

**RAPPORT D'ACTIVITE
DU COMITE NATIONAL BELGE DE GEODESIE ET DE GEOPHYSIQUE
EN 2008**

Au cours de l'année 2008 le Comité National de Géodésie et de Géophysique (CNBGG) a tenu une assemblée générale (29.01.2008) et deux séances ordinaires (15.05.08 et 9.10.08). Une troisième séance avait été convoquée le 27.11.08 mais a dû être annulée en dernière minute pour cause de maladie du conférencier.

Les conférences suivantes ont été données à la tribune du Comité:

29.01.08 Prof. Joachim Voigt, « Jacobs Universität Bremen », qui présente en anglais un exposé intitulé :

"Effects of internal geomagnetic variations on the Earth's space environment and the middle atmosphere"

Un bref résumé est donné ci dessous :

On geological time scales, variations of the internal geomagnetic field affect the structure and the dynamics of the Earth's magnetosphere and contribute to what may be called space climate and paleomagnetospheric processes. The presentation summarizes the paleomagnetospheric research that was carried out in the context of the DFG priority Programme SPP 1097 "Geomagnetic Variations". Structural aspects of paleomagnetospheres were studied using theoretical concepts of magnetosphere formation, a potential field approach to model magnetopause shielding, and magnetohydrodynamic simulations. The types of geomagnetic variations considered here include changes of dipole moments magnitude and excursions of the dipole axis. Quadrupolar paleomagnetospheres serve as important examples to assess the rich variety of non-dipolar configurations that may arise during geomagnetic polarity transitions. Energetic particles of solar and cosmic origin into the magnetosphere were studied by means of scaling relations for cutoff energies and differential particle fluxes as functions of a reduced dipole moment. We further investigated how higher-order core fields can open the polar caps and even create new particle entry regions in the equatorial region. The resulting particle fluxes into the upper and middle atmosphere during solar particle events were coupled into a numerical model to study ionization, chemistry and dynamics of the middle atmosphere. In combining magnetospheric and atmospheric modelling, we were able to identify geomagnetic transition field scenarios that could significantly affect the ozone chemistry in the middle atmosphere.

15.05.08 Dr. Steven Dewitte, de l'Institut Royal Météorologique, qui présente en anglais un exposé intitulé :

**"30 years of Total Solar Irradiance measurements:
status and outlook for the future."**

Un bref résumé est donné ci dessous :

The climate on earth is driven by the radiative heat exchanges with outer space at the top of the earth's atmosphere. For the monitoring and understanding of the change of climate with time, it is therefore necessary to make long term measurements of these radiative heat exchanges, including the heat input by the incoming solar irradiance, referred to as Total Solar Irradiance (TSI).

Useable TSI measurements from space exist since the launch of Nimbus 7 in 1978. Our institute has made important contributions to these measurements with a first instrument on Spacelab in 1983, six space shuttle flights of the SOLCON instrument from 1992 to 2003, the SOVA instrument on the European RETRIEVABLE CARRIER (EURECA) in 1992-1993, the DIARAD/VIRGO instrument on SOHO since 1996, and recently the DIARAD/SOVIM instrument on the International Space Station. Currently we are preparing the SOVAP instrument for launch on the PICARD satellite in 2009.

The variations of the TSI with time are the most relevant for climate change on earth. The TSI measurements cover 2.5 11 year solar cycles, indicating a variation of the order of 1 W/m^2 in phase with the solar activity, and causing weak temperature variations of the order of $0.1 \text{ }^\circ\text{C}$ to $0.2 \text{ }^\circ\text{C}$ on earth. There exists some controversy whether on top of this cyclic 11 year variation, there exists a decadal long term variation of the TSI, which would have a stronger climate change impact. Recently we were able to demonstrate that for the last solar cycle 23 there exists no such long term variation. This milestone result was obtained thanks to our DIARAD/VIRGO instrument which covered the entire cycle 23 with unprecedented stability, and thanks to the objective analysis of all other available TSI measurements.

