**OPENING ADDRESS BY THE DIRECTOR-GENERAL, DR PHIL MJWARA AT THE 1ST INTERNATIONAL LONG-TERM ECOLOGICAL RESEARCH NETWORK OPEN SCIENCE MEETING, IN KRUGER NATIONAL PARK, 9 OCTOBER 2016**

Dr Michael Mirtl, Programme Director, and Chair of the International Long-Term Ecological Research Network

Mr Johan Pauw, Managing Director, South African Environmental Observation Network

Distinguished guests,

Ladies and gentlemen.

It is my honour to address you this morning, as we make history on the occasion of the 1st International Long-Term Ecological Research Network Open Science Meeting.

Many of you have travelled long distances to join us here at Kruger National Park and most importantly, to participate in this important event in the history of the South African Environmental Observation Network (SAEON) and International Long-Term Ecological Research Network (ILTER).

Programme Director, allow me to warmly welcome everyone present here today, coming from far or near. And to many from around the world, I take pleasure in inviting you to enjoy the wonderful hospitality of the Kruger National Park and South Africa with its beautiful scenery.

I am opening this conference wearing two hats, namely as Director-General responsible for the Department of Science and Technology, and also as founding Co-Chair of the Group on Earth Observations. Both these positions are particularly relevant for this conference and hence my great interest in being part of you this morning. The conference itself is a major contribution to the objectives of my Department and that of GEO. I am therefore very pleased to note the key roles that my Department has played through our national Long-Term Ecological Research (LTER) program, the South African Environmental Observation Network (SAEON), as the local organiser, and the joint sponsorship of the DST and the National Research Foundation.

Ladies and gentlemen, those who know South Africa well will agree with me when I say: South Africa is an exceptionally diverse country, not only in terms of her people, language, or culture, but also in terms of its biological and marine resources.

As the world’s third most biologically diverse country, South Africa has an exceptional comparative advantage, containing between 250 000 and 1 000 000 species of organisms, most of which occur nowhere else in the world. South Africa covers less than 2% of the world’s land surface area, yet is home to almost 10% of the world’s known plant species and 15% of all known coastal marine species.

Our seas straddle three oceans, the Atlantic, the Indian and the Southern Ocean, and include an exceptional range of habitats, from cool-water kelp forests and tropical coral reefs, to semi-arid and montagne biomes. The southern African coast is home to almost 15% of known coastal marine species, providing a rich source of nutrition and supporting livelihoods especially to coastal communities.

Without doubt, the value and potential of South Africa’s natural assets are underpinned by its exceptional diversity and uniqueness. The surge of international interest in the natural environment, and in products derived from nature, provides many opportunities for a biologically rich country like ours.

There is valid concern throughout the world that human activities that can lead to habitat destruction; the introduction of alien invasive species and pollution are resulting in increasing loss of the Earth’s biological resources.

Meaningful action is therefore needed to ensure that our crucial life-support systems are not further eroded. I believe research and technology development has so much to offer especially in terms of deepening our understanding of these issues and providing solutions that safeguard the environment. As many of you are scientists, some of your presentations and deliberations in this Open Science Meeting should provide us (and all interested) with the much-needed approaches and evidence for our consideration, in sustainably using the natural resources we fortunate to have.

In 2008, the Department of Science and Technology launched its 10-Year Innovation Plan for South Africa, Innovation towards a Knowledge-based Economy. One of the key Grand Challenges identified in this Plan, which I would like to draw your attention to, is the Global Change Grand Challenge. The 10-Year Global Change Research Plan (GCRP), which was adopted in 2010, provides a comprehensive framework for focused research in global change with the aim of:

1) studying and understanding environmental changes,

2) understanding the implications of these changes for informed decision making, and

3) stimulating innovation in responding to the challenges posed by global change.

South Africa’s geographic position is recognised as enabling the country to take a leading role in global change research, especially climate change. And in the area of environmental sciences, the good news is the fact that South African scientists count among the best and are today making valuable contributions in the world; whether it is in the field of protecting biodiversity or the development of more efficient management systems for natural resources. Our collective global ability to understand what is happening to our planet would be poorer without South Africa’s contributions to many international observation systems.

