FIRST

REPORT ON METEOROLOGY,

TO THE

SURGEON GENERAL OF THE UNITED STATES ARMY,

BY

JAMES P. ESPY, A. M.,

AUTHOR OF THE PHILOSOPHY OF STORMS, MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY, AND CORRESPONDING MEMBER OF THE NATIONAL INSTITUTE.

WASHINGTON CITY, *October* 9, 1843.

SIR: The object of the "report" which it is my duty to make annually on meteorology, will be understood by the following circular

"TO THE FRIENDS OF SCIENCE."

"Last summer I announced to my correspondents, and the public generally, that a 'form for keeping meteorological journals' would be prepared and sent to all those in the United States, Bermuda, West Indies, Azores, and the Canadas, who should signify a willingness to co-operate with me in my endeavors to find out all the *phases* of storms which occur within the range of the wide-spread simultaneous observations about to be established.

"I have to announce now that the 'form' is completed,* and arrangements are made to strike off a sufficient number to supply all who shall express a wish to aid in this most important undertaking. It is my intention to lay down, on skeleton maps of the United States, by appropriate symbols, all the most important phases of the great storms which come within the range of our simultaneous observations; and thus it is hoped that we shall be able to determine the *shape* and *size* of all storms, whether they are *round* or *oblong;* and if oblong, whether they move *side foremost* or *end foremost*, or *obliquely;* and their *velocity* of motion and the *direction* which they take in all the different seasons of the year; the *course* that the wind blows in and beyond the borders of the storm; the *fluctuation* of the barometer and *change* of temperature which generally accompany storms, and the *extent* to which their influence is felt beyond their borders.

"Now, as many of these particulars can be observed as well without meteorological instruments as with them, it is manifest that all who will send me a faithful account of the winds and weather will essentially contribute to the great end in view. Editors of papers, too, who notice great storms, may be of much service, by mentioning the time of greatest violence, and the direction of the wind and time of change, and sending a paper containing the account to the *Surgeon General's office, Washington city*, with the word 'meteorology' marked on the corner of the envelope. All papers and journals thus directed will come to my hands, as I am now attached to that bureau; and, after being carefully collated with each other, will be deposited in the archives of that office, to aid the future meteorologist in developing laws which the present state of the science may not enable us to detect. Let none think their *mite* too insignificant to be thrown into this common treasury.

"I am authorized by the Secretary of State to request all our ministers, consuls, and other diplomatic and commercial agents of the United States in foreign countries, to whom the 'form' is sent, to transmit to the *Department of State* the journals which they may keep, or procure from others, that they may be immediately placed in my hands.†

"All masters of vessels sailing in the Atlantic, or Gulf of Mexico, are requested to send a copy of their 'logs' to the *Surgeon General's office*, immediately on their landing at any port in the United States.

"If the chain of simultaneous observations could thus be kept unbroken entirely across the Atlantic, the value of the whole system would be much increased.

"Journals, according to the adopted plan, will be kept at all the military stations of the United States; and the Secretary of the Navy has given orders for the same to be done at the naval stations and in ships

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* It is the "form" prepared under the direction of the Surgeon General for the military posts.

† This request is renewed now, February 24, 1845.

of war on our coast. Forms also will be sent to all the light-houses and floating lights, and many of them will at least keep journals of the wind and weather. Governor Reid, of Bermuda, has promised to send me journals from that island, and I have the promise of various journals from Canada, Newfoundland, and Nova Scotia.

"There are many of the colleges of the United States from whom I have not yet had such promise; but I now appeal to them *all*, with confidence, to unite in their efforts to perfect this most interesting science.

"There are one hundred and three colleges in these United States, and very many high schools; and as it is known that barometric fluctuations accompany storms, it is manifest that the direction in which storms move, and their velocity, may be ascertained by observations made on the barometer alone at these various institutions.

"The number of observations cannot be too great.

"JAMES P. ESPY.

"SURGEON GENERAL'S OFFICE,
Washington, December 6, 1842."

The above "circular" was sent last winter to many hundred persons in various parts of the world, and I have now (May 29, 1843) the pleasure of informing the "friends of science" that more than fifty observers who note the barometer, and more than sixty others who have no barometers, have commenced sending in their journals. From the certainty of success, it is *now* hoped that others, who feel disposed to aid in this great undertaking, will commence their observations immediately.

It is my duty to collate all the journals, and report annually "to the Secretary of War." A copy of these reports shall be sent to each of my regular correspondents as soon as they are published by government.

More observers are much wanted, especially along the Allegany mountains, on both sides; in the northern parts of Vermont, New Hampshire, and Maine; in the "far west," northwest, and north, and in the ocean between this and Europe.

I take this opportunity of requesting all my correspondents to visit the path of any tornado within their reach, and let me know the following particulars: The *width* and *direction* of the path; the *direction* in which the trees are thrown down on the *two sides*, and also in the *middle;* whether the trees are thrown inwards *equally* on both sides, or more backwards on one side than on the other. If any are thrown across each other, mention on which side of the path, and the direction in which both the *upper* and *under* trees are lying; whether the *line* to which the trees converge on both sides, if they do converge, is in the *centre* of the path, or *nearer* to one side than the other.

These questions apply only to a tornado where it passes through a forest of equal density on both sides of the path, for elsewhere both borders will not be well defined.

In case any one has a salt marsh or prairie which he wishes to burn, or a large mass of timber from a clearing of land, preserve these combustibles till the time of a drought, if one should occur: then choose a very calm and clear day, and at about eight o'clock in the morning take a tumbler of cold water, in the open air in the shade, and with a thermometer find the *highest* temperature of the water when it is just cold enough to cause the moisture in the air to condense on the tumbler. This highest temperature is called the dew-point. If this should not be more than six or eight degrees (the less the better) below the temperature of the air, everything is then favorable at the surface of the earth for the production of rain. Set fire to your combustibles at many places in the circumference at once. Immediately an up-moving column of air will be produced; and if it is not bent out of a perpendicular motion, by an upper current of air, it will begin to form a cloud when its top reaches as many hundred yards high as the dew-point is below the temperature of the air in degrees of Fahrenheit. *Watch the subsequent phenomena, and describe them to me.*

If it rains, it will not extend much to the west; but it is *probable* that it will widen out from the place of beginning, and become a general rain to the east.*

If it should not rain, it will be prevented by one of two causes: an *upper current* of air, sweeping the up-moving column out of the perpendicular; or an *upper stratum* too warm and light to let the up-moving column swim in it.

Other instructions will be given, if requested, before the middle of July.

JAMES P. ESPY.

To carry out the plan proposed in the circular, skeleton maps of the territory embracing the observations were procured; and on these maps are laid down the observations taken by the various observers at three o'clock, p. m., of each day, unless another hour is specially mentioned.†

The direction of the arrows shows the direction of the wind, and the length shows its force. An arrow half an inch long represents a gentle breeze, and one an inch and a half a very violent wind; and so in proportion. The points of the arrows are near the places of observation. The numbers in red ink represent the quantity of water fallen, whether in rain or snow, in hundredths of an inch. *S* means snow, and *R* means rain. A large *S* means a great snow, and a small *s* means a little snow; and so of rain.

The long black lines represent the various maxima of pressure of the atmosphere, as indicated by the barometer; and the long red lines represent the various minima of pressure. The figures attached to these

* Since this was written, various experiments have been made, and extensive rains to the east were produced, and none to the west.—*Author.*

† Only 29 of the 92 maps are engraved for this report.

lines represent the amount of change in the barometer since the preceding fluctuation at the place where the figures stand.

The numbers which stand by themselves in black ink, with the sign + or — after them, represent the various fluctuations of the thermometer at its highest and lowest temperatures. When *max.* is subjoined, it means the highest temperature of the month; and when *min.* is subjoined, it means the lowest temperature of the month. These numbers are affixed to several localities in the extreme north, south, east, and west, and middle of our territory, with a view to ascertain whether any general law, regulating the sudden fluctuations of temperature, could be deduced from the observations.

The great irregularities which attend the fluctuations of the thermometer seem to forbid any attempt *at present* to lay down general laws on the subject. The time of observation is too short. During the three months which have been employed in the examination on this point, the highest elevations of the thermometer sometimes take place in the east, at the same time that the lowest take place in the west, and *vice versa.* The same may be said of the north and the south. Nay, even the maximum and minimum of the month sometimes occur on the same day at different places. If there is anything at all approaching regularity on this point, it is that the thermometer has a tendency to rise on the eastern side of storms, and sink on the western side; but this is by no means universal. It would be expected that northerly winds would always reduce the temperature; but even this is not a universal law. Instances are not wanting of a rise of temperature with a northerly wind, and of a fall of temperature with a southerly wind. That these apparent anomalies are effected by the influence of the vicinity of storms, there can be little doubt; and if so, patient investigation will eliminate the cause.

Other phases of storms are less anomalous, and, from a careful examination of the meteorological charts, the following generalizations have been deduced:

1st. The rain and snow storms, and even the moderate rains and snows, travel from the west towards the east, in the United States, during the months of January, February, and March, which are the only months yet investigated.

2d. The storms are accompanied with a depression of the barometer near the central line of the storm.

3d. This central line of minimum pressure is generally of great length from north to south, and moves side foremost towards the east.

4th. This line is sometimes nearly straight, but generally curved, and most frequently with its convex side towards the east.

5th. The velocity of this line is such, that it travels from the Mississippi to the Connecticut river in about twenty-four hours; and from the Connecticut to St. John, Newfoundland, in nearly the same time, or about thirty-six miles an hour.

6th. When the barometer falls suddenly in the western part of New England, it rises at the same time in the valley of the Mississippi, and also at St. John, Newfoundland.

7th. In great storms, the wind, for several hundred miles, on both sides of the line of minimum pressure, blows towards that line, directly or obliquely.

8th. The force of the wind is in proportion to the suddenness and greatness of the barometric depression.

9th. In all great and sudden depressions of the barometer, there is much rain or snow; and in all sudden great rains or snows, there is a great fluctuation of the barometer.

10th. Many storms are of great and unknown length from the north to the south, reaching beyond our observers on the Gulf of Mexico and on the northern lakes, while their east and west diameter is comparatively small. The storms therefore move side foremost.

11th. Most storms commence in the "far west," beyond our most western observers; but some commence in the United States.

12th. When a storm commences in the United States, the line of minimum pressure does not come from the "far west," but commences with the storm, and travels with it towards the east.

13th. There is generally a lull of wind at the line of minimum pressure, and sometimes a calm.

14th. When the wind changes to the west, the barometer generally begins to rise.

15th. There is generally but little wind near the line of maximum pressure, and on each side of that line the winds are irregular, but tend outwards from that line.

16th. The fluctuations of the barometer are generally greater in the northern than in the southern parts of the United States.

17th. The fluctuations of the barometer are generally greater in the eastern than in the western parts of the United States.

18th. In the northern parts of the United States, the wind, in great storms, generally sets in from the north of east, and terminates from the north of west.

19th. In the southern parts of the United States the wind generally sets in from the south of east, and terminates from the south of west.

20th. During the passage of storms, the wind generally changes from the eastward to the westward by the south, especially in the southern parts of the United States.

How far these generalizations will apply to other months of the same year, or even to the same months of different years, remains to be seen by future investigations. Whatever may be the result, the facts which will be collected and imbodied cannot fail to be of the highest interest and utility, especially if they shall be found to unite in one grand theory which explains all the phenomena.*

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* For explanation of these phenomena, see "*Espy's Philosophy of Storms.*"

It would add much, however, to the interest, and probably to the utility of the system of investigation now adopted, if simultaneous observations were obtained over a much wider field.

