STATEMENT ON THE OCCASION OF THE FIFTY-SIXTH SESSION OF THE MARINE ENVIRONMENT PROTECTION COMMITTEE (MEPC)

by

M. Jarraud
Secretary-General
World Meteorological Organization
(London, 9 July 2007)

Excellencies,
Dear Colleagues,
Ladies and Gentlemen,

I am especially grateful to Mr Efthimios Mitropoulos and the International Maritime Organization (IMO), for the opportunity afforded to me to address you today. I am aware that for its World Maritime Day, to be celebrated on 27 September 2007, IMO has selected the theme: "IMO's response to current environmental challenges". This is indeed a vital theme, since it provides IMO the opportunity to focus upon its past and present environmental work and to contribute to the efforts being made by the rest of the international community for the protection and the preservation of our common environment, in particular our marine environment.

This is also a welcome opportunity to highlight how much our two Organizations have in common. In November 1854, during the Crimean War, a severe storm in the Black Sea destroyed many British and French vessels. The Paris Observatory later indicated that barometric readings showed the storm had passed across Europe in about four days and its Director, Urbain Le Verrier, who is best known for his calculations leading to the discovery of Neptune, concluded that the British and French fleets could have received appropriate warnings.

In 1854 Vice-Admiral Robert FitzRoy, captain of the Beagle during Darwin's famous voyage, was appointed Director of the British Board of Trade's Meteorological Department. The tragic wreck of the iron vessel Royal Charter in October of 1859 provided another opportunity to sustain that storms should be tracked and forecasted. The first warnings were issued in February 1861 and by August weather forecasts were being issued regularly. Unfortunately, given the predominant westward movement of the storms, neither France nor Britain had the capacity to track them as efficiently as might have been possible in Crimea.

Actually, the First International Meteorological Conference was held in Brussels, in August 1853, as a consequence of the growth in international trade and the increasing concern for safety in marine transportation. A few years later, in September 1873, the first International Meteorological Congress met in Vienna to establish the International Meteorological Organization - which was also known as the IMO - a non-governmental organization that was responsible for international cooperation in meteorology from its creation until the end of the Second World War.

In September 1947, the Conference of Directors of National Meteorological Services (NMSs) held in Washington unanimously approved the WMO Convention, which became effective on 23 March 1950. In so doing, our founding fathers also relinquished the IMO acronym and made it available to your Inter-Governmental Maritime Consultative Organization (IMCO). Subsequently, in December 1951, WMO became a specialized agency of the United Nations.

In 2005, on the occasion of its fifty-seventh session, the WMO Executive Council decided that the theme for the World Meteorological Day 2007 would be “Polar meteorology: understanding global impacts”, in recognition of the importance of, and as a contribution to, the WMO co-sponsored International Polar Year (IPY) 2007-2008. In recent years, there has been renewed interest in the climate and the environmental conditions in the polar regions, but there are also important historical antecedents, as WMO's predecessor organized an International Polar Year in 1882-1883 and a second one in 1932-1933. The success of these two IPYs led to the development of a wider International Geophysical Year (IGY) 1957-1958, extending to encompass the lower latitudes, rather than simply a new international polar year.

Ladies and Gentlemen,

The oceans cover about two-thirds of the Earth's surface and oceanic phenomena have major impacts on the marine coastal environment and socio-economic activities in these regions. A large percentage of populations inhabit the coastal regions and often depend for their livelihoods on coastal resources and the marine environment. They are especially vulnerable to marine meteorological extreme events. The oceans are also under stress due to the pressures of coastal development, industrial pollution and over-fishing.

For those working at sea or simply living near the coast, forecasts of maritime weather and ocean conditions are extremely important. Rough seas, high waves and storm surges can be dangerous to mariners. Ocean currents and winds can transport and disperse oils slicks and other forms of pollution. Changes in ocean temperatures can also significantly affect the marine ecosystem, from plankton to fisheries. Understanding, monitoring, mapping and predicting maritime weather and ocean conditions therefore offer the opportunity for adequate planning of the coastal zone and marine activities, and provide a structure for early detection and warning of marine-related hazards.

