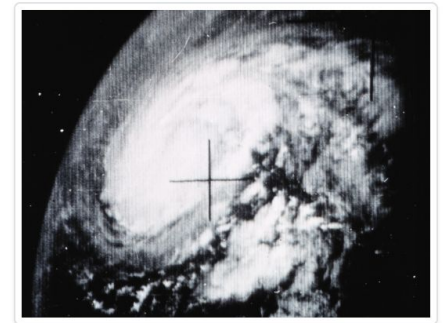




**NATIONAL WEATHER SERVICE**  
*Protecting Lives and Property for 150 Years*

# Crossroads in Wx History: Becoming a Weather-Ready Nation

■ **Dr. Louis W. Uccellini, Director, National Weather Service**  
**NWS Partners Meeting, January 16, 2020**



# 150 Years...

- Saving Lives ...
- Protecting Property ...
- Enhancing the Nation's Economy



*Our partnership isn't something that just happened in the last few decades, it's been a recurring theme since the beginning...*



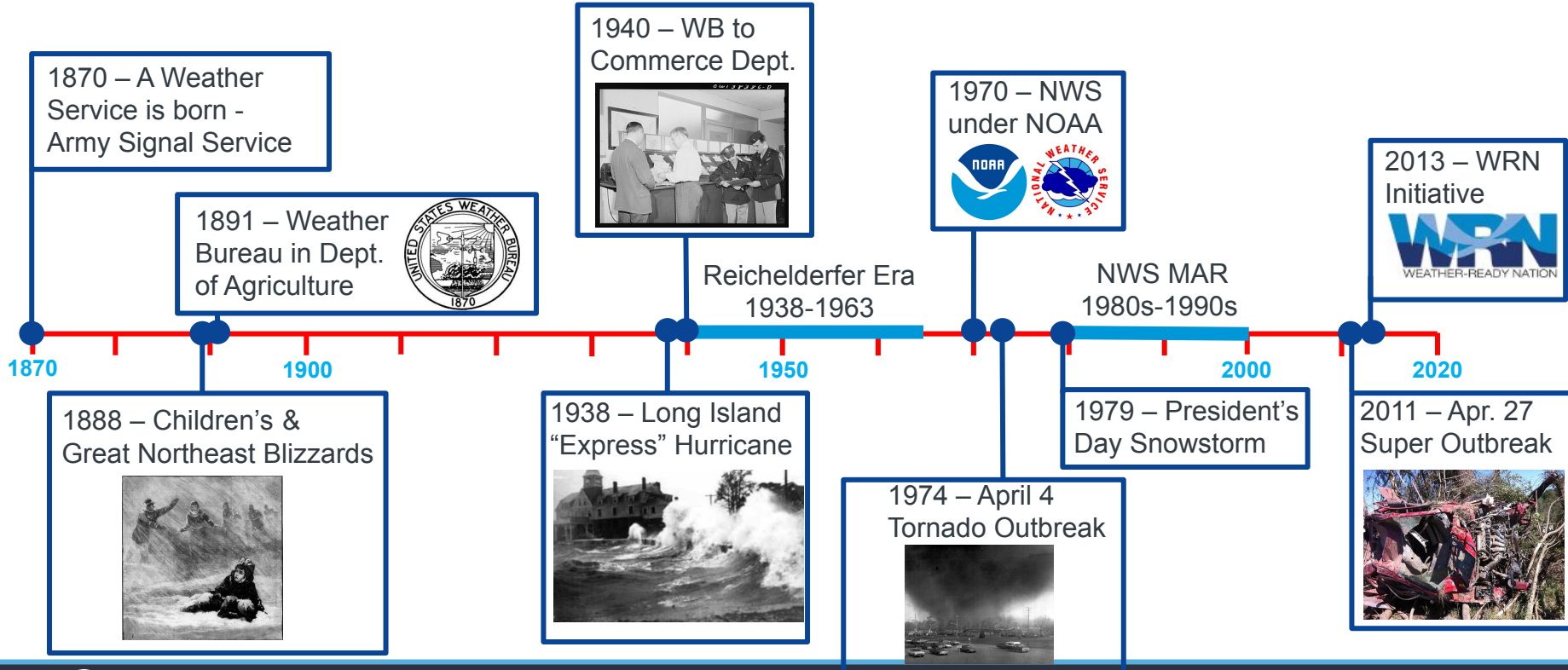
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Building a Weather-Ready Nation // 2

# NWS Heritage

## Protecting Life & Property for 150 Years



# Increase A. Lapham...for the public good

We propose, in this article to suggest a few reasons why it would have been wisdom and good policy in the Legislature to have adopted the measure proposed, and we cannot do better than to commence by making the following quotation from a report of Elias Loomis of the University of the city of New York, showing of the advantages that may be expected to arise from the study of meteorology,--

"Very little argument is needed to prove that our comfort and convenience and not infrequently our lives and property are dependent upon meteorological phenomena.\* \* \* \*

"But how can the study of meteorology benefit the sailor? Will it enable him to calm the tempest or subdue the raging sea?"

