

**ANNUAL REPORT OF THE SA NATIONAL COMMITTEE FOR URSI**  
**for the Period 1 January 2007 to 31 December 2007**  
**Professor K M Reineck, Chair**

**1. Executive Summary**

The 2007 Annual Meeting of the National Committee for URSI was held at the Hermanus Magnetic Observatory (HMO) in Hermanus, Western Cape on 4<sup>th</sup> May 2007. With almost all Commissions represented it was a time to reflect on the achievements of the past year and to look ahead to the 29<sup>th</sup> General Assembly of the International Union of Radio Science (Union Radio Scientifique Internationale / URSI) to be held in downtown Chicago, Illinois, USA on August 07-16, 2008. This is always a highlight to review current research trends, present new discoveries and make plans for future research and special projects in all areas of radio science, especially where international cooperation is desirable. The General Assemblies now span a period from 1922 when the first Assembly was held in Brussels, Belgium.

The local National Committee for URSI has been gearing up to meet the challenge of participation in the activities of the 2008 General Assembly. It is up to each Commission to keep in contact with their Commission chairs and encourage researchers to submit papers by the deadline of 31. January 2008. Most papers are being presented in oral sessions, but there is also provision for poster paper presentations. As in the past the complete GA Proceedings will be available on a CD-ROM.

The Commissions of all member countries are tasked to participate in and become engaged in the activities of URSI and in particular contribute to the thrust of new scientific projects of a global dimension.

In an effort to remain at the forefront of scientific endeavour the URSI executive decided that in future white papers on highly topical subject matter be introduced. The first such white paper was presented to URSI Council at the last General Assembly in New Delhi, India on the subject of Solar Power Satellites. This proposal received Council approval in that it considered, that meeting the world's energy needs, without considerable negative environmental effects, is one of the major challenges to sustainable development. The potential interest in collecting the Sun's energy in space and transmitting it through electromagnetic waves (microwaves) to the ground, and feeding it to the terrestrial power grid is seen as a major challenge. Preliminary studies by radio scientists have evaluated the feasibility of Solar Power Satellite systems and identified its benefits and problems. As a result the URSI Council at the last General Assembly resolved that URSI sees its role as providing the necessary scientific background and a fair and open forum on all technical issues related to Solar Power Satellite systems.

Thus the URSI white paper no *Solar Power Satellite Systems* should be used as a reference to undertake world-wide co-ordinated studies to investigate the potential of Solar Power Satellites as an alternative energy source, taking into account all relative scientific aspects, environmental, societal, as well as the impact on other radio services, and its technical and economic feasibility.

Another white paper on *Wireless Communication and Health* will be prepared for submission to Council at the 2008 General Assembly. This again is a topic of significant interest to the general public and it has already received a lot of publicity in the media. In particular Commission K is involved with work in this field. The SA National Committee has over the years devoted particular attention to the effects of Electromagnetic Radiation on the human body as related to mobile phones and power lines.

South African Scientists are represented in all of the Commissions covered by URSI and many facets of research are covered. In particular the Universities and Research Institutions such as the CSIR are engaged in projects covering the various fields. The principle researchers covering the various fields of the URSI Commissions are briefly mentioned.

Commission A, ***Electromagnetic Metrology*** is conducted at the University of Stellenbosch (Prof HC Reader, Dr RG Urban and Dr R Geschke), the University of Pretoria (Profs W Odendaal and J Joubert), and at the National Metrology Institute of South Africa (NMISA) (N Nel-Sakharova, E Coetzee, C Matthee, E Dressler and Dr J Mostert).

Commission B, ***Fields and Waves*** is a field of research predominantly performed at the following Universities: University of Pretoria (Profs J Joubert, W Odendaal and JAG Malherbe), University of Stellenbosch ( Profs J Cloete, D Davidson, Hc Reader, K Palmer and P Meyer), University of Witwatersrand (Prof AR Clark).

Commission C, ***Radio Communication Systems and Signal Processing***, is a research field with many activities in South Africa. It must suffice to mention the various Institutions involved: Rhodes University, University of Fort Hare, Nelson Mandela Metropolitan University, University of Stellenbosch, Cape Peninsula University of Technology, University of Cape Town, University of Witwatersrand, University of Limpopo, University of Johannesburg, University of Pretoria, University of Western Cape.

