radio telescopes (indeed much experience with the operation and exploitation of such an instrument in our particular case) we agreed to collaborate in some way; for example, when the Malaysian team will have completed the assembly of their telescope, one of us might join and help with the running-in; or we may give some help, based on our experience, to Malaysian students using ALMA archival data.

With the aim of fostering closer collaboration with Thailand, a NARIT delegation will visit VNSC on August 24<sup>th</sup>-25<sup>th</sup> and a MoU will be signed stating, in particular, that *“the parties shall encourage academic cooperation in various areas of mutual interest, in particular astronomy and astrophysics research and education. Other areas of collaboration can be implemented on approval by the parties; Joint research projects between the Parties shall be*

*encouraged; Exchange between the Parties of academic and administrative staff, research and technical staff and visiting scholars will be promoted. The Parties will mutually agree in advance on those staff taking part in such exchanges.”* Following the event a common public lecture will be organised between VNSC and NARIT where Tuan-Anh will give a talk entitled “Our Universe: A Flash Tour”.

Concerning collaboration between the ASEAN countries in astronomy and astrophysics, the South East Asian Regional Office of Astronomy for Development (SEA-ROAD) was established during the IAU General Assembly in Beijing in August 2012. It is one of two OAD regional nodes and was assigned to the National Astronomical Research Institute of Thailand (NARIT). The SEA-ROAD is committed to the development of astronomy in ASEAN nations. My role as a panellist consists in contributions such as commenting on expressions of interest sent to the IAU-OAD, in particular those coming from South-east Asia. Together with NARIT we are co-organising for the first time in Viet Nam this year’s SEAN meeting. It will take place at VNSC from December 12<sup>th</sup> to 13<sup>th</sup>. We keep close contact and will do our utmost to make the event a success.

### **ADDRESS**

*given by Bac Pierre on the occasion of the award of the 2016 Phan Chau Trinh Prize for educational and cultural development.*

The prize, which I have the great honour to receive today, is much too prestigious in comparison with my modest contribution to the advancement of fundamental science in the country. I understand my nomination as a manifestation of friendship rather than as the recognition of successes which I failed to achieve; at best may it be a recognition of the effort that I have been devoting, for now sixteen years, to helping with the development of science in the country and with the cultural change of style that it requires. The cultural and educational development of the country is indeed a prerequisite to its progress. I am deeply convinced that if we succeed in its achievement, the rest will follow. It remains as true today as it was a century ago, when Phan Chau Trinh and his companions,

the so-called Five Dragons, were fighting for cultural and educational emancipation of the Vietnamese people as the best way toward independence and freedom.

Our universities are modelled on what universities were fifty years ago in developed countries. But fifty years have passed and we are a country that is still struggling for its development after decades of wars and starvation, the scars of which are still with us. We must rethink which kind of higher education we need in order to best serve the interests of the nation. We must give much more importance to vocational guidance. We must understand how many workers, how many technicians, how many engineers, the country needs for its progress; and how they must be distributed among the various professions. How many medical doctors, how many nurses, how many architects, how many teachers, how many farmers. Today, so many university students waste four or five years, among the most precious in their life, in the illusory hope of some kind of social promotion, listening to lectures that are miles away from what we should be teaching them. Nuclear physics classes are still teaching the same nuclear physics as I learned as a student sixty years ago and in over twenty years, we have not yet been able to train the team of engineers and scientists who could master the construction, operation, exploitation and maintenance of our future nuclear power plants.

Today, we are training too many students in the tertiary sector, in marketing, in banking, in management, names which often hide feeding the cheap labour that globalisation requires from developing countries in a regime of market economy. Before teaching marketing, we need to teach how to produce what we may need marketing for; before teaching management, we need to teach the skills that will require being managed. Otherwise we shall train managers who will have no one to manage but themselves.

We are spending fortunes to send many of our young students study abroad for a master or a PhD. But we do not exert enough judgement in deciding which kind of skills we wish them to acquire. We do not invest enough effort in following up on their training when they are back home and much of the investment that the country devotes to such training abroad is simply wasted.

