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COMMISSION 22 METEORS, METEORITES AND INTERPLANETARY DUST

MÉTEORES, MÉTÉORITES ET POUSSIÈRE INTERPLANÉTAIRE

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COMMISSION 22 WORKING GROUPS

Div. III / Commission 22 WG	**Professional-Amateur Cooperation in Meteors**
Div. III / Commission 22 WG	
Div. III / Commission 22 TG	**Meteor Shower Nomenclature**

TRIENNIAL REPORT 2006 - 2009

1. Introduction

Commission 22 is part of Division III on *Planetary System Sciences* of the International Astronomical Union. Members of Commission 22 are professional scientists studying bodies in the Solar System smaller than asteroids and comets, and their interactions with planets. The main subjects of interest are meteors, meteoroids, meteoroid streams, interplanetary dust particles, and also zodiacal cloud, meteor trains, meteorites, tektites, etc.

At present Commission 22 consists of 112 active members and 11 of them, mostly young astronomers, are new members elected during the last General Assembly of the IAU in Prague in 2006. Over the past triennium the members of the organizing committee had three business meetings, in August 2006 in Prague (Czech Republic), in June 2007 in Barcelona (Spain) and in July 2008 in Baltimore (USA). The main topics discussed there have been collected in the minutes from these meetings (see: `<meteor.asu.cas.cz /IAU/business.html>`). The official webpage of the Commission 22 was established by the commission secretary immediately after the last GA in Prague and has the address `<meteor.asu.cas.cz/IAU/>`.

2. Meetings

Several important international conferences devoted exclusively or partly to the topics covered by Commission 22 were held in the period 2006 - 2009. Specific conferences in which members of Commission 22 have played a major part are described in more detail. Commission 22 supported the proposal of Commission 20 and Commission 15 of the Division III to organize the Symposium on *Icy bodies in the solar system* during next General Assembly of the IAU in Rio de Janeiro in 2009, selected as IAU Symposium No. 263.

2.1. *Meteoroids 2007*

The *Meteoroids 2007 Conference* held at the CosmoCaixa Science Museum in Barcelona, Spain, 11-15 June 2007, was the main conference in meteor astronomy in this period and served as the official tri-annual meeting of Commission 22. It was the 6^{th} in the series of Meteoroids conferences, which started in 1992.

The conference was very successful and was dedicated to a comprehensive review of meteor research, including topics dedicated to the physics and chemistry of meteors, meteoroid stream dynamics, activity and forecasting of meteor showers, interaction of larger meteoroids with the atmosphere, physical properties of interplanetary dust, and all techniques of meteor observations.

Researchers in meteor science and supporting fields representing more than 20 countries participated at this international conference where 126 presentations were delivered in oral and poster forms. Essential contributions were collected in the Special Issue of the *Earth, Moon and Planets* journal named *Advances in Meteoroid and Meteor Science* (EMP, Vol. 102, Nos 1-4, June 2008, eds. J. M. Trigo-Rodríguez, F. J. M. Rietmeijer, J. Llorca & D. Janches). The 69 papers included in this volume represent the work of 154 authors from about 70 different institutions across the globe (Trigo-Rogríguez *et al.* 2008). All papers underwent the rigorous refereeing process that is applied to other papers in the journal *Earth, Moon, and Planets*.

