Declaration released by scientists participating to the Damocles international symposium: The Arctic Climate system, its present status, future evolution and potential impacts on November 10-12, 2009 in Brussels, Belgium.

The Arctic sea-ice cover has rapidly decreased during the recent decades. The September 2007 sea-ice extent was the all time record minimum and the September 2008 and 2009 were the second and third lowest ice extents observed.

There is much evidence that the rapid retreat of the summer Arctic sea-ice cover from 2005 onwards, was a response to at least three decades of thinning, resulting in an ice regime which was unable to cope with the summer melt period whilst remaining intact as a coherent cover, and instead broke up and opened up, allowing increased heat absorption by near-surface water.

As sea-ice becomes thinner, the amount of heat required to melt it, is likewise reduced. Hence, moderate changes in the heat fluxes from the atmosphere and ocean to sea-ice can generate large changes in the sea-ice cover. Changes in this particularly sensitive component of the climate system provide positive feedback to the atmosphere and ocean: earlier spring onset of snow melt on sea-ice, results in a decrease of the surface reflectivity to solar radiation, which warms up the atmosphere and enhances the melt. The reduced sea-ice cover results in more solar radiation absorbed in the ocean, which further heats up the atmosphere and reduces the ice extent.

During the last 100 years, the Arctic atmosphere has warmed almost twice as fast as the global average. Observations from the Damocles period, including those from the French schooner *Tara* which drifted across the Arctic Ocean in September 2006- January 2008, suggest that cloudiness has increased, that the air temperature in spring has greatly increased, and that the melting season has become longer. *Tara* data and a combination of a numerical model results and observations show that atmospheric warming has been strongest well above the ice surface. This is partly due to increased heat advection from lower latitudes. Much of the transport of heat and clouds is carried by cyclones, and the data available suggest an increase in the Arctic cyclone activity.

The changes in the Arctic sea-ice, atmosphere and ocean also have global significance. The increasing amount of solar radiation absorbed in the Arctic, reduces the south-north temperature gradients both in the ocean and atmosphere and therefore has the potential to alter the large-scale circulation in the ocean and atmosphere. The warmer atmosphere and ocean accelerate the melt of the Greenland ice sheet with large implications for the global sea level. Melt of the Arctic permafrost will enhance the release of methane into the atmosphere which can further accelerate global warming.

The observed decrease of Arctic summer sea-ice extent over the last decades, results from a combination of strong natural variability of the coupled atmosphere-ice-ocean system and a growing radiative forcing due to rising concentrations of green house gases. We are deeply concerned that the most recent CO2 emission estimates, are even higher than the most extreme IPCC-AR4 release scenario. Unless emissions are curbed significantly, we are not expecting a stabilisation of the Arctic's climate system. On top of the emission induced changes in the Arctic, we are observing decade-to-decade swings of the Arctic system which makes a reliable prediction very challenging and very much dependent on up-to-date observations. It is essential that these observations should be continued.

Long-term, systematic real time monitoring stimulating synthesis via data assimilation and modelling, are the keys to provide policy makers and stakeholders with the high-quality assessments they need to make pertinent decisions.

The dwindling sea-ice will have serious consequences for indigenous livelihoods and cultures, for the exploitation of non-renewable resources such as oil and gas, for coastal and offshore fisheries activities, tourism and shipping. The abundance and distribution of important fish stocks will likely change, and we will have access to new and unexplored ocean areas for oil and gas exploration. All of which raise major environmental, economic, geo-political and governance questions. We need a high level of preparedness in terms of science and governance to cope with the expected increase of human activities in the Arctic.

The 4th International Polar Year, the EU Integrated Project Damocles and an extensive and intensive international cooperation provided a unique opportunity for scientists from many countries interested in Arctic research to cooperate actively and successfully for a better knowledge of the Arctic regions. This effort should be maintained specially now when environmental changes are altering the geo-strategic dynamics of the Arctic. Potential consequences for international stability, call for the development of a policy protecting and preserving the Arctic, promoting sustainable use of resources and contributing to enhanced Arctic multilateral governance.