Worse, it feeds a brain drain that is fatal to the country. It no longer makes sense to waste so much money in sending our children abroad and maintaining too high a level of brain drain. We would be much better off by keeping this money to support those who stay at home with the determination to change things to the better. Of course, it would imply a change of style in our practice: we should be much more selective in choosing, on the sole basis of their talents, those who have such ability; and we should offer them resources, both in terms of wages and of working environment, that can attract them. They should see their action in the framework of a long term policy, clearly spelled out, giving them confidence in a sustainable support, giving them reasons to be proud of their achievements, giving them a sense of serving a country which recognizes their contribution.

The world around us keeps changing, much faster today than it used to, even in the recent past. We need to raise responsible citizens, who look around them with wide open eyes, who can exert their own judgement, who can adapt swiftly to a new environment. We need to raise responsible citizens who reject doctrines and dogmas, who fight inertia, bureaucracy and conservatism, who get outraged when they witness events that run against their convictions. We need to raise responsible citizens who are able to change the regulations that govern our society when the changing world around us requires it, not simply to blindly apply rules that have become obsolete and a cause of paralysis and of sclerosis.

The change of style that is required for such progress implies a restoration of moral and intellectual rigour and of professionalism in our habits and practices that we, scholars, scientists, intellectuals have the duty to foster. We need to restore respect for knowledge, for integrity, for the primacy of serving the interests of the community over serving one's own interests. Failing to do so ineluctably means failing to open the country to progress.

Culture does not mean conservatism, nor does it mean exclusion. On the contrary, it means progress and tolerance. The respect which we owe to our ancestors, who have made us who we are, to our country, to our traditions does not mean that we should not respect the cultures and traditions of

our brothers and sisters in the world. On the contrary, it should make us curious of learning about these. We should have the ambition to learn from other cultures as much as to give our own as an example to the world. Such an attitude of curiosity, of rigour, of tolerance and of foresight is inherent, in particular, to scientific culture and we, scientists, must be committed to it. We must feel the duty of fighting for restoring these intellectual and moral values that contribute to the elevation of human dignity. We must feel responsible for promoting a science without border.



*Bac Pierre and Chu Hao during the Phan Chau Trinh ceremony*

In order to succeed, we need to trust the young generation much more than we are presently doing. We need to rely on their enthusiasm, their energy, their talents, their skills, their generosity, their faith in a future of which they are the main actors. We need to give them a chance to bring to the country the fresh air which we need so much in order to breathe deeper. We need to give them opportunities to change things to the better, encouragements to take initiatives that will contribute to the progress and development of the nation. Its future is in their hands, the hands of the Doi Moi generation. They have not suffered the wars, the starvations, the pains, the sorrows, the oppression that their parents and grandparents had to endure. They inherited from them independence and freedom. Their fight is no longer for winning wars, but for winning the peace. It is as noble a cause to serve as was the cause for which their parents and grandparents have fought. As noble and as challenging. We must do our utmost to give them the support and encouragements that the task requires; we need to do our utmost to equip them with the

tools that will make it possible for them to overcome the many obstacles that they will have to face.

I may sound arrogant in speaking the way I do. Who am I to think that I know what we should be doing? Having convictions is one thing, being right is something else. My only excuse for speaking so freely is that I don't do so for me, I am an old man, but for the young colleagues whose lives I share day after day. My only motivation is to see the country give them the opportunities that their talents and generosity deserve having. What I say is not original; it is simply the expression of common sense and of the courage of facing the truth.

Before closing this address, allow me to express my deep gratitude to those whose indefectible friendship has made time pass by so happily over these past sixteen years: my wife, of course, without whom I would not have come to Vietnam; my young colleagues, who are present behind each of my efforts; and my friends Viet Phuong, Hoang Tuy and Pham Duy Hien, of whom I share the convictions and for whom I have as deep a respect as profound a devotion. Finally, allow me to thank Madam Nguyen Thi Binh, Mister Nguyen Ngoc and Professor Chu Hao, who have placed in me their confidence with the award of a prize, which, I repeat, my modest merits do not deserve. I will do my best to be worthy of their confidence and of the example set by my prestigious predecessors.