*Most a school*

*"Very little argument is needed to prove that our comfort and convenience and not infrequently our lives and property are dependent upon meteorological phenomena." - Increase A. Lapham*

Article by Increase A. Lapham for Northwestern Journal of Science and Education, 1850

Source: Wisconsin Hist. Society



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# Cleveland Abbe - "a highly important enterprise"

FEBRUARY, 1931

MONTHLY WEATHER REVIEW

ped by the daily recurring duties of my position that all correspondence has been postponed now for the past five months.

I shall surely make an appropriate return for your very highly valued photograph as soon as I have some of my own taken.

Your essay on the meteorology of the lake country was too intimately connected with my own studies not to attract my immediate attention.

Although not professing to know much of meteorology yet I have undertaken the preparation of our daily weather bulletin as a means of starting what I esteem to be a highly important enterprise.

The three months' trial are not at an end and the chamber of commerce of this city who have liberally defrayed the incidental expenses of the same are now of the opinion that it is able to sustain itself (with the support of the daily press of this city).

Negotiations are now in progress which will doubtless lead to the call of an able meteorologist to take charge of this matter and the attempt to forewarn important ports of approaching storms will be inaugurated and pushed systematically.

I hope that I shall thus in a few months be able to return to my proper study—astronomy—and to extend the labors of the observatory in that direction.

At present we are unable to do anything satisfactorily because of our ill-constructed building and exposed situation.

Your list of disasters on the Lakes is a sad picture and it should be the earnest endeavor of all scientists so to obtain that knowledge as to avert such calamities.

I return your barometric curve after having entered by date the observations made at this observatory during that time (recorded in local mean time), the comparison of the curve will have some interest to you. It is to be regretted that Thanksgiving Day somewhat interfered with the labors of myself and two faithful assistants.

With high respect I remain,

Very truly yours,

CLEVELAND ABBE.

HON. I. A. LAPHAM.

Abbe gives the following history of the Cincinnati bulletin in his annual report as director of the Cincinnati observatory, dated June 4, 1870:

had been lost or  
loss of 209 lives  
Lapham of his  
prepared a form  
terms:

Not only does it  
that of humanity if  
to prevent the fear  
such as has recent  
appalling details.

If we could have  
great storm that  
mischief would be  
rence of storms ha  
Fitz Roy, and in F  
success will appear from the following extracts:

"On the 2d of December, 1863, I received two dispatches stating

that a severe storm  
dent of the Touk

"They were publi  
vessels in the roads  
all risks. The m  
officers, who were  
storm burst forth  
noon. The first t  
day before, had the  
and everything wa  
precautions thus ta

The Genoese Jo  
telegraphed by th  
communicated to  
last instant was fu  
felt yesterday abo  
ously, but there a  
occurrence in our  
had hastened to t  
for them."

Prof. J. P. Espy,  
many others the following generalizations from the observations

*"Although not professing to know much of meteorology yet I have undertaken the preparation of our daily weather bulletin as a means of starting what I esteem to be a highly important enterprise." - Cleveland Abbe*

*"Your list of disasters on the Lakes is a sad picture and it should be the earnest endeavor of all scientists so to obtain that knowledge as to avert such calamities."  
- Cleveland Abbe*

Letter from C. Abbe to I. A. Lapham, Dec. 4, 1869 in Miller, Eric R. "New Light on the Beginnings of the Weather Bureau from the Papers of Increase A. Lapham," Monthly Weather Review, Feb. 1931, p. 66-67.

