Meteorology/Atmospheric Science Family Tree: An Update at Age 13

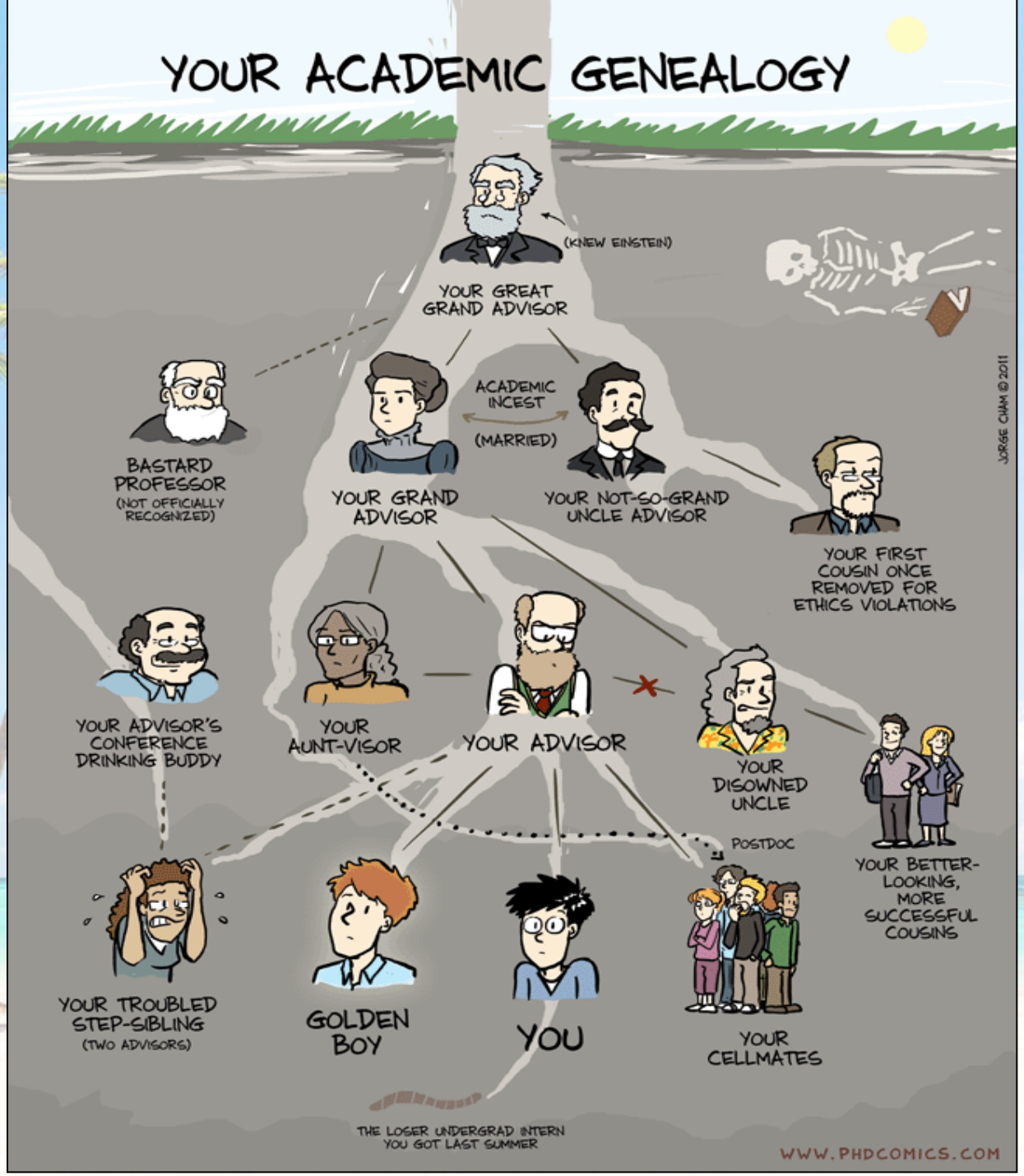
Robert Hart, Florida State University

Josh Cossuth, Office of Naval Research

Greg McFarquhar, University of Oklahoma

January 13, 2025

AMS Annual Meeting, New Orleans, LA



Phdcomics.com;
"Piled Higher and Deeper"

(used with permission, Jorge Cham)

The Meteorology Family Tree Inception

- Documentation of the genealogy of a field has already been done by some (e.g. Mathematics: http://genealogy.math.ndsu.nodak.edu)

- Applying this to the meteorology community has apparently been talked about for a while, but was overwhelming both in terms of motivation and technology at the time.