Over the years, South African scientists have made key contributions, not only through publishing and conferencing, but also through participating in the planning and administration of global science initiatives such as the Group on Earth Observation (GEO), the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES), the Belmont Forum, the International Human Dimensions Program (IHDP), the Global Oceans Observation System (GOOS), and the Global Climate Observation System (GCOS), to name but a few. More recently, my Department has successfully proposed to host a regional secretariat for Future Earth and is currently establishing the structure of that office.

Furthermore, the fact that most South African scientific publications are in natural sciences is testimony that SA’s output of science in Environmental and Ecological Science generates the largest impact of all South African research output across all disciplines. I am convinced our researchers will keep up the good work in this area!

Chapter 5 of the National Development Plan (NDP) proposes an increased public investment in research and technological innovations to support environmental sustainability and resilience actions of government, business, and civil society. These actions have been translated into specific actions and performance indicators in the NDP’s implementation plan for the environment sector – Outcome 10 Medium Term Strategic Framework (MTSF) 2014-2019. The compilation of biennial climate reports on the state of climate change science and technology in South Africa is one of the performance indicators for the DST in the Outcome 10 MTSF. It is anticipated that the reports will provide a high-level mirror of the state of climate change science and technology in South Africa and highlight areas for targeted intervention.

I understand that the United States - Long-Term Ecological Research (LTER) currently has 26 research sites, covering the landscape and ecosystems of the USA, as well as the Arctic and Antarctic regions. Programme director, allow me to use this opportunity to salute the National Science Foundation (NSF) of the United States of America for the foresight they have demonstrated to initiate Long-Term Ecological Research in 1980. Realising the inter-connectedness of earth and environmental systems around the globe, the NSF went further to launch the International Long-Term Ecological Research Network (ILTER), a global network which today has 43 active member countries with hundreds of research sites across the Globe. The vision of ILTER is a world in which science helps prevent and solve environmental and socio-ecological problems. South Africa, just like many other nations present here, is today, through the South African Environmental Observation Network (SAEON), a proud member of ILTER.

And here in South Africa, much ground work has truly been achieved by SAEON. Currently SAEON has 6 operational nodes covering, among others: fynbos; arid lands; as well as grasslands, forests and wetlands. I am sure those of you who have had the privilege of joining field trips to various SAEON LTER sites had a worthwhile time out there in the field. And again, those who are yet to go to the field, I trust they will enjoy the beautiful scenery we have in this country.

As a special programme of my Department, the DST has also taken the leading investment role in the development of SAEON, since 2002. Should it not have been the visionary leadership of the National Science Foundation, I am sure, we would not have had the opportunity to invest in SAEON; which is now one of the key programmes that enables us to effectively address one of our key challenges today - the Global Change Grand Challenge.

SAEON grew from strength to strength and has indeed become a comprehensive large-scale environmental programme based on significant research infrastructure including information management systems. In this regard, I would like to recognise the crucial role that the International Long-Term Ecological Research Network (ILTER) has played in the seeding of SAEON. Today, fourteen years after its establishment, SAEON supports several government institutions with a range of services and has thus become a strategically important knowledge-based instrument of the Government of South Africa.

Post the establishment of SAEON and the WSSD in 2002, the South African Government continued to address Global Change Research and Sustainable Development through hosting the 2011 United Nations Framework Convention on Climate Change and adopting various national strategies and policies, to name a few: the National Sustainable Development Strategy and Action Plan, the 2030 National Development Plan, the 10-Year Global Change Research Plan (GCRP), the Climate Change Response Strategy, the South African Earth Observation Strategy, and the Integrated Coastal Management Act. To strengthen our global change science capacity, my Department further invested in three new Centres of Excellence namely the Applied Centre for Climate and Earth Systems Science (ACCESS), the CoE for Invasive Biology and the CoE for Food Security, as well as 18 relevant university-based research chairs. The Department continues to support the South African Antarctic Program, which was launched as early as 1959, and envisages that it will be incorporated into a larger offshore marine and polar institution in due course.

Ladies and gentlemen, science has an important role to play in helping solve many of the troubles facing the world today. In this landmark 1st International Long-Term Ecological Research Network Open Science meeting, with the theme of: *Long-Term Ecosystem Research for sustainability under global changes,* I am actually looking forward to a unique meeting of minds in a world-renowned biodiversity sanctuary, the Kruger National Park! The good news is that this conference is also much more than just a series of research reports. In sync with the theme, some 30 additional contributions ranging from keynote speeches, network position papers, and workshop sessions were included to raise the OSM to a level where globally shared scientific and organisational issues will be actively deliberated on and advanced, among the global change research community, which many of you are a constituent part.

