Streamlining SWIRLnet data acquisition, analysis, storage and dissemination procedures

Natural Hazards Research Australia

RESEARCH TEAM

SUPPORTING ORGANISATIONS

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Project duration: 10 months

Background

The Surface Weather Information Relay and Logging Network (SWIRLnet) is a network of six portable weather stations deployed in advance of landfalling tropical cyclones along the Queensland coast. This network was first deployed in 2014 with the objective to provide real-time information about tropical cyclone winds *within* communities as storms made landfall and to capture research-grade wind data that enabled researchers to better understand near-surface wind fields during these storms and provide observations of wind speed that could be mapped back to observed damage following the storms.

To date, SWIRLnet has been deployed for six tropical cyclones, including Severe Tropical Cyclones Ita (2014) and Debbie (2017). With each deployment, more information has become freely available to a broader audience, with a simple website most recently developed for real-time monitoring of measurements. Despite this, automated data analysis, visualisation and dissemination procedures are not currently in place. Improving these procedures will increase the ease by which end-users and the public can interact with these data and utilise them to improve situational awareness and response.

Project description

The primary aim of this project is to streamline the data acquisition and dissemination procedures currently enacted during SWIRLnet deployments and to make the data more accessible in real-time. The automation of these processes will ensure data capture and dissemination is robust, reliable, and timely.

The project team will also develop an open-access repository for all high-time-resolution data captured during previous and future deployments. Broad access to these data will enable the public, disaster management agencies and infrastructure operators to better quantify the winds actually experienced during particular events so they may better plan for future cyclones.

Finally, the project will see two new weather stations added to SWIRLnet. Tropical cyclones can be geographically large events, so network expansion will enable more resolute capture of wind fields within communities or the capture of data across a broader geographic region.

Intended outcomes

Tropical cyclone winds within communities are rarely measured. People's understanding of the ferocity of winds experienced during a cyclone are generally inferred from Bureau of Meteorology Automatic Weather Station measurements, which could be made some distance from any given community, if any exist at all. SWIRLnet enables wind measurements to be made where none were previously possible, and this project will lead to development of an improved interface for end-users to interact with these real-time data.

Outcomes of the project will include:

- Improved and automated code for acquisition and analysis of real-time and archived tropical cyclone wind data.
- Development of a dedicated website for interfacing with SWIRLnet data in real-time.
- An open-source archive of high-resolution wind and other atmospheric data captured by SWIRLnet during all future and historic deployments.
- Expansion of the physical network to include two new weather stations.

Translation and implementation potential

The collection of wind data from within communities is vital for understanding the winds that damage buildings and infrastructure (and therefore impact on people and communities) during tropical cyclones. The capture of these data enables:

- Accurate vulnerability models and post-event wind field models to be constructed, allowing better estimates of risk to be made.
- Advance the science of tropical boundary layer wind structure – which is currently lacking data of near surface winds specifically around housing communities.
- Provision of real-time data to disaster management agencies to enhance response and recovery activities.

Further information

For full project details head to: https://www.naturalhazards.com.au/research/research-projects/streamlining-swirlnet-data-acquisition-analysis-storage-and

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