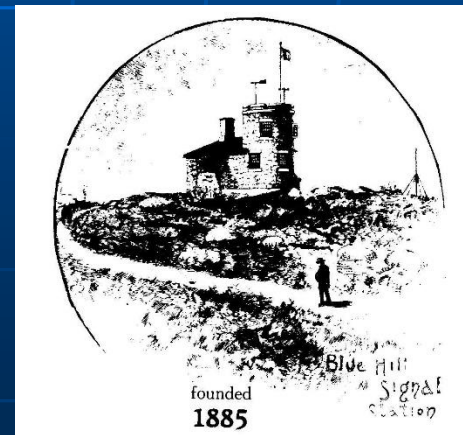




PROFESSOR CHARLES FRANKLIN BROOKS

Dr. Charles Franklin Brooks at Blue Hill Observatory

The Evolution of a Career, a
Weather Institution, and the
Growth of the American
Meteorological Society

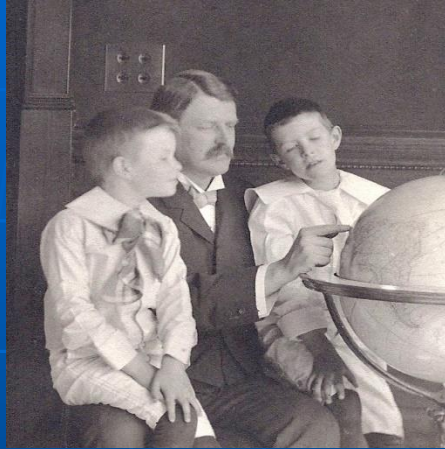


Dr. Charles Franklin Brooks'

Early Years and Education

- Dr. Charles F. Brooks was the second son born to Morgan Brooks The elder Brooks was a Professor of Electrical Engineering. Charles grew up in St Paul/Minneapolis
- At age 16 he entered Harvard University after one year of studying engineering at the University of Illinois Urbanna He earned his A.B. in 1911 at age 20
- At Harvard he studied climate and meteorology under Robert DeCourcy Ward and as a junior he first came to Blue Hill Observatory for a research course under the tutelage of Professor Abbott Lawrence Rotch founder and Director of the Blue Hill Meteorological Observatory in Milton. He earned his A.M. at Harvard in 1912 and was awarded a Ph.D. in Meteorology in 1914 – only the second such degree in the US
- Brooks apparently hiked Blue Hill for the first time 3/12/1911 and began his research studies at Blue Hill Observatory in the Fall of 1911

CF Brooks from youth to his Graduation from Harvard



15- An aeroplane carrying Messrs Atwood and Reynolds maneuvered about the summit of Blue Hill at 7:40 A.M. today, at one time coming within 25 feet of the top of the Observatory tower. The trip was made from the Squantum aviation field, to which the aeroplane returned safely after encircling the hill three times. This is the first appearance of an aeroplane in the immediate vicinity.

15- Mr. Ferguson, who returned today from Reno, Nevada, will make some repairs on the kite and meteorograph.

17- Professor Rutch went to New York.

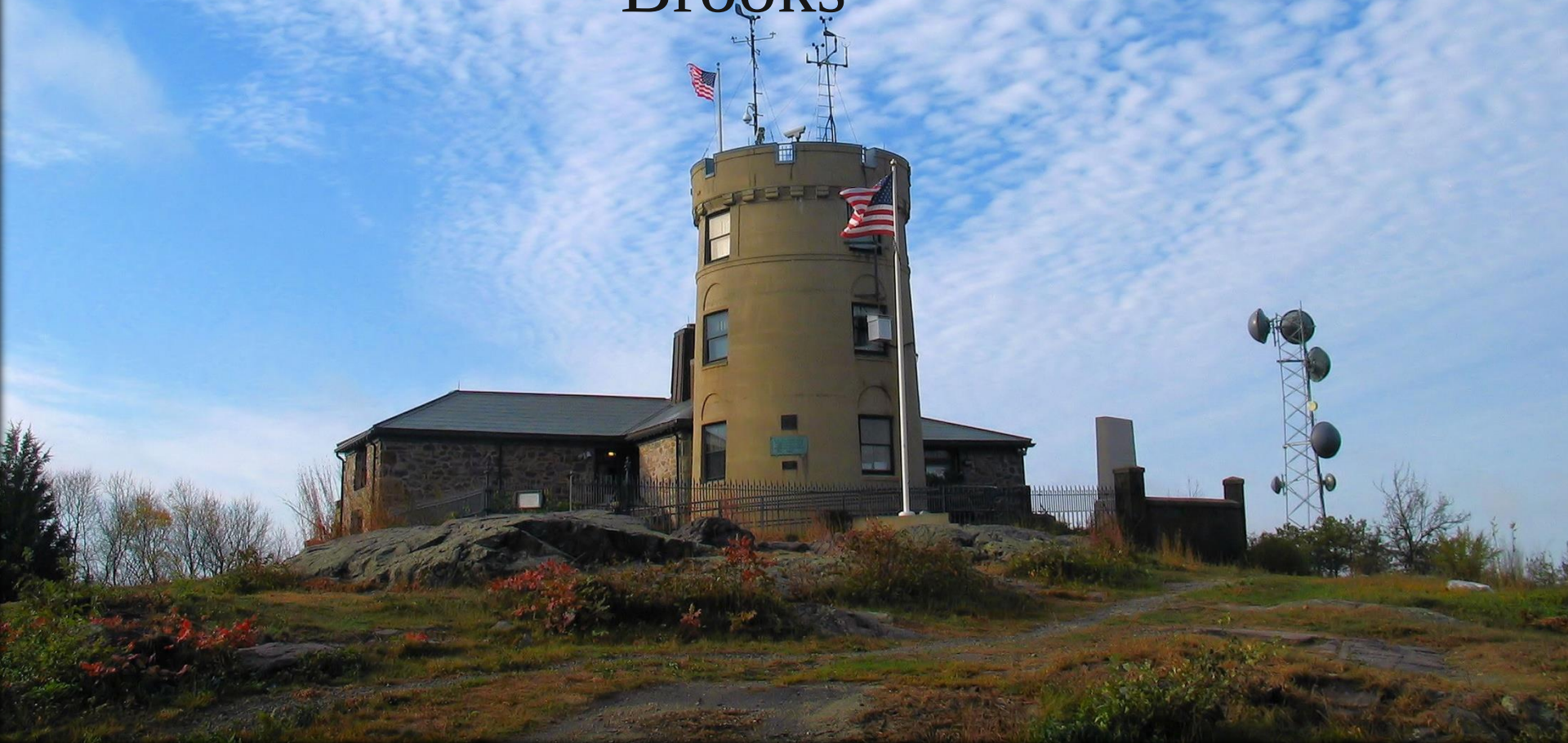
17- Prof. Rutch returned.



Dated 15 June, 1911 the top entry reads "An aeroplane carrying Messrs. Atwood and Reynolds maneuvered about the summit of Blue Hill at 7:40 A.M. today, at one time coming within 25 feet of the top of the Observatory tower. The trip was made from the Squantum aviation field, to which the aeroplane returned safely after encircling the hill three times. **This is the first appearance of an aeroplane in the immediate vicinity.**"

Atwood flying at Squantum Harvard Airfield
June 1911 Photograph Charles F Brooks

History of Blue Hill Meteorological Observatory from Professor Abbott Lawrence Rotch to Dr. Charles Franklin Brooks





**Blue Hill
Observatory is
home of the oldest
continuous
weather record in
all of North
America, dating
back to 1885.**

Abbott Lawrence Rotch
founded Blue Hill
Observatory in his twenty-
fourth year.

- possessed unusual energy
- was well educated
- a frequent traveler abroad
- spoke German *and French*
- *was trained in business*
- was financially secure What
were the Dartmouth and Beaver?

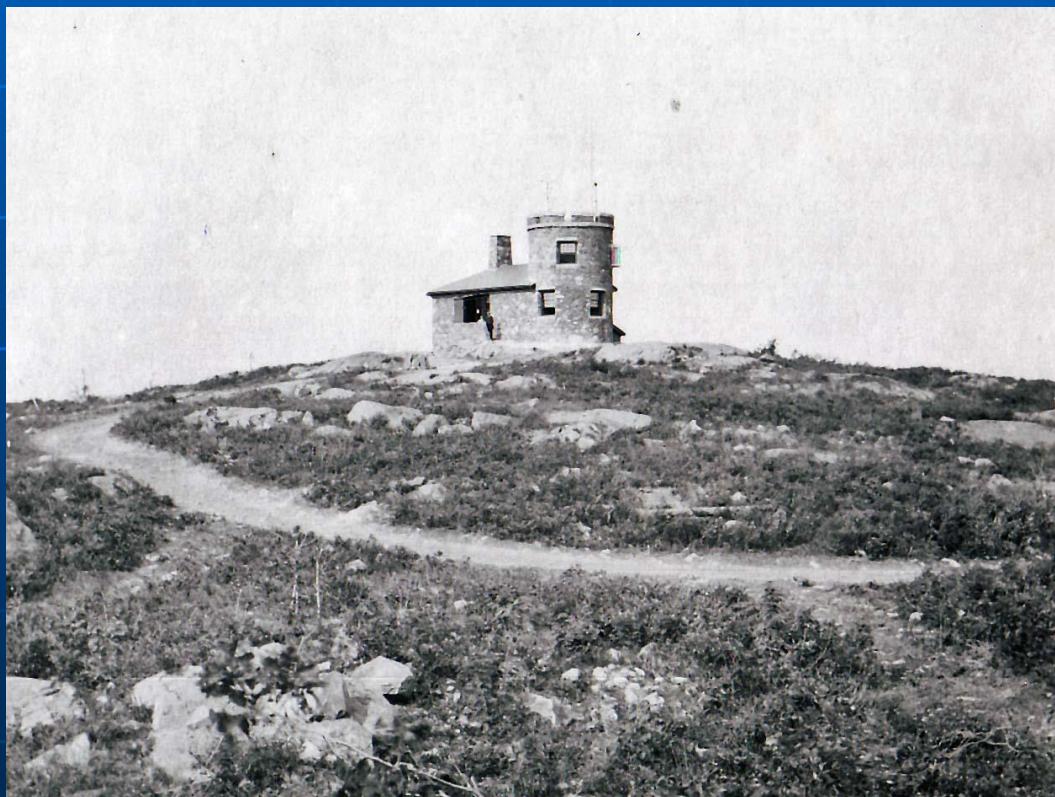




Rotch chose 635 foot Great Blue Hill in Milton for his new weather observatory.