### ***THIS YEAR'S STEM DAY***

*Thao and Tuan-Anh helped with the organisation of this year's STEM day, to which VNSC gave an important contribution. They report below.*

STEM stands for Science, Technology, Engineering, and Mathematics. Promoting STEM teaching to young children has become of major concern among educators around the world in recent years. In several Vietnamese cities, such as Ha Noi and Ho Chi Minh City, science clubs have been organised together with other means to foster extracurricular activities aimed at children between 6 and 12. A STEM day was held in Ha Noi for the second time this year, in the wake of last year's successful experience. Some two thousand attended, from high school students to very young

children accompanied by their parents. They were mostly Hanoians, but some also came from neighbouring provinces such as Nam Dinh, Thai Binh and Quang Ninh. The theme of the event was “*Cổ máy thời gian*”, meant to convey the idea that over centuries, men kept strengthening their domination over nature, with inventing and constructing increasingly sophisticated tools and instruments.

VNSC manned a booth as part of a programme meant to celebrate the fifth anniversary of the centre. The idea was to help children to learn about the Universe and to make them aware of the role of science and technology in the exploration of space. The booth was accordingly split in two parts, one on astronomy centred on Earth, Moon, solar system and constellations, and the other on space technology, centred on satellites, rockets and remote sensing. The idea was to start with observations familiar to young children and progressively introduce them to what is hiding behind these.



*Thao keeping the VNSC booth on STEM day*

The Moon, for example, is familiar to children of all ages. But only the older of them know that it is in fact diffusing light from the Sun. We illustrated for them the different phases of the Moon with a simple setup. We also made them play a kind of role game, with two kids wearing one a mask figuring the Moon and the other a mask figuring the Earth; we made them turn slowly around each other in the way the Moon does around the Earth and explained for them the phases of the Moon, and even the tides, making them think of what a day means on the Moon and making them aware of the fact that it always shows us a same hemisphere. It was only when a

spacecraft could be sent to travel around the Moon that we could discover what the other hemisphere looks like. In another game, children were invited to throw stones onto a tray filled with fine powder for them to understand how a meteorite falling on the Moon surface leaves a crater at impact. This was an occasion to make them scrutinize the map of the Moon, identifying the various accidents of its terrain and understanding how they suggest to our imagination all kinds of marvellous legends. It was also an occasion to make them notice the difference with the Earth surface, to introduce the role of the atmosphere and tell them about shooting stars, to underline the roles of water and wind in gradually eroding the Earth surface. We could this way make them become conscious of the importance of the atmosphere, which, in spite of being so thin, protects life on Earth by shielding it from the unfriendly environment of empty space.



*Tuan-Anh showing constellations to school children on STEM day*

They enjoyed looking at the pictures taken from the Moon in 1969, revealing the Earth, our home, as a small blue disc. We had all kinds of small models to make them understand day and night, the seasons, time zones, solar and lunar eclipses, all of which turned out to be very useful. It was a challenge to make them understand gravity; we reviewed for them the evidence for the spherical shape of the Earth, showing pictures of it taken from space or pictures of its shadow on the Moon on the occasion of eclipses, and telling them about the mast of the ship disappearing behind the horizon; but to make them swallow that the Americans who live on the other side of the Earth do not fall down in empty space was more difficult.

For what concerns the Sun, the idea was to make them realize that it is a star as any other star and that, at variance with planets, it emits light of its own. We made them conscious of its crucial role in maintaining life on Earth, with illustrating examples such as photosynthesis, breathing and solar panels. We also mentioned auroras and magnetic storms occasionally causing major disruptions to electrical networks and telecommunication. We also had other models to show and play with, such as of the planets of our solar system, properly scaled, and other pictures and drawings, such as of the major constellations. I wish to take this opportunity to praise the quality of the toolkit that we had got from Universe Awareness, a IAU and UNESCO endorsed project aimed at “inspiring every child with our wonderful cosmos”. I gratefully acknowledge their support.