For millenniums, the world's oceans have provided a medium for transport, trade and commerce, and this is of even greater importance in the modern world. The oceans provide the environment for a substantial proportion of the Earth's bio-diversity and have long been recognized as major components of the global climate system. Meteorological and oceanographic data and services are vital to the understanding, protection and sustainable management and exploitation of the global ocean and coastal environment, and the National Meteorological Services have an increasing role to play in delivering the relevant information.

From their origins in the middle of the 19th century, the National Meteorological Services (NMSs) and WMO's predecessor organization were vitally concerned with the provision of quality meteorological forecasts and warnings in support of the safety at sea. In this context, WMO has been collaborating closely with the International Maritime Organization, in ensuring that the best and most complete meteorological services are indeed provided to meet the needs of mariners, wherever they may find themselves over the worlds' oceans. These services are made freely available to all maritime users by NMSs within the context of the International Convention for the Safety of Life at Sea (SOLAS), and they are in turn extremely dependent on the timely acquisition of extensive observations from the marine atmosphere, the sea surface and the oceans.

In the mid-1980s, the WMO Commission for Marine Meteorology (CMM) recognized that new communications requirements to be met under the Global Maritime Distress and Safety System (GMDSS), being developed by the IMO, would demand a substantial revision of the existing marine broadcast systems for meteorological services, which were up to then mainly based on coastal radio networks. WMO therefore embarked upon the development of a new, globally coordinated marine broadcast system for the GMDSS. This system is now fully incorporated into the WMO Technical Regulations as part of the WMO *Manual on Marine Meteorological Services*.

The worldwide implementation of the new WMO system has been very effectively undertaken by the National Meteorological Services that accepted the relevant responsibilities and, as of 1999, a global coverage of meteorological forecasts and warnings became available through the SafetyNet service of INMARSAT. Sixteen WMO Metareas, which are identical to the International Hydrographic Organization (IHO) Navareas, were entrusted to the selected NMSs and, in addition to the SafetyNET broadcasts, meteorological forecasts and warnings for mariners are provided in a variety of other ways, in particular, through NAVTEX.

Dear Colleagues, Ladies and Gentlemen,

Operations carried out in response to marine pollution emergencies on the open oceans or within coastal waters will invariably be most effective if they can be supported by timely and accurate meteorological and oceanographic data and products. In an attempt to ensure that appropriate services are available in international waters, WMO established in 1994 a Marine Pollution Emergency Response Support System (MPERSS), which is designed to provide coherent and internationally coordinated meteorological and oceanographic services in support of marine pollution emergency response operations worldwide.

In addition, the efficient and sustainable exploitation and management of marine fisheries, offshore oil and gas infrastructures and many other installations is enhanced by the availability and application of meteorological and oceanographic data and products. Substantial benefits can be accrued in terms of economy and safety, through the judicious use of this information in ship routing, marine tourism, recreational boating and in many other applications. The WMO Marine Meteorology and Oceanography Programme, which since 1999 is coordinated through the Joint WMO/Intergovernmental Oceanographic Commission of UNESCO (IOC) Technical Commission for Oceanography and Marine Meteorology (JCOMM), plays today a vital role in supporting these activities and in contributing to the sustainable use of oceanic resources. Observations collected by ships, coastal stations, drifting and moored buoys and satellites, as well as specialized products and services, are used in weather forecasting and the issuance of early warnings, in climate research and in support of marine operations.

Furthermore, our growing understanding of the links between the ocean, weather and climate conditions, as reflected in the El Niño/South Oscillation (ENSO) phenomenon, offers the perspective to forecast critical phenomena such as severe droughts several months in advance. The increased importance of climate change has also brought into sharp focus the vital role of the oceans in the capture, storage and release of water vapor, carbon dioxide and other greenhouse gases, as well as the potential impacts of sea-level rise on coastal regions and lowlands, including the Small Island Developing States (SIDS). Climate has thus become a main challenge of the 21st Century.

Dear Colleagues, Ladies and Gentlemen,

Today, it is generally accepted that human activities are modifying climate at an increasing rate and that, even if mitigation actions like greenhouse gas emission reductions would indeed contribute to diminish the rate of this problem, adaptation measures must necessarily be considered among the options available to society. Through the National Meteorological and Hydrological Services (NMHSs) of its 188 Members, WMO has traditionally played a crucial role in detecting and alerting humanity on climate change and is now at the forefront of responding to this challenge.

