An accurate representation of the geographical pattern of maximum winds associated with the passage of a hurricane is an important factor in the analysis of its loss-producing potential. Ideally, the mapping of this high wind pattern should be based on speeds measured by a spatial array of anemometers which has a density and location configuration that is consistent with the geography and demography of the area. It also would be desirable for these wind instruments to be of a similar type; be positioned at a comparable height; be properly exposed and calibrated; and be continuously recording. Over time, additional anemometers could be added at appropriate locations within this basic network to even further increase its efficiency as a wind-measuring system. Unfortunately, along Gulf and Atlantic coast areas, the geographical distribution of the basic network of anemometers was not pre-planned. It evolved haphazardly over over the first half of this century with very few additions to the grid since that time.

In fact, since the late 1950's, there actually has been a decrease in the number of observations available, after a hurricane's occurrence, for constructing its maximum wind pattern. To estimate the extent of this decrease, an analysis has been made of the number of maximum wind observations that were available for hurricanes that affected Gulf and Atlantic coastal areas at various times over the past 30 years. Published listings of observed maximum winds for each of the 43 hurricanes that significantly affected the United States mainland since 1960 were used as the information source for this study.

A number of months after the occurrence of each of these storms, information about physical characteristics (intensity, storm size, rate of movement, and track) is given in several climatological information sources: Storm Data, U.S. Department of Commerce; Monthly Weather Review, American Meteorological Society, Boston; National Climatalogical Data, U.S. Department of Commerce (no longer available). Included with this physical data, there usually is a tabulation of the maximum wind speeds: peak gust; one-minute sustained wind; fastest-mile-of-wind (no longer available) observed at various locations during passage of the storm. The one-minute sustained wind and fastest-mile-of-wind can be converted into an estimate of concurrent peak gust.

Before comparisons of these maximum wind observations for various hurricanes could be made, a standardization process was needed to account for the size of the land area that was affected by each of the storms. This indexing was obtained by relating the geographic area that had maximum winds of at least 40 miles per hour (peak gusts) to the number of maximum wind observations that were available for the hurricane. Figure 1 summarizes results of these comparisons. It shows the average number of wind observations (per unit area of 10,000 square miles), available for constructing the maximum wind patterns of hurricanes which affected the Atlantic or Gulf states during the past 3 decades.

Thirteen of these hurricanes affected Atlantic states during the period: six of them in the 1960's. An average of 16 maximum wind observations per 10,000 square miles was available for mapping the high wind pattern of these six storms. In the 1980's there were 5 hurricanes. For these hurricanes, there were only 8 observations per 10,000 square mile area. This is one-half of the average number that was available for the 1960's storms. In Gulf states, there were fewer available maximum wind speed observations as compared with those in the Atlantic states (10 versus 16) in the 1960's. In the past decade, these averages have declined to 7 for the Gulf and 8 for the Atlantic states. When the information for these 2 areas is combined, the average number of available observations suggests a decrease from about 12 for the 1960's hurricanes to 8 for the 1980's storms.

One reason for this decline in the number of available maximum wind speed observations is a reduction in the number of estimated wind speeds that are given in the tabulations. This increases the general quality of those speeds that are listed. However, it reduces the utility of the tabulations in defining the overall size, shape, and internal gradient of speeds in a hurricane's maximum wind pattern for which even estimated speeds can be useful. With information that is available, it is not possible to evaluate the size of the effect of reducing the number of estimated wind speeds on the overall decline in the number of maximum wind observations.

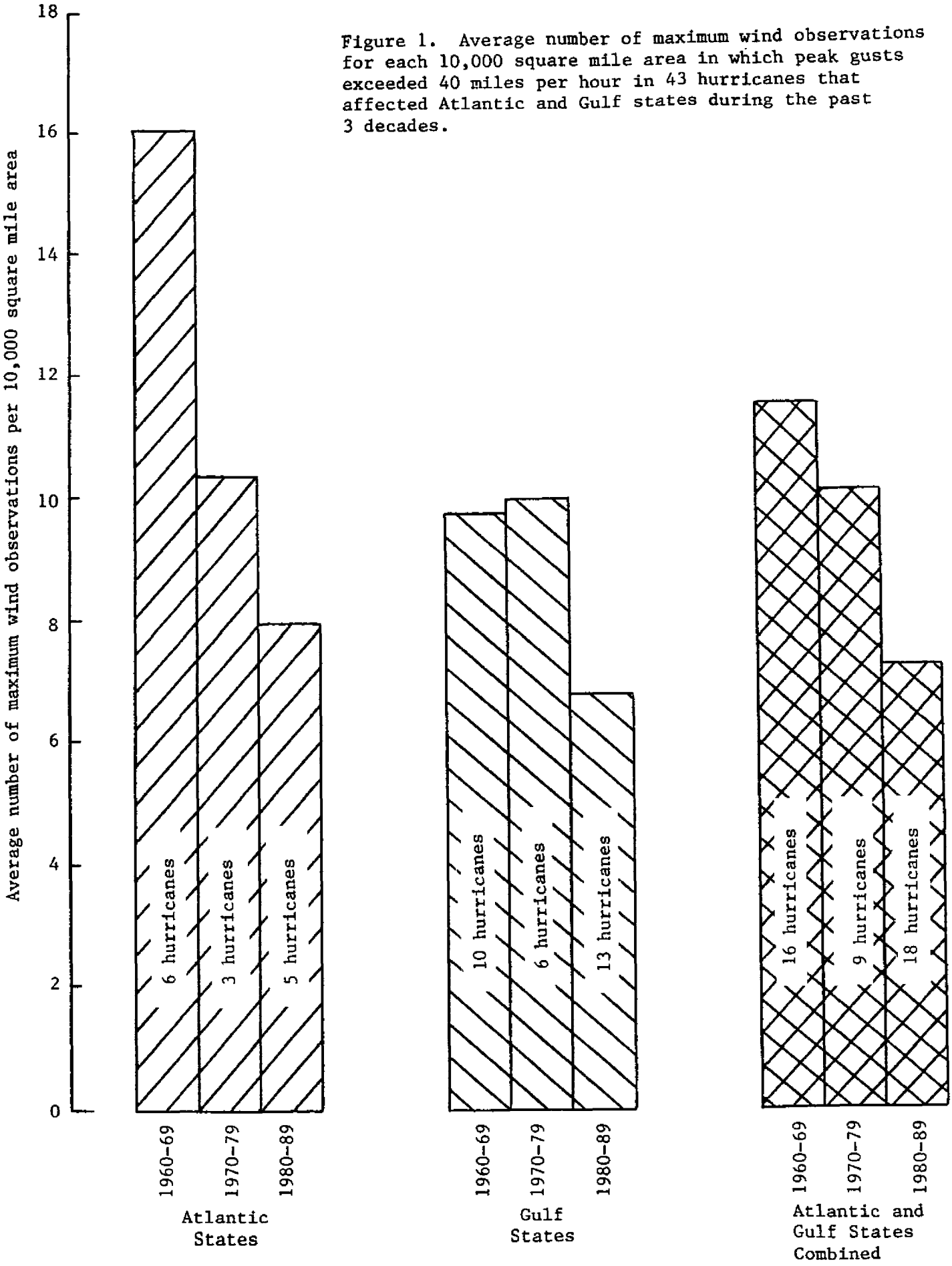

Figure 1. Average number of maximum wind observations for each 10,000 square mile area in which peak gusts exceeded 40 miles per hour in 43 hurricanes that affected Atlantic and Gulf states during the past 3 decades.