

## Commentary

# Smart cyclone alerts over the Indian subcontinent

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## Abstract

**This article describes a first application of mobile telephony alerts for an extreme weather event - the progression and landfall of cyclone Phailin. The international media picked up on the cyclone Phailin story (11th–12th October 2013) - 800 000 people were evacuated within 48 h. Here we describe a novel scheme using Weather Research and Forecasting (WRF) simulations and mobile phone alerts for cyclone warnings. Cellphones have a deep penetration even in rural pockets of India and it is anticipated that the results of this commentary will inspire disaster mitigation efforts over many parts of the developing world.**

**Keywords:** mobile telephony; cyclone alerts; Phailin

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Cyclone Phailin was one of the largest to hit India in more than a decade. It was categorized by the Indian Meteorological Department as a very severe cyclonic storm and classified as a Category 5 tropical cyclone. It affected more than 12 million people in India and neighboring countries of Myanmar, Thailand and Nepal.

Despite the enormous scale of Cyclone Phailin, its death toll in India was just 23. This was because of the evacuation of as many as 800 000 people in a short time scale of 48 h. Such large scale evacuation was made possible by weather predictions using state of the art climate models such as the Weather Research and Forecasting model (WRF). However, these models are computationally intensive and until now, have required expensive infrastructure to yield quick forecasts, largely restricting their use. This is likely to change radically in India – a demographically young country having enormous engineering and numerical prowess can change the future of cyclone forecasts within the subcontinent. This Phailin success story is a good example.

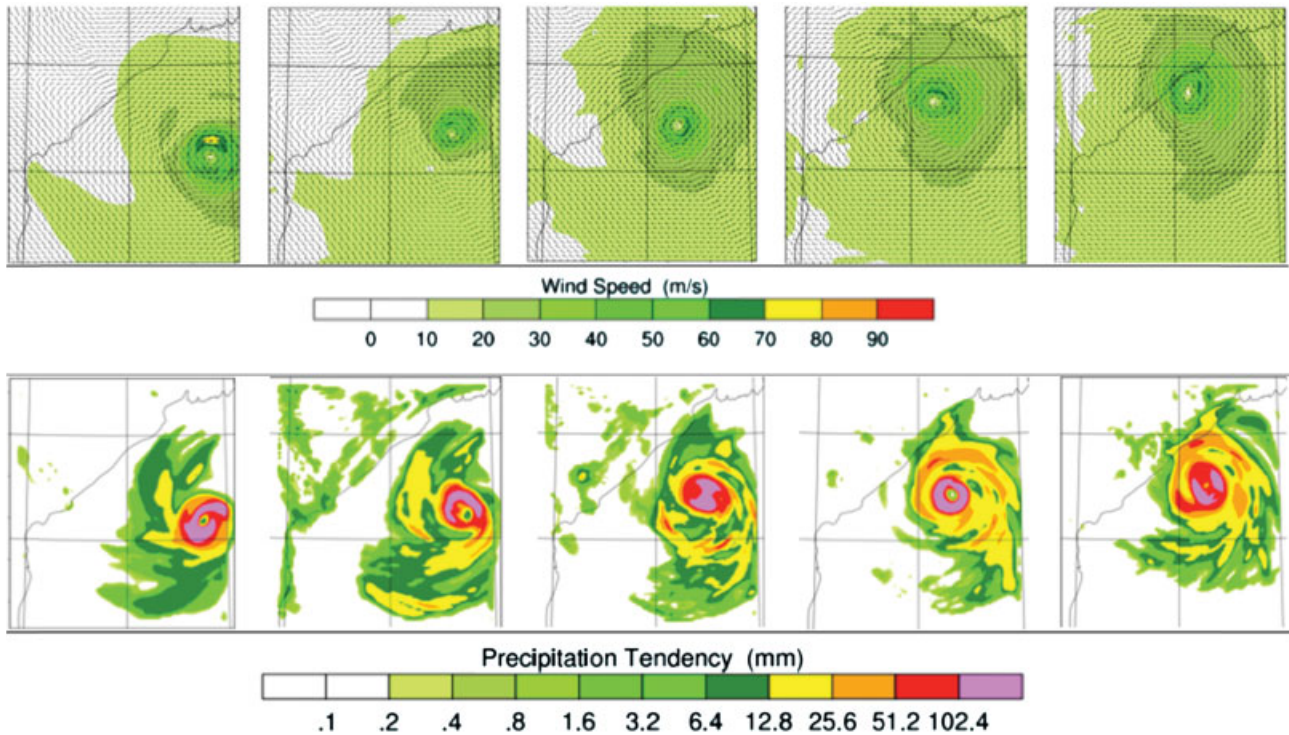
Computer Science Undergraduates worked closely with an atmospheric scientist to develop applets that can configure, install and run the WRF anywhere and everywhere-on student laptops and on class room clusters.

On receiving preliminary reports of the imminent super cyclone, they tracked its genesis, progression and landfall. The results showed stunning consistency with the progression of the actual events that unfurled. This is clearly visible in the images shown below (Figure 1). The high quality results motivated them to automate the weather forecasting process making the forecasts accessible to all – fishermen and

farmers, ordinary citizens and tourists. This first application was targeted mainly toward people who are nonexperts in fluid mechanics and weather forecasting, with little knowledge of English. A compelling visual image on an item of everyday use – the ubiquitous cellphone – was the chosen instrument for the dissemination of cyclone alerts. Cellphones have a deep penetration even in rural pockets of India – they are owned even by villagers who do not have access to sanitation, safe drinking water and electricity on the grid. It is anticipated that this will facilitate timely evacuation well in advance.

The response to such a system has been overwhelmingly positive. Rajalakshmi, a local of the rural town of Katpadi says ‘Currently, I receive weather forecasts from news channels on TV in Tamil. Forecasts are broadcast only one day in advance’. She was excited by the idea of getting weather updates directly on her phone (Figure 2). ‘Everyone, including my children, have mobile phones which they carry with them at all times. So a cyclone warning on the phone will be very useful’ she says. Rajalakshmi’s enthusiasm motivated the authors to extend the reach of these cyclone alerts over many other states of India. Currently, they are poised to liaise with the government of Tamil Nadu for the necessary permissions.

India has a subscriber base exceeding 929 million – it is expected to touch 1.15 billion by the end of 2013. This accounts for a staggering 97% of the population, making India’s mobile telecommunications system the second largest in the world. This makes it the ideal medium for large scale disaster warning systems. The number of individuals who access the internet using their mobile phones is 23.8 million. The *raison d’être* for this article is



**Figure 1.** Offline WRF simulation showing the progression of Cyclone Phailin.



**Figure 2.** Rajalakshmi, with a demo of the cyclone warning system.

making WRF generated cyclone alerts accessible to all in the quickest possible manner. Special efforts were made to generate offline cyclone forecasts. SMSs and MMSs with intuitive iconography in the local vernacular can then make these forecasts accessible to nearly a billion subscribers within the sub-continent.

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