*Khoi carrying the Sun on his head*

As far as space technology was concerned, they could learn how to launch a satellite on orbit, understand the roles of the different stages of a rocket, make the difference between expandable and reusable vehicles; we had models of the space shuttle and of the international space station. We told them about PicoDragon, a small satellite assembled at VNSC and brought to the ISS by a Japanese module in 2013, from which it was then dropped into space. They were told about the structure, components and basic functions of satellites and ground stations, the need for both satellite control and signal reception. Applications of satellite technology to telecommunication, navigation and remote sensing were abundantly illustrated.

In parallel with exhibition sites such as that where the VNSC booth was installed, STEM day was also celebrated in several other places. An

example is Trung Vuong secondary school and educational farm where the school children have been conducting interesting chemistry experiments, such as simulating volcanic eruptions or demonstrating the use of test-pads that they had made themselves to detect the presence of borax in sausages. The Edu Farm Academy presented a beautiful vegetable garden made of many recycled plastic bottles of all colours.

The day has been a success: it has attracted the interest of many children on science and technology, and, in our specific case, on space and the Universe. No doubt, they will remember the experience, which will leave a mark in their mind and will have made them become aware of the importance of space science and space technology in our daily life.

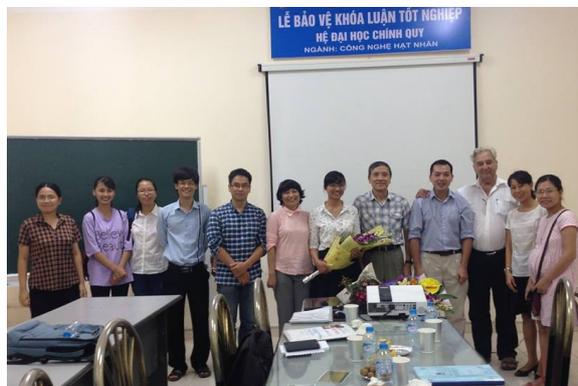
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– PHOTO ALBUM –



*Hosting our Tia Sang friends after lunch*



*Phuong, the jury and friends after her thesis defence*



*Celebration of Bac Pierre's birthday*



*At Tuan-Anh and Minh Ngoc wedding*



*Thao and Paul Ho*



*Phuong with her classmates at the school in Quy Nhon*



*At the VNSC booth on STEM day*



*Tuan-Anh entertaining a young future astronomer on STEM day*



*Bac Pierre and Khoi in the office*



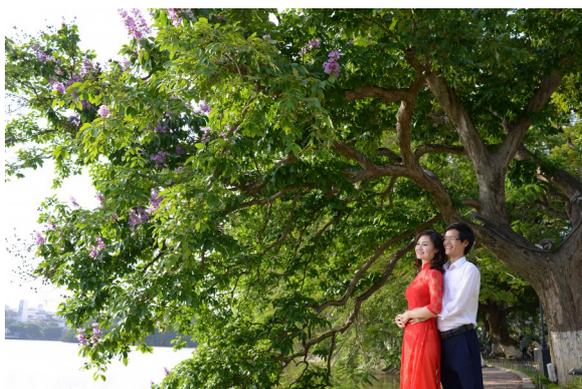
*With Viet Phuong after lunch*



*Bidding farewell to Hoang Anh*



*Dr. Zamri Zainal Abidin presenting the state of Malaysia radio astronomy in the VNSC conference room*



*Idyllic wedding picture of Tuan-Anh and Minh Ngoc at Hoan Kiem lake*



*Minh Ngoc and Tuan-Anh*



*Group photo of the workshop on “Astronomy Development in Viet Nam: challenges and opportunities”*