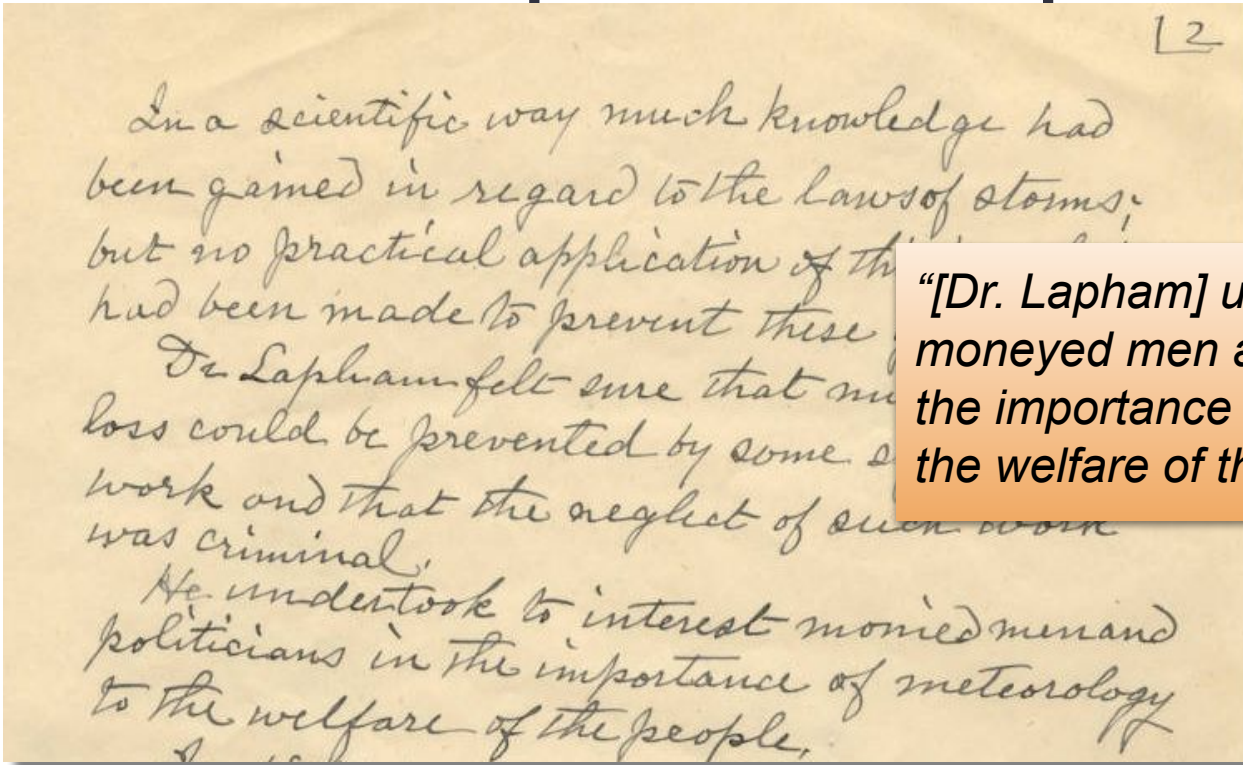


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Building a Weather-Ready Nation // 5

# Increase A. Lapham...for the public good



**"[Dr. Lapham] undertook to interest moneyed men and politicians in the importance of meteorology to the welfare of the people."**

Essay written by Julia Lapham, 1916. Source: Wisconsin Hist. Society



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Building a Weather-Ready Nation // 6

# Crossroads in Weather History:

Where Serving Public & Private Needs Intersect

Change Driven by:

- Advances in science, technology, and engineering
- National and global economic transitions
- Catalyzing extreme events



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Building a Weather-Ready Nation // 7

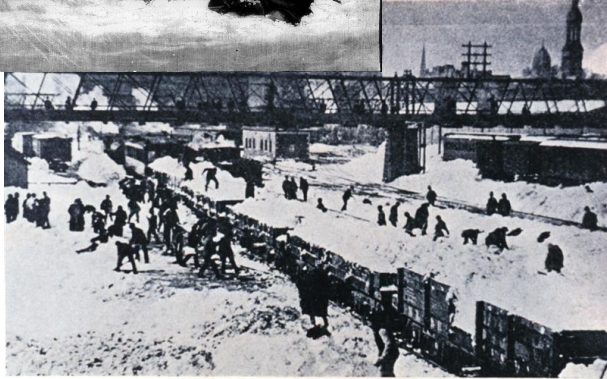
# 1888: Children's and East Coast Blizzards



- With Signal Service upheaval, a Catalyst for creating the Weather Bureau in Ag. Dept.

