



This discussion paper is/has been under review for the journal Natural Hazards and Earth System Sciences (NHESS). Please refer to the corresponding final paper in NHESS if available.

# Is there a wind connection to freaque wave occurrences?

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## Abstract

There was a recent freaque wave encounter near Scituate, Massachusetts by a local transport ferry en route from Provincetown to Boston. The encounter resulted in minimal damages, fortunately, and provided us a chance to examine a possible connection between the freaque wave occurrence and the ambient wind field, since the place of encounter was in the vicinity of a NOAA NDBC buoy where wind and wave data were recorded. Here we present a brief analysis. In particular, we found it is plausible that the freaque wave was the result of a wind speed reduction in the wind field that preceded its occurrence.

## 1 Introduction

On 13 August 2014, Boston Herald.com (2014) carried this news item with the headline “Rogue wave hits Provincetown ferry.” reported by Owen Boss:

A Provincetown ferry was temporarily disabled and suffered damage when it was struck by a 20-foot wave off Scituate, according to the US Coast Guard and Bay State Cruises, has been escorted into Boston Harbor under its own steam.

Later the local WCVB TV News (2014) reported these further details:

“Just before 4 p.m., a ferry was midway through its fourth trip of the day, to and from Provincetown and Boston, when the vessel was hit by a large set of waves that broke two of the seven windows in the pilot house, Bay State Cruise Company officials said in a statement.

The two windows that broke were in the center of the pilot house, which is where the captain navigates from.

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Officials said windows in the passengers cabin, which is under the pilot house, were not broken and it appeared as though the waves were at an angle and height that they only struck at the pilot house level, which is about 20 feet above the water.

After the large waves hit the ferry, seas returned to the normal wave pattern of about 5 feet, officials said.”

Evidently the indication that the large waves hit unexpectedly, at an angle, 20 feet above the water provided the basis for the Boston Herald’s “20 foot rogue wave” report. On 14 August 2014 Boston Globe correspondent Kiera Blessing (2014) further provided these details including the actual time of the occurrence:

The ferry was carrying 42 passengers around 4.10 p.m. on Wednesday when the wave struck the vessel, deflected off the ship’s bulkhead and broke through the windshield into the pilot house, the company said.

This case has been well reported locally. Maybe because there was only minor damage, it did not receive worldwide attention. Nowadays, sea going passenger ships encountering freaque waves in the middle of the ocean is no longer infrequent. Earlier this year, in February 2014, it was widely reported that the Cruise Ship *Marco Polo* was smashed into by a “massive” wave where one passenger was killed with several injured during “adverse” sea conditions in the English Channel. In March 2010, another cruise ship, the *Louis Majesty*, was reportedly struck by three successive large waves near Marseille, France. Two passengers in a lounge were killed by flying glass when several of the windows shattered. Many passengers were injured, and the ship suffered extensive damage.

What makes the Boston–Provincetown ferry case different from the cases mentioned above, however, is that a few miles north from where the encounter took place near Scituate, Massachusetts (Fig. 1) there is a NOAA NDBC Buoy, Station 44013, in 200 feet of water that records wind and wave measurements for the general area. Therefore, actual wind and wave information in the vicinity where this freaque wave encounter