The building was designed by his architect brother Arthur Rotch.

Construction began on 18 October, 1884 at a fixed cost of \$3,500.



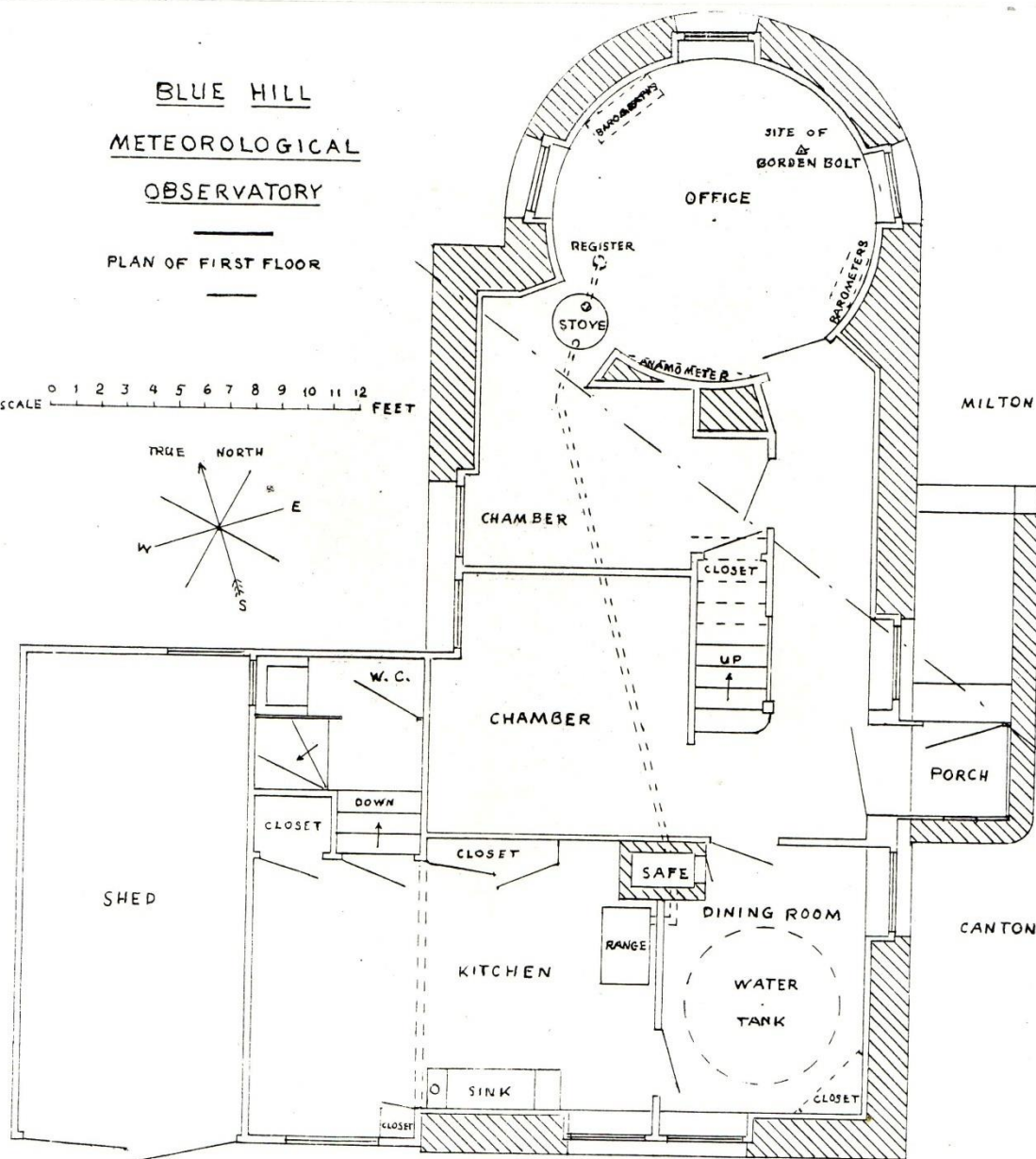
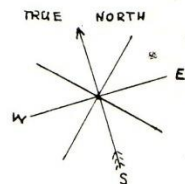
At midnight on 31 January 1885 a red fire and rockets announced the official opening of Blue Hill Observatory.



BLUE HILL
METEOROLOGICAL
OBSERVATORY

PLAN OF FIRST FLOOR

SCALE 0 1 2 3 4 5 6 7 8 9 10 11 12 FEET



February 1, 1885.

Precipitation.

Kind

Snow

Time of beginning

AM
10:55

Direction of wind at beginning

S.E.

Time of ending

P.M.
6:40 P.M.

Direction of wind at ending

W.

Changes in direction of wind.

Veered from S.E. to W.

Amount of rain

Amount of melted snow by gage

.09 in.

Amount of melted snow by section.

Estimated depth of snow

1 1/2 in.

Self Registering Thermometers

7 A.M.

Minimum thermometer

18.1

Corrected minimum

18.1

Minimum thermometer

15.7 by Exposed.

Maximum thermometer

30.4 by Exposed.

Corrected minimum

15.7

11 P.M.

Corrected maximum

30.4

Range

14.7

Minimum after setting

15.0

Maximum after setting

15.8

Wind

Maximum velocity

Time of maximum velocity

Minimum velocity

Time of minimum velocity

Changes in direction.

NE veering to W

Number of miles in 24 hours

420

Miscellaneous.

Wind Velocity of 36 miles noted at 8 P.M.