Commission D, ***Electronics and Photonics***

Commission E, ***Electromagnetic Noise and Interference*** research is carried out at a number of academic institutions: University of Stellenbosch (Prof HC Reader and Dr RH Geschke), University of Witwatersrand (Profs J Reynders, WA Cronje, AR Clark and Dr J van Coller), University of Kwa-Zulu Natal (Profs N Ijumba and S Mneney), University of Pretoria (Prof W Odendaal), ESKOM (Prof AC Britten, Messrs KR Hubbard, P Johnson, B Otto and L Pillay), TELKOM (Ms M Paul), SENTECH (Mr Koffeman), VODACOM (Mr C Mercer).

Commission F, ***Wave Propagation and Remote Sensing*** is carried out at the University of Cape Town (Prof MR Inggs), University of Stellenbosch (Prof S Mostert, E de Jager), Citrus Growers Association {CGA} (Mr W Lueck), Institute for Satellite and Software Applications {ISSA} (Mr T Boyd).

Commission G, ***Ionospheric Radio and Propagation*** research is carried out at the University of Kwa-Zulu Natal (Prof JPS Rash, Dr E Mravlag, Hermanus Magnetic Observatory (Mr Lindsay), Rhodes University (Prof AWV Poole, Dr L-A McKinnell)

Commission H, ***Waves in Plasma*** is field of research mainly carried out at the University of Kwa-Zulu Natal with significant international University collaboration (Profs ADM Walker, ARW Hughes and Dr A Collier).

Commission J, ***Radio Astronomy*** work is currently under taken by a number of Universities (Rhodes, UCT, UNW, UKZN, Wits and UJ) and at the Hartebeesthoek Radio Astronomy Observatory. Most of the work concerns activities in respect of the Square Kilometer Array (SKA) an international project.

Commission K, ***Electromagnetics in Biology and Medicine*** is a field with with considerable research effort at South African Universities, Research Institutions and Companies: Tshwane University of Technology (Mrs N Falzone), University of Pretoria Profs A Joubert, d Franken, Dr C Huysen, Mrs M Mabika, Mrs D Snyckers), South African Bureau of Standards (Prof A Joubert, Dr C Huysen).

At the 2008 General Assembly the South African National Committee will strive for more involvement in working groups, standing committees and Council work of URSI.

The National Committee for URSI continues to promote the aims of URSI and aims to widen its influence within the South African Science and Engineering fraternity. The upcoming General Assembly should be published widely and scientists encouraged to participate.

Headings	Activities completed- January to December 2007	Activities planned- January to December 2008
2. Background and Composition of the National Committee	<p>There is general willingness to make room for younger persons on the National Committee. Such candidates are normally recruited from Research Groups at Universities, Research Institutes and Industry. It is found very difficult to identify and interest talented and academically good black graduates as these are snapped up by industry to become managers and are then lost to the research community.</p> <p><i>Prof K M Reineck</i> (UCT) Chair / <i>Prof M R Inggs</i> (UCT) Deputy Chair  <i>Mr R E Dressler</i> (NMISA) Commission A: Electromagnetic Metrology  Alternate: Professor J W Odendaal (UP)  <i>Dr A R Clark</i> (Wits) Commission B: Fields and Waves  Alternate: Professor J Joubert (UP)  <i>Mr B T J Maharaj</i> (UP) Commission C: Systems and Signal Processing  Alternate: vacant  <i>Professor B M Laquet</i> (Wits) Commission D: Electronics and Photonics  Alternate: Mr S Sinha (UP)  <i>Professor H C Reader</i> (US) Commission E: EM Noise &amp; Interference  Alternate: Dr R Geschke (US)  <i>Professor M R Inggs</i> (UCT) Commission F: Wave Prop. &amp; Remote Sens.  Alternate: Ms A Mlisa (Umvoto Africa)  <i>Dr E Mravlag</i> (UKZN) Commission G: Ionospheric Radio &amp; Propagation  Alternate: Dr Lee-Anne McKinnell (Rhodes)  <i>Professor A R W Hughes</i> (UKZN) Commission H: Waves in Plasma  Alternate: Dr A Collier (UKZN)  <i>Professor J L Jonas</i> (Rhodes) Commission J: Radio Astronomy  Alternate: Dr J F H Quick (Hartebeesthoek)  <i>Professor P J Cilliers</i> (HMO) Commission K: EM in Biology &amp; Medicine  Alternate: Mr R Hubbard (Eskom)</p>	<p>A number of changes in the composition of the National Committee will occur in 2008. Also a new chairperson will take office as from the beginning of 2008.</p> <p>New Chairperson:  <i>Professor B M (Bea) Lacquet</i> (Wits)  Deputy Chair (one / two years to help with transition)  <i>Professor K M Reineck</i></p> <p><i>Mr S Sinha</i> (UP) Commission D</p> <p><i>Dr R (Riana) Geschke</i> (US) Commission E  Alternate: Professor H C Reader  <i>Ms A Mlisa</i> (Umvoto Africa) Commission F  Alternate: Professor M R Inggs</p>

