Proposal 15
Submitted by:
Eigil Kaas ek@dmi.dk
Danish Meteorological Institute
Lyngbyvej 100, DK-2100 Copenhagen Ø, Denmark
IPY research themes proposed by the Danish Meteorological Institute (DMI).
It is noted that all these themes comply with the main IPY themes including
☐ Research (new knowledge)
☐ Polar change
☐ Improved understanding of polar processes
The proposed research themes deal with geophysical research themes only, but it
is important to note, that all the themes have a direct and strong impact – and
interacts – with other areas of research, including biological/ecological, political
and social sciences. It will therefore be easy to integrate the research into somewhat
larger interdisciplinary research themes.
It is generally suggested that the Danish activities within the proposed areas focus
on the largest possible extent on Greenland. Thus, atmospheric measurement
components (including those in the upper atmosphere) should be performed at
the existing Greenland stations (lidar, ozone, radar, etc).
For most of the suggested research the main focus is naturally on Greenland and
the Arctic region, but some themes are also directly related to the Antarctic region.
It is noted that the list is in non-prioritised order.
High-energy radiation and the geomagnetic field
One of the characteristic features of the polar regions is the approximate
co-location of the geographical and geomagnetic poles maintained over
millions of years even through polarity reversals.
The geomagnetic field screens for impinging high-energy charged particle
radiation of solar or galactic origin everywhere except within the polar
caps, and furthermore it is causing high-intensity auroral particle radiation
at the edges of the geomagnetic polar cap.
The high-energy radiation affects the properties of the upper atmosphere,
among other, its electrical properties – which may greatly influence cloud
formation – and its chemical and isotopic composition. The most
penetrating
part of the primary or the secondary radiation may reach ground
level and directly affect the biological (long-term) conditions in the polar
regions.
Consequently, a possible IPY program should comprise monitoring of the
high-energy charged-particle radiation in the polar and auroral regions
and studies of its effects of on upper atmospheric, climatic and biological
conditions.