- However, at IWTC La Réunion (Nov. 2010) Hart and Cossuth proposed beginning the task leading to a presentation of the tree for the 2012 AMS Tropical Meteorology Conference in Ponte Vedra, FL.

A provocative response to the idea

"Academic family trees are unusual in that only progeny who become academics are able to reproduce. It would seem that it is actually impossible to produce a bastard academic heir, though in point of fact I know several individuals worthy of that title."

A provocative response to the idea

"Academic family trees are unusual in that only progeny who become academics are able to reproduce. It would seem that it is actually impossible to produce a bastard academic heir, though in point of fact I know several individuals worthy of that title."

--- Name redacted.

Initial Data Collection

- Emails soliciting member information to metfamilytree@gmail.com were sent to three meteorology mailing/discussion lists:
  - Tropical-storms List (hosted by Colorado State Univ.)
  - Map List (hosted by Univ. at Albany)
  - AMS 2012 Tropical Conference Attendee List

- Method: Excel (!) used to store database, which is converted for Graphviz software format with a complex script, and then displayed using Graphviz (specifically, the DOT command).

- The family tree was first presented at the 30th AMS Trop. Meteor. Conference in 2012 in Ponte Vedra, FL.

30th AMS Tropical Meteorology Conference (2012)



Photo courtesy: E. Zipser and D. Klotter; *Hart and Cossuth 2013 (BAMS)*

Unique Responses

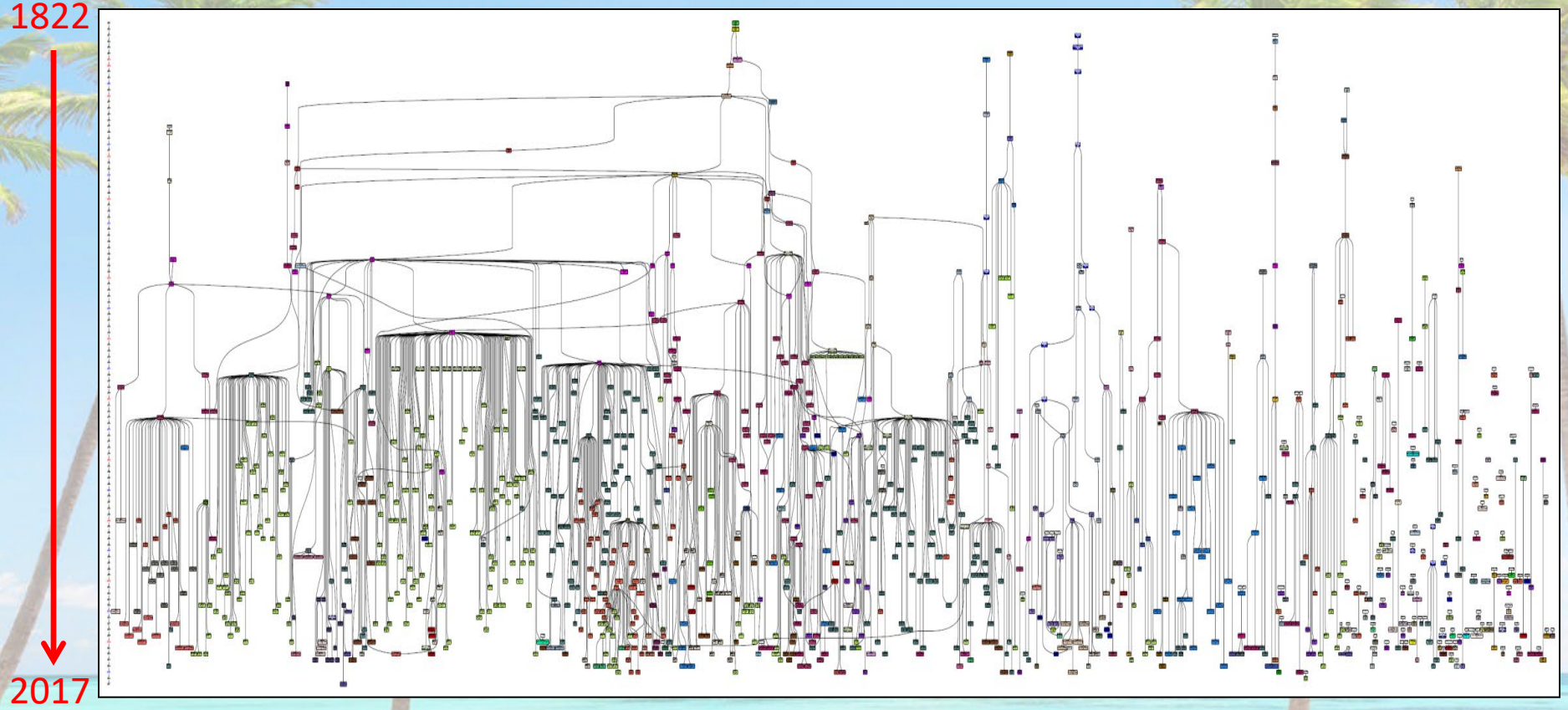
- *"Looking at it as an abstract work of art, I was struck by how beautiful it is--like some sort of exotic Biblical temple or futuristic edifice in an unknown civilization."*