*“The Chief of the Weather Bureau, under the direction of the Secretary of Agriculture ... shall be charged with the forecasting of weather, the issue of storm warnings, the display of weather and flood signals for the benefit of agriculture, commerce and navigation...”*

*- SB 1451 (1890)*



45th Street and Grand Central Depot, New York, Blizzard, March 1888





# 1930s: Aviation Drives Weather Needs



- 1926 - Air Commerce Act is enacted. The Weather Bureau is assigned duty to provide aviation-related observations and forecasts.
- September 1938 - Long Island Express; not forecast to hit L.I. & New England
- December 1938 - Reichelderfer Era Begins
- 1940 - President Franklin D. Roosevelt transfers Weather Bureau to Department of Commerce.

*“[T]he navigation of the air is rapidly extending to its civil and commercial or industrial stage. Flying in ignorance or disregard of meteorological conditions and warnings is at times suicidal and destructive of costly property.”*

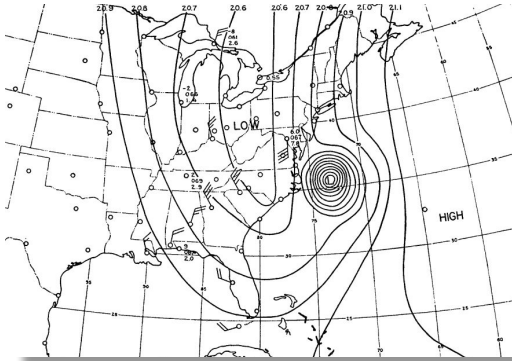
*- WB Chief Charles Marvin, 1919*



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# 1938: The L.I. Express & Rise of Dynamic Forecasting



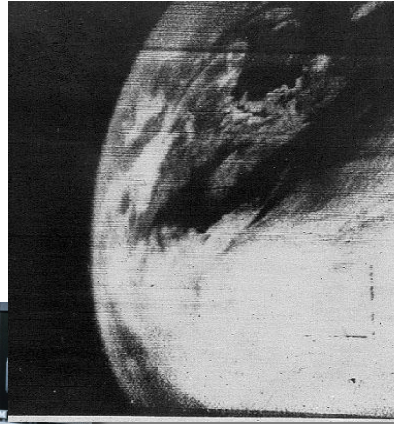
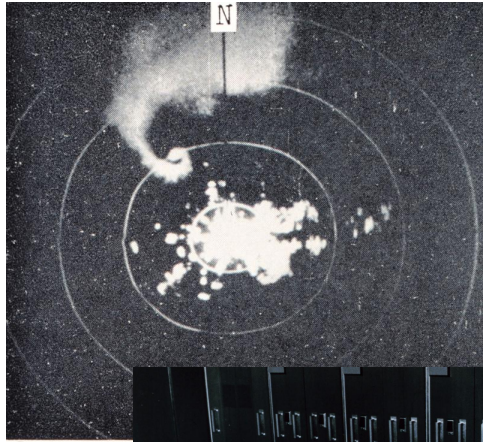
10K ft Analysis, Sep. 21, 1938 4:00 a.m



- As WB employees deal with the sudden death of Chief Willis Gregg, conflict emerges between Bergen School acolytes and traditionalists.
- The Long Island Express hits with little warning
- With support from the U.S. Navy, Carl Rossby and others, Francis Reichelderfer named Weather Bureau Chief, quickly establishing more scientific rigor.
- WB fully adopts air mass and fluid dynamics techniques.



# 1945: Post-War Tech Boom



- War's end brings expanded tech capabilities.
- Nat RAOB Network, Operational NWP, Radar Network, Satellites
- Radar, Numerical Weather Prediction, Satellites, Radio/Television enhance obs, forecasting, dissemination capabilities.
- WMO emerges; focus on international collaboration.
- New opportunities for the private sector.



# 1974: Apr. 3-4 Super-Outbreak



*An F5 tornado strikes Xenia, OH, Apr. 3, 1974*

- 150 Tornadoes across 13 states
- 6 F5, 24 F4 tornadoes
- “Indications” the night before
- Watches issued based on 1200 UTC Radiosonde obs
- Warnings issued when tornadoes spotted

## ***314 Fatalities***

Helped drive the need for a “modernized” approach to warnings based on Doppler Radar Data



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Building a Weather-Ready Nation //12

# 2011: Apr. 27-28 Super-Outbreak



*A destroyed wood frame house in Concord, AL*

- ~200 Tornadoes across 16 states
- 4 EF5, 11 EF4 tornadoes
- Outlooks issued 4-6 days in advance
- Extreme threat recognised 20 hours in advance
- Watches based on wide range of data, updated regularly
- Warnings based on Doppler radar
- ~24 min. average lead time

**316 Fatalities**



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# Building a Weather Ready Nation