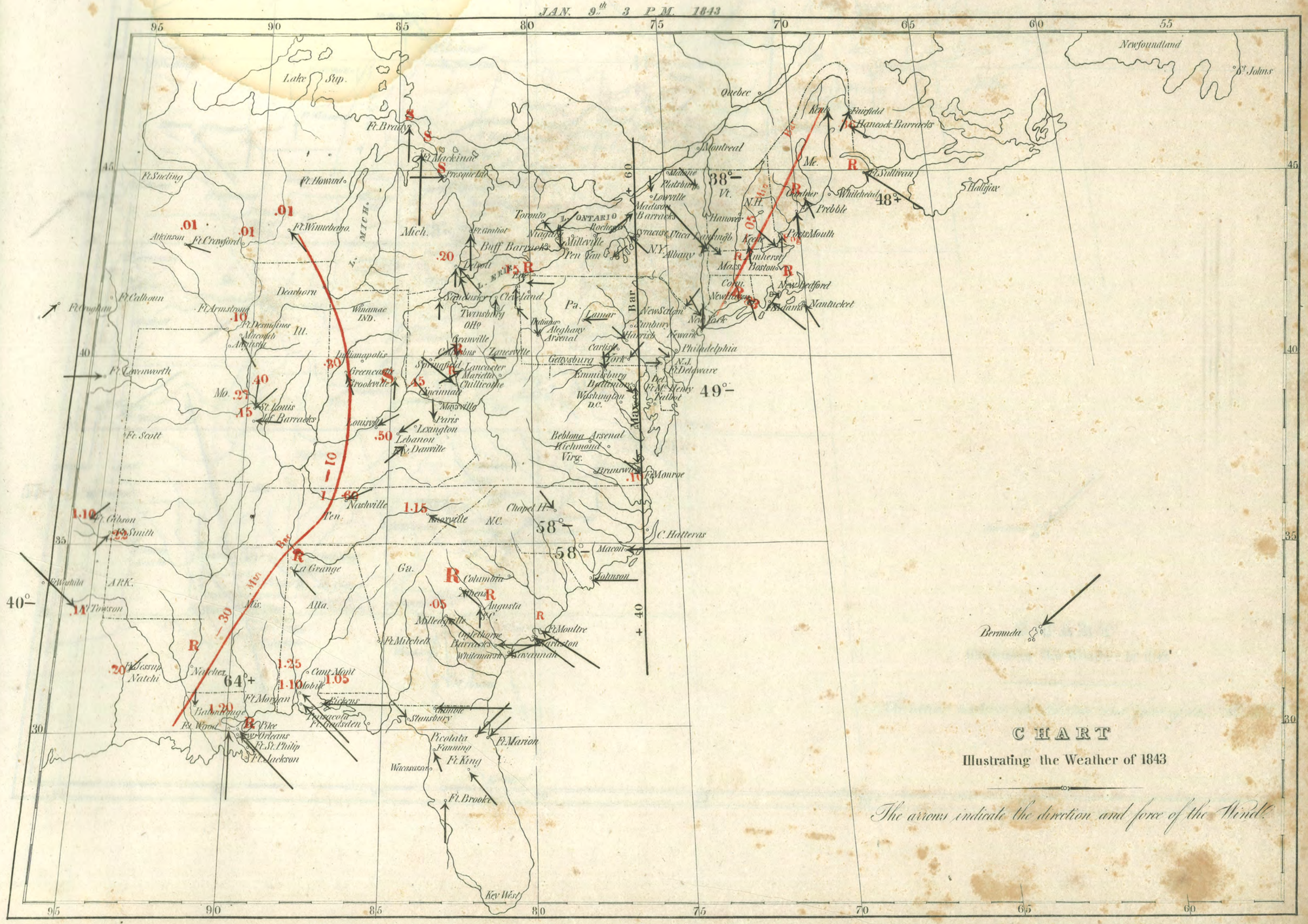
It is highly desirable to *surround* storms, and keep them constantly in view, from their beginning to their end. Now, as the barometer generally sinks more during the passage of our great winter storms in the northern parts of the United States than in the southern, is it not probable that the northern half of many of these storms is entirely beyond the bounds of our observations? And, as these storms certainly reach Newfoundland in their progress towards the east, is it not probable that they do not break up before they advance far into the ocean? May not some of them even reach the shores of Europe? Under these circumstances, would not the governments of England and France, if they were requested by the proper authorities, order the masters of the numerous steamers which now ply the Atlantic to send copies of their journals to Washington city, to be collated with those received now from so many other quarters?

What high utilities to the mariner, and through the mariner to all mankind, might not reasonably be anticipated from such a system of wide-spread simultaneous observations, continued long enough to compare with each other, not merely the storms of different seasons, but the storms of different years!

All which is respectfully submitted.

JAMES P. ESPY.

THOMAS LAWSON, M. D.,
Surgeon General U. S. A.


JAN. 9th 3 P.M. 1843
CHART
Illustrating the Weather of 1843
The arrows indicate the direction and force of the Wind!
Lake Sup.
Newfoundland
St. Johns
Quebec
Montreal
Halifax
Bermuda
Key West
Ft. Brady
Ft. Mackinac
Presque Isle
Ft. Howard
Ft. Snelling
Ft. Winnebago
Ft. Crawford
Atkinson
Ft. Calhoun
Ft. Croghan
Ft. Armstrong
Ft. Desmoines
Macomb
Augusta
Ft. Leavenworth
Ft. Scott
Ft. Gibson
Ft. Smith
Ft. Washita
Towson
Ft. Jessup
Natchez
Baton Rouge
Ft. Wood
New Orleans
Ft. St. Philip
Ft. Jackson
Ft. Morgan
Mobile
Pensacola
Ft. Gadsden
Ft. Mitchell
Ft. Moultrie
Charleston
Savannah
Ft. Pickens
Ft. Brooke
Ft. King
Ft. Marion
Ft. Monroe
C. Hatteras
Ft. Sullivan
Ft. Hancock Barracks
Fairfield
Whitehead
Prebble
Portsmouth
Boston
Nantucket
New Bedford
Hartford
New Haven
New York
Newark
Philadelphia
N.J.
Ft. Delaware
Ft. M. Henry
Talbot
Baltimore
Washington D.C.
Annapolis
Harrisburg
Carlisle
Gettysburg
York
Lancaster
Marietta
Chillicothe
Cincinnati
Springfield
Columbus
Zanesville
Cleveland
Sandusky
Detroit
Buff. Barracks
Toronto
Niagara
Rochester
Milleville
Pen Yan
Utica
Syracuse
Albany
Troy
Lowville
Plattsburg
Madison Barracks
Montpelier
Hanover
Concord
Amherst
Newport
Lexington
Louisville
Paris
Maysville
Lebanon
Danville
Nashville
Knoxville
Chapel H.
Raleigh
Macon
Columbia
Athens
Augusta
Milledgeville
Tallahassee
Barracks
Whitemarsh
Savannah
Camp Mont
Stansbury
Picolata
Fanning
Wacasassa
Beblona Arsenal
Richmond
Virg.
Brunswick
Lamar
Pa.
Allegheny Arsenal
Indianapolis
Greencastle
Brookville
Dearborn
Winamac
Mich.
L. Mich.
L. Erie
L. Ontario
Pa.
Ohio
Ind.
Ill.
Mo.
Ark.
Tenn.
N.C.
Ga.
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Miss.
Mexico
Bar
Max. 60
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Val. 02
Mid. 05
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Mid. 30
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Mid. 60
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Mid. 45
Mid. 40
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Mid. 25
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Mid. 10
Mid. 22
Mid. 11
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Mid. 10
Mid. 15
Mid. 60
Mid. 15
Mid. 10
38°–
48°+
49°–
58°–
58°–
40°–
64°+
+ 40
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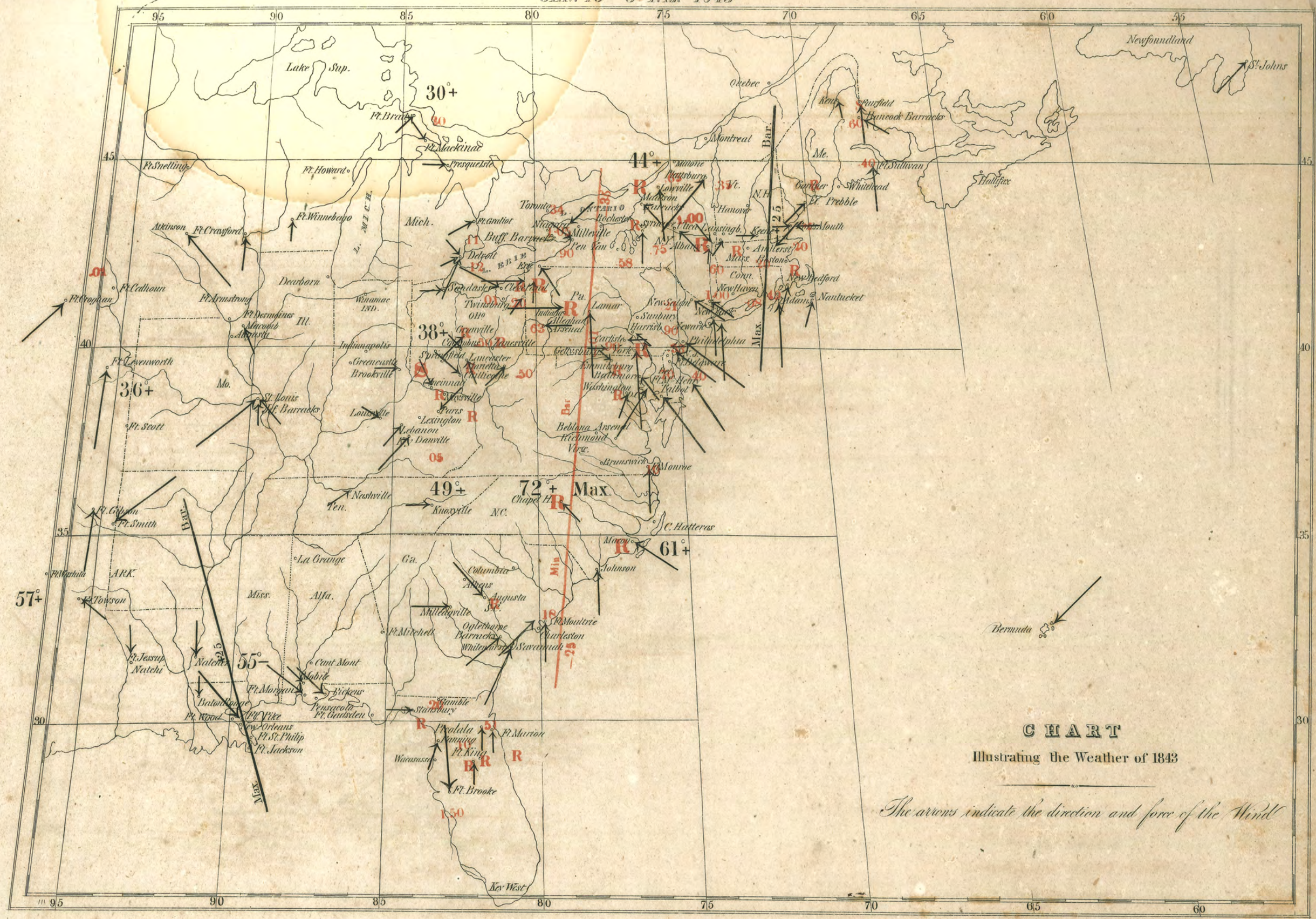
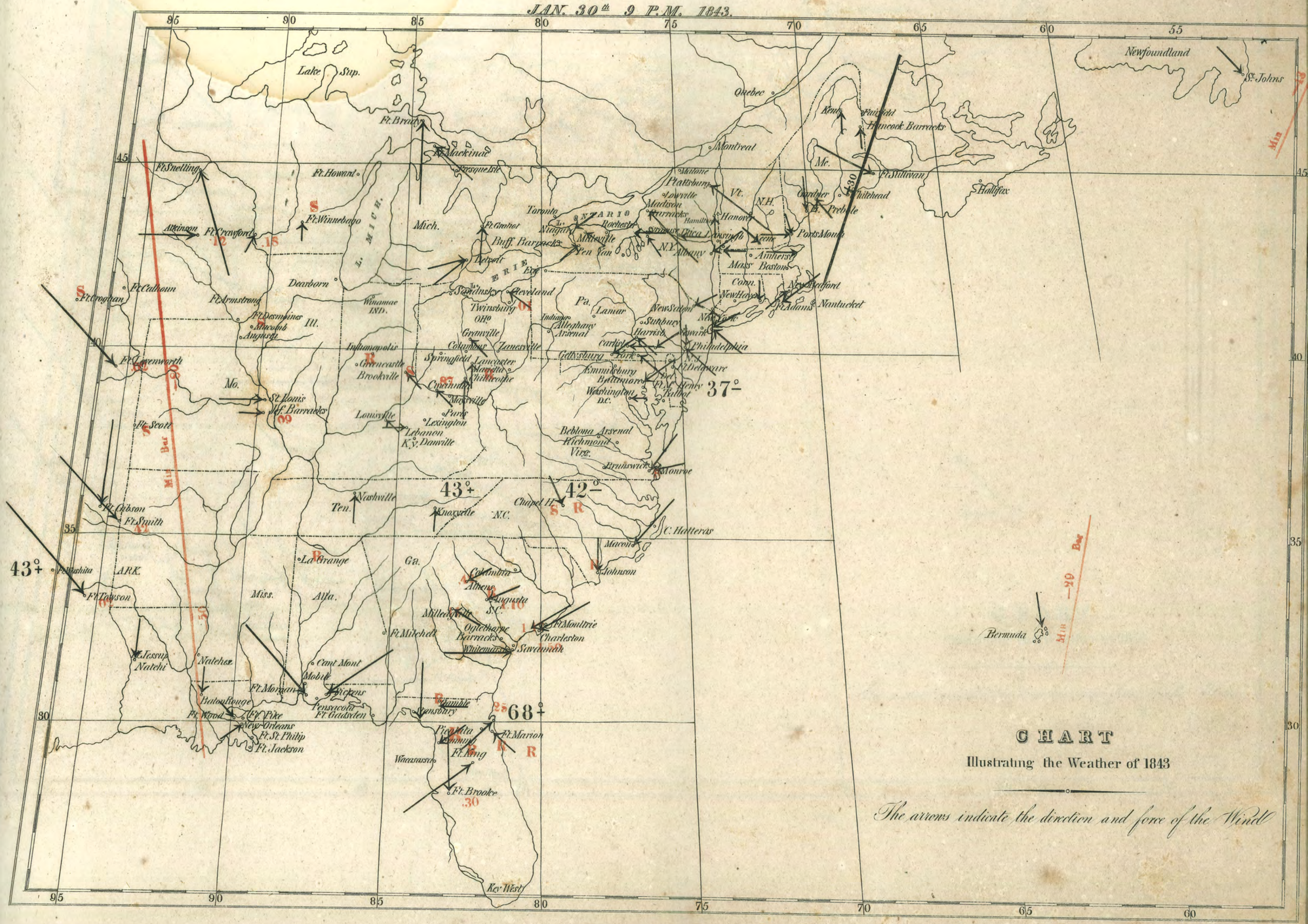
JAN. 10th 3 P.M. 1843