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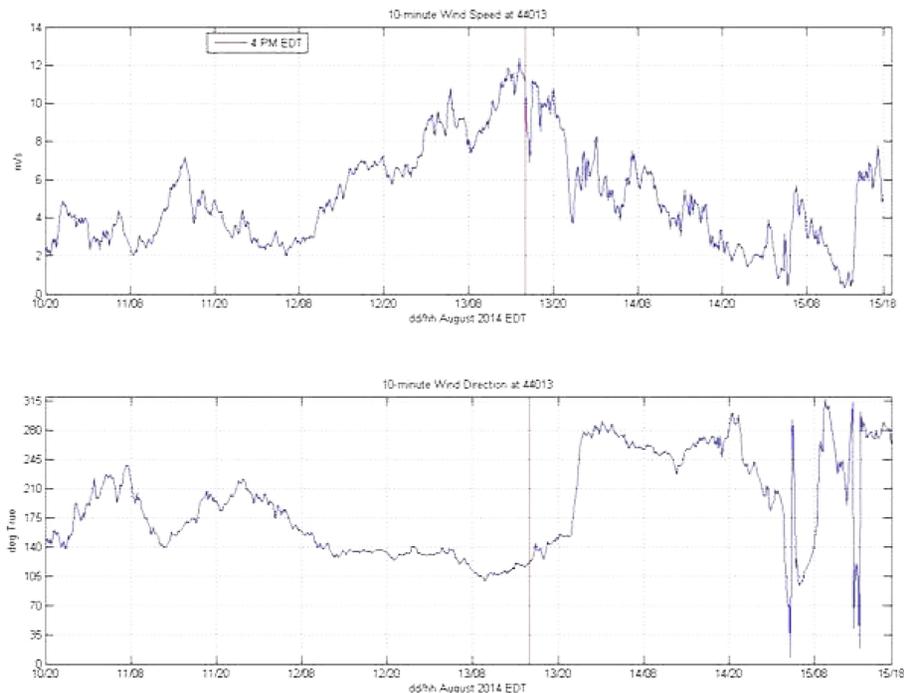
Figure 1. Map of Boston–Provincetown Ferry surrounding area.

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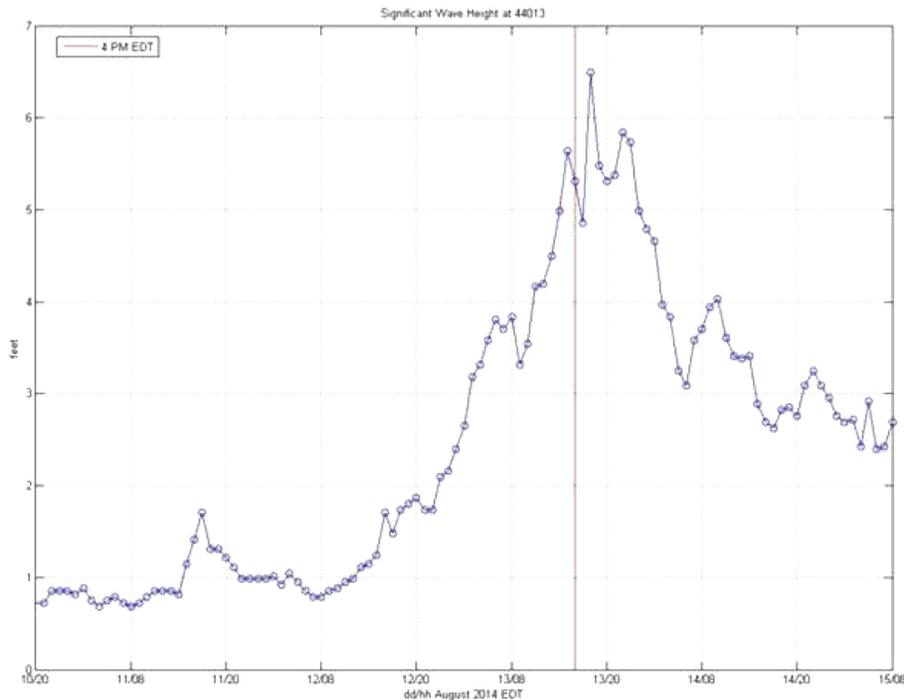


**Figure 2.** Hourly data of wind speed and wind direction recorded at NDBC Buoy 44013. The red line indicates the approximate time when the ferry boat possibly encountered a freaque wave outside Scituate, Massachusetts.