## “A Vital Conversation”

December 2011 Workshop in Norman, OK

- Focus on the “last mile”: delivery of warnings
- Assess and update warning dissemination strategy
  - Integrate social and physical science
  - Is the message delivered equal to the message received?
- Impact-based Forecast and Warnings for a wide range of decision makers (from ‘organized’ to ‘loosely coupled’ to ‘individuals’)
- Improved outreach and education



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# Bringing it to Now

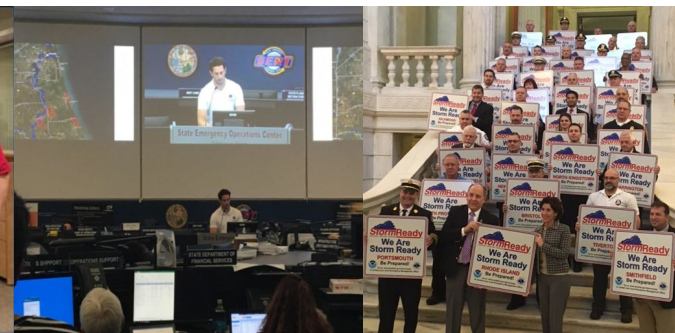
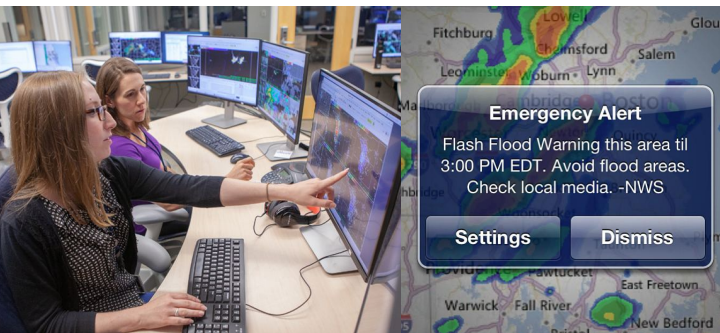
Building a  
Weather-Ready  
Nation Initiated

Weather  
Research &  
Forecasting  
Innovation Act  
of 2017 -  
Authorized IDSS  
Approach

NWS  
Evolve Effort -  
Transforming  
Toward a  
Collaborative  
Forecast

## NWS 2019-2022 Strategic Plan

- Transform way people receive & act on Info.
- Harness science & tech
- Evolve through people, partnerships & organizational performance



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# EVOLVING THE NATIONAL WEATHER SERVICE TO BUILD A WEATHER-READY NATION -

Connecting Observations, Forecasts, and Warnings to Decision-Makers through Impact-Based Decision Support Services

Authors: Louis W. Uccellini and John Ten Hoeve

Reference:  
Uccellini, L., Ten Hoeve, J. (2019). Evolving the National Weather Service to Build a Weather-Ready Nation; Connecting Observations, Forecasts, and Warnings to Decision-Makers through Impact-Based Decision Support Services. Bulletin of the American Meteorological Society, (100), 10. 1924-1942.