CHART

Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind


JAN. 30th 9 P.M. 1843.
CHART
Illustrating the Weather of 1843
The arrows indicate the direction and force of the Wind
Lake Sup.
Newfoundland
St. Johns
Quebec
Montreal
Halifax
Ft. Brady
Mackinac
Ft. Snelling
Ft. Howard
Ft. Winnebago
Ft. Crawford
Atkinson
Ft. Calhoun
Ft. Croghan
Ft. Armstrong
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Ft. Gibson
Ft. Smith
Ft. Washita
Ft. Towson
Jessup
Natchi
Natchez
Baton Rouge
Ft. Wood
Ft. Pike
New Orleans
Ft. St. Philip
Ft. Jackson
Ft. Morgan
Mobile
Cant Mont
Pensacola
Ft. Gadsden
Ft. Mitchell
Ft. Brooke
Key West
Ft. Marion
Ft. King
Wacasassa
Tallahassee
Sunbury
Ft. Monroe
C. Hatteras
Macon
Johnson
Ft. Moultrie
Charleston
Savannah
Augusta
Columbia
Athens
Milledgeville
Ogletharpe Barracks
Whitemarsh
Nashville
Knoxville
Chapel Hill
Ten.
N.C.
Ga.
Miss.
Ala.
ARK.
Mich.
L. MICH.
ONTARIO
ERIE
Toronto
Niagara
Rochester
Buff. Barracks
Detroit
Sandusky
Cleveland
Twinsburg
Ohio
Granville
Columbus
Zanesville
Springfield
Lancaster
Marietta
Chillicothe
Cincinnati
Maysville
Parks
Lexington
Lebanon
Ky. Danville
Louisville
Brookville
Indianapolis
Greencastle
Winamac IND.
Ill.
No.
Pa.
Lamar
Allegheny Arsenal
Harrisburg
Carlisle
Gettysburg
York
Emmitsburg
Baltimore
Washington D.C.
Del.
Md.
Ft. Delaware
Philadelphia
New Castle
New York
Sandy Hook
Ft. Adams
Nantucket
New Bedford
Boston
Mass.
Amherst
Conn.
New Haven
Hartford
Albany
Utica
Syracuse
Rochester
Hamilton
Oswego
Madison Barracks
Sackets Harbor
Plattsburg
Malone
Lowville
Vt.
N.H.
Hanover
Portsmouth
Me.
Gardiner
Ft. Preble
Ft. Sullivan
Whitehead
Hancock Barracks
Fairfield
Kents
Bermuda
Richmond
Virg.
Brunswick
Beblona Arsenal
43°+
42°−
37°−
68°+
30
25
1
10
4
6
7
8
9
12
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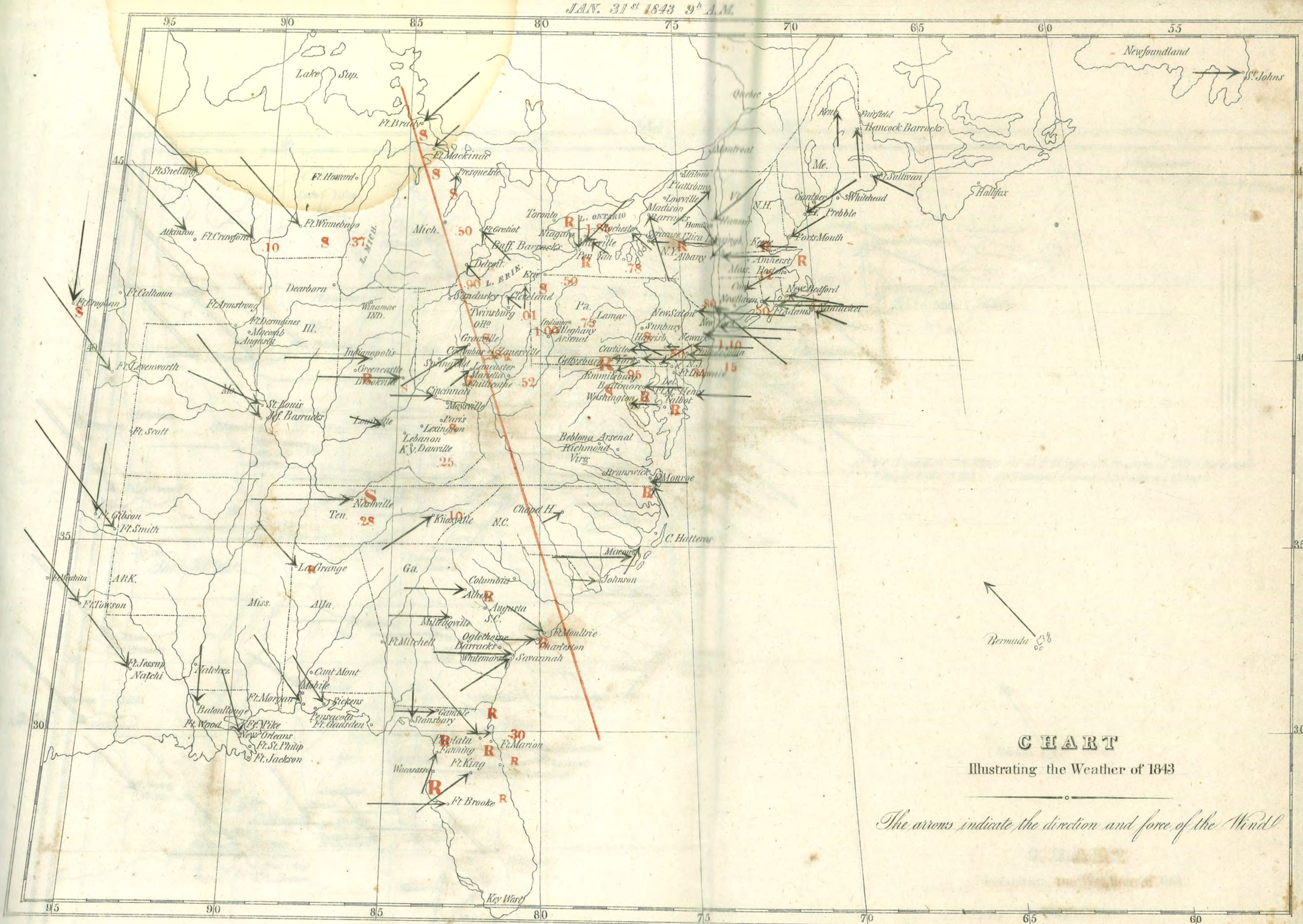


JAN. 31st 1843 9h A.M.

CHART

Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind

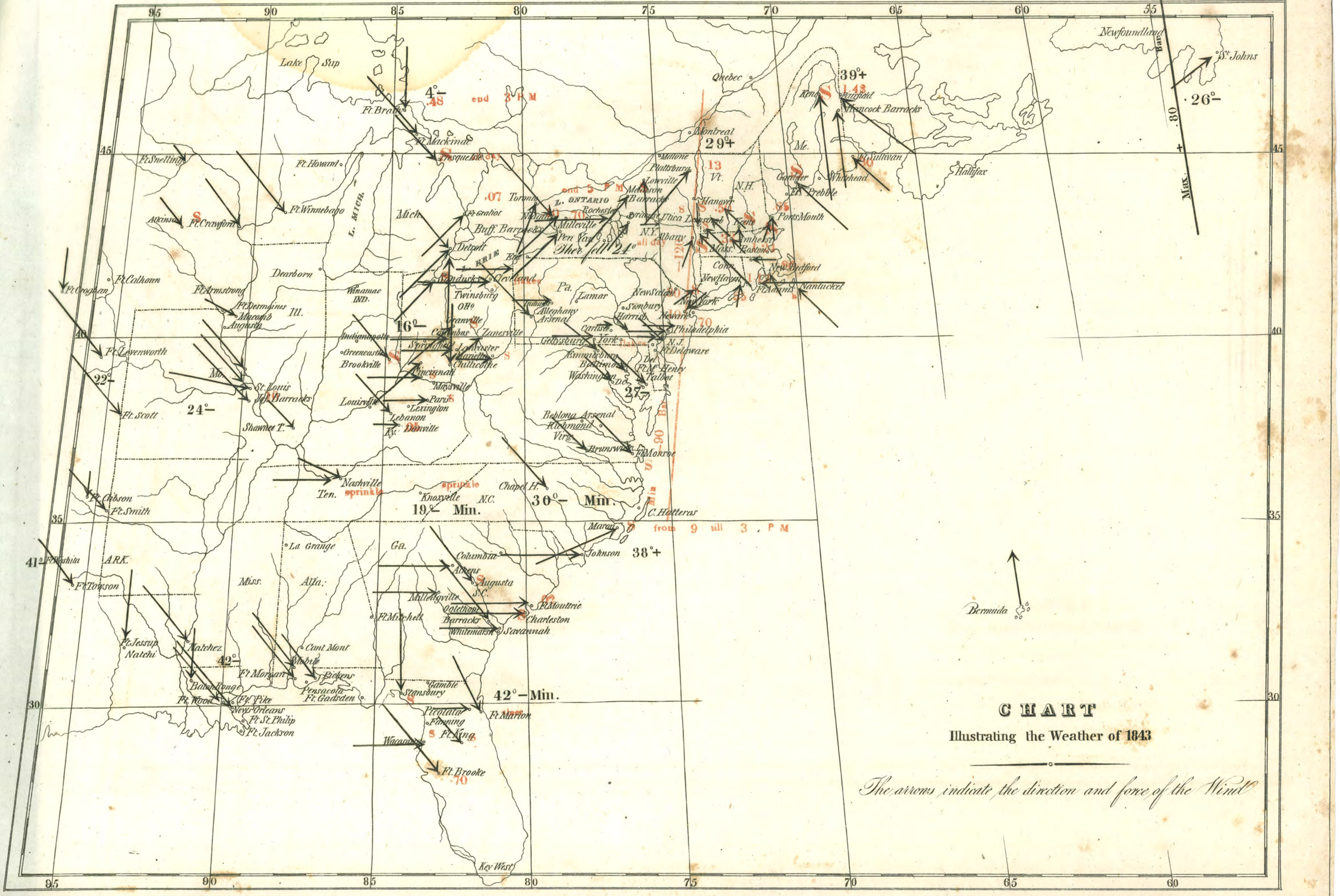
JAN. 31st 3 P.M. 1843.

CHART

Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind

FEB. 1st 9 A.M. 1843.