The original intent of the TSI measurements was to measure the mean value of the TSI, referred to as the Solar Constant. Ironically, after 30 years of TSI measurements, we still have a relatively large uncertainty on the value of the solar constant, particularly after the launch of the TIM instrument on SORCE in 2003. We plan to finally determine the value of the solar constant by comparing our retrieved Sova 1 radiometer with a reference cryogenic radiometer.

Although there appears to be no long term decadal TSI variation during the recent 11 year solar cycles, there are strong indications that such a long term TSI variation did exist between the Maunder minimum corresponding to the little ice age around 1700, and the modern solar maximum conditions. With the PICARD project which is currently in preparation we will try to have an indirect reconstruction of these long term TSI variation through a correlation with solar diameter variations.

Finally, the SOVAP instrument on PICARD will contain a Bolometric Oscillation Sensor (BOS), which will resolve TSI variations at time scales smaller than those of the solar p mode variations. The BOS is developed in collaboration with the Royal Observatory of Belgium.

9.10.08 Prof. Jean-Pascal van Ypersele, climatologue de l'UCL et vice-président du GIEC (Groupe d'experts Intergouvernemental sur l'Evolution du Climat), qui présente en anglais un exposé intitulé :

"Climate change: The last IPCC (Intergovernmental Panel on Climate Change) report and new developments."

Un bref résumé est donné ci dessous :

Key messages :

- Climate change is happening now, mostly as a result of greenhouse gases (GHG) from human activities;
- Impacts will be important, with most damages in developing countries, but developed countries will be affected too;

- Together with lifestyle and behaviour changes, known technologies and policies can reduce GHG emissions at reasonable costs, but effective policies, including an effective carbon-price signal are required;
- The IPCC, which received the 2007 Nobel Peace Prize with Al Gore produces the most reliable set of assessed information about climate change in all its dimensions. Its Fourth Assessment Report (AR4) was published in 2007;
- Since the AR4, new observations and scientific analyses have confirmed the key messages from the IPCC;
- Some of the unique characteristics of IPCC, at the frontier between science and policy will be described, together with its work plan until 2015.

27.11.08 Prof. Philippe Huybrechts, de la VUB, correspondant belge de l'IACS (International Association of Cryospheric Sciences) devait présenter en anglais un exposé intitulé :
" Overview of cryospheric science in Belgium."

Un bref résumé est donné ci dessous :

The cryosphere is one of the most dynamic spheres on the Earth's surface on almost any time scale owing to the Earth's temperatures being around the freezing point of water. Recent interest in cryospheric research is fueled by its sensitive role in the Earth's climate system and by the threat of substantial sea level rise if land ice starts to melt in a warmer greenhouse world. Belgium harbours a very active cryospheric research community despite the fact that Belgium has no ice on its soil or that it was covered by large ice sheets during the Quaternary ice ages. Among other reasons, this is rooted in Belgium's historic presence in Antarctica and by theoretical palaeoclimatic research on the origin of the ice ages since the seventies. Cryospheric research groups at Belgian universities are currently involved in glacier studies in Alaska, the Alps, and the Himalaya and participate in glaciological field activities in Greenland and Antarctica, as well as on Arctic islands. Several groups play an important role in large international programmes for ice coring in Antarctica and Greenland. Moreover, Belgian research groups are deeply involved in sea-ice and ice-sheet modeling and in the modeling of the surface mass balance of the large polar ice sheets. As such, Belgian scientists have co-authored subsequent IPCC assessment report chapters dealing with the cryosphere, the modeling of ice-climate interactions, and the projection of sea-level changes. This presentation intends to give a (selective) overview of Belgian cryospheric science and its role in international scientific activities.

Le Prof. Huybrechts étant malade ce jour-là, la séance a été annulée mais cet exposé sera présenté au cours d'une séance de 2009.