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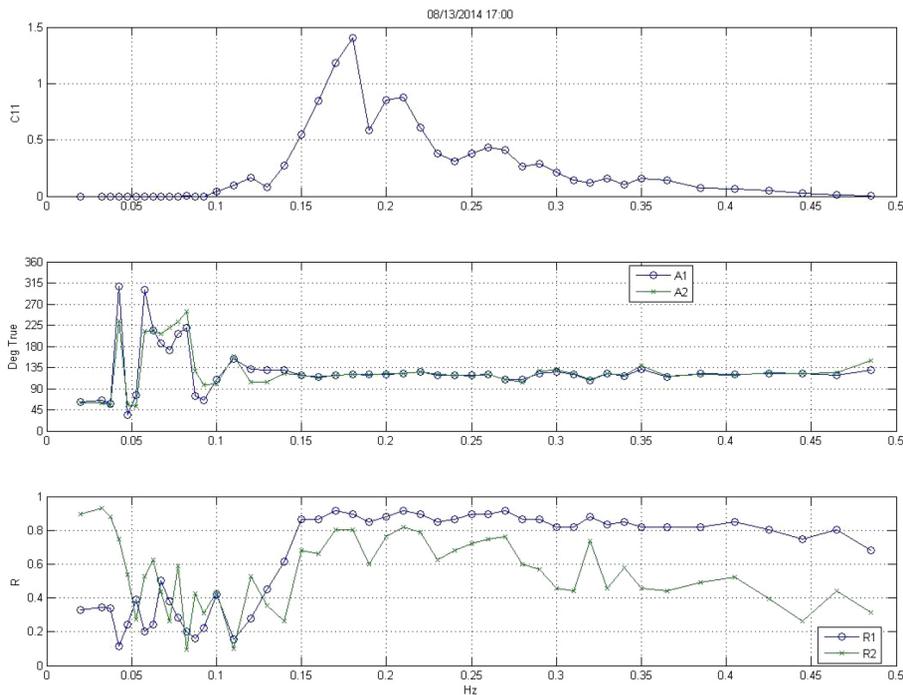


**Figure 3.** Hourly data of significant wave heights recorded at NDBC Buoy 44013. The red line indicates the approximate time when the ferry boat possibly encountered a freaque wave near Scituate, Massachusetts.

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**Figure 4.** Wave spectrum recorded on NDBC Buoy 44013 at hour 17:00, 13 August 2014.

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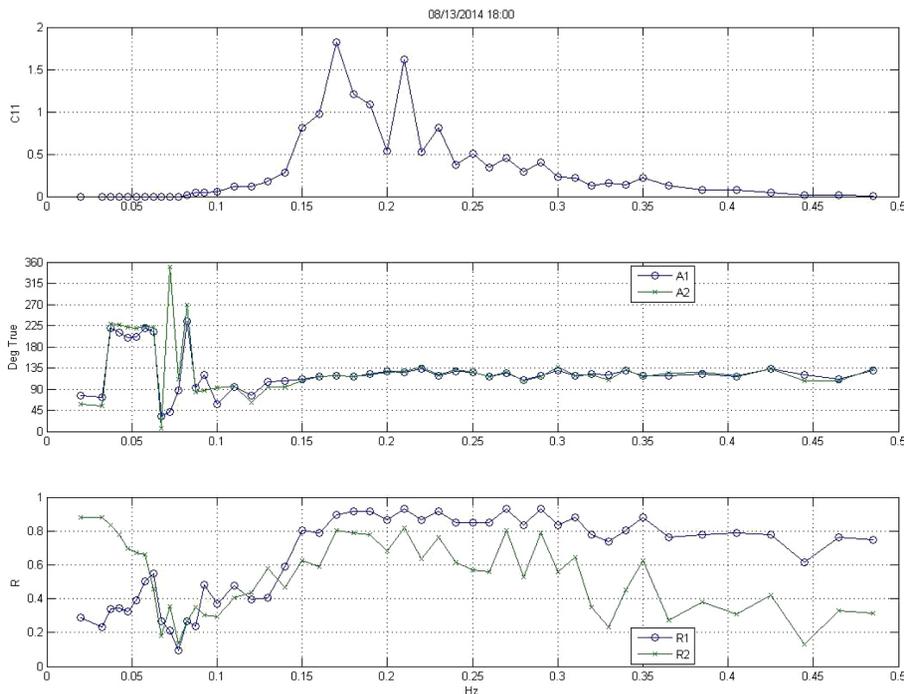
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**Figure 5.** Wave spectrum recorded at NDBC Buoy 44013 at hour 18:00, 13 August 2014.