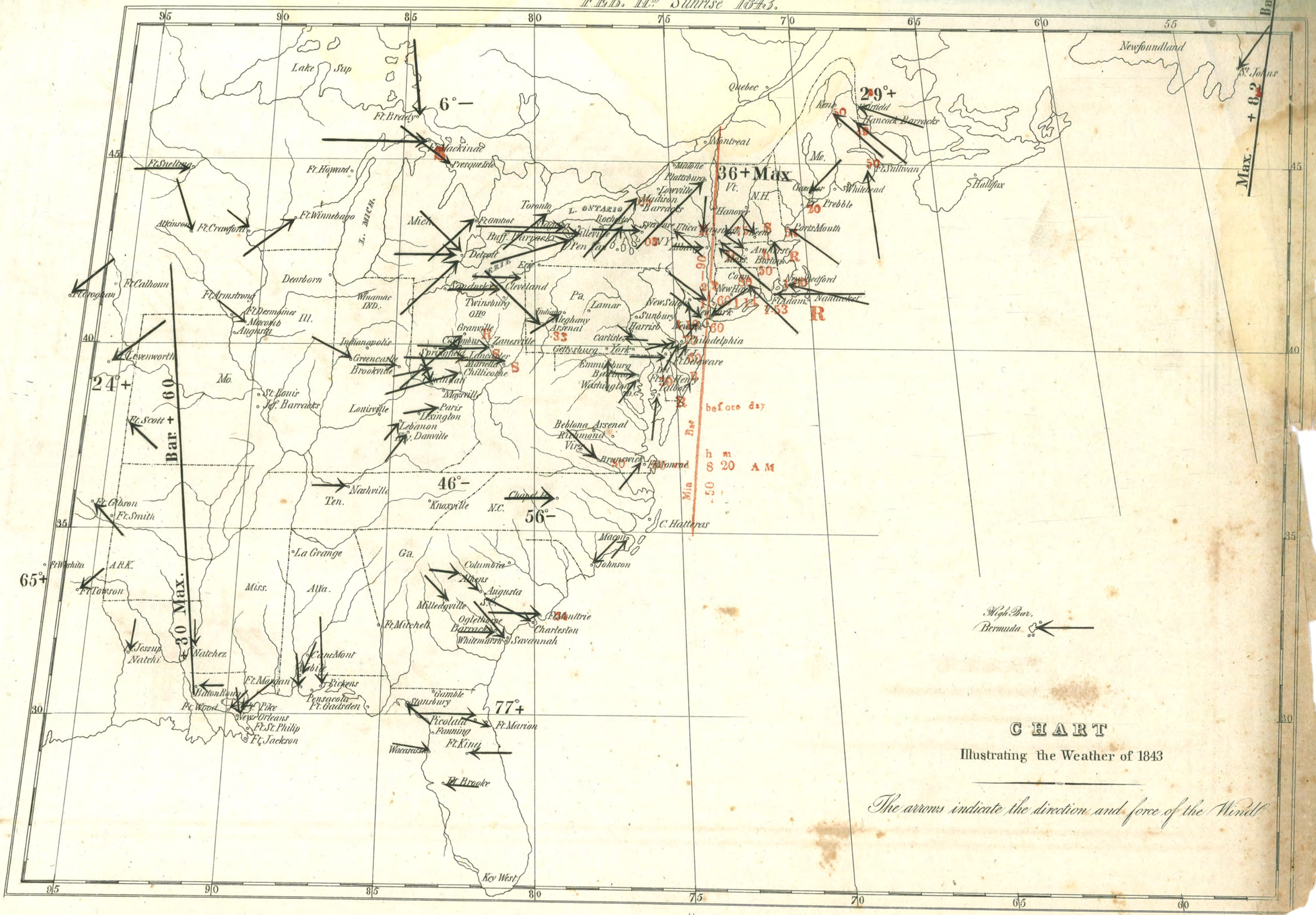
CHART

Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind

FEB. 10th 3. P.M. 1843.

FEB. 11th Sunrise 1843.

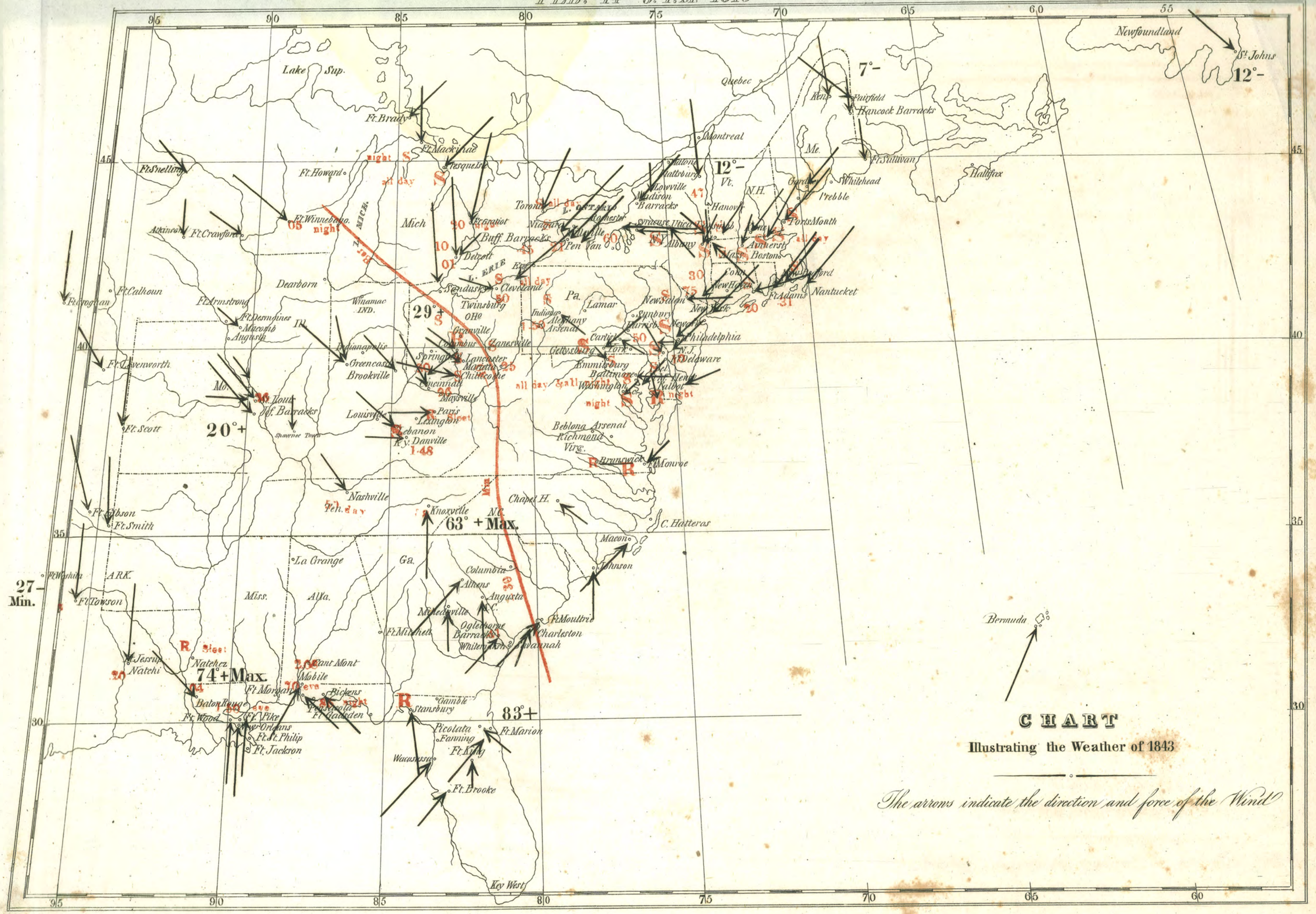


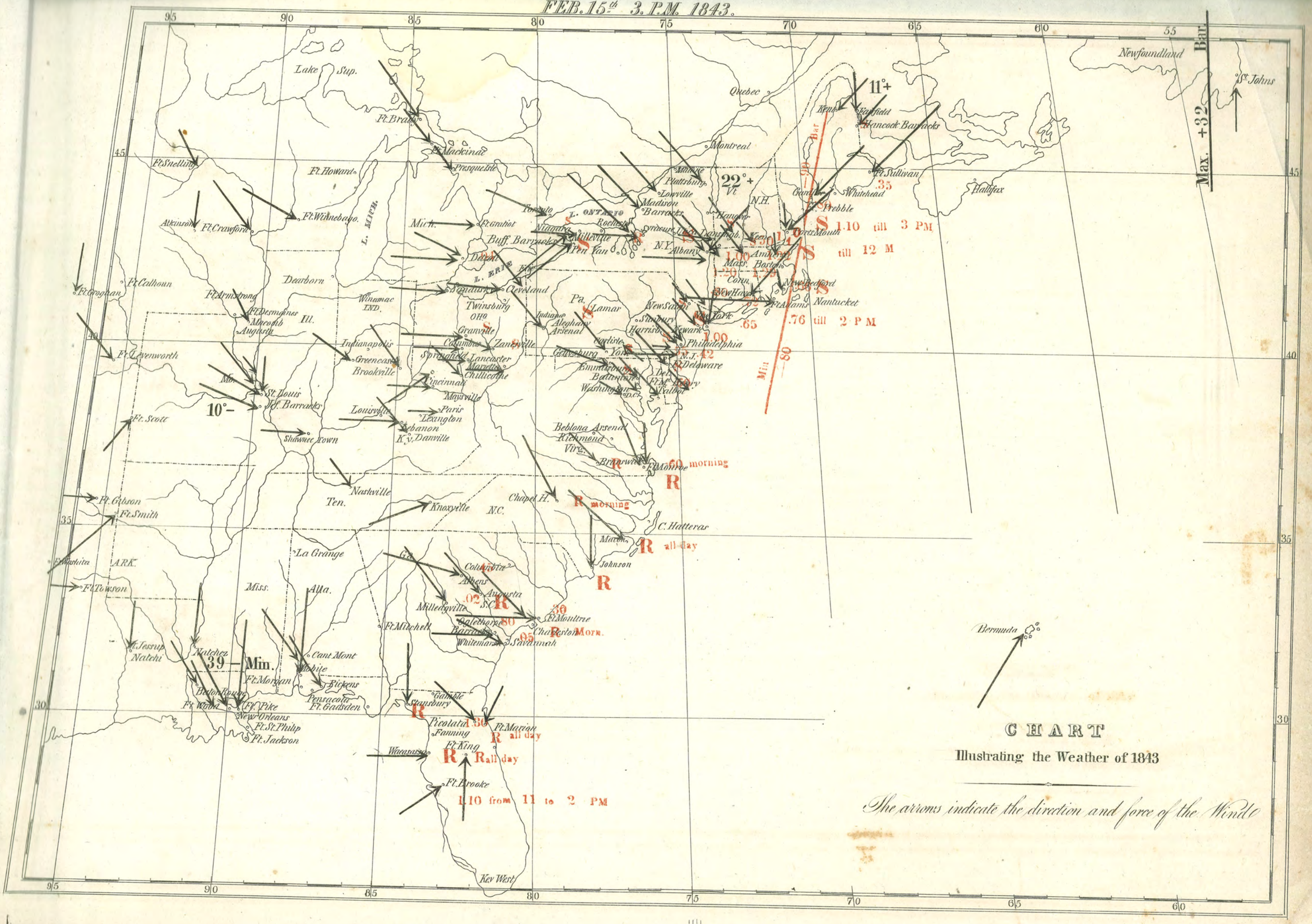
CHART

Illustrating the Weather of 1843

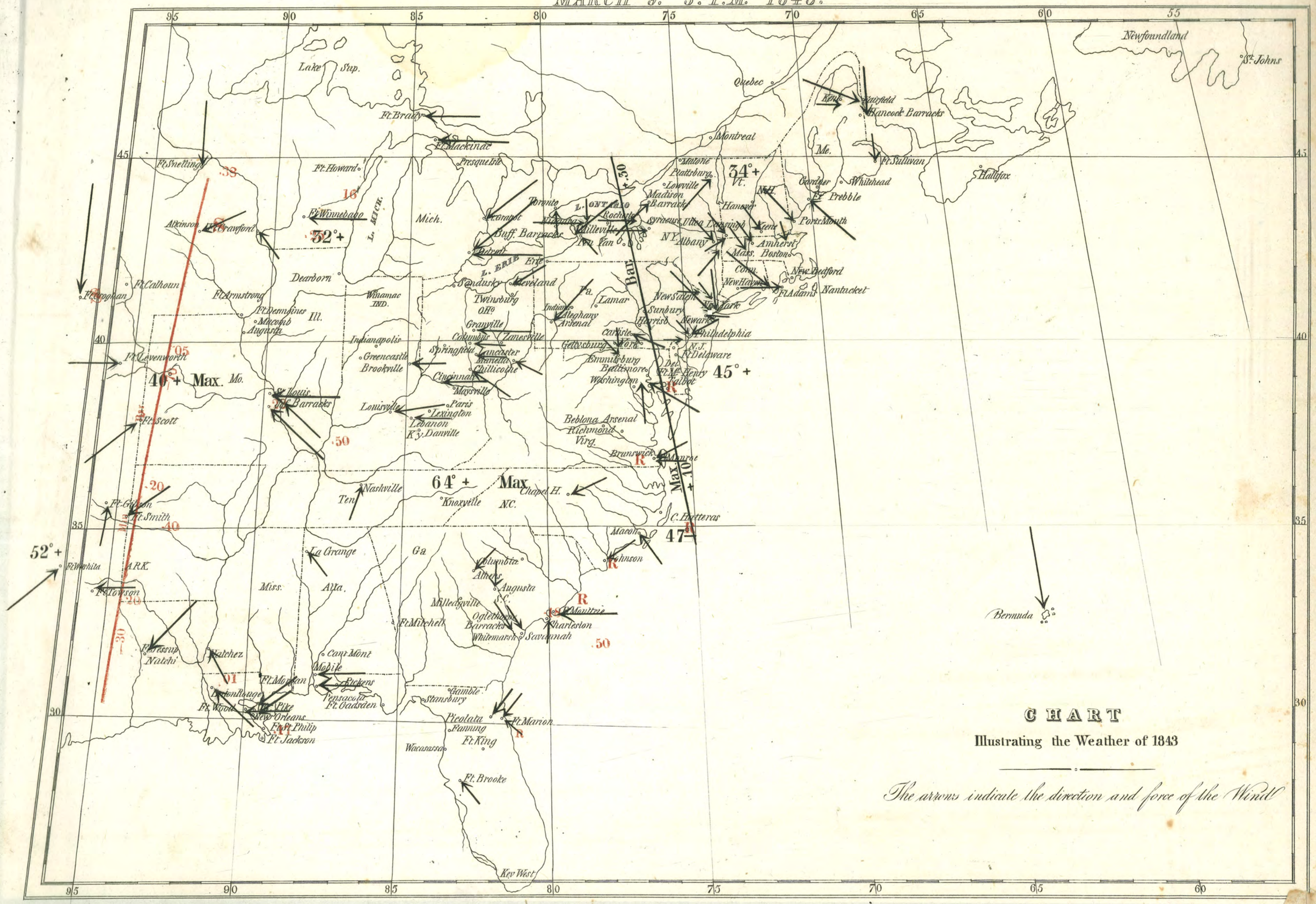
The arrows indicate the direction and force of the Wind