" " 42 " " " 8.30

" " 48 " " " 10

Three views of the new Observatory



Northeast



West



South

Rotch seated at desk in first floor office

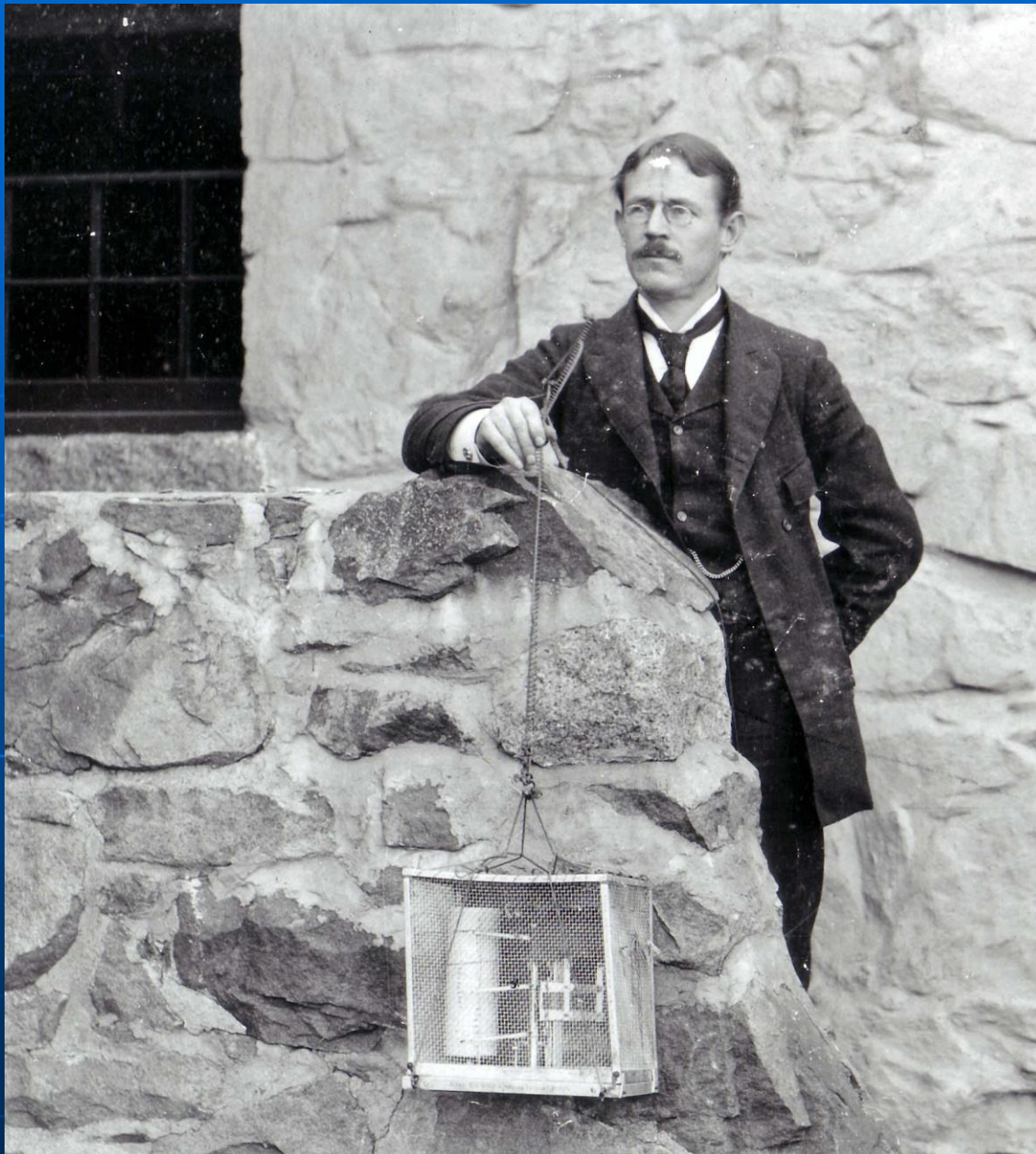




Second floor of old tower after sheathing

Colored flags alerted neighbors to changes in the weather

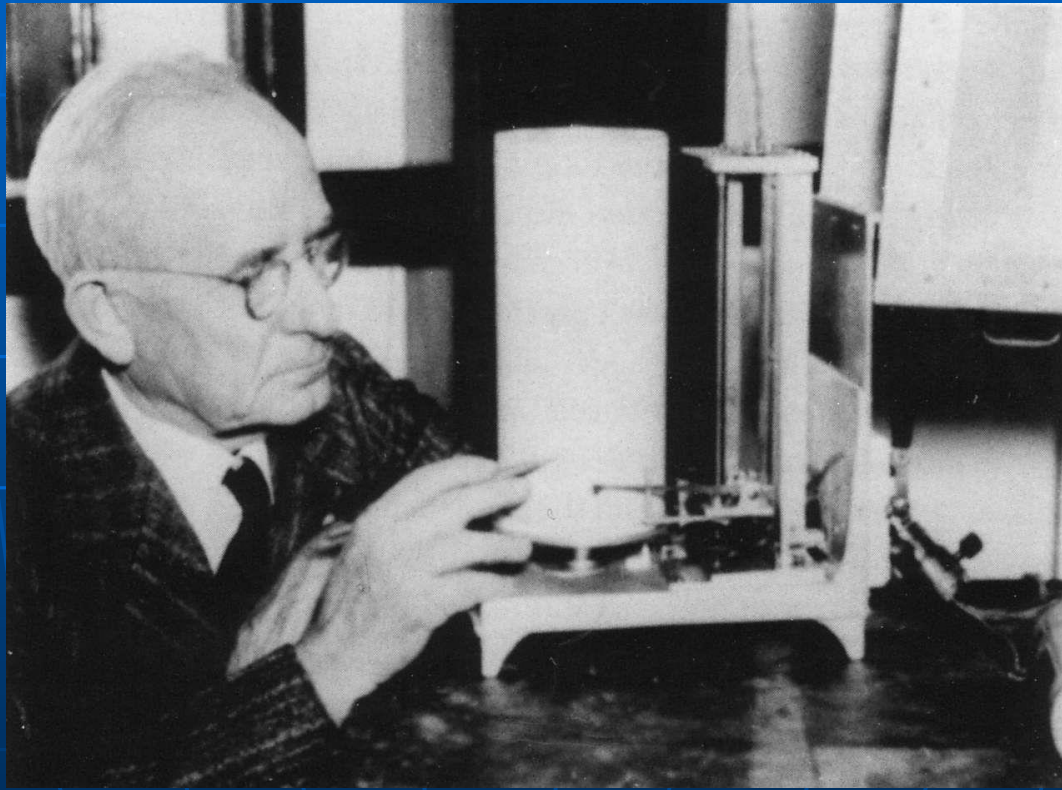




Henry Helm Clayton, age 24, arrived at the Observatory in 1886. His interest in clouds led to the first detailed cloud statistics in America and provided the first basis climatology of cloud types, height, and velocities in the Western Hemisphere

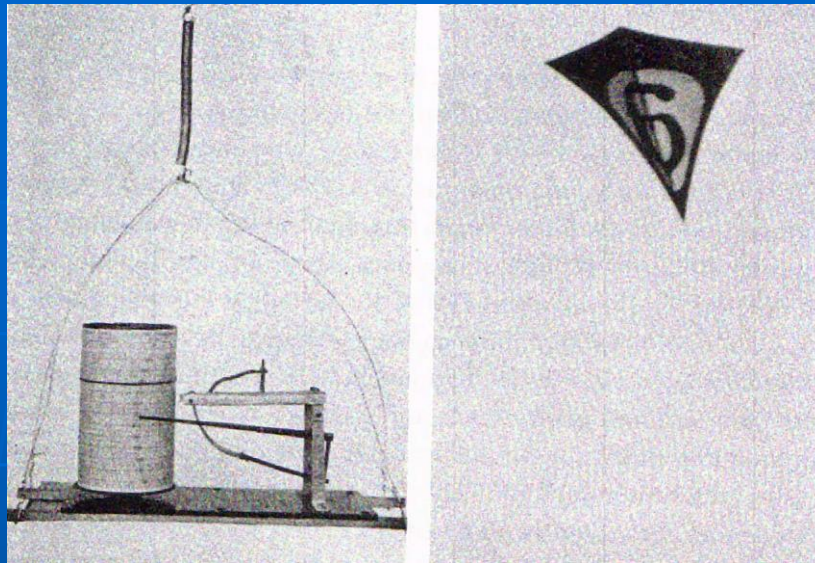
S. P. Fergusson

Mechanical Wizard



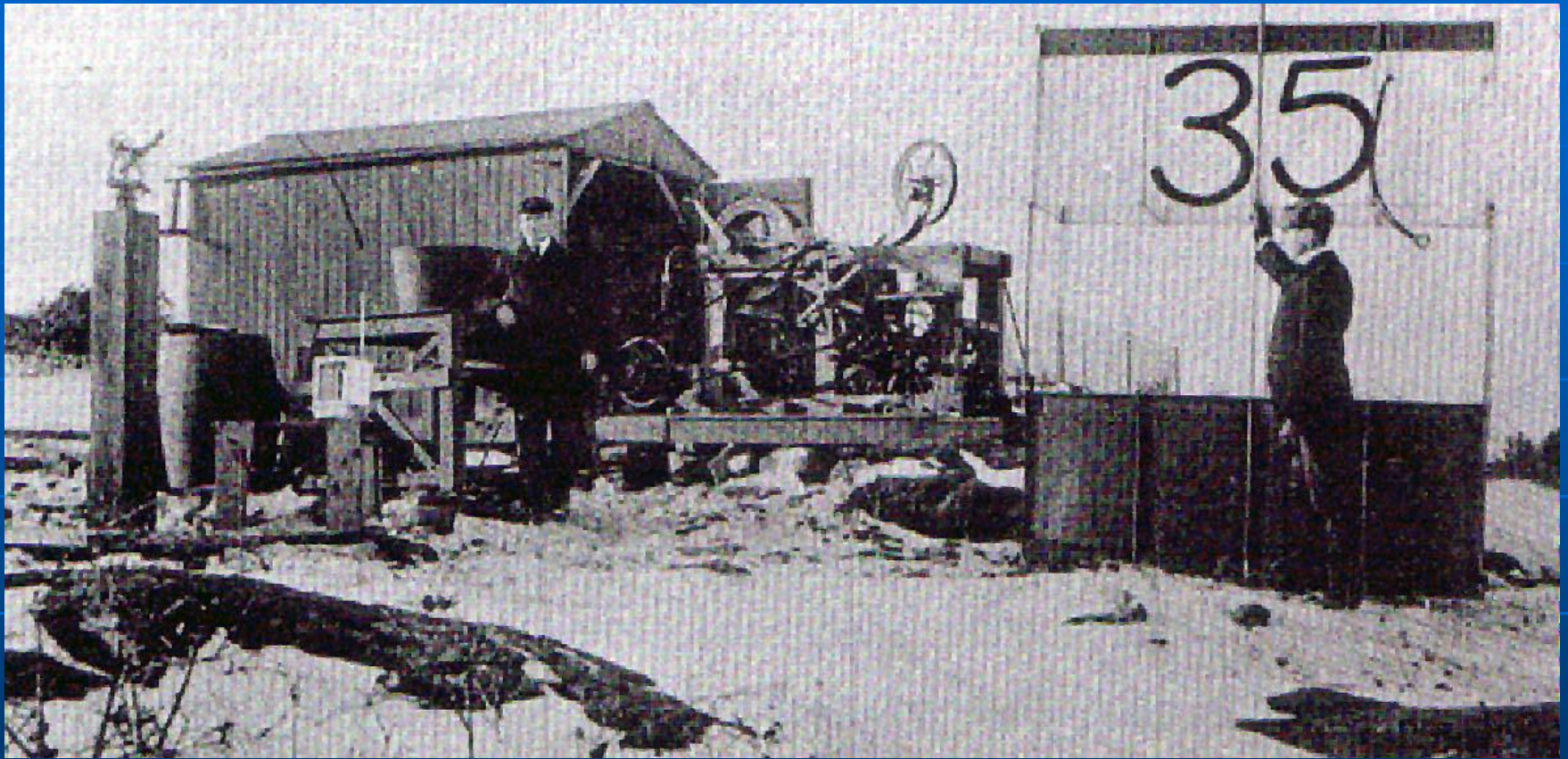
An east wing library was added in 1889





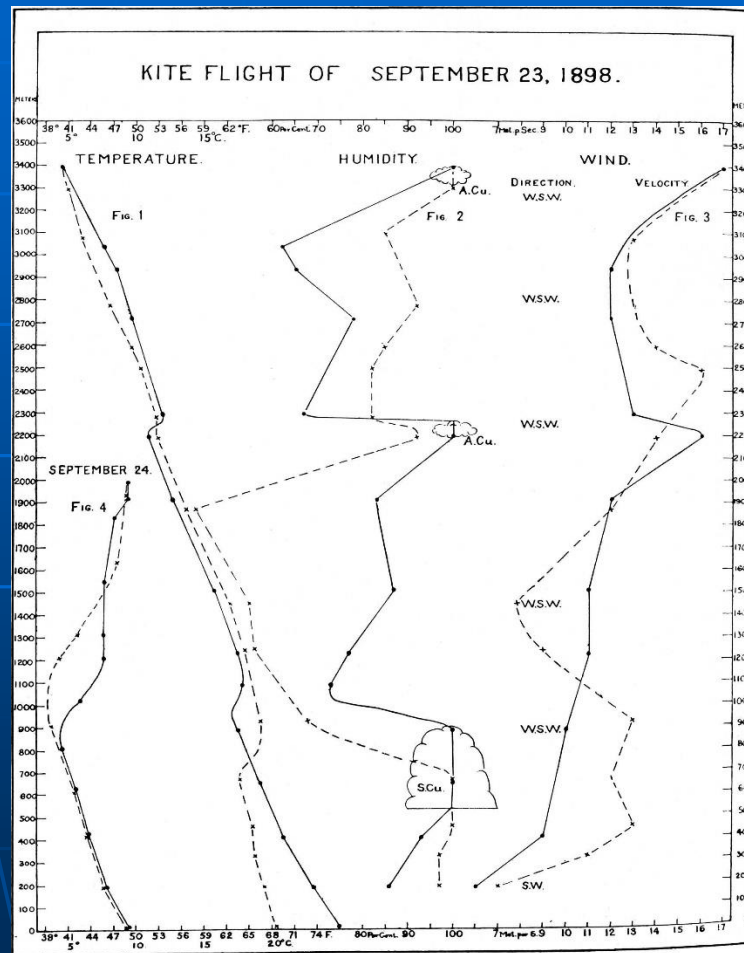
On 4 August 1894
using a series of
Malay tailless kites,
the thermograph was
carried aloft to an
altitude of 1,400 ft.