  Jeff Rosenfeld

- *"The analogies between this tree and genealogical trees kept me thinking about whether the former has examples of the latter for such possibilities as offshoots, grafts, adoptions and…artificial insemination. For the subject at hand, I suppose we meteorologists are "mutations" from the Math, Physics, etc. tree; at least the mathematicians, physicists, etc. seem to think of us as so. We'd probably attribute it to evolution."*

  Ed Rappaport

The thumbnail version in 2012



1166 scientists among 129 schools

Actual size when printed: 16.7 feet by 7 feet

Expanded tree: 2013 AMS Annual (Austin)



Photo courtesy: R. Hart; *Hart and Cossuth 2013 (BAMS)*

Cloud Physics Branch: 2024 ICCP (Jeju)



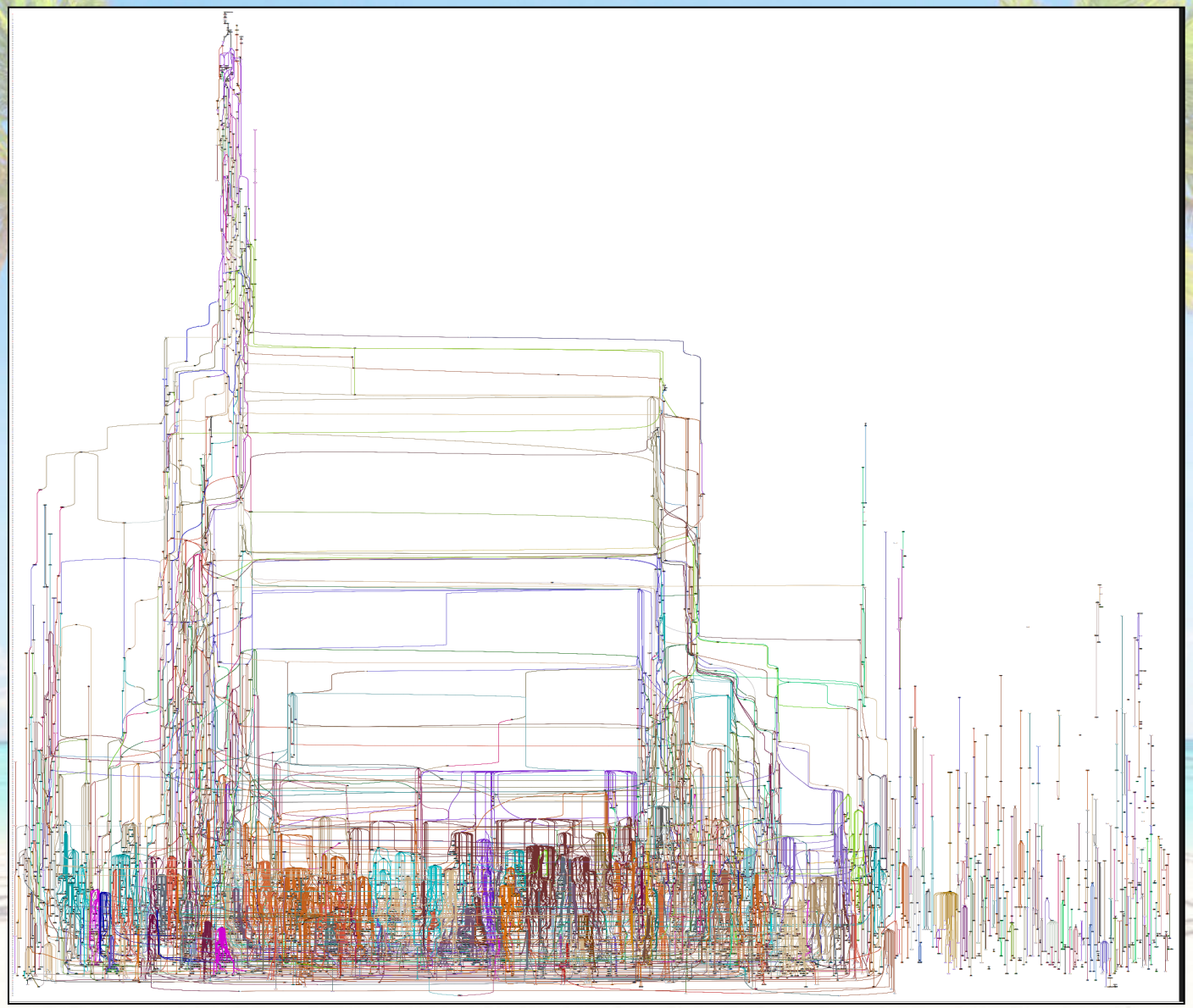
Photo source: http://iccp2024.kr

2025 Full Tree of ~6400 entries and ~500 institutions

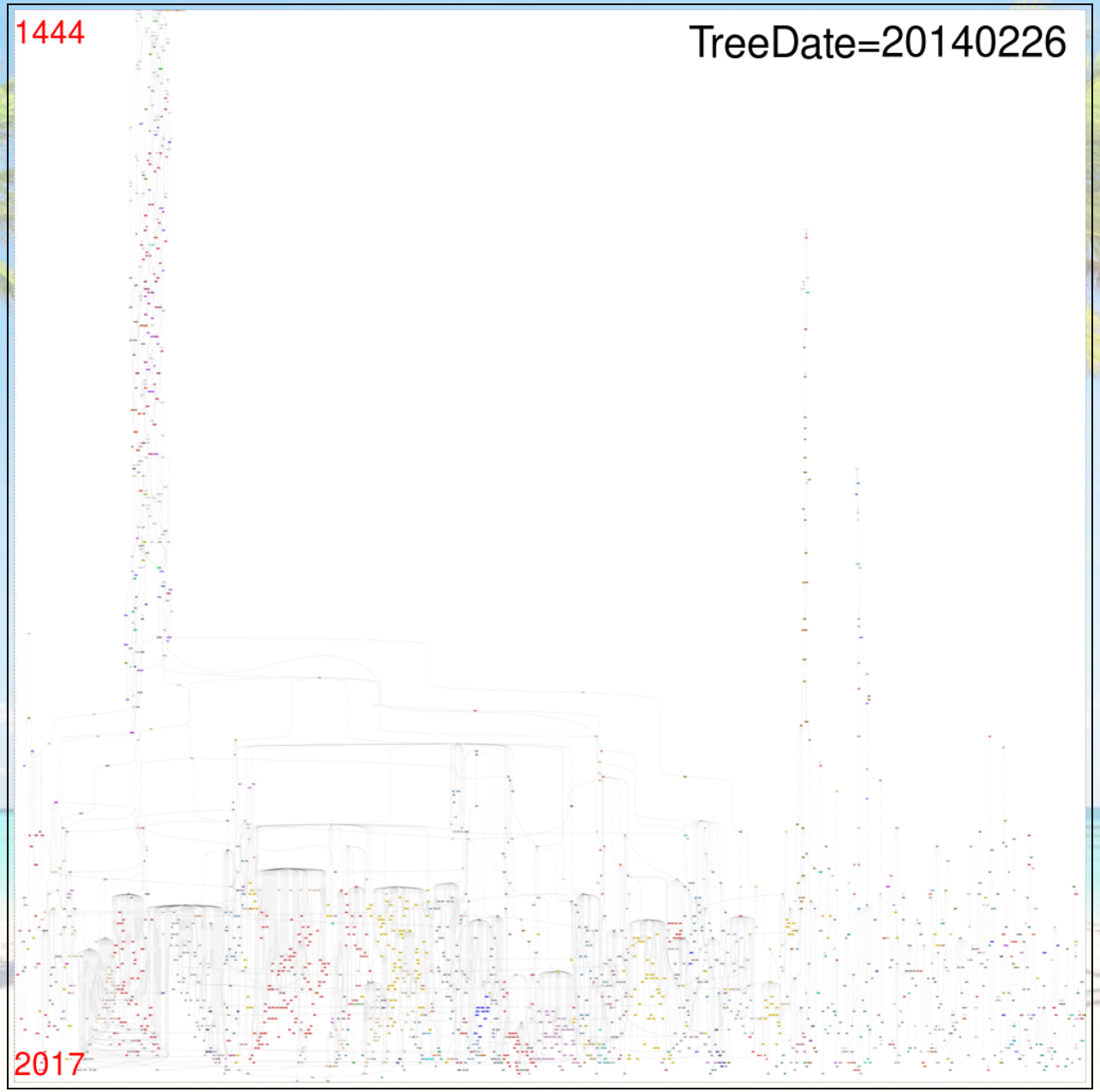
1170

YEAR

2027



2014-2025 Animation of Evolving Tree Structure



Disciplinary Roots of Tree

- 1100s-1400s: Religion, "Medicine", Philosophy, Astrology
- Late 1400s-early 1800s: Mathematics
- 1800s-early 1900s: Astronomy, Geography, Mathematics, & Physics