Headings	Activities completed- January to December 2007	Activities planned- January to December 2008
3. Participation by South Africans in Union activities	<ul style="list-style-type: none"> <li>• Dr. Lee-Anne McKinnell is Vice Chair for the G1 Ionosonde Network Advisory Group (INAG)</li> <li>• Prof K M Reineck is Member of the Standing Committee on Developing Countries.</li> </ul>	<ul style="list-style-type: none"> <li>• The National Committee aims to get more South Africans involved in Union activities and hopes to be successful in this at the 2008 General Assembly.</li> </ul>
3.1. Size of local community	<ul style="list-style-type: none"> <li>• The local science and engineering community adhering to the activities of URSI consists of about 350 researchers at Universities the CSIR and other Research Institutions. Because of the corporate membership structure of URSI it is difficult to give exact figures.</li> </ul>	<ul style="list-style-type: none"> <li>• It is hoped that the URSI National Committee and its activities will become better known to the South African science and engineering community.</li> </ul>
3.2 South Africans serving on Unions or its subsidiary bodies	<ul style="list-style-type: none"> <li>• Members of the National Committee are in contact or serve on the following local bodies: ICASA, SABS, TELKOM, ESKOM, MTN, VODACOM.</li> <li>• Prof H C Reader and Mr R Hubbard continue to serve on the EMC Technical Committee 73.</li> <li>• Prof J Jonas was appointed to the ICASA Working Group on Radio Astronomy.</li> <li>• Prof M Inggs as Technical Chair of the local organising committee for the International Geoscience and Remote Sensing Society continues planning for the IEEE IGARSS 2009 conference.</li> <li>• Prof J Jonas is the SA representative on the International SKA Steering Committee (ISSC) and will carry on with this work..</li> </ul>	<ul style="list-style-type: none"> <li>• The National Committee strives for more representation on local policy formulating bodies in order to provide vital scientific and engineering input.</li> </ul>
3.3 Attendance of International Congresses/Workshops  <ul style="list-style-type: none"> <li>• Number of conferences attended</li> <li>• Number of South African delegates</li> <li>• Number of papers presented</li> </ul>	<ul style="list-style-type: none"> <li>• International and local conferences are attended on a regular basis. The members of the National Committee are leaders of prominent research groups who participate in Conferences every year. Conferences involve the ten Commissions and are generally too numerous to report on here. Details are given in various Commission Reports tabled at every annual meeting of the National Committee for URSI and attached to the minutes of the annual meeting.</li> <li>• Participation of URSI in the IPY has encouraged a group of South African Researchers to participate funded by SANAP. About 15 people are involved in measurements and data collection.</li> </ul>	<ul style="list-style-type: none"> <li>• Attendance at International and local Conferences is ongoing and is a requirement of the research output of the Universities and Research Institutions.</li> <li>• The number of papers submitted each year are quite substantial and too numerous to report here.</li> </ul>
3.4 Capacity Building with regard to Membership of National Committee and involvement of young scientists in International Meetings	<ul style="list-style-type: none"> <li>• The question of Capacity Building is matter for discussion at most annual meetings. The appointment of Alternates has helped with transformation process, however progress is slow. URSI through its young scientist award programme allows us to identify young researchers who could be future candidates for the National Committee.</li> </ul>	<ul style="list-style-type: none"> <li>• Changes in the composition of the National Committee for URSI are occurring as from the beginning of 2008. A number of Alternate Members have moved to the position of Member of the Committee.</li> </ul>

