

## Weather People and History

### The Weather Legacy of Admiral Sir Francis Beaufort



Admiral Beaufort

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Admiral Robert Fitzroy of H.M.S. Beagle fame wrote of Admiral Sir Francis Beaufort, "All honor to Beaufort, who used and introduced this succinct method of approximation by scale..." The method to which Fitzroy refers, one of Beaufort's many accomplishments during his distinguished naval career, is the Wind Force Scale, still in widespread use today by men of the sea.

Francis Beaufort was born in 1774, in County Meath, Ireland, the son of the Reverend Daniel Augustus Beaufort, the Rector of Navan. At the tender age of 13, he began his nautical career as a cabin boy in the British Navy. Three years after going to sea, Francis Beaufort recognized the value of being weatherwise and began keeping a meteorological journal in the form of brief comments on the general weather scene, a practice he would continue until his death. At 22, he had risen to the rank of lieutenant, serving aboard H.M.S. Phaeton.

In 1805, Beaufort was given his first command, H.M.S. Woolwich, and assigned to conduct a hydrographic survey of the Rio de la Plata region of South America. During these early years of command, he developed the first versions of his Wind Force Scale and Weather Notation coding, which he was to use in his journals for the remainder of his life.

#### Injury Leads to New Career

Beaufort's assignment during the years 1811 and 1812 led him to the Eastern Mediterranean off Asia Minor for a combined hydrographic study and patrol mission against the pirates operating out of the Levant. In June, 1812, Beaufort sent a survey party ashore to make astronomical observations. When the party encountered armed hostilities from the local pashas, Beaufort himself led the rescue. As they were rowing back to H.M.S. Fredrikssteen, Beaufort was struck in the groin by sniper fire. The ball fractured Beaufort's hip, and he subsequently spent several months convalescing aboard ship.

By the end of the year, however, it was obvious that both ship and commander were in great need of repair, and they were ordered home by the Admiralty. Francis Beaufort would never again return to active sea duty although he would remain in the British Navy until he was 81.

In 1829, Beaufort was appointed Hydrographer to the Admiralty. From this post, he outlined the hydrographic studies for many British expeditions including that of H.M.S. Beagle, commanded by his protégé Robert Fitzroy. In 1838, Beaufort's Wind Force Scale was introduced for use by the British fleet for all log entries, joining his

Weather Notation, which had been prescribed for use five years earlier.

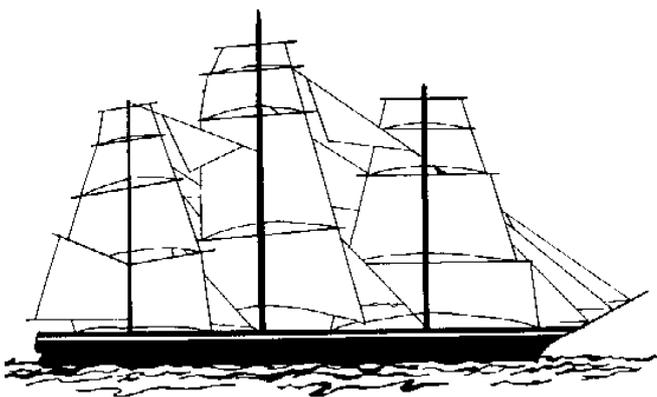
The Admiralty promoted Beaufort to Rear Admiral in 1846. Beaufort was bestowed the title Knight Commander of the Bath two years later. In 1855, after 68 years of service, Sir Francis retired from the Admiralty. He died in 1857, but his life's work continued to receive recognition and honor.

Of his many achievements, Admiral Beaufort is remembered today most for the Wind Force Scale which now bears his name. The scale, which he conceived in 1805 and the British Navy adopted in 1838, however, underwent major changes in the 100 years following its initial adaptation.

Rigging of a British Frigate circa 1830

#### Frigates as Wind Sensors -- The Beaufort Wind Force Scale

In his journal for January of 1806, then-Commander Beaufort wrote, "From now on I shall evaluate the force



of the wind in accordance with the following scale, since nothing gives a more indefinite representation of the wind and the weather than the previously used expressions like moderate wind or cloudy weather."

Originally, the Wind Force Scale consisted of 13 degrees of wind strength, from calm to hurricane, and was based upon the effects of various wind strengths upon the amount of canvas carried by the fully rigged frigates of the period. In the days before elaborate meteorological instruments, Beaufort had chosen for his wind sensor the prime ship of the British fleet. The 1831 version of the wind scale as outlined in a memorandum to Commander Robert Fitzroy could be divided into three sections.

The first five states (Forces 0-4) described a ship's speed with all sails set and clean full, and in smooth water. The next five (Forces 5-9) concerned the ship's mission, the chase, and its sail-carrying ability. For example, in a fresh gale (Force 8), a well-conditioned man-of-war could just carry in chase, full and by, treble-reefed topsails, etc. The final three Forces (10-12) referred to a ship's ability to survive whole gale, storm, or hurricane.