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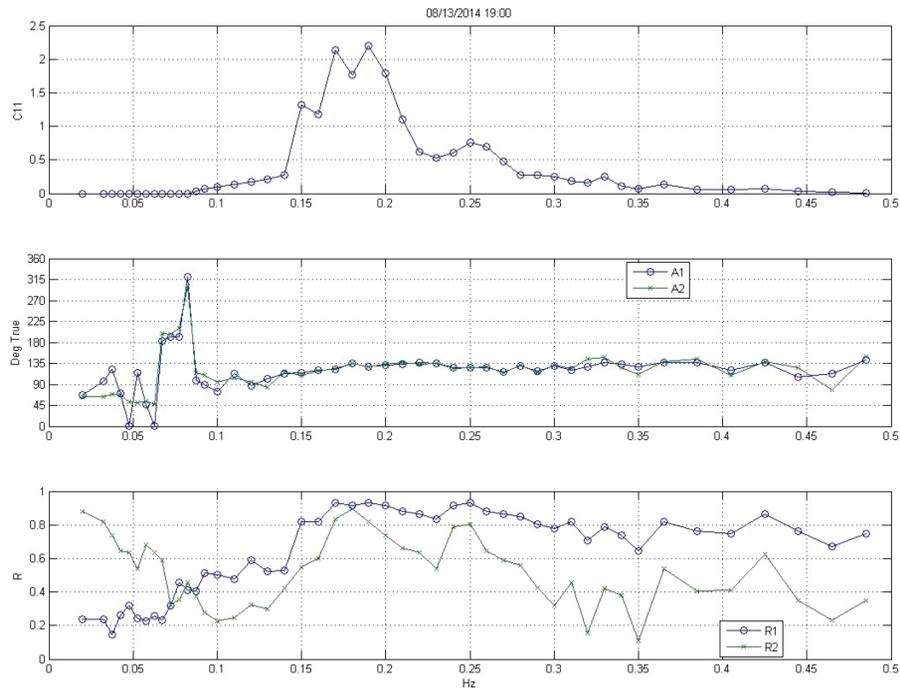
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**Figure 6.** Wave spectrum recorded at NDBC Buoy 44013 at hour 19:00, 13 August 2014.

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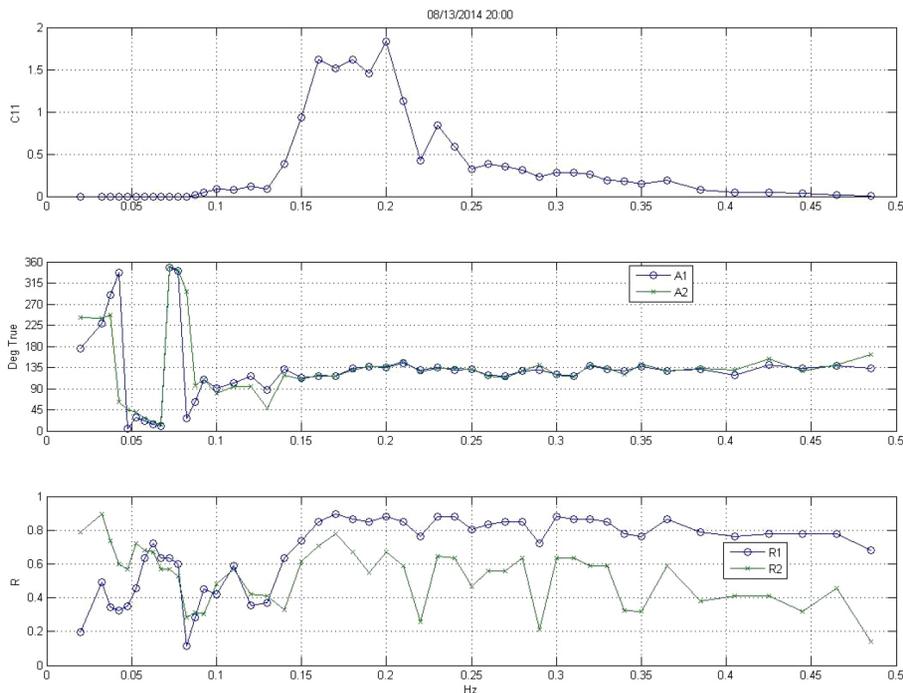
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**Figure 7.** Wave spectrum recorded at NDBC Buoy 44013 at hour 20:00, 13 August 2014.

