What Seasonal Hurricane Forecasts Mean to the Residents of Florida

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Every year warnings of the approaching hurricane season are sounded. "This year will be active," or "El Niño is expected to keep hurricane activity in check." Who issues these forecasts? How accurate are they? Should I use them to cancel my Caribbean vacation? Two pioneers of seasonal hurricane forecasts are William Gray and Neville Nicholls. During the 1970's, Dr. Nicholls discovered that El Niño[1] meant fewer tropical cyclones near Australia. Since El Niño conditions change slowly, Dr. Nicholls was able to anticipate Australian storms by a few months. Professor Gray at Colorado State University used a similar idea. Professor Gray noticed that jet-level winds during El Niño events hamper hurricane development over the Atlantic. Seasonal hurricane forecasting is now a cottage industry. Currently the National Oceanic and Atmospheric Administration (NOAA) issues an official prognostication for the season.

Seasonal forecasts are based on hurricane records. For instance, 11 hurricanes formed

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[1]El Niño refers to the periodic warming of the ocean waters off the coast of Peru, typically commencing around Christmas time.

in 1995, 9 in 1996 and 3 in 1997. The variation is not entirely random. El Niño winds resulted in fewer hurricanes during 1997. To make sense of this information, climatologists use statistics. Meteorology helps answer the question why fewer hurricanes form during El Niño, but statistics provides the logic to build forecast models. On average there are 5 to 7 hurricanes a year. A below-average year has fewer than 5 and an above-average year has more than 7. Forecasts are more accurate than simple guesswork. But, since most hurricanes remain out at sea, the forecast has little relevance to your chance of experiencing storm-induced high winds or surge. A case in point is 1992 when a below-average year (4 hurricanes) resulted in a devastating blow to Florida in the form of Hurricane Andrew. By comparison 2001 was an above-average year (9 hurricanes) but none made it to the United States.

More precisely, suppose an average hurricane season is forecast. This means we can expect 5, 6 or 7 hurricanes. Now, how many of these storms will affect Florida? This is a billion dollar question. Among the last 52 years (1950–2001), 21 of the seasons had an average number of hurricanes, 15 had and above-average amount, and 15 had a below-average amount. The mean number of Florida hurricanes during the 21 average seasons was 1.38, this compares with 1.25 during above average seasons and 0.80 during below average seasons. Surprisingly the probability of a Florida hurricane peaks during average seasons. Figure 1 shows probabilities of Florida hurricanes conditioned on the abundance of hurricanes that form. Not surprisingly, during a below average season the chance that Florida will get his is low (30% compared to a average value of 40%). Yet during a normal season the chance of seeing at least two Florida hurricanes increases from 10% to 15%. In fact, assuming the seasonal forecast is perfectly reliable and the present climate is no different than the past, a forecast of an average season is the most ominous to the

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residents of Florida.

Scientists are making seasonal hurricane forecasts more relevant by focusing on landfalls. Our work at Florida State University has identified climate signals that indicate where storms will track (Elsner 2003). A forecast that the storms will track through the Caribbean portends an active year along the Gulf coast. For example, a weak North Atlantic oscillation pattern likely contributed to more landfalls during 1979. Although this information is more relevant to coastal residents, the accuracy of these predictions remains limited. The science and technology of hurricane climate is new. Every year we learn more. Seasonal forecasts will get better and more specific. Meanwhile, the advice is to be prepared regardless of what the prognosticators say.

Reference.

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Figure Caption. Probabilities of a hurricane making a direct hit on Florida. The cyan bars indicate climatological probabilities and the magenta bars indicate conditional probabilities based on overall activity being (a) below normal (inactive season), (b) normal, and (c) above normal (active season). Probabilities indicate the chance of seeing no hurricane, exactly one hurricane, exactly two hurricanes, etc. (d) The number of years in the 52-year period (1950–2001) with precisely 2, 3, etc hurricanes over the North Atlantic.