Observations, in particular space observations, have shown a global-scale decline of snow and ice over many years. Snow cover is retreating increasingly earlier in the spring and most mountain glaciers are shrinking. Sea ice in the Arctic is also shrinking in all seasons and most dramatically in the summer. Reductions are also reported in the permafrost, seasonally frozen grounds and river and lake ice. Increasingly important coastal regions of the ice sheets on Greenland and West Antarctica, as well as the glaciers of the Antarctic Peninsula, are thinning and contributing to the sea level rise.

I would therefore wish to recall that, in 1976, WMO issued the first authoritative statement on the accumulation of carbon dioxide in the atmosphere and the potential impacts that this process might have upon the Earth's climate. This was the triggering event that caused policy makers to focus their attention onto the threats of climate change. As a result, WMO and the United Nations Environment Programme (UNEP) jointly established in 1988 the Intergovernmental Panel on Climate Change (IPCC), which has since been instrumental in providing the most authoritative and unbiased assessments of climate science, the potential impact of climate change and the available policy options. Through its affiliated programmes and its own, WMO has since been the principal provider of the scientific and technical information underpinning the IPCC scientific assessments.

Moreover, in 1979 WMO organized the First World Climate Conference, which was followed in 1990 by the Second World Climate Conference. The two conferences were very important milestones since the first led to the establishment of the World Climate Research Programme (WCRP) - originally jointly with the ICSU and later also with the IOC of UNESCO - whereas the second called for the establishment of a climate convention and this ultimately resulted, in 1992, in the development of the United Nations Framework Convention on Climate Change (UNFCCC).

In addition, the Second World Climate Conference also organized by WMO led in 1992 to the establishment of the Global Climate Observing System (GCOS) by WMO, UNEP, the IOC of UNESCO and ICSU, in order to ensure the availability of systematic observations needed for climate change studies. The GCOS was designed to be a long-term, user-driven operational system suitable to detect the impacts of climate variability and change, and to support all research activities required for an improved understanding, modeling and prediction of the climate system. In this sense, the GCOS builds upon and operates in partnership with other global observing systems, such as the Global Ocean Observing System (GOOS) and Global Terrestrial Observing System (GTOS), as well as WMO's own World Weather Watch (WWW) Global Observing System (GOS), World Hydrological Cycle Observing System (WHYCOS) and Global Atmospheric Watch (GAW).

WMO considers the UNFCCC to be the basis for future climate change debates and actions. WMO has repeatedly underscored the importance of adequate linkage between the UNFCCC and other international agreements and conventions, such as the United Nations Convention to Combat

Desertification (UNCCD), the United Nations Convention on Biodiversity (UNCBD), and the Vienna Convention on the Protection of the Ozone Layer and its Montreal Protocol and Amendments, thereby recognizing the fact that future climate change policies will require consideration of climate change in the combined context of efficient energy, socio-economic needs and sustainable development. WMO has also emphasized the need to further study the potential relationship between climate change and natural disasters, while supporting the concept that mitigation measures should be supplemented by adaptation practices. In this respect, WMO welcomes the UNFCCC initiative, which recently adopted the *"Nairobi Programme of Work on Impacts, Vulnerability and Adaptation to Climate Change"* and recognized the important roles of WMO and the NMHSs of its Members in the programme.

Through a system of global partnerships in capacity building, education and training, and public awareness at all levels, WMO continues to mobilize support for additional international actions to address climate change. For example, WMO's regular Regional Climate Outlook Forums provide an effective capacity building mechanism in different parts of the world, particularly in developing countries. In addition, WMO has recently begun planning for a World Climate Conference-3 (WCC-3) with its Members and other organizations of the UN System.

WMO has issued annual statements on the status of the global climate since 1993, thereby providing authoritative scientific information on climate and its variability to complement the periodic assessments released by the WMO co-sponsored IPCC. The statement for 2006 describes the corresponding extreme weather and climate events, indicating that all the years since the beginning of the new century have ranked among the 10 warmest years of the observational period ranging from 1850 to the present. Analyses made by two of the world's leading climate centres indicate that the global mean surface temperature in 2006 was 0.42°C to 0.54°C above the 1961–1990 annual average. Moreover, December 2006 was the warmest December since global surface records were instituted and 2006 was the sixth warmest year on record. Since we are in London, I could also underscore that 2006 was the warmest of the 348 years in the Central England temperature series.