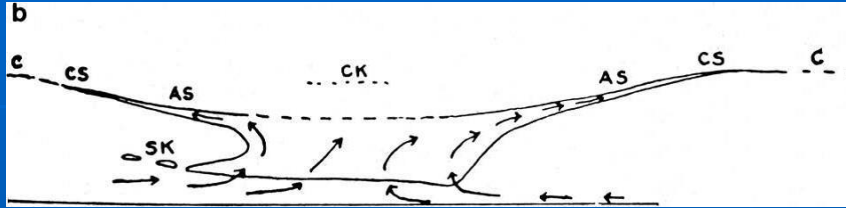
Steam-driven windlass used in kite soundings beginning in March, 1897

BHO Kite sounding data

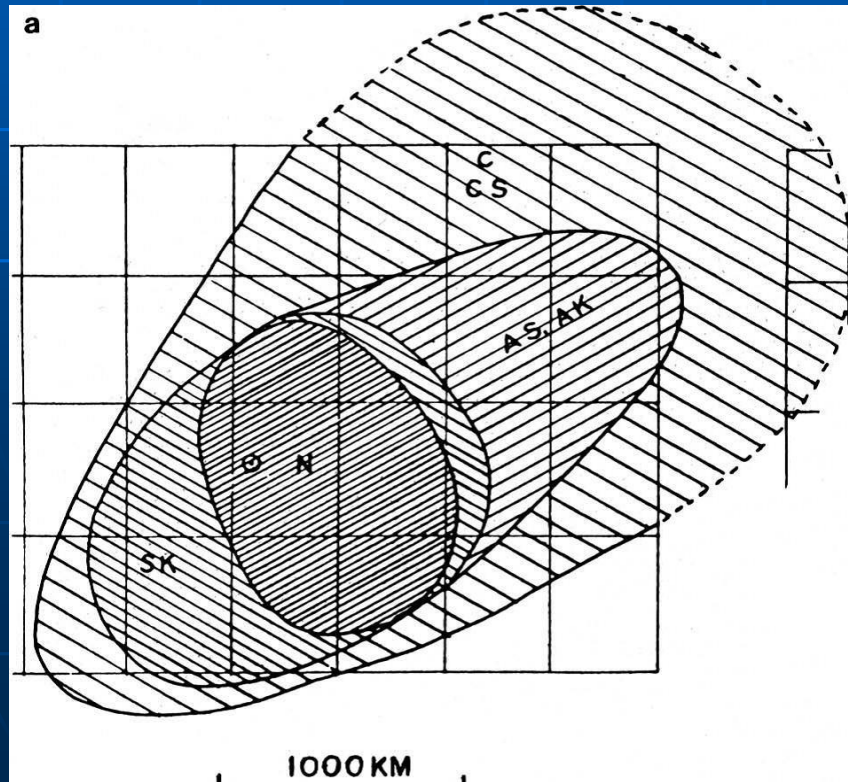


HH Clayton's 1896 Deductions from kite flights at BHO from John Conover's article on the 100th Anniversary of Blue Hill Observatory BAMS Vol 66 No1 1985

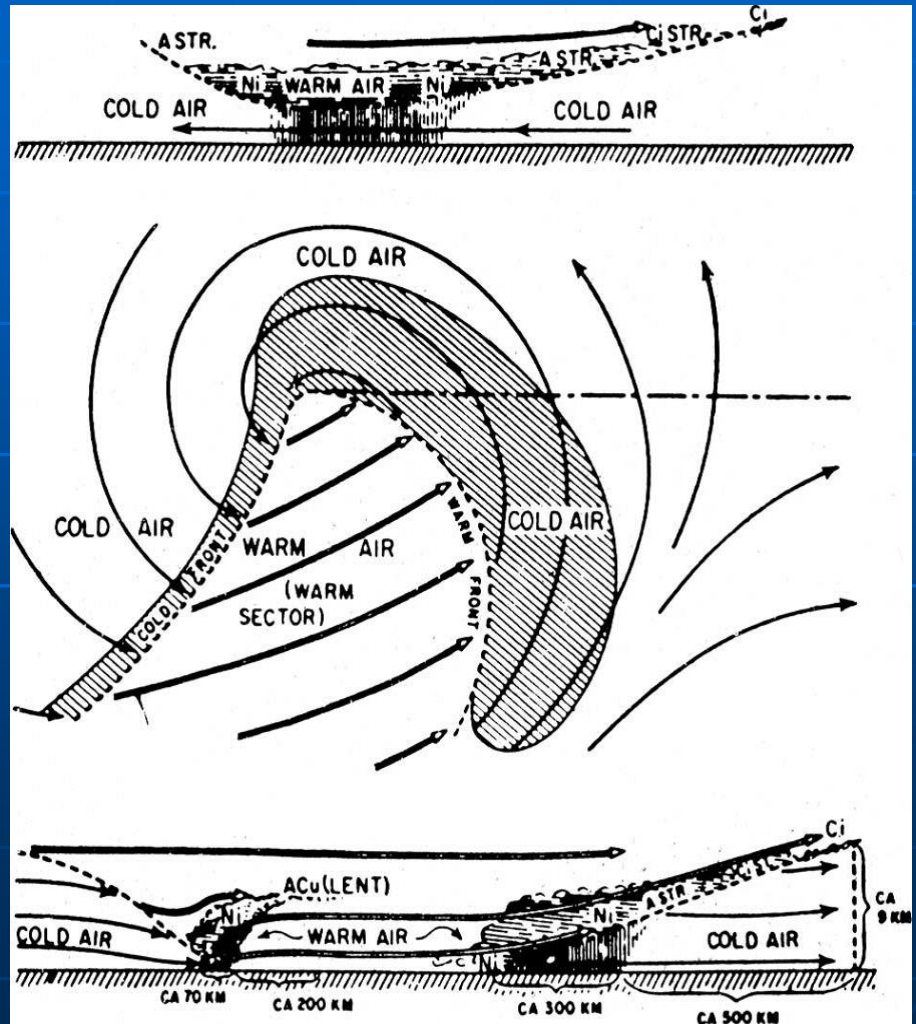
1896 - Southwest-northeast cross section through the cloud model. The cirrus was placed at 9 km. by HH Clayton



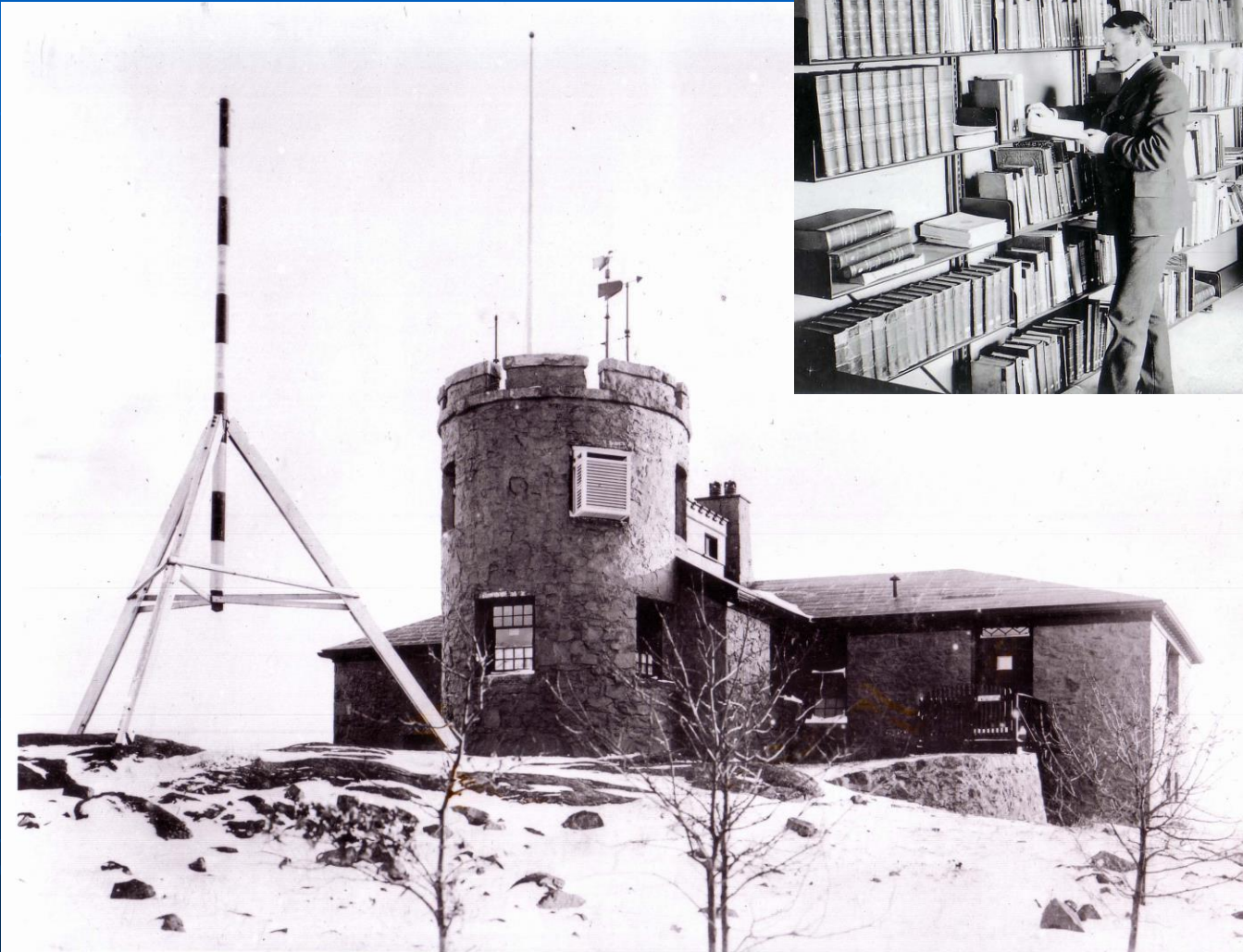
Composite model of cloud types around a cyclone centered at ©; C, CS, AS, AK, N, and SK indicate cirrus, cirrostratus, altostratus, altocumulus, nimbus, and stratocumulus, respectively



The famous Norwegian cloud model around a cyclone, drawn by Jacob Bjerknes with fronts drawn in