FEB. 14th 3. P.M. 1843




FEB. 15th 3. P.M. 1843.
Max. +32
Bar.
Min. 80
Lake Sup.
Ft. Brady
Mackinac
Presque Isle
Ft. Howard
Ft. Snelling
Ft. Winnebago
Atkinson
Ft. Crawford
L. MICH.
Mich.
Ft. Gratiot
Buff. Barracks
Detroit
L. ERIE
Toronto
Niagara
Rochester
L. ONTARIO
Syracuse
Utica
Oswego
Sackets Harbor
Pittsburg
Pen Yan
N.Y.
Albany
Quebec
Montreal
Maine
Plattsburg
Lowville
Madison Barracks
Vt.
N.H.
Hanover
Concord
Keene
Portsmouth
Amherst
Mass.
Boston
Corn.
New Haven
New Bedford
Ft. Adams
Nantucket
Newfoundland
St. Johns
Halifax
Kent
Fairfield
Hancock Barracks
Ft. Sullivan
Whitehead
Ft. Preble
Ft. Calhoun
Ft. Gibson
Ft. Armstrong
Ft. Desmoines
Macomb
Augusta
Ill.
Dearborn
Winnemac IND.
Ft. Leavenworth
Mo.
St. Louis
Jef. Barracks
Ft. Scott
Shawnee Town
Indianapolis
Greencastle
Brookville
Louisville
Paris
Lexington
Lebanon
Ky.
Danville
Cincinnati
Mayesville
Cleveland
Ft. Hamilton
Twinsburg
OHO
Granville
Columbus
Zanesville
Springfield
Lancaster
Marietta
Chillicothe
Indiana
Alegheny Arsenal
Pa.
Lamar
Carlisle
Gettysburg
York
Emmitsburg
Baltimore
Washington
D.C.
New Castle
Sunbury
Harrisb.
Newark
New York
Philadelphia
N.J.
Delaware
Del. Ft. M.
Ft. Calhoun
Ft. Monroe
Beblona Arsenal
Richmond
Virg.
Brunswick
Nashville
Ten.
Knoxville
N.C.
Chapel H.
C. Hatteras
Macon
Johnson
Ft. Smith
Ft. Towson
ARK.
La Grange
Miss.
Alla.
Ga.
Columbia
Athens
Augusta
S.C.
Milledgville
Ft. Mitchell
Columbus
Barracks
Whitemarsh
Savannah
Ft. Moultrie
Charleston
Jessup
Natchez
Natchi
Cant. Mont
Mobile
Ft. Morgan
Pickens
Pensacola
Ft. Gadsden
Baton Rouge
Ft. Wood
Ft. Pike
New Orleans
Ft. St. Philip
Ft. Jackson
Gamble
Stanbury
Picolata
Fanning
Ft. King
Ft. Marion
Wacarasse
Ft. Brooke
Key West
Bermuda
11°+
22°+
10°−
39 — Min.
S 1.10 till 3 PM
S till 12 M
.35
1.00
.20
.30
.65
.76 till 2 PM
1.00
.42
.60 morning
R morning
R all day
R
.02
.30
.80
.95
R Morn.
.30
R all day
R
R all day
1.10 from 11 to 2 PM
CHART
Illustrating the Weather of 1843
The arrows indicate the direction and force of the Wind

MARCH 9. 3. P.M. 1843.



CHART

Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind

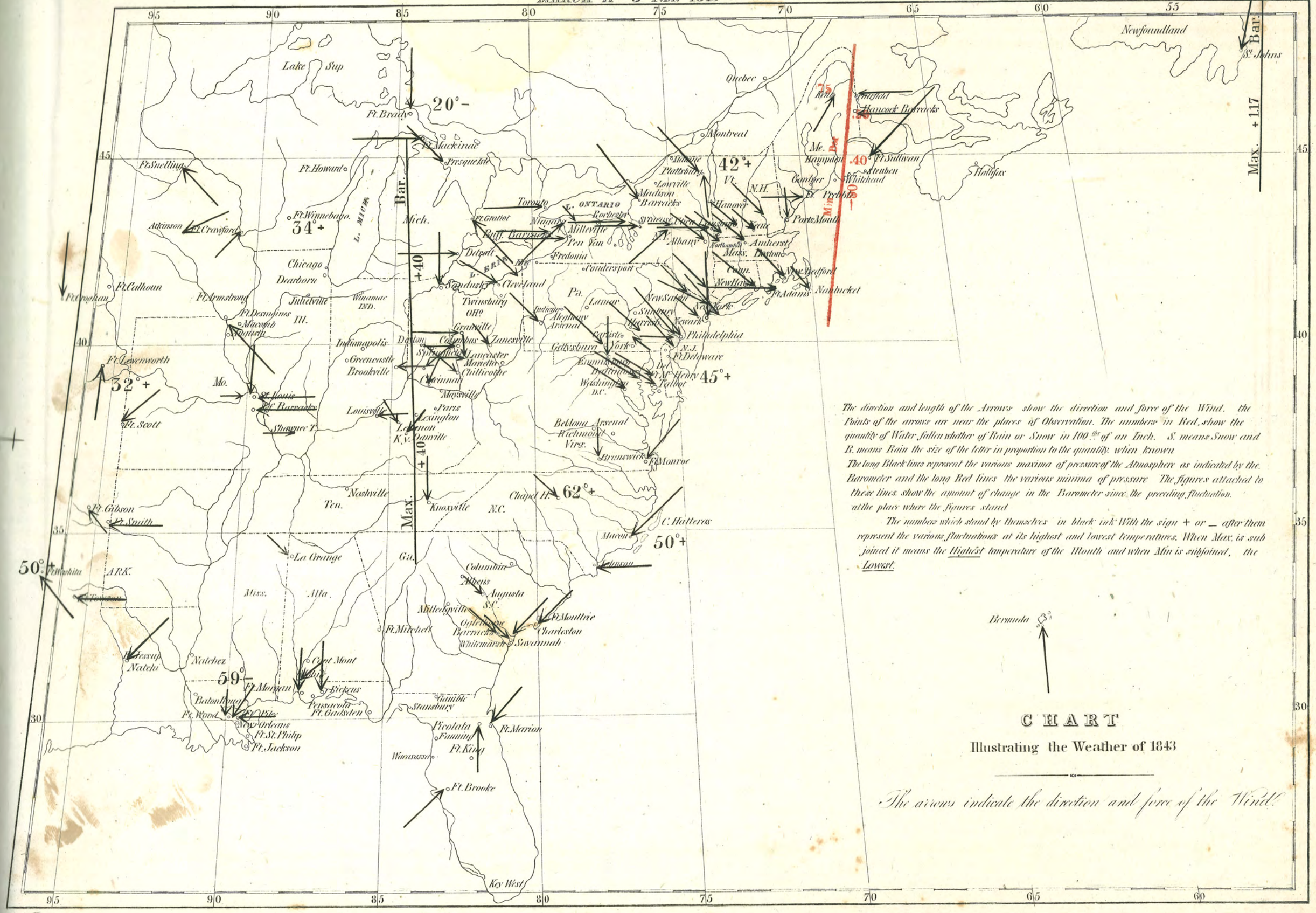
MARCH 10. 3. P.M. 1843

CHART

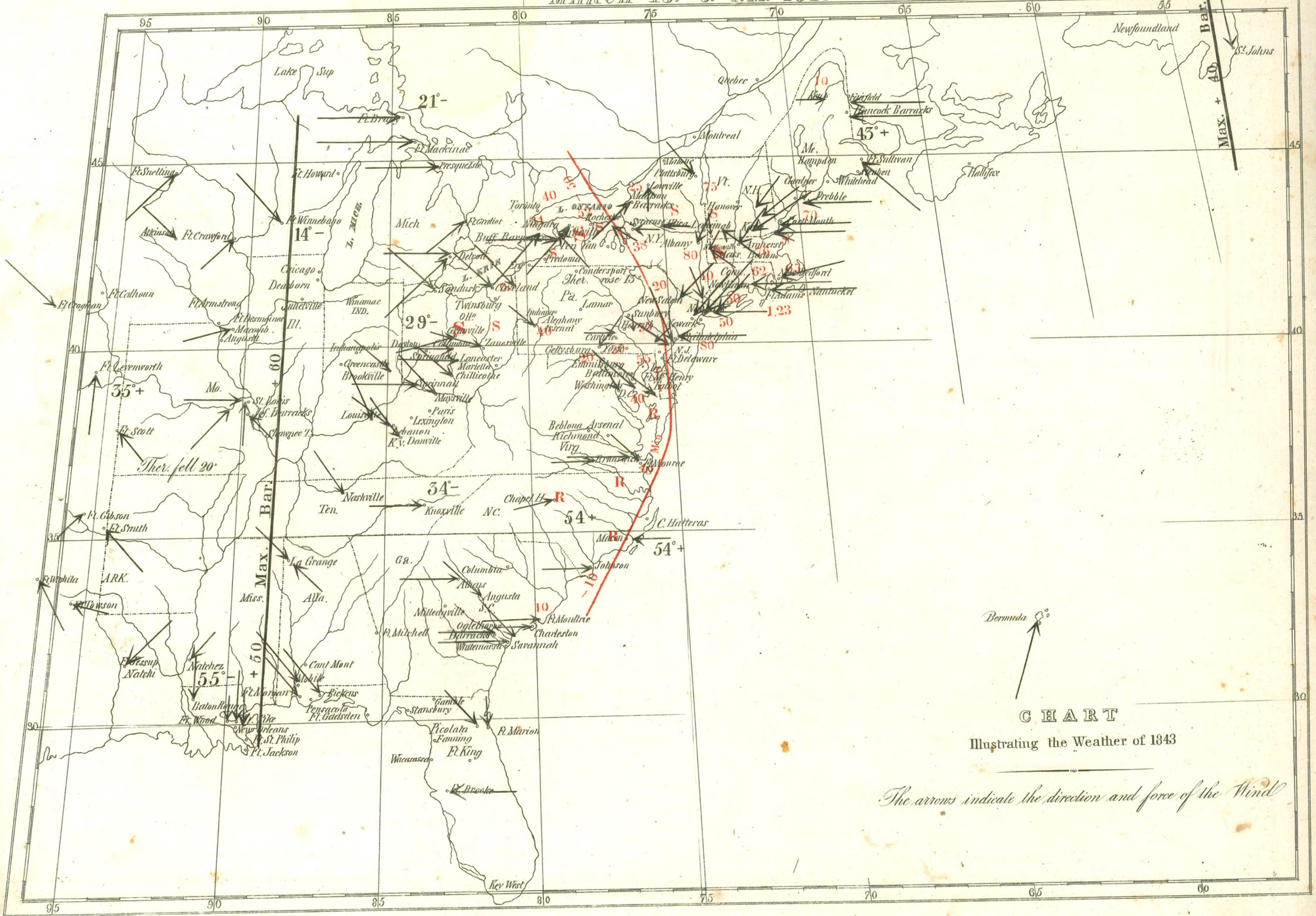
Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind

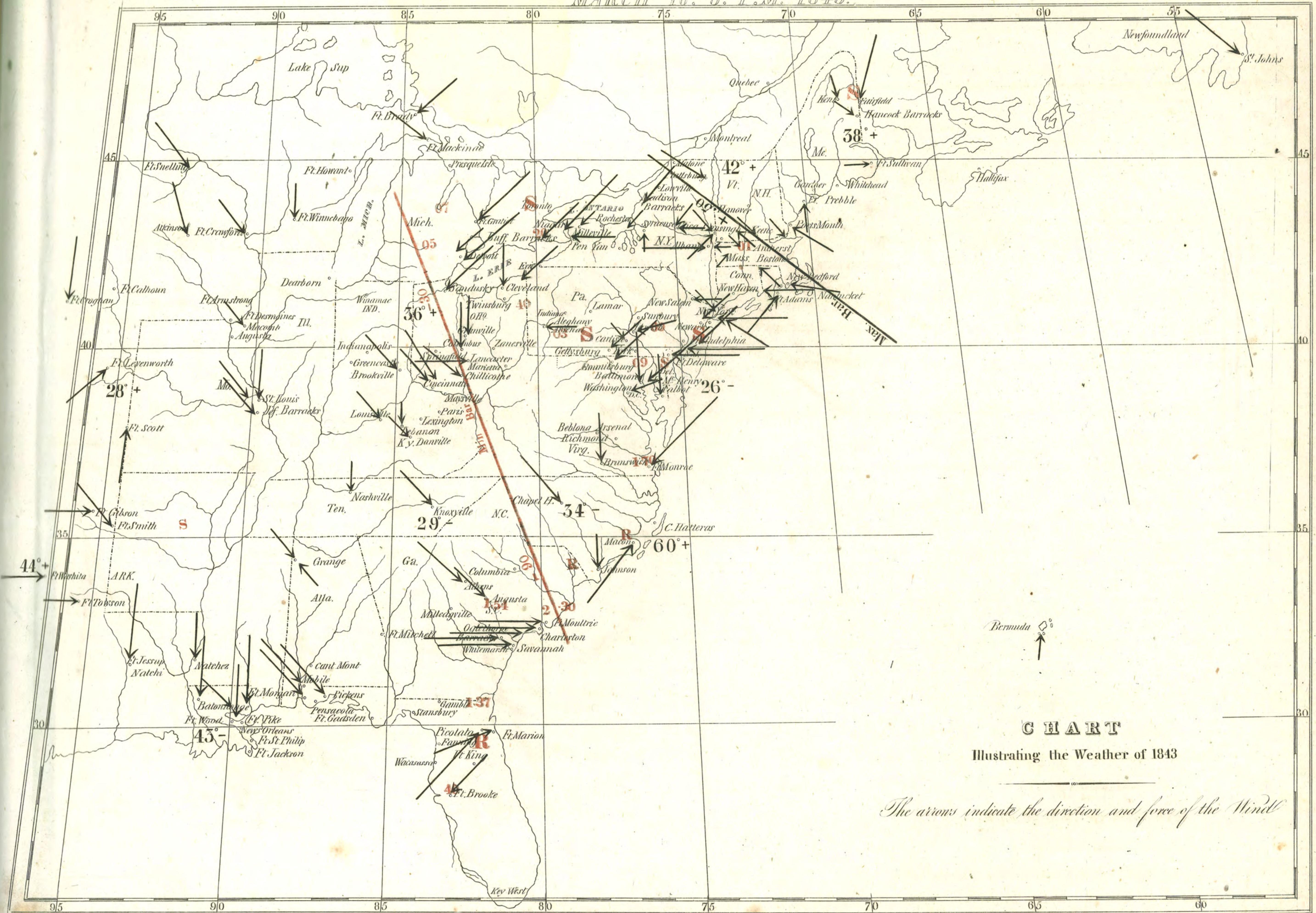
MARCH 11th 3 P.M. 1843



MARCH 13. 3. P.M. 1843



MARCH 16. 3. P.M. 1843.



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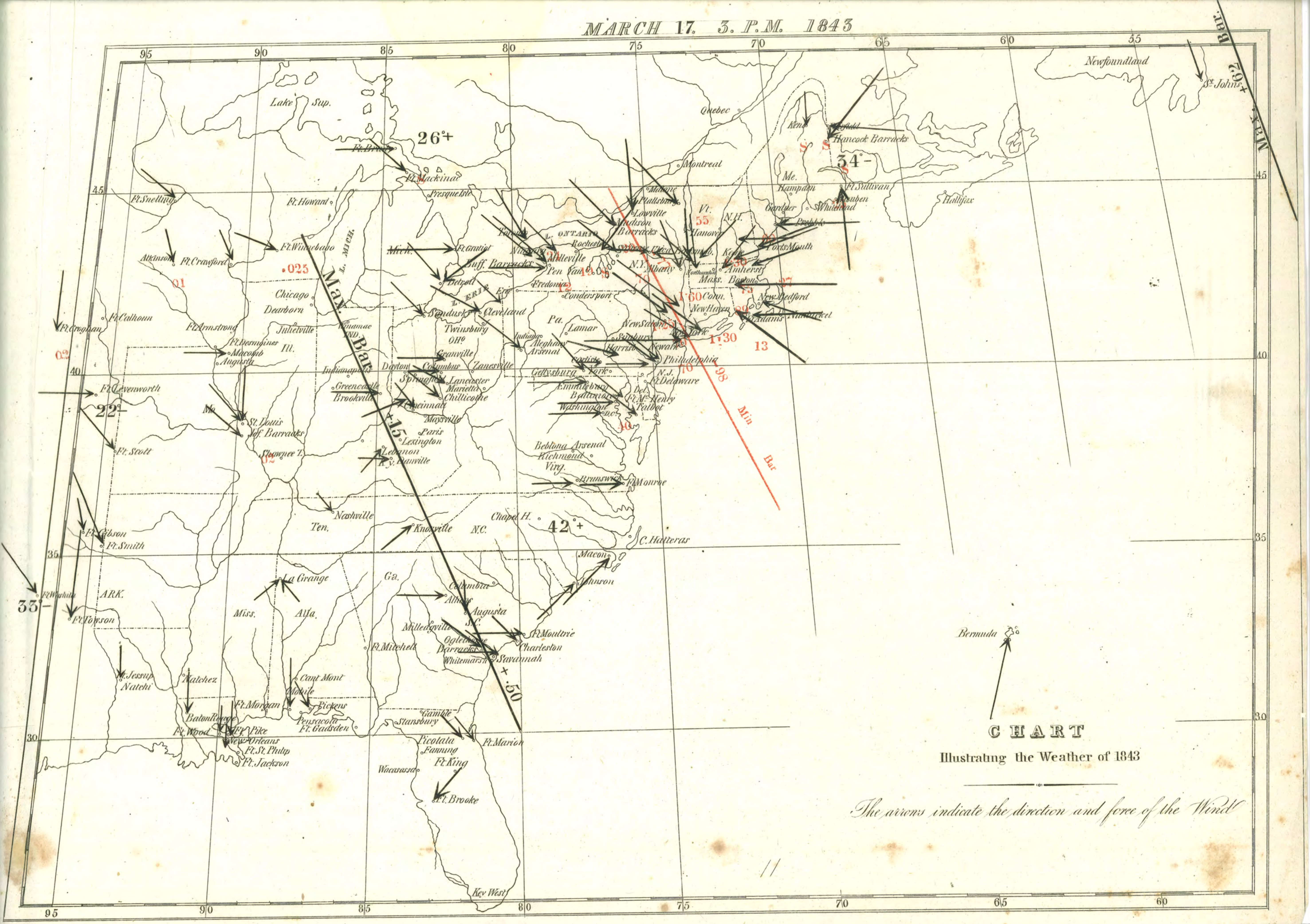
Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind


MARCH 17. 3. P.M. 1843
CHART
Illustrating the Weather of 1843
The arrows indicate the direction and force of the Wind
Max. Bar.
+.15
+.50
+.62
Min Bar
.98
26°+
34°-
22°-
33°-
42°+
Lake Sup.
L. MICH.
L. ONTARIO
L. ERIE
Newfoundland
St. Johns
Quebec
Montreal
Hancock Barracks
Ft. Sullivan
Hallifax
Me.
Hampden
Gardner
Whitehead
Vt.
N.H.
Hanover
Portsmouth
Keene
Amherst
Mass.
Boston
Northampton
Conn.
New Haven
New Bedford
Nantucket
Ft. Adams
N.Y.
Albany
Utica
Rochester
Madison Barracks
Lowville
Plattsburg
Malone
Toronto
Niagara
Buff. Barracks
Penn Yan
Fredonia
Condersport
Pa.
Lamar
New York
Newark
Philadelphia
Harrisburg
Sunbury
Carlisle
York
Gettysburg
Emmitsburg
Baltimore
Washington
D.C.
N.J.
Ft. Delaware
Del.
Ft. McHenry
Talbot
Beblona Arsenal
Richmond
Virg.
Brunswick
Ft. Monroe
Chapel H.
N.C.
C. Hatteras
Macon
Johnson
Ft. Moultrie
Charleston
Savannah
Whitemarsh
Oglethorpe Barracks
Augusta
S.C.
Columbia
Athens
Milledgeville
Ga.
Ft. Mitchell
Gamble
Stansbury
Picolata
Fanning
Ft. King
Ft. Marion
Wacasassa
Ft. Brooke
Key West
Ft. Brady
Ft. Mackinac
Presque Isle
Mich.
Ft. Gratiot
Detroit
Sandusky
Cleveland
Erie
Twinsburg
OHo.
Granville
Columbus
Zanesville
Dayton
Springfield
Lancaster
Marietta
Chillicothe
Cincinnati
Maysville
Indiana
Alleghany Arsenal
Indianapolis
Greencastle
Brookville
Winamac
IND.
Paris
Lexington
Lebanon
Ky. Danville
Nashville
Ten.
Knoxville
La Grange
Ala.
Miss.
Cant Mont
Mobile
Pickens
Pensacola
Ft. Gadsden
Ft. Morgan
Ft. Pike
Baton Rouge
Ft. Wood
New Orleans
Ft. St. Philip
Ft. Jackson
Natchez
Ft. Jessup
Natchi
Ft. Towson
Ft. Washita
ARK.
Ft. Gibson
Ft. Smith
Ft. Scott
Shawnee T.
St. Louis
Jef. Barracks
Mo.
Ft. Leavenworth
Ft. Croghan
Ft. Calhoun
Ft. Armstrong
Ft. Desmoines
Macomb
Augusta
Ill.
Julietville
Chicago
Dearborn
Ft. Winnebago
Ft. Howard
Ft. Crawford
Atkinson
Ft. Snelling
Bermuda
55
60
70
12
13
19
21
1.60
1.30
.025
01
02
03
40
70
95
90
85
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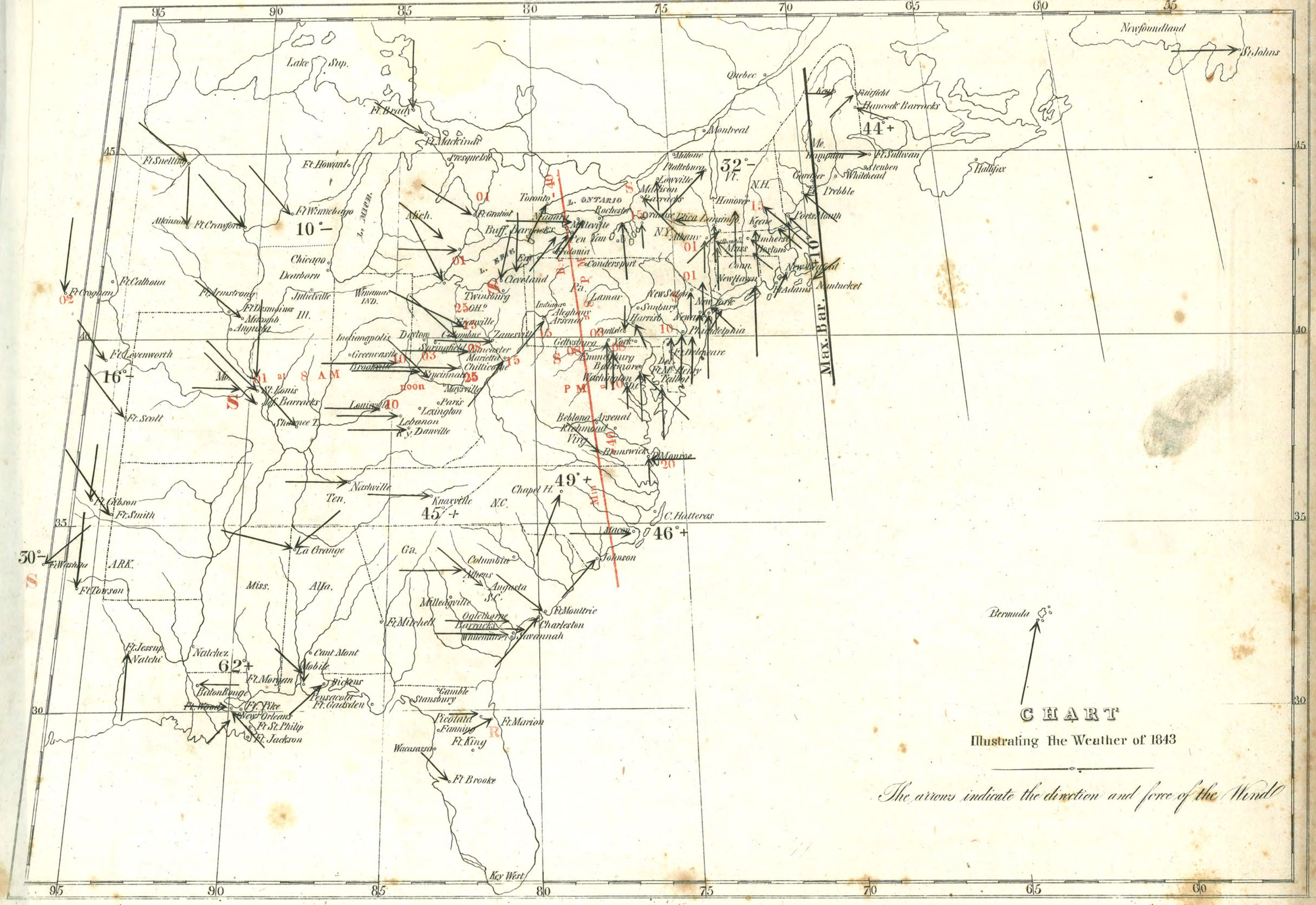
75
70
65
60
55
45
40
35
30