The 1st International Long-Term Ecological Research Network Open Science Meeting is truly an important milestone for the Department of Science and Technology’s Global Change Grand Challenge and is a timeous opportunity for SAEON to benchmark how ecosystem research infrastructure is applied in other parts of the world.

Program Director: Global Change Research is not a mere curiosity-driven specialised scientific pursuit. Instead, it aims for outcomes that will contribute to human health, social security and prosperity, in short, Global Change Research is essential for “Sustainable Development”, an ideal which is hard to define in precise terms but which is so aptly coined by the maxim adopted for the 2030 Agenda for Sustainable Development, namely “People, Planet, Prosperity, Peace, Partnership”. It is my reading that by organizing this 1st ILTER Open Science Meeting on the soil of Africa, under the umbrella theme: “Long-Term Ecosystem Research for sustainability under global changes: Findings and challenges of ILTER from local to global scales”, ILTER embarks on delivering a strong contribution towards the achievement of the Sustainable Development Goals of the United Nations. In particular, I endorse ILTER’s “partnership” ethic which is so emphatically embraced in this conference by the inclusion of partnership conversations with several important global change research and policy initiatives.

According to the United Nations, the SDG’s do the following: 1) address the root causes of poverty, 2) emphasise the need to urgently tackle climate change and protect the environment through a shift to sustainable consumption and production, and 3) are universal and apply to all countries rather than just the developing world. I am very sure these lofty ideals are supported by everyone here. The question then arises what should be ILTER’s contribution to the Sustainable Development Goals? Allow me to raise six SDG’s relevant to ILTER in particular:

SDG #2: “End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.” This goal aims to ensure sustainable food production systems and implement resilient agricultural practices 1) that increase productivity and production, 2) that help maintain ecosystems, 3) that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality. A superficial reading of this goal might lead one to assign the responsibility for its achievement solely to the agricultural sector in terms of food production. However, the role for LTER with respect to agricultural systems is exemplified by the good work already performed by among others the Chinese Ecosystem Research Network (CERN), a founding member of ILTER. A long-term ecosystem research approach delivering time-series data for both agronomic and rangeland systems, is appropriate and lends itself to rapid advances towards achieving sustainable practices, especially when applied to comparative experiments. There is also much scope for broadening LTER platforms to transform those into LTSER platforms with a focus on social-ecological systems.

SDG #6: “Ensure availability and sustainable management of water and sanitation for all.” This goal aims to protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes. Here again, the LTER approach delivering time-series data would be essential for understanding the drivers and consequences of global change, and should include social-ecology given the human dimensions of catchment and water resources management.

SDG #7: “Ensure access to affordable, reliable, sustainable, and modern energy for all.” This goal is set to increase substantially the share of renewable energy in the global energy mix. The harvesting of firewood is common in Africa. As a form of renewable energy firewood harvesting requires social-ecological research. In the local context it is worthy to mention that South African researchers have noticed a steady large-scale increase in the woody component of South African rangelands which is intriguing and complex to explain. Future research will rely on the additional capacity of the new terrestrial and freshwater research infrastructure I have already mentioned. Seen by many as a sustainable solution to energy supply, bio-energy production is still an emerging field raising many sustainability issues, and those will require longitudinal studies to inform the agronomic, environmental, and economic perspectives. An example of the potential role for LTER in achieving sustainable energy is the South African Bio-Energy Atlas, which my department has contracted SAEON to develop and maintain.

SDG #13: “Take urgent action to combat climate change and its impacts.” The first aim of this SDG is to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries with a view on mitigation, adaptation, impact reduction, and early warning. The *in situ* LTER and LTSER approaches have unique roles to play by tracking and informing on the global nature and manifestations of climate change, and by translating such knowledge for a range of suitable local and global policies.

