

## "A Perfect Storm? – The looming urban grand challenge"

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**Abstract.** Global population projections indicate that cities will continue to grow rapidly at the expense of rural areas, much in the way that population patterns have already changed since the mid-1980s. Urban growth will be especially pronounced in the developing regions. At the same time, there is compelling evidence that Earth's climate is changing – in large part as a consequence of anthropogenic emissions of radiatively important trace gases. Climate model projections indicate these changes will continue for the foreseeable future, pending significant reductions in human-produced emissions. The recent report of the Intergovernmental Panel on Climate Change reinforces the sense that climate changes will be accompanied by changes in weather, and that there are indications that some climate-induced weather changes may already be happening. In the face of these pronounced changes in population, climate and weather, the importance of short-range weather forecasts and predictions will be even greater in the future. Especially vulnerable are the low-lying coastal regions where fully ten percent of the world population – 634 million people -- lives on just two percent of the world's land with elevation less than 10m msl. In the face of these ominous trends, urban forecasts and warnings still depend on observations from a surface-based observing system that is largely synoptic in design and is not well matched to the needs of accurate and precise, high-resolution weather predictions in the cities of today and tomorrow. This impending "perfect storm" – urban population growth and climate and weather changes – and the implications for public safety need to be met in the future by the national meteorological services in partnership with non-governmental organizations, academia and private industry. Together they must implement advanced regional atmospheric prediction models that properly simulate urban surface exchange processes and high-resolution observing systems that facilitate markedly improved warnings, forecasts and predictions of weather-related hazards of all types – severe weather, flooding, heat stress, poor air quality, wildfires and disease.