Small unmanned airplanes and their use to improve on-demand local forecasts

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An on-demand weather forecasting system, named SARWeather, has been developed. The system is tailored to meet the demanding needs of Search And Rescue operators world-wide. SARWeather uses the Advanced Research WRF model, initialized and forced on the boundaries with data from the GFS global forecasting system. One of the unique features of the system is that it is run on the Amazon Elastic Compute Cloud (Amazon EC2). This ensures that twenty individual forecasts can be run simultaneously for any region in the world. Increasing the number of potential forecasts is straight forward, and can be done at a short notice. A second unique feature of SARWeather is that the system does not require any prior knowledge on behalf of the user regarding atmospheric modeling and/or high performance computing. Thirdly, output from SARWeather can be easily ingested into other decision support software, such as ArcGIS.

Data from a UAS system named SUMO [1] (Small Unmanned Meteorological Observer) have been shown to improve local weather forecasts [2]. Ongoing research aims at combining the SUMO with SARWeather by transmitting atmospheric observations from vertical profiles, made by the SUMO observer, directly from the field to the SARWeather system via 3G mobile transmissions.

In 2011, SARWeather joined GDACS (Global Disaster Alerts and Coordination System - http://www.gdacs.org) to provide on-demand detailed weather forecasts for disaster areas world-wide. SARWeather is also being integrated with the D4H system (http://www.decisionsforheroes.com).

References:
[1]
Reuder, J., Brisset, P., Jonassen, M., Müller, M., Mayer, S., 2009: The Small Unmanned Meteorological Observer SUMO: A new tool for atmospheric boundary layer research. Meteorol. Z., 18(2), 141-147.
[2]
Marius O. Jonassen, Haraldur Ólafsson, Hálfdán Ágústsson, Ólafur Rögnvaldsson, and Joachim Reuder (2012). Improving a high resolution numerical weather simulation by assimilating data from an unmanned aerial system. Monthly Weather Review, in revision.