- Early 1900s-mid 1900s: Physics including nuclear
- Mid 1900s onward: Physics, Statistics, and Atmospheric Science

Some famous “non-meteorology” deceased members…

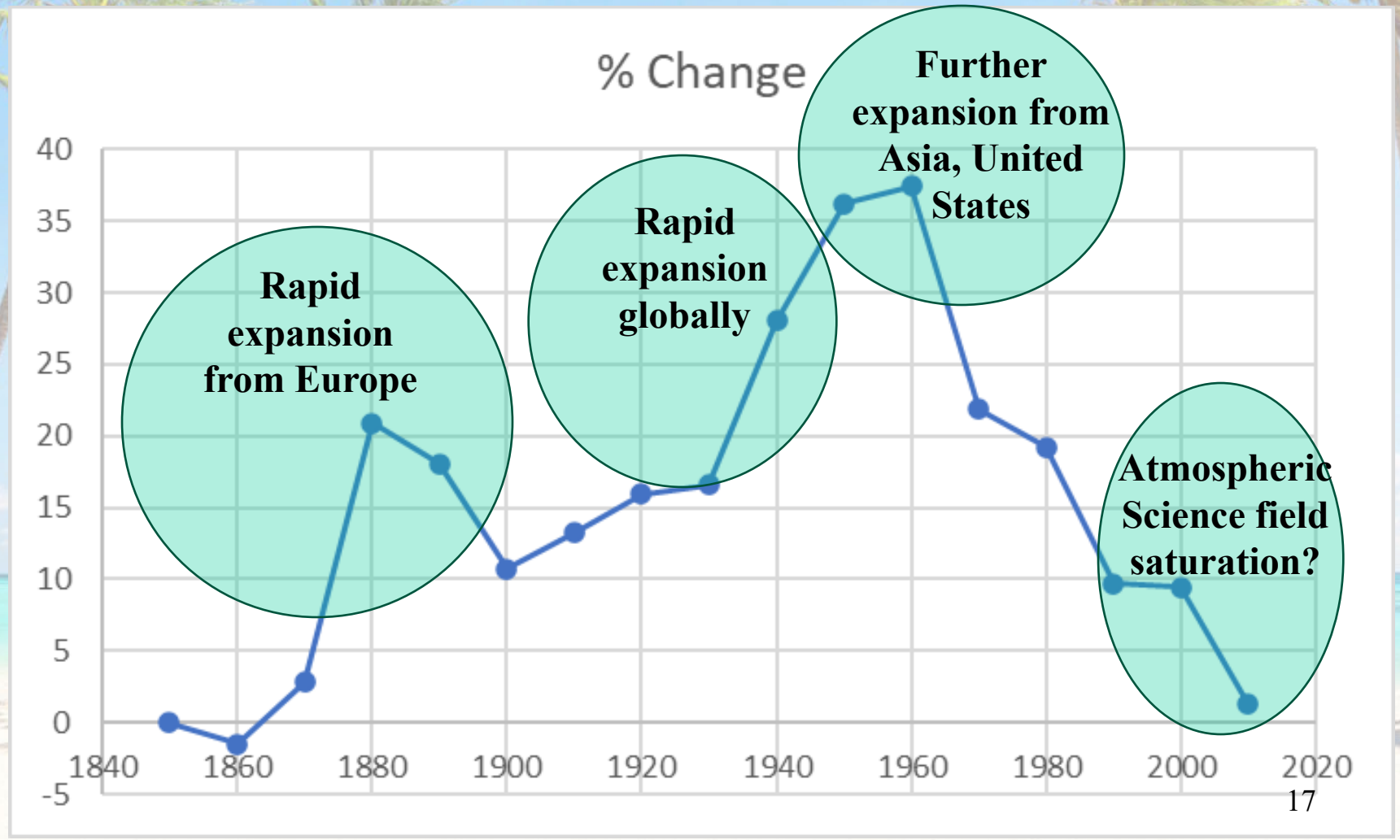
1471	Leonardo da Vinci
1499	Nicolaus Copernicus
1585	Galileo Galilei
1666	Gottfried Wilhelm Leibniz
1668	Isaac Newton
1678	Edmond Halley
1726	Leonhard Euler
1743	Benjamin Franklin
1754	Joseph Louis Lagrange
1767	Pierre-Simon Laplace
1795	Jean-Baptiste Fourier
1842	Hermann von Helmholtz
1866	Ludwig Boltzmann
1867	Joseph Boussinesq
1868	Lord Rayleigh
1868	Julius von Hann