The conference provided a summarizing overview on meteoroid and meteor science in two broad-based thematic categories. The first category covered detection, observation and measurement techniques many of which were described in great detail by invited speakers. The contributed presentations in this category focused on the formation of meteoroid streams by active or dormant comets and asteroids, together with dynamical studies of meteoroids moving through the solar system. The study of meteoroids as space hazard is a topic of rapidly increasing interest due to the need of insure the safety and health of manned and unmanned space missions. Papers discussing optical techniques to observe meteor phenomena were prominent and results included the observation of enhanced activities of the 2006 Leonids and 2006 Orionids. The outcomes of years of infrasound and radar detections also showed that these methodologies are no longer stepchildren of meteor science, greatly expanding the mass range of extraterrestrial bodies which can now be studied. Radar meteor detection methodologies have evolved immensely since these instruments were first applied in the 1950s. Greater transmitted power, multi station interferometric techniques and the use of dual frequencies allow meteor radars to provide exciting new data, including the discovery of new meteoroid streams. In addition, in the past decade, the increasing use of high-power and large-aperture radars offer a new look at the meteor phenomena by allowing the routine study of the meteor head-echo, non-specular trails and a particle size range that bridge the historic gap between dust detector on board of satellites and specular meteor radars.

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The second category of results included dynamical modeling exemplified by the power of reconstructing past meteor displays and accurately predicting modern meteor shower activities. Meteor observations are now providing more precise input to fine-tuned models, which is an achievement of increasing sophistication in both areas. For example, Comet Wild 2 data were preliminary explored for their relevance to cometary meteoroid properties. With the availability of this comet dust, interplanetary dust particles, micrometeorites and meteorites for laboratory studies, we are able now to take the next great step of using what we know of these samples as a starting point for experimental meteor science. Results from laboratory simulations of chemical releases during the meteor ablation process are showing that we are closer to understanding how the meteoric mass is deposited in the upper atmosphere. This particular advancement allows linking the meteoric flux with several aeronomical phenomena such as mesospheric metallic layers, noctilucent clouds and meteoric smoke particles embedded in the ionospheric plasma.

During the *Meteoroids 2007 Conference*, members of Organizing Committee of the Commission 22 decided that the next *Meteoroids 2010 Conference* will be held in Breckenridge, Colorado, USA in May 2010. The chair of the LOC will be Diego Janches. The SOC was established in late 2007 and has already started work.

2.2. *Asteroids, Comets, Meteors 2008*

The *Asteroids, Comets, Meteors* (*ACM*) Conference will be held in Baltimore, USA, 14-18 July 2008. This is the premier international gathering of scientists who study small bodies of our Solar System. The ACM series began in 1983 in Uppsala, Sweden, and the 2008 *ACM Conference* will be the 10th in the series and will mark the 25th anniversary of the first meeting in Uppsala. It mainly serves as a means of bringing together different groups within the asteroid, comet, and meteor communities who do not often have the opportunity to interact. The conference now takes place every three years, and it is the pre-eminent meeting for small-bodies research with great attendance.

The scope of presentations and discussion is broad, including all topics related to asteroids, comets, and meteors, including observations, theories of origin and evolution, discoveries, astrometry, dynamics, internal structure, mineralogical composition, space missions, laboratory studies, classifications, and databases. Two plenary sessions will be completely devoted to the meteor science and one session will be devoted to the interrelations among all main small bodies objects, i.e., also meteoroids.

2.3. *Bolides and Meteorites Falls 2009*

The international conference *Bolides and Meteorite Falls* will be held on the occasion of the 50th anniversary of the Pribram meteorite fall in Prague, Czech Republic, 10–15 May 2009. This conference completely covers the main interest of Commission 22 and will be held under auspices of this commission.

The Pribram meteorite fall on 7 April 1959 was the first instrumentally observed meteorite fall in history and it belongs to the most important milestones in meteor science. It initiated various observational programs and modeling efforts and our understanding of bolides and associated phenomena increased dramatically during the past 50 years. However, the conference will be devoted not only to celebrate the 50th anniversary but also to discuss numerous recent achievements in this field and future prospects in the study of larger meteoroids.