1902- New West Wing
Completed



June 26, 1903
New Library
opens



1905- Concrete wall and iron fence erected around Observatory



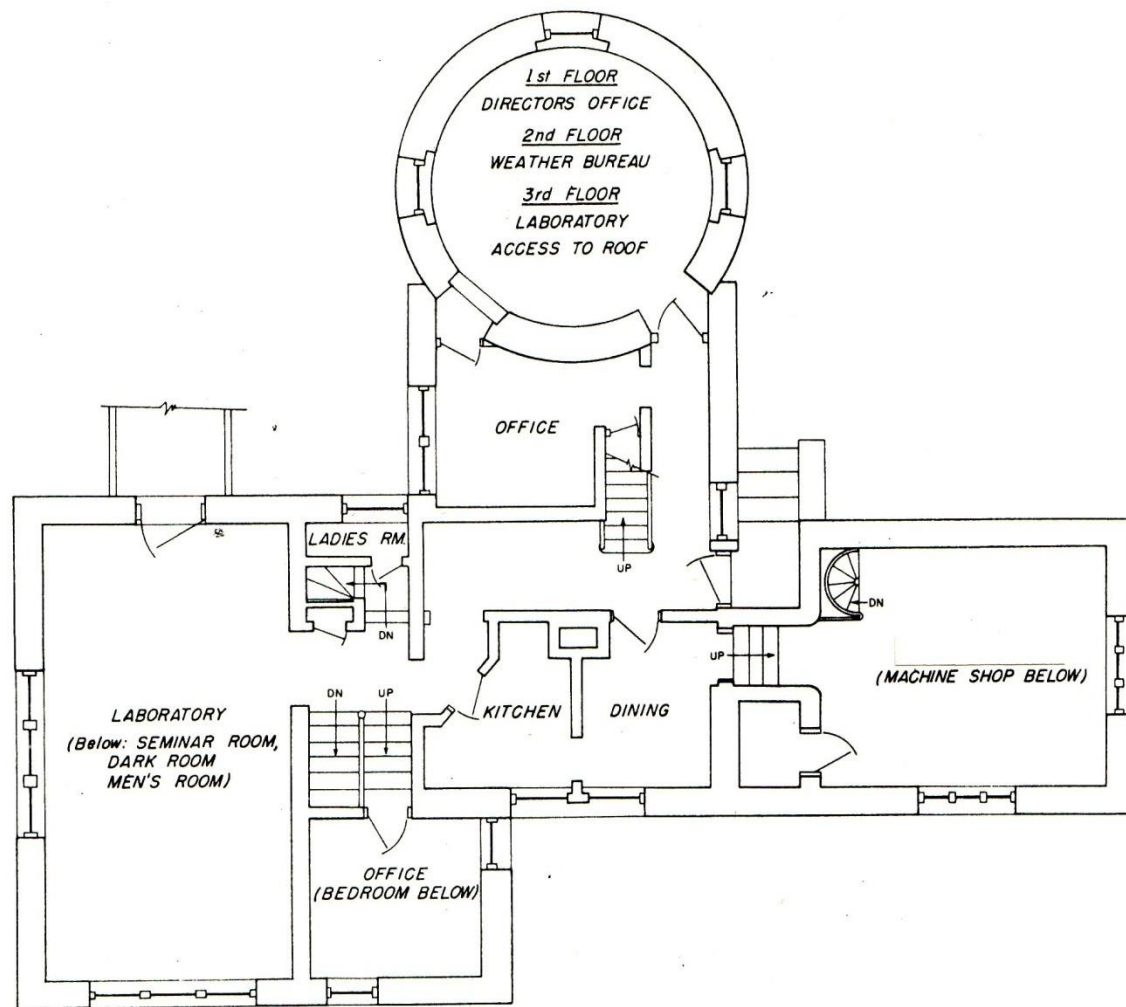
25 March, 1908 new tower construction began

4 June, 1908 new tower completed.

- 800 tons of concrete mixed by hand and hauled up in buckets
- Anemometers moved to chimney
- Parapet of tower notched to form a perfect compass



- Tower completed at a cost of \$5,000



BLUE HILL OBSERVATORY

Charles Franklin Brooks comes to Blue Hill Observatory

- CF Brooks started a research course in meteorology with Prof. AL Rotch on 10/11/1911 at BHO
- Began his Ice Storms paper - which became his 180 page Masters paper
- Adjusted his course work at the suggestion of Profs Ward/Rotch to include Petrography/Mineralogy

Brooks' Work continued at Blue Hill Observatory

- Continued his research reading in the large BHO library – his “monastery”
- Began work for Professor Ward on a Annual US Snowfall Map – published Royal Met. Society
- Considers year long research position at BHO
- Climbs Mt Washington for the first time with the AMC with BHO observer LA Wells on 2/19/1912

April 1912 Rotch dies suddenly

CF Brooks becomes observer at BHO 9/24/1912

1913 Harvard College takes over Observatory Mrs. Rotch takes over as Director

Alexander McAdie eventually appointed BHO Director

In a description of a thunderstorm (1895), he wrote:

The thunder cloud is noteworthy in another respect; namely, that the water in it may be cooled below the freezing point and yet not frozen. A snowflake or ice just as we may see ice needles dart in all directions A crystal falling into it may suffice to start a sudden congelation, when the chilled surface of a still pond is disturbed.

We liken this monstrous cloud to a huge gun loaded and quiet, but with a trigger so delicately set that a falling snowflake would discharge it.

McAdie's wife, Mary (1949), quoted Charles F. Brooks, who commented, "Here is a clear statement of the fundamental basis of the Bergeron-Findessen theory of rain, propounded forty years later, and of the artificial production of precipitation by 'seeding' overgrown cumulus with dry ice, to produce ice crystals, ten years later still."

During World War I, McAdie instructed Naval officers in meteorology at Blue Hill, among them the late Francis W. Reichelderfer, the long-time chief of the U.S. Weather Bureau.

McAdie also invented the word "aerology"



CF Brooks continues as Observer at Blue Hill Observatory 1912-1913

During a Kite Sounding on 3/6/1913 atmospheric electricity was noted as was often seen but then a blinding flash and tremendous crash and as Brooks dashed out of the kite shed he saw a shower of globules falling from the sky – molten steel. The windlass engineer – a Mr. Conway - collapsed his arms and legs powerless from the lightening bolt down the wire. He was carried into the Observatory and an hour later was able to walk – leaving the Observatory never to return



CF Brooks earns his PhD in the Spring of 1914 from Harvard University

- His thesis on Snowstorms ran 73 pages with 12 snowfall charts – Eleanor Stabler his soon to be bride helped with editing and the thesis was published in the MWR March 1914. His paper on Ice Storms was published in the Annals of the Blue Hill Observatory that year as well thanks to Director McAdie
- His Post Doctoral work includes teaching position at Yale University 1915-18 and work for the Weather Bureau on the Atlas of American Agriculture
- During the summer of 1918 he taught Meteorology to US aviators-College Station Tx
- From 1919 -21 he was the editor of the Weather Bureau's Monthly Weather Review. **In this period he founded the AMS - becoming the Society's first Secretary(1919-54) - overseeing the publication of the first edition of BAMS and subsequent issues**
- On March 27, 1921 he was offered/accepted teaching position at by President Atwood of Clark University in Worcester, MA

The true founding of the American Meteorological Society



THE BROOKS CHILDREN – ED AND MARGARET MAILING THE AMS
ORGANIZATIONAL CIRCULARS WASHINGTON DC 1919

At Clark University he taught geography and climate and was once taken to the police station when a police officer thought it odd that there was some one trying to measure temperatures over a frozen brook late at night. He was present for the remarkable ice storm of November 29, 1921 and wrote a great summary about it

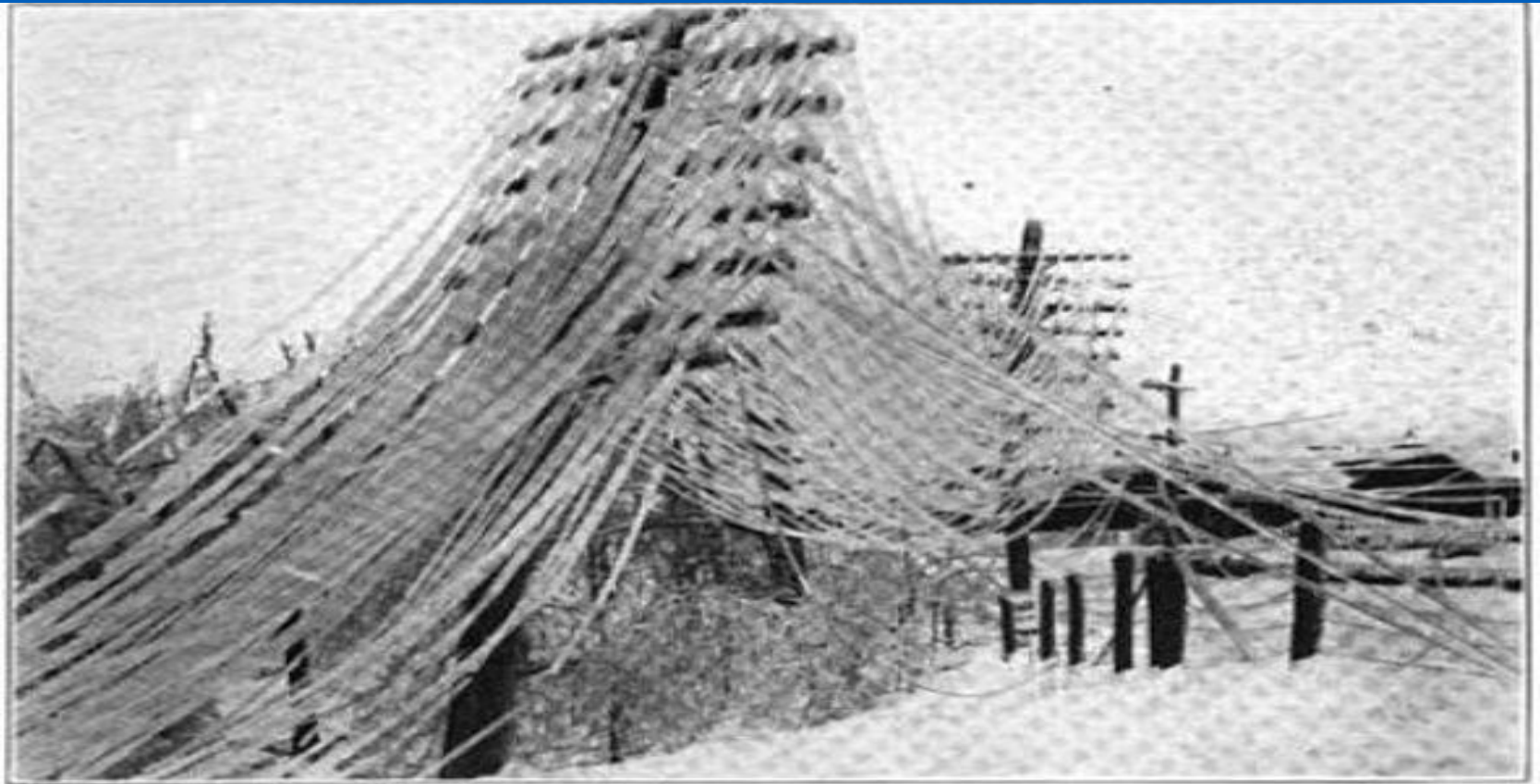


FIG. 5. Telephone wires at Summit, just east of Worcester, Massachusetts. Ice weighed 800 lbs. per wire between poles and was three inches in diameter.
(Photo by New England Tel. and Tel. Co.)