In 1838, the British Admiralty officially prescribed the Scale and made its use mandatory for all ship's log entries, for, as it was defined, the Scale had no ambigui-

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ties for the sailors and officers of the day. But the winds of change move ever onward, and like Beaufort himself, the frigate eventually passed from the scene as the prime ship of the British Navy. Thus, when the Permanent Committee of the First Meteorological Congress met to adopt the Beaufort Wind Scale for international use in meteorological telegrams, changes were needed.

tem of notation that was to become the forerunner for modern weather-observation codes.

One part of this observation notation was the wind force number from his Wind Force Scale. The second part of the code was a series of alphabetic symbols of one to three characters which described the state of the sky and weather, differentiating between types of precipitation and cloud conditions. See [www.islandnet.com/~see/weather/history/beawxnto.htm](http://www.islandnet.com/~see/weather/history/beawxnto.htm)

Between 1806 and 1832, Beaufort further refined his original coding scheme. For example, in the 1806 designation, Beaufort used f to indicate fine weather but, in the 1826 version, this notation now represented fog. With slight alterations, the Beaufort Weather Notation was adopted by the British Navy in 1833.

Nearly a century later, the British Meteorological Office adopted the code for use, again with only slight alterations such as adding intensity indicators (e.g., the use of the upper rather than the lower case to indicate high-intensity precipitation). An international conference meeting in Warsaw, Poland in 1935 officially approved a form of the Beaufort notation for international exchange of weather observations. See [www.islandnet.com/~see/weather/history/beawxnt1.htm](http://www.islandnet.com/~see/weather/history/beawxnt1.htm)

Today, numbers have generally replaced alphabets for the reporting of general meteorological observations, except for some specialized reports where letter notation is still used to indicate weather and cloud conditions. And direct measurements have replaced the estimates of the Wind Force Scale. The new forms, however, do not hide the legacy of Sir Francis Beaufort as landsmen and sailors alike continue to describe the ever-changing sea and the ever-present wind.

### Learn More From These Relevant Books Chosen by The Weather Doctor

\* Gribbin, John and Mary Gribbin: *FitzRoy: The Remarkable Story of Darwin's Captain and the Invention of the Weather Forecast*, 2004, Yale University Press, New Haven CT, ISBN: 0300103611, 352pp (hc).

\* Watts, Alan: *Instant Wind Forecasting*, 2002, Sheridan House Inc, ISBN 1574091433 (pb).

\* Watts, Alan: *The Weather Handbook (2nd Edition)*, 1999, Sheridan House Inc, ISBN 1-57409-081 X .

Written by Keith C. Heidorn, PhD, THE WEATHER DOCTOR, June 2, 1998

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Beaufort Wind Force Scale			
As Communicated to Commander Fitzroy (1831)			
0	Calm		
1	Light Air	Or just sufficient to give Steerage Way	
2	Light Breeze	Or that in which a man-of-war with all sail set, and clean full would go in smooth water from.	1 to 2 knots
3	Gentle Breeze		3 to 4 knots
4	Moderate Breeze		5 to 6 knots
5	Fresh Breeze	Or that to which a well-conditioned man-of-war could just carry in chase, full and by.	Royals Etc.
6	Strong Breeze		Single-reefed topsails and top-gal. sail
7	Moderate Gale		Double reefed topsails, jib, etc.
8	Fresh Gale		Treble-reefed topsails etc.
9	Strong Gale		Close-reefed topsails and courses
10	Whole Gale	Or that with which she could scarcely bear close-reefed main-topsail and reefed fore-sail.	
11	Storm	Or that which would reduce her to storm staysails.	
12	Hurricane	Or that which no canvas could withstand.	

### Refinement of the Beaufort Wind Scale

Since the frigate was no longer the dominant ship on the seas, a new "probe" was necessary to determine the wind's force. The original Beaufort force numbers were now subtly changed so that they referred to states of the sea or degrees of motion of trees instead of the sails on a frigate. But ambiguities soon arose, for the state of the sea also depends upon swell, fetch and water depth, and trees vary in their response to the wind.

Finally, in 1946, the International Meteorological Committee, while extending the scale to 17 values (the added five values further refining the hurricane-force winds), defined the scale values by ranges of the wind speed as measured at a height of 10 meters above the surface for each Force Number. In effect, this transformed the Beaufort Wind Force Scale into the Beaufort Wind Speed Scale.

### The Beaufort Weather Notation Code

As Francis Beaufort rose in rank, his weather journal entries became a regular part of his daily routine, ultimately increasing in frequency to observations at two-hour intervals. To describe the state of wind and weather accurately but briefly, Beaufort devised a sys-