THE KAMAL EWIDA EARTH OBSERVATORY: A NATO SUPPORTED REAL-TIME REMOTE SENSING RECEIVING STATION BEING ESTABLISHED IN EGYPT WITH HPC-ENABLED NEAR-REAL-TIME DATA PRODUCTS FOR MITIGATION OF ENVIRONMENTAL & PUBLIC HEALTH DISASTERS

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ABSTRACT

Establishment of the Kamal Ewida Earth Observatory (KEEO) has been funded by a grant from the North Atlantic Treaty Organization (NATO) Science for Peace Program. It has been named in honor of Dr. Mohamed Kamal Tolba Ewida, who, until his untimely death on November 4, 2006, served as Egypt's delegate to the NATO Committee on the Challenges to Modern Society's (now Science for Peace & Security) Pilot Study on Clean Products & Processes. Dr. Ewida also served as Professor of Environmental Engineering and Dean of the Faculty of Engineering at Zagazig University, El-Sharkeya, Egypt, and was an early advocate on behalf of environmental sustainability. KEEO will combine the expertise and be a jointly managed initiative of two of Egypt's largest and most venerable institutions of higher learning, Cairo University and Al Azhar University, both based in Cairo, Egypt, a NATO Mediterranean Dialogue country, in collaboration with established environmental observatories in two NATO countries, Turkey and the USA.

Specifically, the Egyptian partners are engaging in applications development, research and instructional collaboration with partnering resources from Boğaziçi University's Kandilli Observatory and Earthquake Research Institute (Istanbul, Turkey), with expertise in disaster mitigation, and Purdue University Rosen Center for Advanced Computing's Purdue Terrestrial Observatory (West Lafayette, Indiana, USA), with expertise in real-time remote sensing and multi-disciplinary applications of satellite data. Since the primary focus of the KEEO focuses on the application of real-time satellite remote sensing for early warning and mitigation of biogenic and anthropogenic disasters, including epidemics and epizootics, there are multiple end-users for this project, as an ineluctable direct result of the interdisciplinary approach to effective disaster management.

This collaboration, with support from NATO's Science for Peace and Security program, will result in installation of instrumentation to facilitate timely notification, mitigation and humanitarian response to an array of natural and man-made disasters, initially focusing on meteorological disasters (e.g. storms, flooding, drought), on public health disasters (e.g. epidemics and epizootics) and on geo-disasters (e.g. earthquakes and desertification). Moreover, the project facilitates collaborative research on identification of best management practices (BMPs) and decision support, within the Egyptian context, for disaster vulnerability assessment, early warning, crisis management (i.e. in collaboration with government,

multi-lateral agencies, NGOs, academe, press and the private sector), environmental impact assessment, emergency response, evacuation, disease outbreak containment, search and rescue, damage assessment and post-disaster reconstruction.

Additionally, so as to share the benefits of this initiative with a wider audience, the project is developing a web-based Disaster Mitigation Hub, initially accessible, during beta testing, to the initial partnering universities and collaborating end-users, then to additional Egyptian universities (e.g. Assiut University, University of the Suez Canal, Zagazig University and American University in Cairo) and ministries (e.g. Ministry of Environmental Affairs; Ministry of Health), subsequently to NATO members, partners and dialogue countries, and ultimately available to the global scientific community, in order to further the state-of-the-science with respect to disaster preparedness research and instruction, as well as to strengthen collective capacity for anticipation and response to meteorological, environmental and public health disasters.

Given the anticipated volume of data to be ingested from the geostationary groundstation at Al Azhar University, collecting the European Space Agency's Meteosat data, the tracking groundstation at Cairo University, ingesting data from polar orbiting satellites, initially NOAA's AVHRR, NASA Terra MODIS and Aqua MODIS and the Chinese Space Agency's Feng Yun 1D MVISR, in addition to data collected by the partnering Egyptian Government Agency, the National Authority for Remote Sensing and Space Sciences (NARSS) at its Cairo and Aswan groundstations (i.e. EgyptSat 1, CNES' SPOT, USGS/NASA Landsat and the Chinese/Brazilian Environmental Research Satellite (CBERS), the data analysis will be performed on NARSS' IBM Blue Gene L Supercomputer, recently installed in Cairo. Subsequent collaboration is planned with South Africa's Center for High Performance Computing's (CHPC) IBM Blue Gene P Supercomputer, based in Cape Town, South Africa.

The authors further delineate the resources to be shared with the KEEO from Purdue University's Rosen Center for Advanced Computing and the Purdue Terrestrial Observatory, including the PRESTIGE subscription service for satellite data, the open source MultiSpec image analysis software, and the archive of satellite data from Purdue's Laboratory for Applications of Remote Sensing (LARS) and from the IndianaView Consortium.