CFB and BHO

Many congratulatory letter to
CF Brooks - this one from
Ernest Clowes

Bridgehampton, NY – he to be
heard from later

Bridgehampton, Long Island, N. Y.,
14 October 1931.

Dr. Charles F. Brooks,
Clark University,
Worcester, Mass.

Dear Brooks,

I saw by the papers a while ago when I was travelling en route to Canada or back that you had received the appointment to McAdie's job at Harvard. Many congratulations. Perhaps I shall have opportunity for more. I visited my old quarters in the Syracuse office of the Weather Bureau while away and heard there the gossip that Marvin was soon to retire and that you were among those spoken of for his successor. I hope it is so; you could rattle the dry bones down there very nicely. Poor Professor Henry's departure leaves one less. The best gossip however was that the appointment, which is a presidential one, would go west for political reasons. If however you should be interested and have any pull with the Sage of Northampton it might help. I am quite sure there will be one man in Washington grievously disappointed.

I enjoyed your card from London but had no way of acknowledging it till now. I left hereabout a month ago and went to Montreal, Quebec, the Saguenay, Ottawa, Syracuse. A pleasant trip of 19 days. I like Canada.

Anything new in the Gulf Stream work?

Sincerely Yours,
Ernest S. Clowes

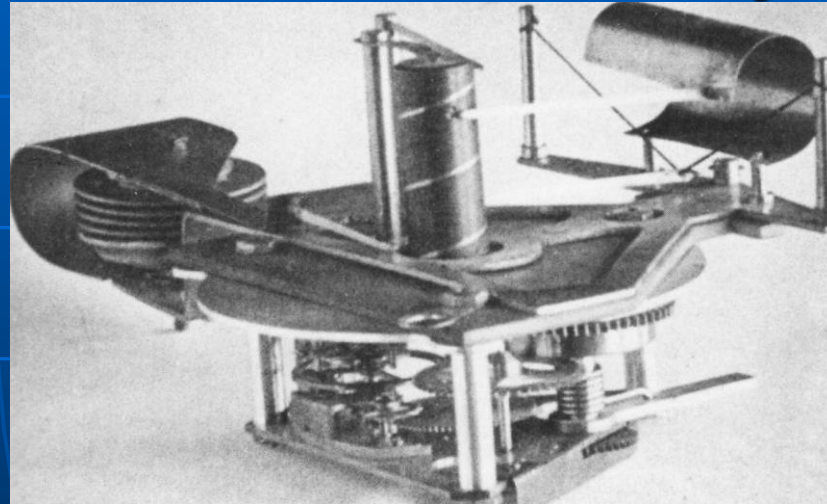
During late April or early May 1931 Dr. Charles Franklin Brooks was approached by Alexander McAdie about the possibility of taking over as Director of Blue Hill Observatory. A teaching post at Harvard was part of the discussion as well. Terms were agreed upon and after an extensive trip to many meteorological institutions in Europe during August and early September 1931 Dr. Brooks arrived at Blue Hill Observatory on 10/18/1931 as its new Director and eventually moved his growing family into the former Rotch house at the base of Blue Hill

Charles Franklin Brooks was
Director BHO from
October 1931 to May 1957

- Restored the observing program to world class status
- Founded Mt. Washington Observatory, trained the observers, and provided instruments
- Was long time Secretary and founding member of the American Meteorological Society BAMS edited and published from the West Room library at BHO – articles and submissions added to library

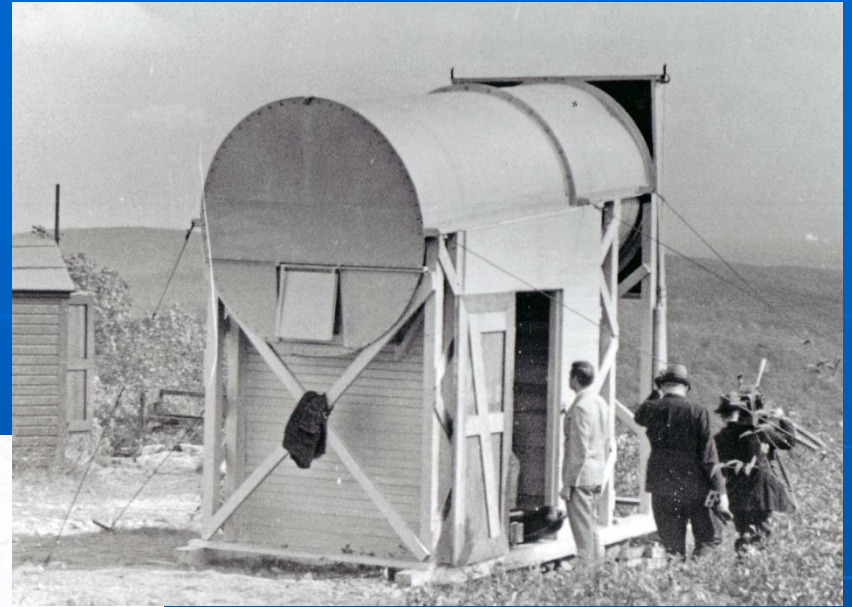


Brooks was instrumental in the development of the chronometric radiosonde used by the Weather Bureau for several years



Model F Radio-Meteorograph
Developed at BHO

1935 first successful radio-meteorograph transmission from a free balloon was made.



1936-balloon launcher was completed



THE BLUE HILL METEOROLOGICAL OBSERVATORY OF HARVARD UNIVERSITY, MILTON, MASSACHUSETTS

CFB and his Rangefinders



Dr. Brooks in his famous fur hat

CFB passport 1931



CFB pointing out solar equipment at BHO



Dr. Brooks at his desk BHO



Dr. Brooks Daily Schedule and his "Hands On" Leadership style

CFB															MAR 9 1940	
TEAM	ES	CLIM	MISC	CONFER	DIR	SPEC	RES	RESEARCH	RESEARCH	KOL	A	MISC	MISC	SEMI	S	TOTAL
	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A	17A	18A	19A	20A	21A	22A
S	8-830	830-855	855-945	945-10	10-1030	1030-11	11-12	1240-130		130-1330		1330-1240	1240-730	730-1-245		9 1/2
M	8-830	830-855	855-945	945-10	10-1030	1030-11	11-12	1240-130	40	130-455	455-730	730-10				8 1/4
T	8-830	830-855	855-945	945-10	10-1030	1030-11	11-12	1240-130	40	130-455	455-730	730-10				7 3/4
W	8-830	830-855	855-945	945-10	10-1030	1030-11	11-12	1240-130	40	130-455	455-730	730-10				6 1/2
T	8-830	830-855	855-945	945-10	10-1030	1030-11	11-12	1240-130	40	130-455	455-730	730-10				7 1/4
F	8-830	830-855	855-945	945-10	10-1030	1030-11	11-12	1240-130	40	130-455	455-730	730-10				6 1/2
S	8-830	830-855	855-945	945-10	10-1030	1030-11	11-12	1240-130	40	130-455	455-730	730-10				44 1/2
6 1/4 1 3/4 2 1/2 3 6 2 1/4 9 1/2 1/2 3 5 1/2 4 2 4 1/4																44 1/2

4/18	MON	TUES	WED	THUR	FRI	SAT
9	M I S C E L L A N E O U S ⑥					
10	C O R R E S P O N D E N C E ⑥					
11	W E A T H E R R E C O R D S ; R E S E A R C H D I R E C T I O N ⑥					
12	L U N C H					
1	R E A D I N G ⑥					
2	W E E K L Y C L E A N - U P ⑫					
3	L U N C H					
4	T H E M A J O R R E S E A R C H AT T H E T I M E ⑫					
5	M E T E O R O L O G Y S E M I N A R ①					