SDG #14: “Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.” This goal aims to sustainably manage marine and coastal ecosystems, to conserve at least 10 per cent of coastal and marine areas, to minimise ocean acidification, overfishing. The role of an LTER approach towards understanding and tracking our dynamic coastal and marine systems requires expensive research infrastructures such as research vessels and large-scale instrument arrays for example the Argo system. The importance of ocean dynamics for explaining and predicting large-scale atmospheric phenomena driving ecosystem changes is indisputable and should surely be an area of collaboration and capacity building within ILTER. The required research approaches are also more than just oceanography, for example, the warming of our oceanic waters often cause algal blooms in the coastal zone and when those start to affect tourism and/or commercial and subsistence fisheries, the phenomenon rapidly becomes political due to the socio-economic effects.

SDG #15. “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.” The objective of this goal is to ensure the conservation, restoration and sustainable use and management of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains, and drylands. Once again, *in situ* derived LTSER time-series data will be irreplaceable sources of information to inform and to monitor conservation and restoration practices for sustainability.

I have now briefly examined the globally agreed objectives for the future of the human race, and which are pertinent for ILTER going forward beyond this conference. In order to contribute to your further deliberations, I was also asked to delve deeper by investigating the specific role of ILTER with respect to the achievement of the SDG’s.

**Specific role of ILTER**

Program Director, in our view, due to its global research infrastructure, multi-disciplinary character and evolving ability to produce trans-disciplinary knowledge, the ILTER is globally in a good position to provide reliable *in situ* derived longitudinal data and information that can:

 1) advance global change science,

2) inform better global environmental policies, and

3) achieve the Sustainable Development Goals.

However, there is an important caveat with regards to the latter. To enable a strong contribution towards achieving the Sustainable Development Goals, ILTER scientists will have to rise above their personal site-based research and:

1) establish evenhanded North-South and South-South collaborations;

2) develop a data sharing culture and systems;

3) focus on finding solutions to problems resulting from interrelations between humans and nature; and

4) contribute to scientific global assessments.

In support of these high level objectives, a range of LTER and LTSER programs implementable at regional and global scales comes to mind, namely: 1) monitoring and modeling to understand the natural and human drivers and impacts of environmental change; 2) unraveling the interrelations and feedbacks between drivers and drivers, drivers and responses, and responses and responses; 3) packaging user-friendly information (e.g. maps, decision-support systems) for policy and decision-making; 4) monitoring the impact of newly adopted policies in terms of ecosystem services and equitable resource use; 5) designing and performing experiments to fast-track the production of knowledge; 6) archiving and analysing historical data; 7) developing globally-connected interoperable information systems to allow Big Data and inter-disciplinary analytics; 8) calibrating and validating space-based observations; 9) devising new approaches and technologies to promote sustainable development; and last, but not least, 10) engaging the public, government and students using appropriate language in order to give society the tools it needs to address our very complex environmental challenges, as captured in the six aforementioned Sustainable Development Goals.

South Africa also has an enormous wealth of scientific research collections, the largest herbarium in the southern hemisphere and globally-important museum collections of several vertebrate and invertebrate groups. These are seen as a ‘global public good’. To support this work, the DST and NRF are currently in the process of finalising a framework for scientific research collections. This framework, referred to the National Coordinating System and Programme for Scientific Research Collections, could be a precursor to the eventual establishment of a national facility for scientific research collections, as proposed in the draft South African Research Infrastructure Roadmap (SARIR).

A few days ago, during the International Conference on Research Infrastructures which was held in Cape Town, the Minister of Science and Technology made an important announcement with regard to the expansion of global change and environmental research infrastructure in South Africa. In this announcement, she committed the Department to support two large-scale research infrastructure proposals. These are the Expanded Terrestrial and Freshwater Ecosystem Observation Network and the Shallow-Marine and Coastal Research Infrastructure. Together, these will advance South Africa’s current global change research capacity by orders of magnitude. The terrestrial and freshwater ecosystem observation network will be established in six selected landscapes around South Africa. The coastal research infrastructure will establish three Sentinel Sites and five satellite sites. Both these research infrastructures will be hosted by SAEON on behalf of the South African research community.

**Conclusion**

I am confident that this forum will offer us a promising way forward as regards meaningful and innovative ways of conserving our crucial life supporting systems as well as ensuring the equitable sharing of the benefits arising from natural resources. This is important in helping position our countries on a fundamental path of sustainable development and thereby helps liberate humanity from the scourge of poverty.

On this note, I declare the 1st International Long-Term Ecological Research Network Open Science Meeting officially opened. And I wish you all of the best in your deliberations during this conference!

Thank you.