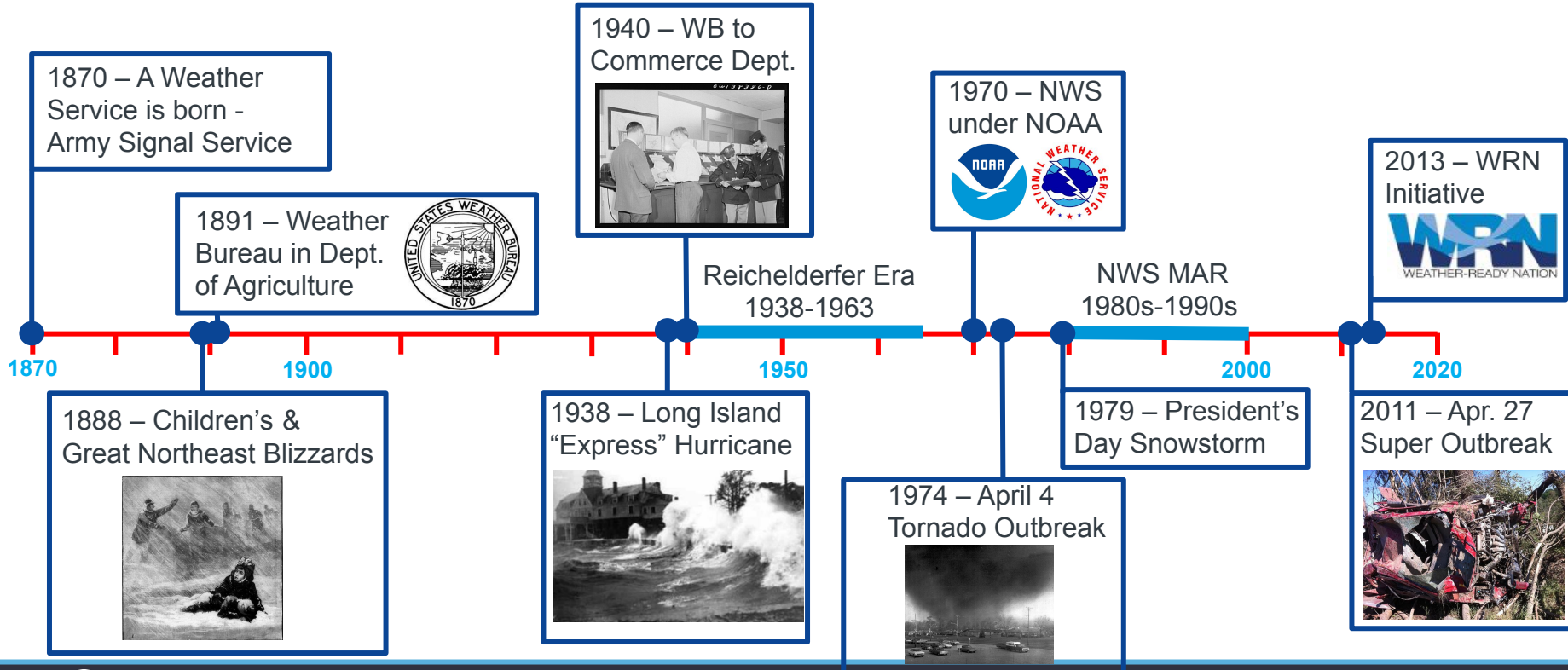
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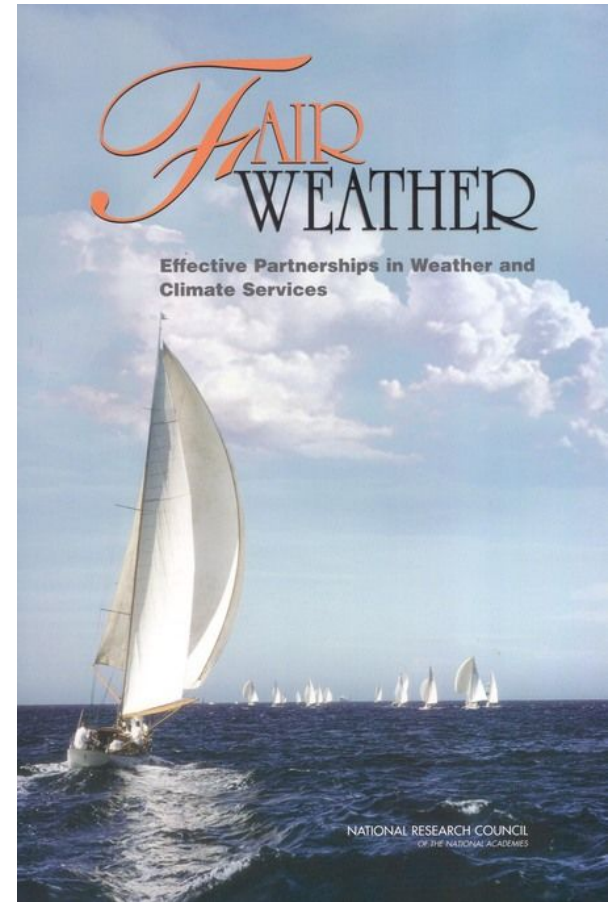
# NWS Heritage

## Protecting Life & Property for 150 Years



# Fair Weather Report (2003)

- Still Relevant Today
- AMS – New commission formed for public-private “neutral ground”
  - Today, this is the **CWWCE**
- Brought the private and public sectors together and accelerated the growth of entire Enterprise
- International community is in awe of our **public-private** community and what we do across the entire value chain to serve commerce and public safety



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# Cg-18: Geneva Declaration 2019

**1999:**

**We EXPRESS deep concern**

about the potential impacts on the provision of meteorological services worldwide **of any development which endangers** the unique and integrated international system for obtaining and exchanging meteorological and related data and products, a system which has benefited the global community for over 100 years. **These developments can adversely affect the effective and efficient provision of appropriate meteorological data, information, products and services, as well as the role and operation of National Meteorological and Hydrometeorological Services,** resulting in unfavourable impacts on national economies, the environment, the well being of peoples and the whole world community.