50th Anniversary BHO

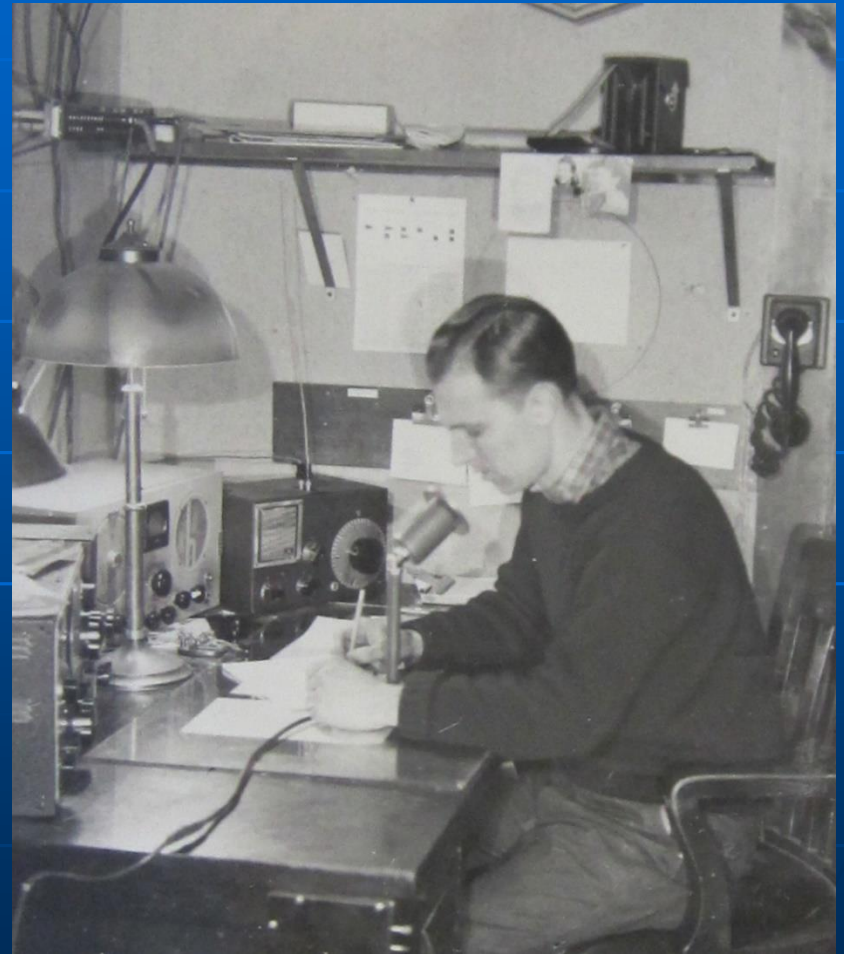
February 1935



Dr. Brooks as Director of both Blue Hill and Mount Washington Observatories



Daily Radio contact between BHO and MWO



The Big Wind at MWO – April 12, 1934 Clocked at 231mph

CF Brooks article

MWO special heated anemometer

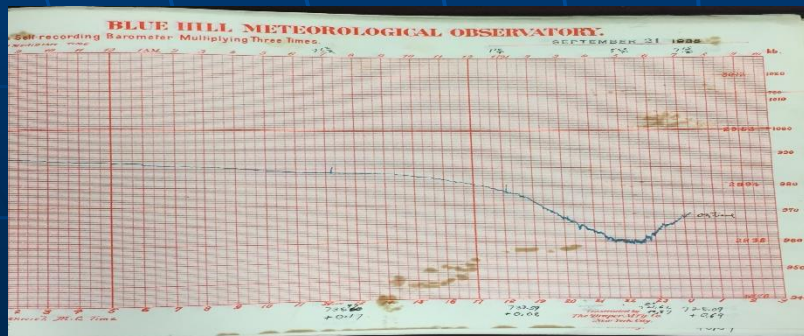
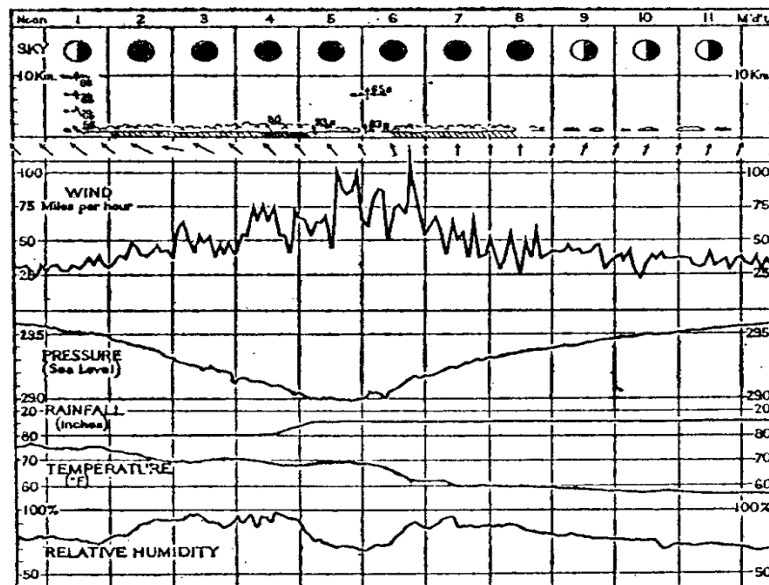


'38 Hurricane Sept. 21, 1938 -

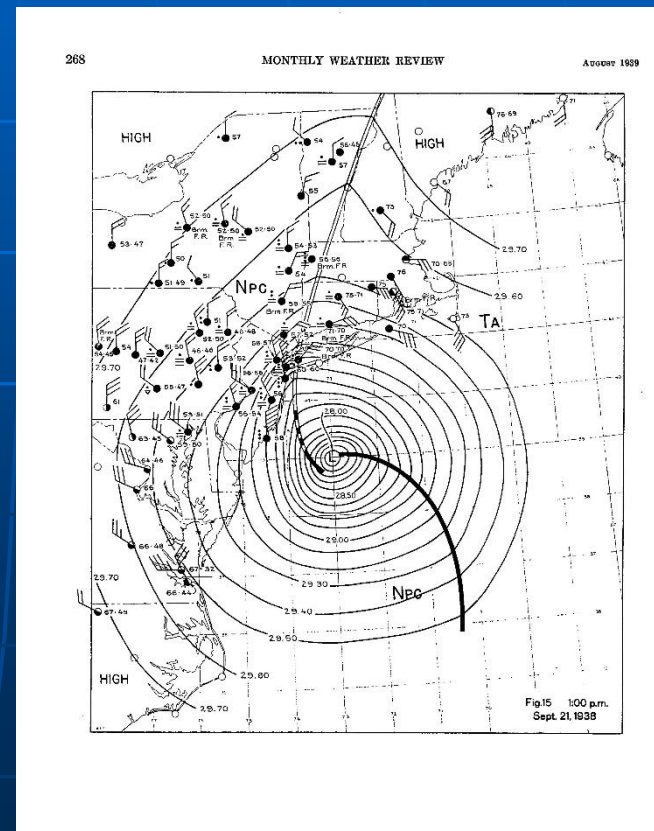
correctly forecasted by Dr. Brooks using the nephroscope late AM on the 21st His forecast sent to Harvard University

From CF Brooks article on the storm –
sequence of weather at BHO on 9/21/38

WEATHER SEQUENCE AT BLUE HILL



Charles Pierce's maps from his classic article
*The Extratropical Transition of the 1938
Hurricane in the MWR 1939*

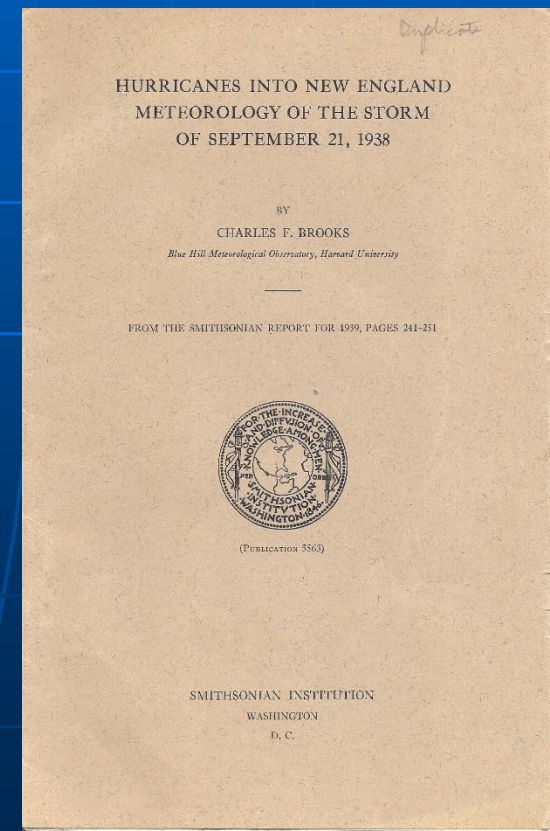


Damage from the “38 Hurricane

Dr. Brook's house at the base of Blue Hill Frana Brooks noting 'no cars today to look both ways for'



Ernest Clowes wrote a very detailed account of the storm in Bridgehampton, NY which CFB included in his paper on storm



Dr. Brooks was first to report the occurrence of a tornado in Eastern Massachusetts June 9 1953

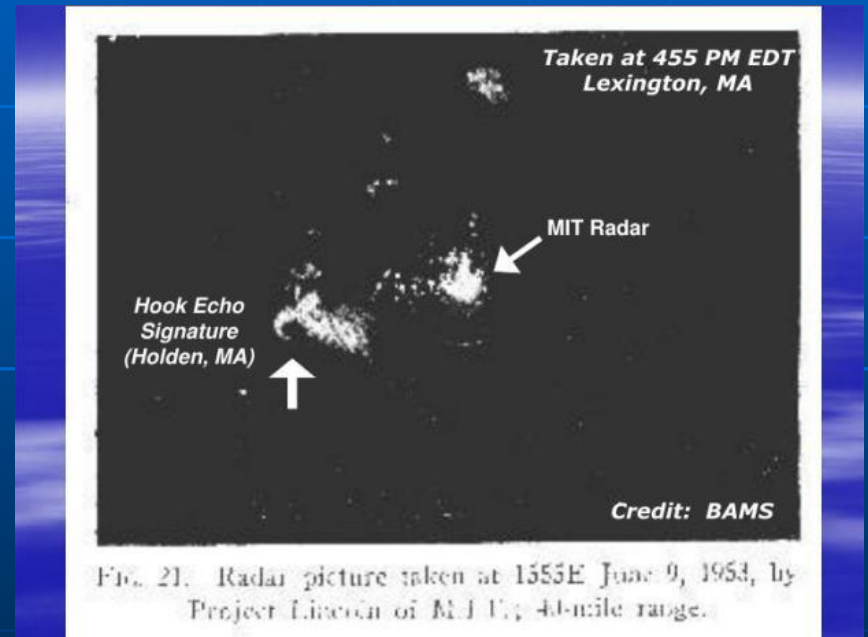
- The tornado had touched down in Petersham and moved eastward with the heaviest damage in Worcester – 93 lives were lost
- Other smaller tornadoes were reported near Exeter NH and Norfolk MA
- As the squall line passed east of BHO over 300 flashes of lightning/min noted

Worcester Tornado

Photo Worcester Tornado

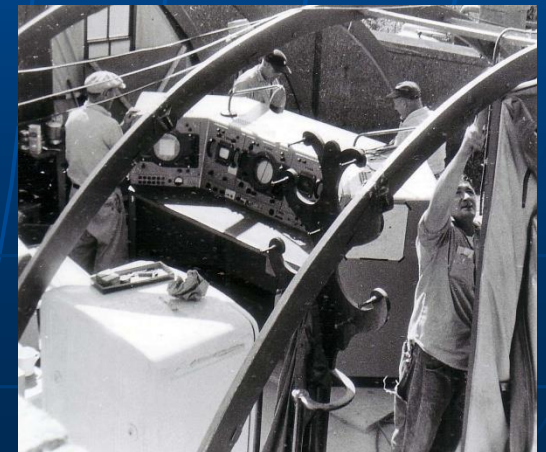


One of the first radar images of a Tornado from MIT





1954- Weather radar installed on
Great Blue Dr. David Atlas
arrives at BHO
with the
Air Force