Headings	Activities completed- January to December 2007	Activities planned- January to December 2008
3.5 Organisation of Union related Conferences in South Africa	<ul style="list-style-type: none"> <li>• IEEE Africon 2007, 26-28 September 2007, Windhoek, Namibia</li> <li>• Test and Measurement Conference 19-21 Nov. 2007, Spier Wine Estate, Stellenbosch</li> </ul>	<ul style="list-style-type: none"> <li>• International Polar Year (IPY) 2007-2008 The IPY is organized through the International Council for Science and the World Meteorological Organization (WMO). IPY 2007-2008 covers two full annual cycles from March 2007 to March 2009 and will involve over 200 projects with thousands of scientists from over 60 nations examining a wide range of physical, biological and social research.</li> <li>• Radio Frequency Planning, Jan. 2008 Johannesburg.</li> <li>• URSI General Assembly, Chicago, USA, 07-16 Aug. 2008</li> </ul>
3.6 Contribution by members to documents and publications	<ul style="list-style-type: none"> <li>• Members of the National Committee are involved in the preparation and publication of Government policy papers. Prof H C Reader, Dr R H Geschke are involved in EMC work.</li> <li>• A group of researchers from a number of Universities is involved in an SABS coordinated research on 900 MHz GSM mobile phone effects on a reproductive model.</li> </ul>	<ul style="list-style-type: none"> <li>• The National Committee continues to encourage involvement of members in these activities.</li> <li>• International collaboration has been fostered with a University in Finland.</li> </ul>
3.7 Report back on recommendations made during the in depth review	<ul style="list-style-type: none"> <li>• Recommendations regarding capacity building and transformation are being addressed. We are aware that progress in this regard has been slow. A list of possible future candidates for the National Committee has been compiled with a view to accelerate the transformation process. In addition we have appointed Alternate members of the National Committee to assist transformation.</li> </ul>	<ul style="list-style-type: none"> <li>• The issue of transformation has been taken up and changes to the composition of the National Committee are occurring.</li> </ul>
4. Value to the Community and Benefit to South Africa	<ul style="list-style-type: none"> <li>• Local Scientists and Engineers contribute widely to the various fields of Radio Science. A significant part of the research by South African Institutions is of direct benefit to the SA community. The Square Kilometre Array as an example is a project that already provides work for a fair number of South Africans. In general Membership of URSI offers the opportunity for South Africans to participate in international forums and professional bodies. It will continue to be the aim of the National Committee to try and interest a larger number of local scientists in the activities and work of URSI.</li> </ul>	<ul style="list-style-type: none"> <li>• It is hoped to further strengthen the local URSI representation by stronger interaction within the local community of scientists and engineers. Those already participating are benefiting greatly from the interaction with scientists around the globe.</li> </ul>

<b>Headings</b>	<b>Activities completed- January to December 2007</b>	<b>Activities planned- January to December 2008</b>
5. Public Society Interfaces and Outreach Programmes – self initiated or facilitated by ICSU	<ul style="list-style-type: none"> <li>On the question of health issues surrounding electromagnetic wave radiation is a topic of great public interest and concern. Professors H C Reader and P J Cilliers are experts on this subject and have been acting as spokespersons to the South African media and public.</li> </ul>	<ul style="list-style-type: none"> <li>The Committee will continue publish work of general interest. Thus the work concerning the effects of Electromagnetic Radiation from mobile phones will as an example be an item for publication in the local press.</li> </ul>
6. Research Highlights/ New Initiatives in South Africa	<ul style="list-style-type: none"> <li>The Square Kilometre Array (SKA) has continued to be the prime focus of the National Committee. RFI measurements were conducted to establish the suitability of a possible South African site for the SKA. The site proposals from the four competing countries i.e. Argentina, Australia, China and South Africa are currently being scrutinised by the International SKA Site Advisory Committee (ISSAC) and various working groups of the International SKA Steering Committee (ISSC).</li> <li>Research of Commission K will continue to be involved with the effects of Electromagnetic Radiation from power lines and mobile phones.</li> </ul>	<ul style="list-style-type: none"> <li>Local scientists and engineers will continue during 2008 to be involved with numerous projects related to the SKA project. At the 2008 General Assembly the topic of Solar Power Satellites will feature prominently and in addition some preliminary studies will have been concluded with regard to the URSI white paper on Wireless Communication and Health.</li> <li>A number of studies are under way in South Africa funded by various organisation including mobile phone companies</li> </ul>
7. Science Education	<ul style="list-style-type: none"> <li>Most Members of the national Committee are University Professors and as such intimately involved in science and engineering education. Through outreach programmes schools are frequently visited and learners invited to Universities for open days through which science education is promoted. In addition University staff visit schools to introduce learners to tertiary education opportunities.</li> </ul>	<ul style="list-style-type: none"> <li>Wherever possible the National Committee will promote the question of science education in secondary educational establishments. Universities annually offer outreach programmes.</li> </ul>
8. Financial assistance received by South Africans direct from ICSU bodies during 2006	<ul style="list-style-type: none"> <li>The National Committee is not aware that any funding that has been received.</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>