**2019:**

**We WELCOME**

- **The opportunities for all stakeholders** and the broader user community that will result from a closer collaboration among public, private and academic sectors;
- **The engagement of all sectors in addressing the societal needs** through weather, climate, water and other environmental information and services;
- **The contributions of Members and partner international organizations** to sustaining and developing the global meteorological infrastructure coordinated by WMO through its programmes;
- **The evolving role of WMO as a facilitator in establishing and expanding partnerships among stakeholders, from public, private and academic sectors ...**



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## Observations

- ASOS SLEP: Integration testing for new hardware and software
- Nexrad SLEP: Perform Pedestal & Generator refurbishment
- RFMP: Complete autolauncher installations in Alaska & begin site prep and installation of remaining 8 autolaunchers in CONUS
- SPADES IOR for GOES-16 and 17 space weather

## Central Processing

- Award WCOSS Follow-on Contract
- Transition 12 National Center desks into AWIPS
- Complete deployment of Hazard Services IOC to all WFOs and deploy Hydro Hazards

## Science & Tech Integration

- EPIC Support: Public release of global atmosphere FV3GFS code with community support
- Implement NBM v3.2 into operations on WCOSS



**FY2020**

**WRN Ambassador Initiative  
10,500+ Ambassadors**

## Facilities

- Complete WFO Cleveland relocation
- Complete FCA Phase IV
- Award Design/Construction Contracts for 4 relocations (Slidell, LA; Charleston, WV; Burlington, VT; Albany, NY)

## Dissemination

- Maintain NWR services at 96% availability
- Maintain IDP Operational availability at 99%
- Demonstrate development cloud environment for MRMS v12
- SPADES Phase 1 (GOES-16) on IDP

## Analyze, Forecast and Support

- SWPC designated as Global ICAO Space Weather Center
- Hazard Simplification recommendations queued for implementation decision
- Transfer of National Ice Center to Ocean Prediction Center in support of operational sea ice forecasting
- 100 New StormReady Communities recognized
- 50 new and renewed Tsunami Ready Communities recognized
- Initiate flood inundation mapping (FIM) techniques using the River Forecast Center (RFC) official forecast for Northeast River Forecast Center (NERFC) domain.



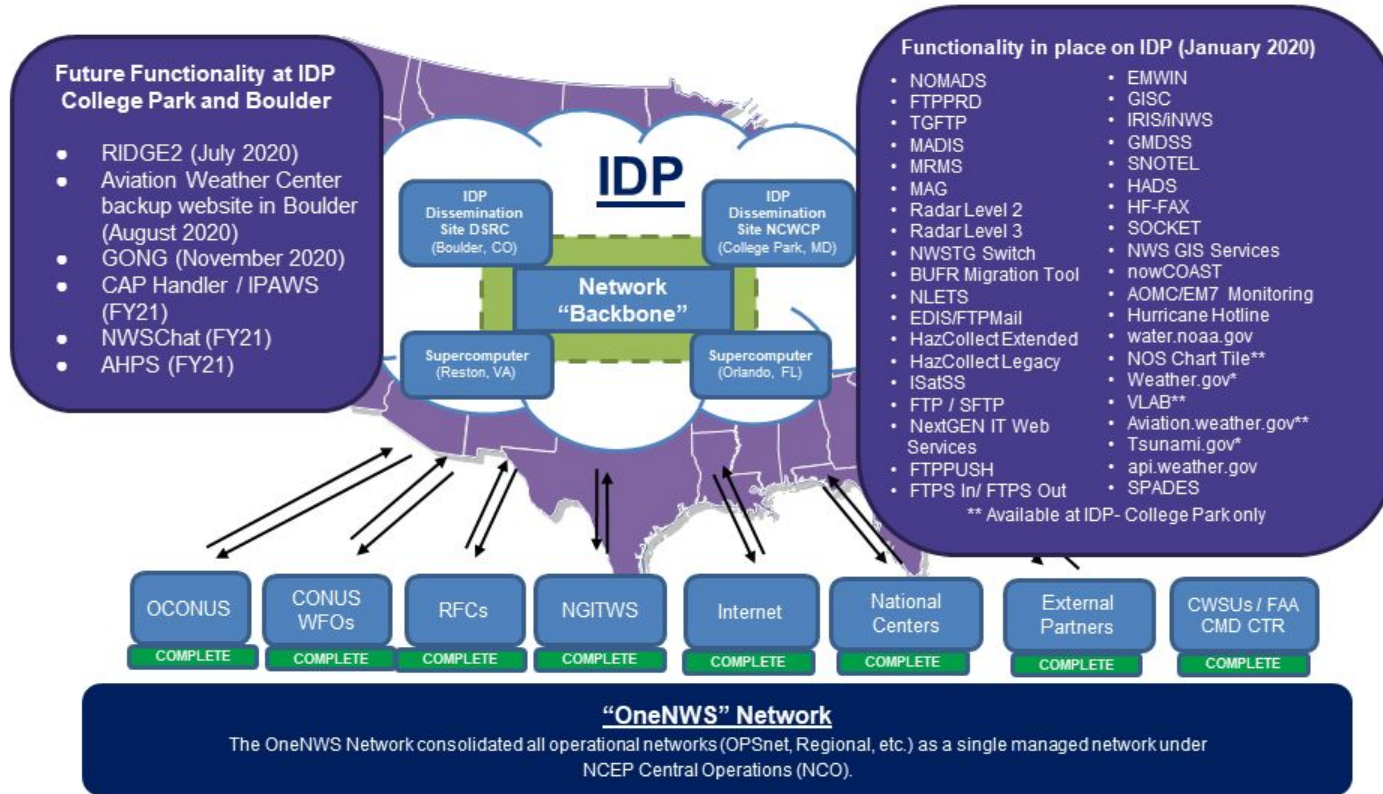
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**Building a Weather-Ready Nation /20**