Also in 2006, 9 named tropical storms developed during the Atlantic hurricane season, which has an average of 10 events, while 19 did so in the eastern North Pacific, which was well above the average value of 16. Moreover, 2006 Arctic sea ice continued to decrease sharply; whereas the Antarctic ozone depletion attained new record values since, on 25 September 2006, the maximum recorded area of the Antarctic ozone hole reached 29.5 million km^2, which was slightly larger than the previous record area of 29.4 million km^2 observed during September 2000.

Ladies and Gentlemen,

Available scientific evidence suggests that climate change will have significant impacts upon societies, particularly in the developing countries. It is therefore vital to provide decision-makers with the capacity to formulate policies on the basis of authoritative and unbiased information. Integration of observations, advanced computational and research facilities and scientific knowledge are essential if we are to achieve progress in the task of understanding the processes determining our climate. The IPCC Fourth Assessment Synthesis Report will be released in October 2007, but the IPCC Working Groups have already released substantive findings. In particular, the IPCC Working Group I (on scientific findings) contribution describes progress made in understanding human and natural drivers of climate change, observed change, climate processes and attribution, as well as estimates of projected future change.

This IPCC report includes substantial new research and addresses some gaps of the previous version by providing tighter estimates. It is important to keep in mind that climate change in IPCC usage refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that of the UNFCCC, where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. Some of the IPCC findings are perhaps more striking quantitatively than qualitatively. For example:

- Global atmospheric concentrations of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning hundreds of thousands of years. The global increases in CO_2 concentration are due primarily to fossil fuel use and land use change, while those of CH_4 and N_2O are primarily due to agriculture;

- CO_2 is the most important anthropogenic greenhouse gas and its global atmospheric concentration has increased from a pre-industrial value of about 280 ppm to 379 ppm in 2005. Its atmospheric concentration in 2005 exceeds by far the natural range over the last 650,000 years;

- The understanding of anthropogenic warming and cooling influences on climate has improved since the previous IPCC report in 2001, leading to *very high confidence* (at least a 9 out of 10 chance of being correct) that the global average net effect of human activities since 1750 has been one of warming;

- Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level;

- Observations since 1961 show the average temperature of the global ocean increased to depths of at least 3000 m and that the ocean has been absorbing more than 80% of the heat added to the climate system. Such warming causes seawater to expand, contributing to sea level rise;

- Mountain glaciers and snow cover have declined on average in both hemispheres. Widespread decreases in glaciers and continental ice caps have also contributed to sea level rise;

- Global average sea level rose at an average rate of 1.8 mm per year over 1961 to 2003. The rate was much faster over 1993 to 2003: about 3.1 mm per year. There is *high confidence* (about an 8 out of 10 chance of being correct) that the rate of observed sea level rise increased from the 19^{th} to the 20^{th} century. The total 20^{th}-century rise is estimated to be 17 cm;

- At continental, regional and ocean basin scales, numerous long-term changes in climate have been observed. These include changes in Arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation and heat waves;

- Palaeoclimatic information supports the interpretation that the warmth of the last half-century is unusual in at least the previous 1,300 years. The last time the polar regions were significantly warmer than at present for an extended period (about 125,000 years ago), reductions in continental ice volume led to 4 to 6 m of sea level rise;

- Most of the observed increase in global average temperatures since the mid-20th century is *very likely* (>90%) due to the observed increase in anthropogenic greenhouse gas concentrations. This is an advance since the TAR’s conclusion that “most of the observed warming over the last 50 years is *likely* (>66%) to have been due to the increase in greenhouse gas concentrations”. Discernible human influences now extend to other aspects of climate, including ocean warming, continental-average temperatures, temperature extremes and wind patterns;

- The observed widespread warming of the atmosphere and oceans, together with ice mass loss, support the conclusion that it is *extremely unlikely* (<5%) that global climate change of the past 50 years can be explained without external forcing, and *very likely* (>90%) that it is not due to natural causes alone;

- For the next two decades, a warming of about 0.2°C per decade is projected. Even if the concentrations of all greenhouse gases and aerosols were kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected, due to slow response of oceans;

- Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would *very likely* (>90%) be larger than those observed during the 20th century;

- Sea ice is projected to shrink further in the Arctic and Antarctic under all scenarios. In some projections, Arctic late-summer sea ice disappears almost entirely by the end of the 21st century;

- Anthropogenic warming and sea level rise would continue for centuries even if greenhouse gas concentrations were to be stabilized.