MARCH 22. 3. P.M. 1843

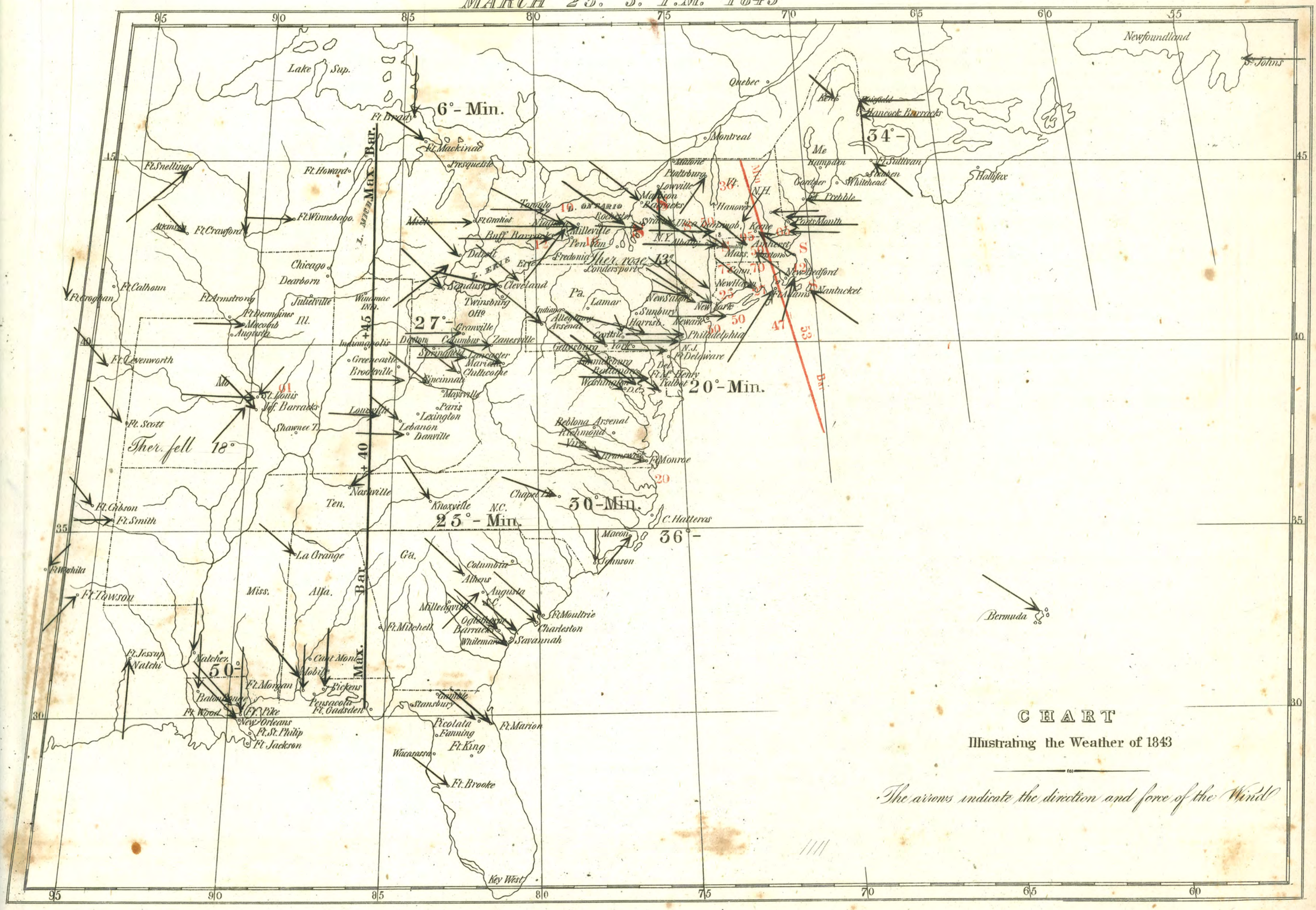


CHART

Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind

MARCH 23. 3. P.M. 1843

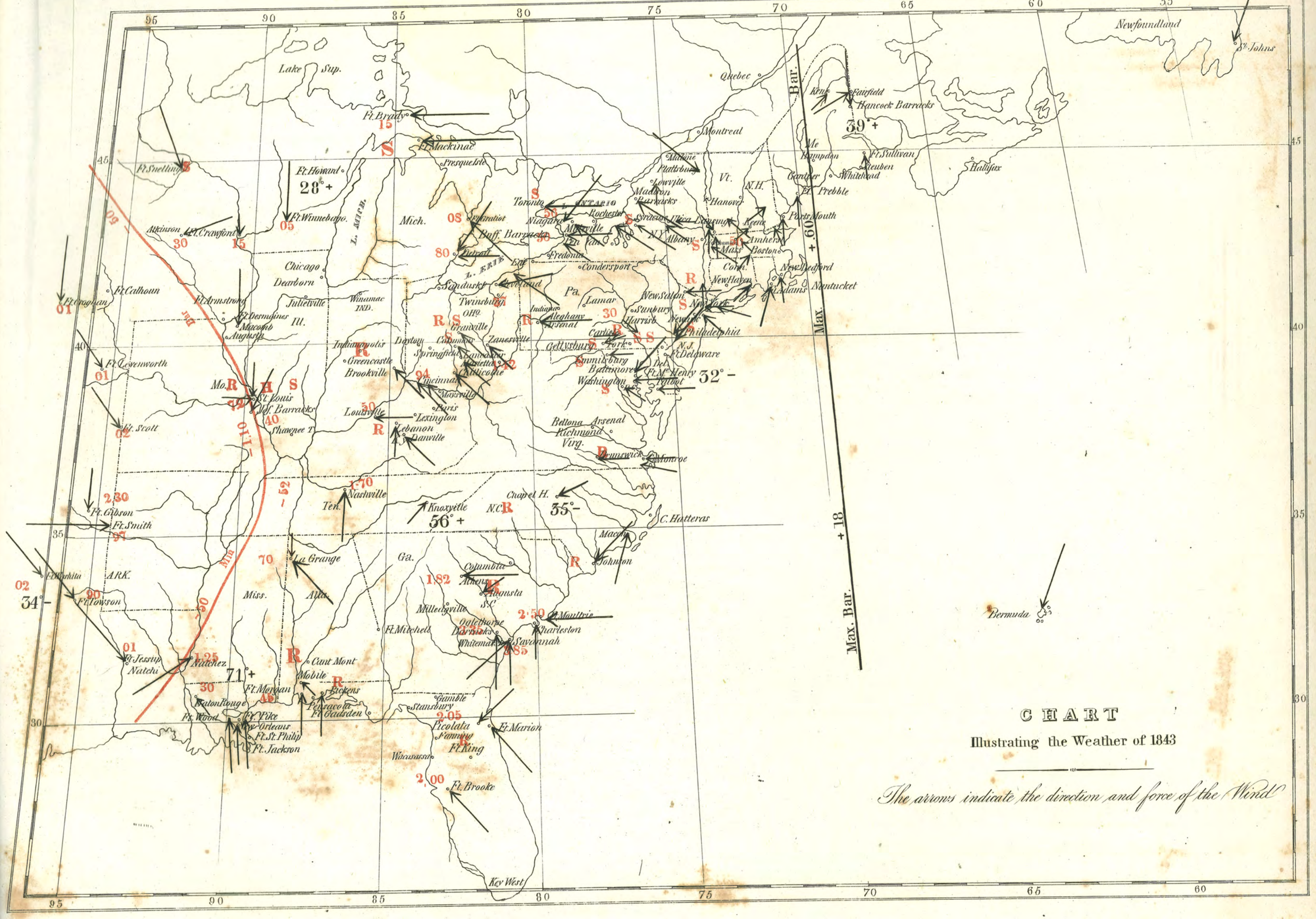


CHART

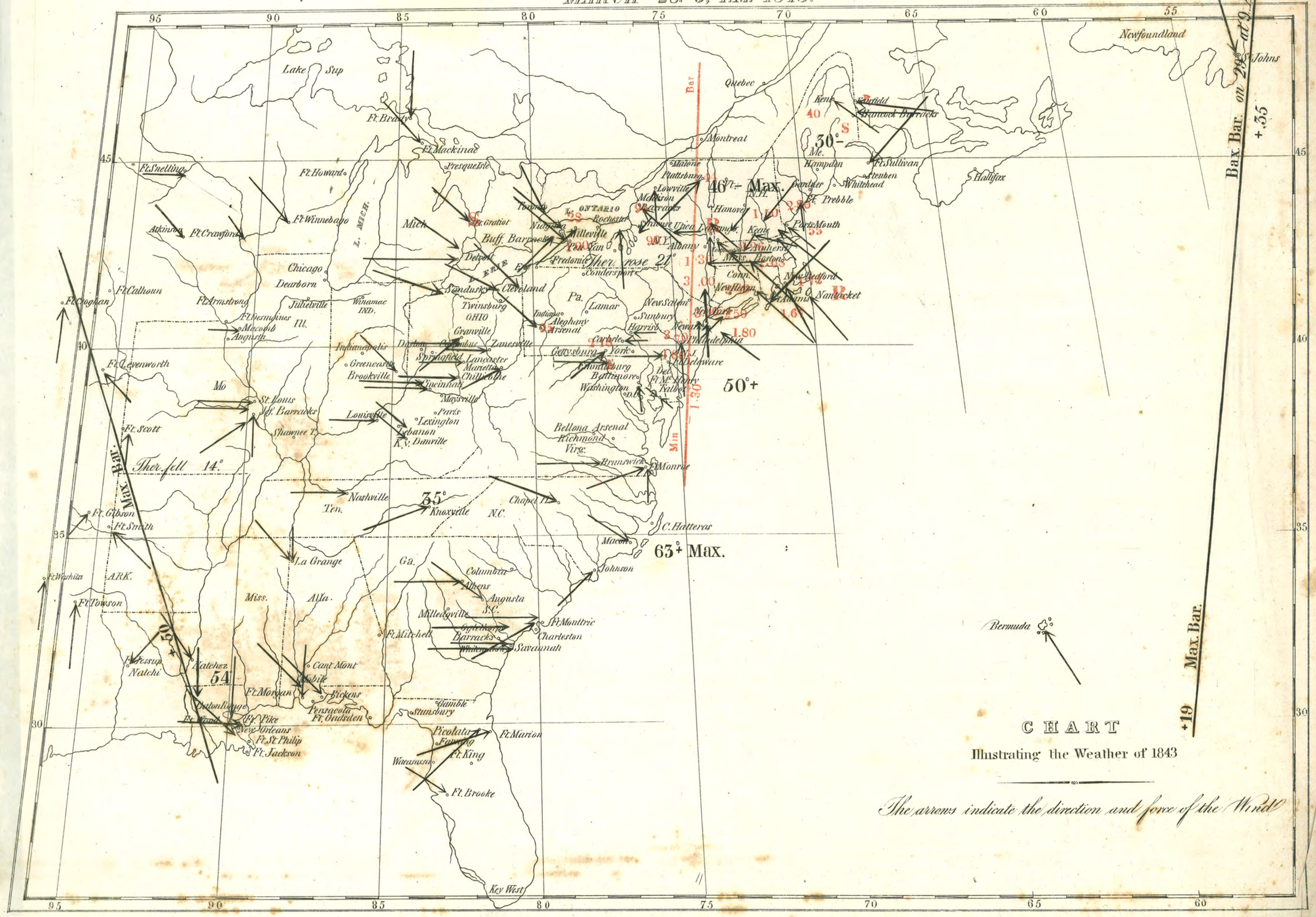
Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind

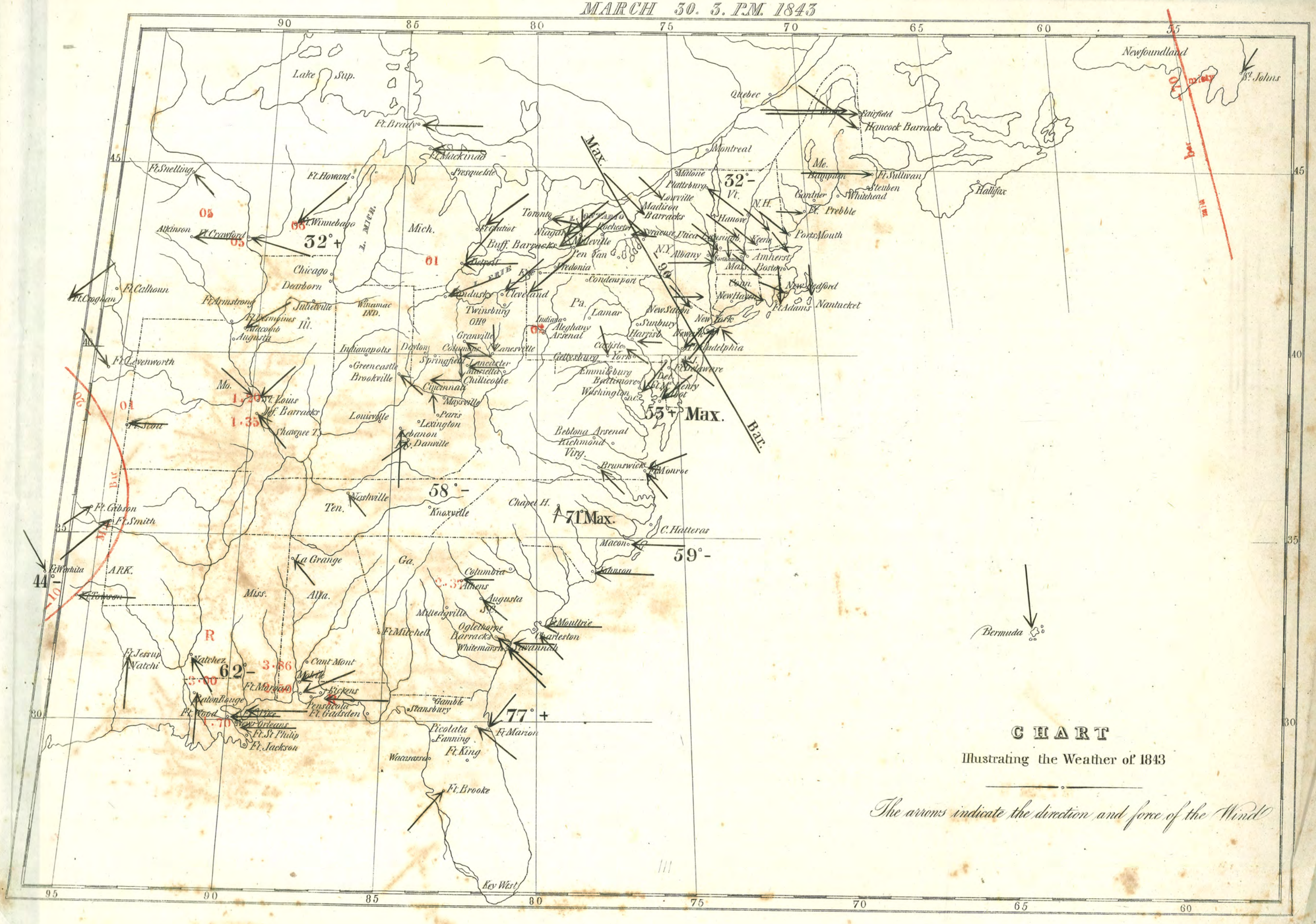
MARCH 27. 3. P.M. 1843.



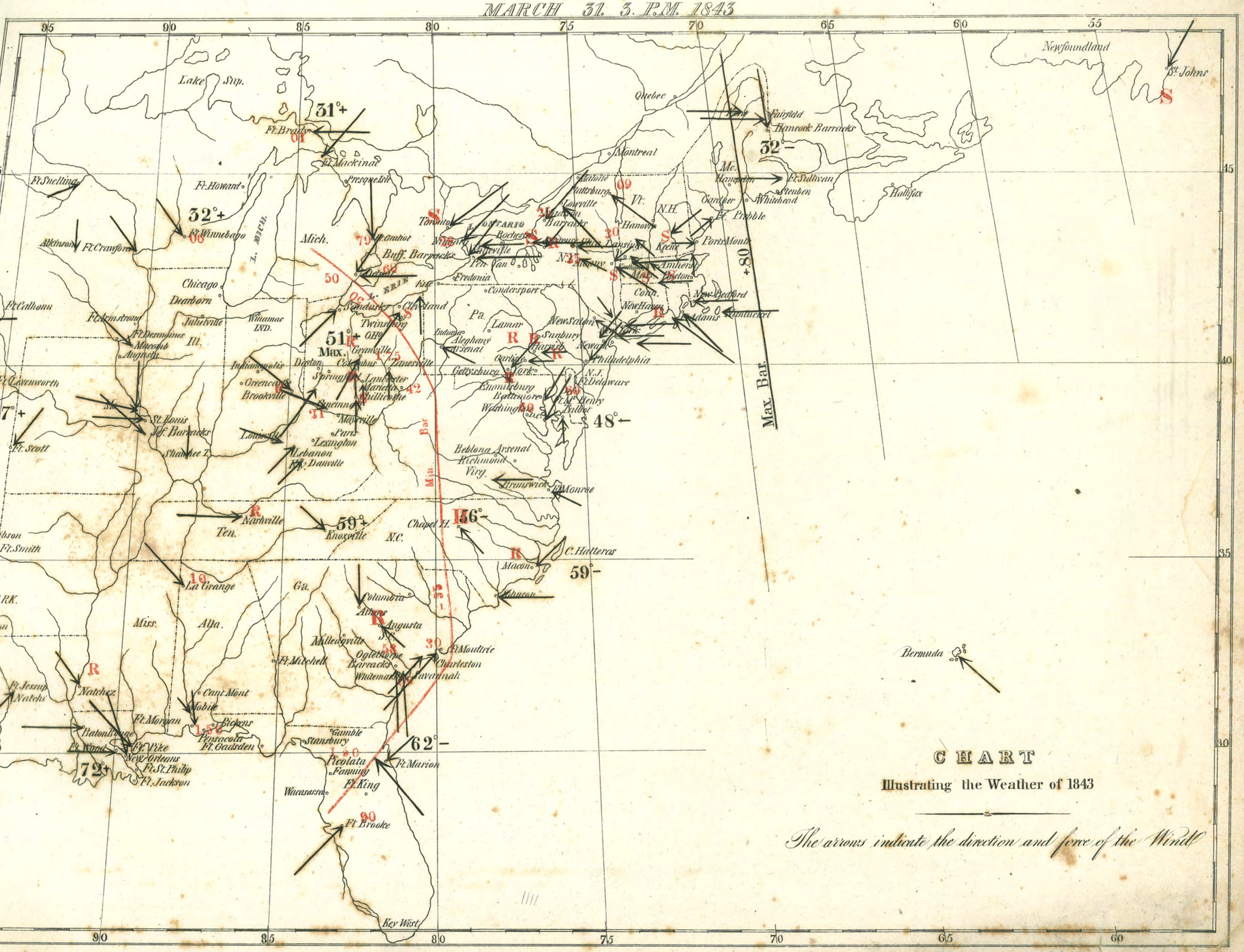
MARCH 28. 3, P.M. 1843.



MARCH 30. 3. P.M. 1843



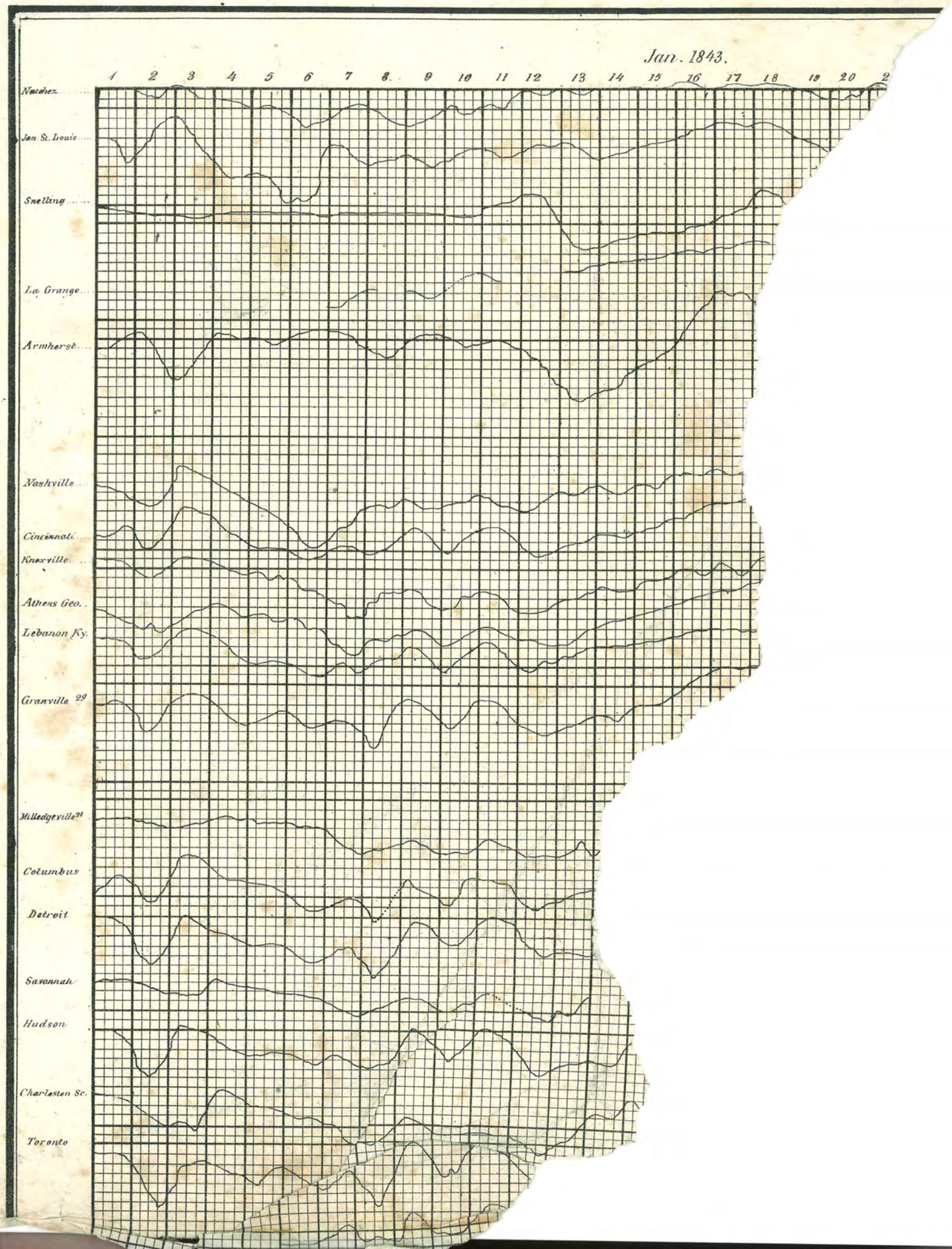
MARCH 31. 3. P.M. 1843



CHART

Illustrating the Weather of 1843

The arrows indicate the direction and force of the Wind


Jan. 1843.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2
Natchez
Jan. St. Louis
Snelling
La Grange
Armherst
Nashville
Cincinnati
Knoxville
Athens Geo.
Lebanon Ky.
Granville 29
Milledgeville 24
Columbus
Detroit
Savannah
Hudson
Charleston Sc.
Toronto