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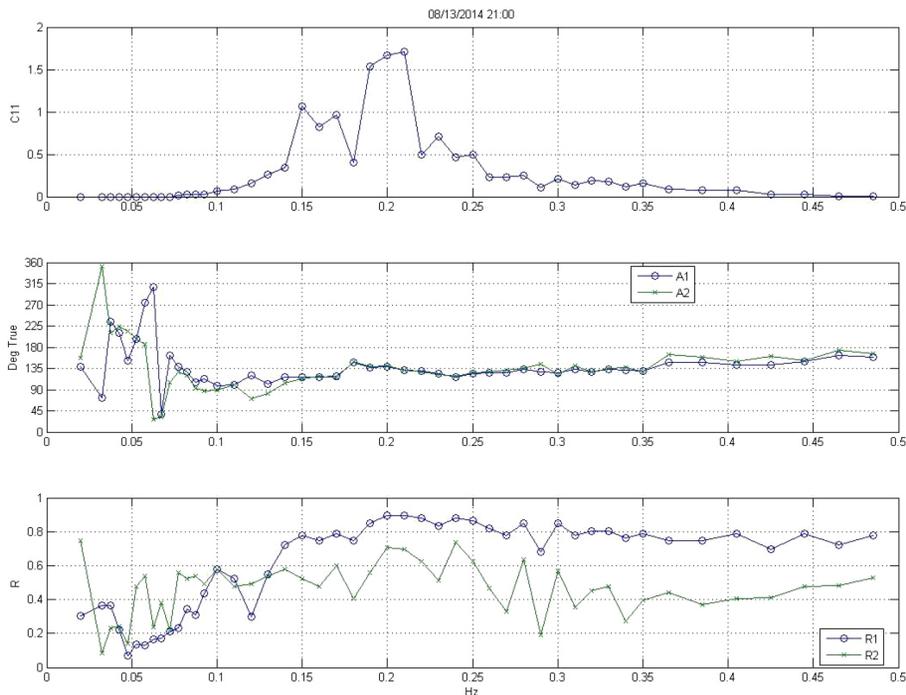
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**Figure 8.** Wave spectrum recorded at NDBC Buoy 44013 at hour 21:00, 13 August 2014.

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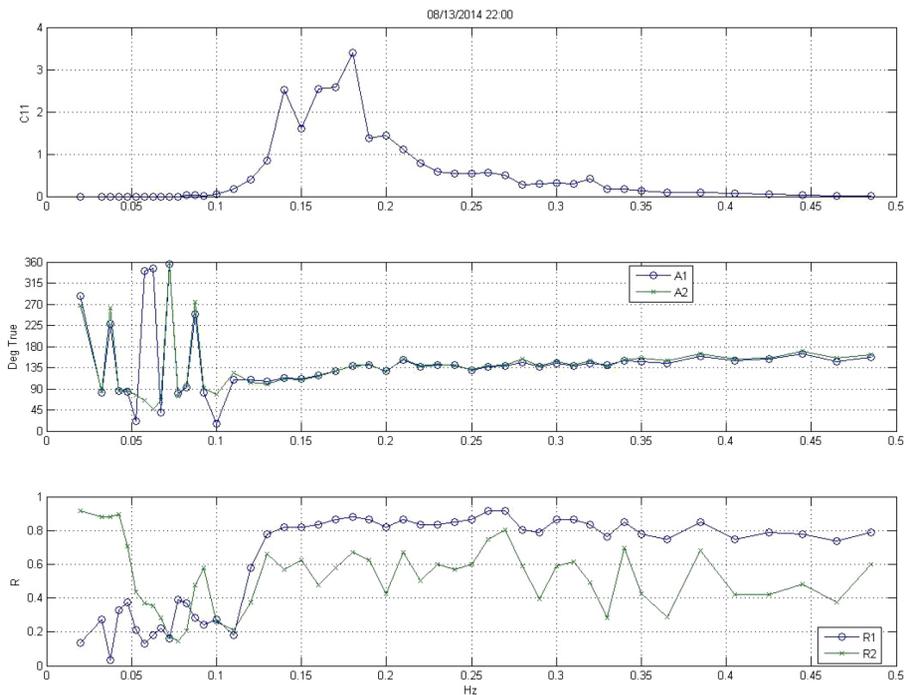
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**Figure 9.** Wave spectrum recorded at NDBC Buoy 44013 at hour 22:00, 13 August 2014.

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