Ladies and Gentlemen,

Whereas the IPCC Third Assessment Report (2001) detected the regional effects of anthropogenic warming, the new Fourth Assessment Report (2007) now renders visible the global effects of anthropogenic warming. The IPCC Working Group II (Impacts, adaptation and vulnerability) has identified future impacts and particular vulnerabilities for 6 specific sectors:

- Freshwater resources;

- Ecosystems;

- Food;

- Coastal systems and low-lying areas;

- Industry, settlement and society; and

- Human health.

In addition, the most vulnerable regions are considered to be:

- The Arctic, because of the impacts of projected warming;

- Sub-Saharan Africa, because of low adaptive capacity;

- Small islands, due to high exposure to sea-level rise and increased storm surge; and

- Asian megadeltas, due to their large populations and high exposure.

The Working Group III (Mitigation of climate change) contribution to the IPCC Fourth Assessment Report has focused on new literature on the scientific, technological, environmental, economic and social aspects of mitigation of climate change, published since the IPCC Third Assessment Report, as well as on the Special Reports on CO_2 Capture and Storage and on Safeguarding the Ozone Layer and the Global Climate System.

Dear Colleagues, Ladies and Gentlemen,

Between 1970 and 2004 global greenhouse gas emissions have increased by 70%, for which carbon dioxide is the largest contributor. Under the current climate change mitigation policies and related sustainable development practices, these emissions will continue to grow unabated over the next decades. Specific socio-economic and geographic areas of vulnerability have been identified requiring urgent measures of adaptation, in addition to the general mitigation of greenhouse gas emissions.

WMO recognizes that every social, economic and environmental sector is sensitive to climate variability and change and encourages improved policy formulation and operational decision-making in these sectors through a more intensive use of climate knowledge and information. WMO therefore supports partnerships in climate activities and promotes further development of decision-support tools and capacity building in climate-related risk management. WMO also emphasizes the need to explore the potential relationship between climate change and natural disasters and supports the concept of mitigation supplemented by adaptation practices encompassed in the *"Nairobi Programme of Work on Impacts, Vulnerability and Adaptation to Climate Change"*.

At the policy level, WMO considers the climate change issue in the context of sustainable development, which also includes the economic and social dimensions, such as the links with energy, poverty and health. This vision underscores the need to advance rapidly in mitigation of emissions of greenhouse gases and adaptation to the local effects of climate change, while emphasizing the special needs of developing countries, particularly the Small Island Developing States (SIDS), which are more vulnerable to the effects of climate change.

At the implementation level, WMO promotes science-based decision-making at national and global levels and supports the strengthening of Members' and organizations' commitments to systematic observations and to climate change research and studies.

The present decade has been a turning point in terms of the understanding of the role of the oceans in global change. Improvements in information technology have enabled the development of ocean-atmosphere coupled models with unprecedented resolution and precision. There is thus both an opportunity and a need to place more emphasis on marine science activities in the context of climate change, the effects of anthropogenic forcing and the natural variability of ocean ecosystems. Ocean science is undergoing a conceptual revolution and there exists growing realization that sustainable development and management of the marine environment can only be achieved through a truly interdisciplinary scientific approach and enhanced observations. This will be part of the common challenge of the climate and marine scientific communities for the next decade.

In closing, I would like to seize the opportunity to reiterate WMO's appreciation for this invitation and its support to IMO's long-established and ongoing work to prevent further air pollution, including the ulterior and consequential effects of acid rain and ozone depletion, as well as to address and reduce greenhouse gas emissions from ships. WMO is grateful to IMO for the collaboration and partnerships that have developed between our communities during the past one and a half century.

Thank you.