Radars & Crew at BHO1957 –

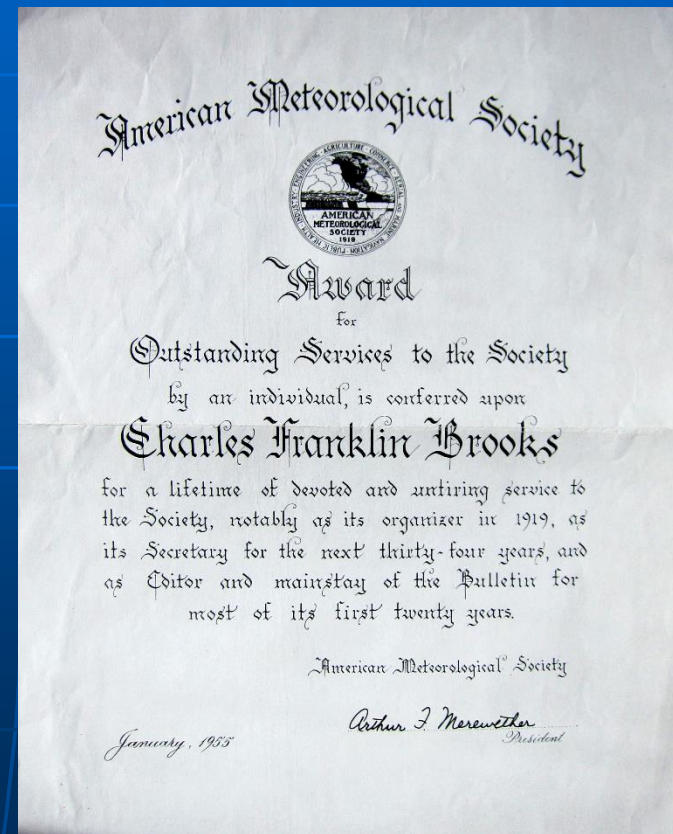
Dr.David Atlas second row L credit Jim Metcalf



Dr. Brooks and the AMS

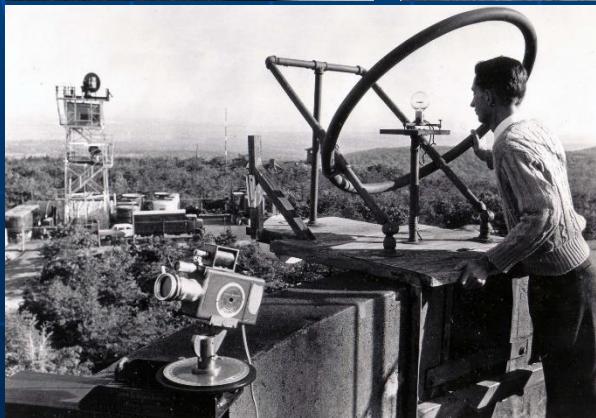
The 120th National Meeting of the AMS — Ken Spengler, Henry DeC Ward Prof Byers Prof Brooks/ Speech at AMS Mtg. Below Dr Brooks at the International Cloud Atlas Mtg.

AMS Award for Dr. Brooks – 1955 — he had seen the society grow under his tenure as Secretary from several hundred to many thousands of members from around the globe



Blue Hill Observatory Staff

1950's = John Conover (below) observing sunshine instrumentation with movie camera used to take time lapse cloud photographs Weather Radar in background The Observatory was a beehive of activity just as Dr. Brooks was nearing retirement



Edith Brooks as observer at BHO and letter to her Dad on his retirement



From awed visitor to Mr. Wells, expert reprint stuffer, incurable signer of the visitors book, and ofttime carrier of the afternoon mail for the Hill, I was promoted to the exalted post of observer because there was absolutely no one else available at the time. I believe that I was the most unqualified observer in the history of Blue Hill Observatory. Cloud observations panicked me, instruments refused to be read easily, how far could I see, were the leaves just wiggling or was the wind moving branches too, and for goodness sake how can you figure how much of the sky is covered? After one week I was happy to relinquish the post and thereafter was content with odd jobs of a less perplexing nature from time to time. The happiest aspect of my long association with BHO was that Dr. Brooks was "Popper"--always there to give help, advice, and moral support when needed. May the mountainous piles of unanswered letters subside as retirement approaches.

Thy loving daughter, Edith

Some of Dr. Brook's Accomplishments while at Blue Hill Observatory

- Help found the Mount Washington Observatory in 1932 – serving as President and advocate
- Authored or co authored many of his 450 publications while at BHO
- Continued his work with the AMS – seeing the Society establish headquarters in Boston and hire an Exec Director – Mr. Ken Spengler
- Helped the WMO with the International Cloud Atlas
- Expanded and republished his *Why the Weather* (1921) book in 1935 – a compilation of previous articles
- Gave great support to the establishment of public radio station WGBH whose first transmitter was in the basement of the Observatory “GBH” call letters referring to Great Blue Hill – did radio show on weather
- Was a great mentor for generations of students and graduate students and young meteorologists

Dr. Charles Franklin Brooks at his retirement party May 26, 1957 with his wife Eleanor





Dr. Brooks photographed his last snowstorm January 8, 1958 He died sweeping the heavy wet snow off his flowering bushes at his home – 1793 Canton Ave Milton

HARVARD UNIVERSITY
BLUE HILL METEOROLOGICAL OBSERVATORY

MILTON, MASSACHUSETTS
JANUARY 10, 1958

SIR:

With great regret I inform you of the death of

CHARLES FRANKLIN BROOKS

Professor of Meteorology, *Emeritus*, and former director of the Blue Hill Meteorological Observatory, which occurred January 8, 1958, at the age of 66.

Respectfully yours,

JOHN H. CONOVER
Acting Director

1959- U.S. Weather Bureau takes over climatological observations



100th Anniversary BHO



Blue Hill Observatory

Our Mission

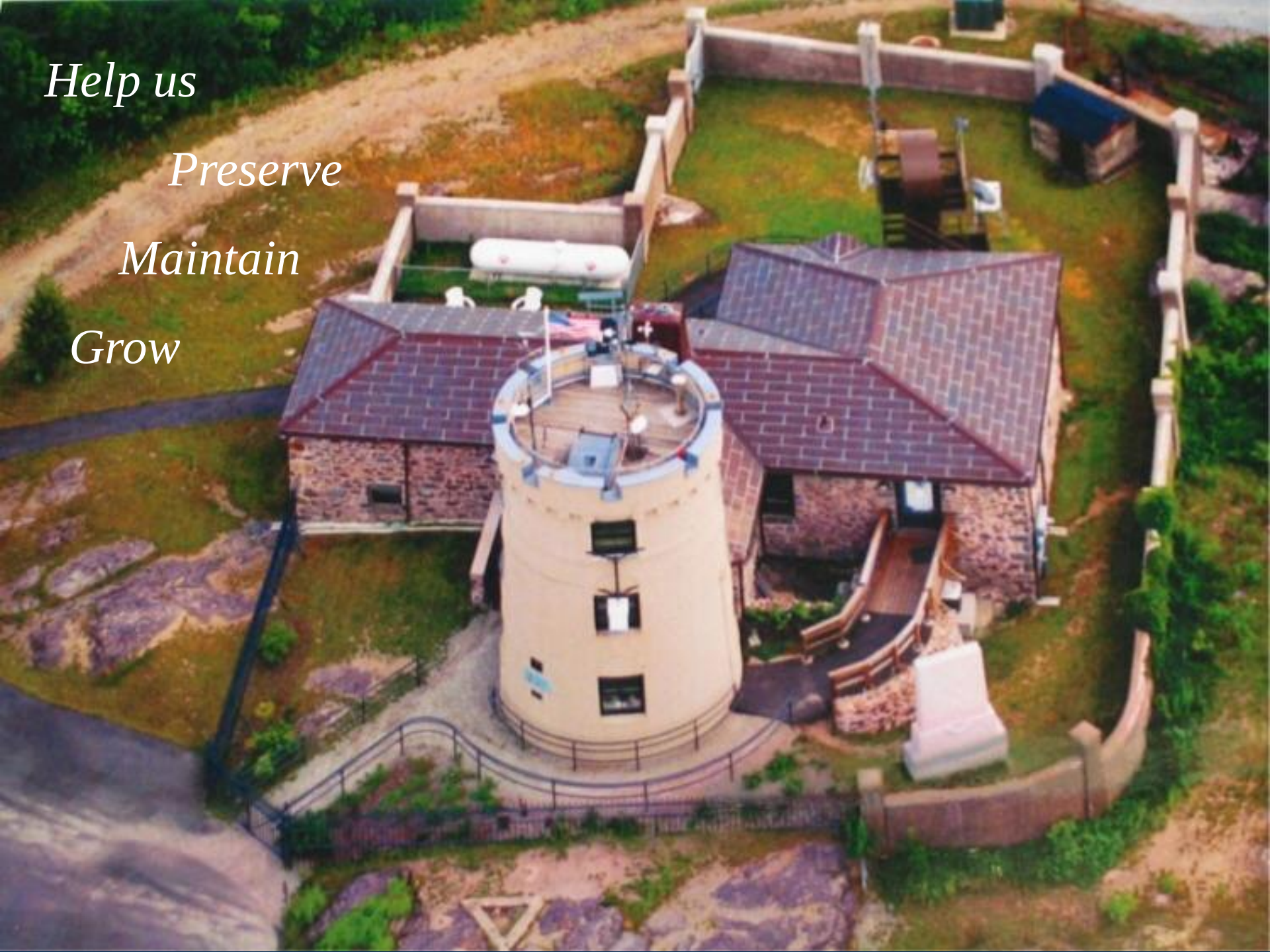
The mission of the Blue Hill Observatory and Science Center is to foster public understanding of and appreciation for atmospheric science, while continuing to maintain a meticulous record of weather observations and long-term study of climate.

Help us

Preserve

Maintain

Grow



The Future at BHO – a legacy of Professors Rotch and CF Brooks

I am a freshman studying meteorology at SUNY

Oswego and I have been an intern and a weather observer at Blue Hill for about one year.

I have gained real working experience in the field of weather at Blue Hill. I love being able to collect data and observe the skies, and get to learn new things about the atmosphere every day. Working there has shown me that a career in weather is what I really want and I cannot wait to go back to BHO over my breaks.

-Lizzy Suziedell



Questions?