3. Commission bodies

3.1. *Working Group on Professional-Amateur Cooperation in Meteors*

The Working Group *Professional-Amateur* of Commission 22 consists of leading amateur meteor astronomers on all continents, who help provide support for international observing campaigns and facilitate contacts between professional and amateur astronomers. The working group also consists of professional meteor astronomers who recognize the importance of the amateur astronomy community for the future of our field. The members elected to this Task Group were Galina Ryabova (chair), Pavel Spurný, Chris Trayner, Juraj Tóth, Shinsuke Abe, Josep Trigo-Rodríguez, Jérémie Vaubaillon, Bob Lunsford, Hiroshi Ogawa, R. Arlt, Steve Evans (who regrettably passed away in April 2008) and Tim Cooper.

The International Meteor Organization (IMO), an association of over 200 active amateur meteor astronomers along with several professionals, plays a very important and irreplaceable role in this field. The IMO was created in 1988 in response to an ever growing need for international cooperation of amateur meteor work. As such, the IMO's main objectives are to encourage, support and coordinate meteor observing, to improve the quality of amateur observations, to disseminate observations and results to other amateurs and professionals and to make global analyses of observations received world-wide. The IMO's main instrument to achieve its goals is its bimonthly journal WGN. Annually, it contains over 220 pages of general meteor news, observing program guidelines, reports and analyses of observations, and more general articles on meteoric phenomena, some of them by professionals in the field. All important details about IMO and its work are available on the webpage <www.imo.net/>.

3.2. *Task Group Meteor Shower Nomenclature*

At the 2006 IAU General Assembly in Prague, a Task Group was established with the objective to formulate a descriptive list of established meteor showers that can receive official names during the next 2009 IAU General Assembly in Rio de Janeiro. This task aims to uniquely identify all existing meteor showers and establish unique names. The Commission 22 members elected to this Task Group were Peter Jenniskens (chair), Vladimír Porubčan, Pavel Spurný, William J. Baggaley, Juergen Rendtel, Shinsuke Abe, Robert Hawkes, and Tadeusz J. Jopek. The effective period of the Task Group is three years.

In order to reach this objective, a Working List of Meteor Showers ('the Working List') was adopted as a starting point and meteor shower nomenclature rules were formulated. The Working List was based on data collected in Jenniskens (2006) and published by the IAU Meteor Orbit Data Center (see: <www.astro.sk/~ne/IAUMDC/STREAMLIST/>). The nomenclature rules were published in IAU *Information Bulletin* 99 and announced in the scientific literature (Jenniskens 2008).

At the *Meteoroids 2007 Conference* in Barcelona, the Task Group convened and established a procedure for adding new showers to the Working List. Tadeusz J. Jopek of Poznan Observatory, Poland, was appointed to be the point of contact for reporting the discovery of new meteor showers, and for reports that established meteor showers in the Working List. Jopek established a new website for the IAU Meteor Data Center, which includes the Working List and the current IAU List of Established Showers (see: <www.ta3.sk/IAUC22DB/MDC2007/>) .

The first series of twelve new showers was added to the Working List based on results from the Canadian Meteor Orbit Radar of the University of Western Ontario, Canada. The new additions were announced in CBET 1142 of 17 November 2007 (Brown *et al.* 2007).

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3.3. *Meteor Data Center*

The IAU Meteor Data Center (MDC) is operated by the Astronomical Institute of the Slovak Academy of Sciences under the auspices of Commission 22 and Division III. The center is responsible for the efficient collection, checking and dissemination of trajectory observations and orbits of meteors. It acts as a central depository for meteor orbits obtained by photographic, video and radar techniques. The MDC closely cooperates with the Task Group on *Meteor Shower Nomenclature* of IAU Commission 22 on the designation of all existing meteor showers. The official web page of the MDC is `<www.astro.sk/~ne/IAUMDC/Ph2003/>` (Lindblad *et al.* 2003).

4. Closing remark

The great progress made by Commission 22 members in the past triennium proves that this field of astronomy prospers. The field has an important impact on our knowledge of planetary astronomy and on space exploration. The International Astronomical Union plays an important role in organizing the community and in finding common ground on various issues.

Pavel Spurný
president of the Commission

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