# Integrated Dissemination Program (IDP)

## Long-Term Sustainable Solution



Overall Status:

Additional Operational and/or Milestone Comments:

**Dissemination**

11/21 17352-21562: Users unable to access NWSChat due to database corruption in Silver Spring. NWSChat was failed over to Kansas City to restore functionality.

**IDP Applications**

API	AWC Web	BMT	Chart Tile	EDIS	EMWIN
FTP	FTPmail	FTPPush	FTPS	GIS	GISC/OpenWIS
GMDSS	HC Extended	HC Legacy	HF Fax	Himawari	iNWS
IRIS	IsatSS	LDM	MADIS	MAG	MRMS
Network	NIDS (IDP)	NLETS	NOMADS	nowCOAST	OWP
Radar 2	Radar 3	Sockets	SPADES	TGFTP	Trouble Tickets
VLAB					

**Non-IDP Applications**

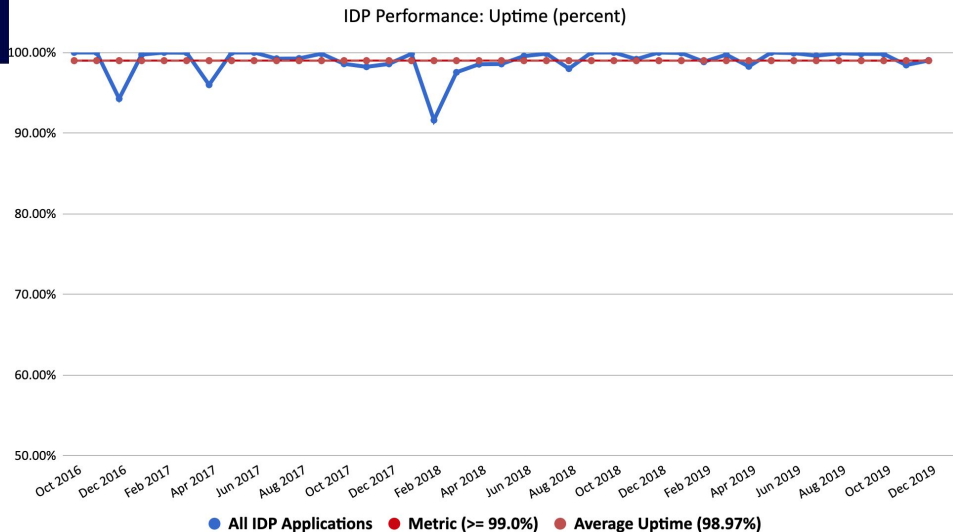
AHPS	NDFD	NIDS (Non-IDP)	NWSChat	Other	SPOT
Weather Wire - OI					

Color-Code Key:

- Milestone Achieved
- Fully Capable
- Degraded Capability
- No Capability

# Monitoring Systems Daily

# Tracking Reliability



# Where We're Headed

- Advancing IDSS across all services
- Improving both physical and social sciences
- Strengthening public-private partnerships
- EPIC
- NWS 150th Anniversary on February 9th



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# Thank you!