Some famous “non-meteorology” deceased members…

1883	J. J. Thompson
1894	Ernest Rutherford
1906	Max Born
1908	Theodore von Karman
1911	Niels Bohr
1915	G. I. Taylor
1922	Enrico Fermi
1923	Werner Heisenberg
1926	Paul Dirac
1927	J. Robert Oppenheimer
1942	Richard Feynman
1948	Arthur C. Clarke
1952	Benoit Mandelbrot
1960	Carl Sagan

Tree Entries Count Derivative by Decade:

Decadal change in percent to identify diversification globally and tree roots



Consider adding yourself to the tree if not in it.

Meteorology / Atmospheric Sci

moe.met.fsu.edu/familytree/



Meteorology / Atmos. Science Academic Family Tree

Robert Hart[1] and Josh Cossuth[2]
[1]Department of Earth, Ocean, and Atmospheric Science, FSU
[2]Office of Naval Research



Photos above (L-R): C. Rossby, H. Riehl, J. Simpson, J. Charney, P. Austin, S. Syono, Sir B. J. Mason, V. Bjerknes

[Home | Help/FAQ | Latest Updates | Full Name List | Most Wanted | Individual Trees | Quotes & Stories | Add Yourself/Someone Else | Acknowledgments]

Tree versions and updates:

Version	Format & Link (SVG is best for browsers)	Date of Update	Viewing Size (inches)	Scope	Number of entries
20241210-all-large	PDF SVG	10 December 2024	400x400	All Origins "Meteorology"	6387
20241210-all	PDF SVG	10 December 2024	200x200	All Origins "Meteorology"	6387
20240614-allcloudphysics	PDF SVG	14 June 2024	200x200	All Origins "CloudPhysics"	1610
20241210-post1800	PDF SVG	10 December 2024	200x100	Post-1800 "Meteorology"	5923
20240614-post1800cloudphysics	PDF SVG	14 June 2024	200x100	Post-1800 "CloudPhysics"	1136
20130213-post1800	PDF	13 February 2013	200x50	Post-1800 "Tropical Met."	1143

We strongly recommend the SVG versions for browsing/viewing/name searching.
Please read the important help/notes at the "Help/FAQ" link above before downloading the documents.

Latest Improvements:

30 June 2018:
If you view the SVG files in most web browsers, the names of a connection ("parent->student") will pop up as text when you move the mouse over the connection. *You may have to try a few locations on the path for the text to appear, and the browser response appears more reliable in Firefox than Chrome.* These pop-ups will help you navigate lineage backwards in time of an individual.

1 May 2018:

http://moe.met.fsu.edu/familytree

Future “Plans”

- Beyond further expansion, and the unending task of filling gaps so there are fewer “orphans”, who will be maintaining the tree 25 or 50 years from now? AMS? AI on its own will take over?

- Quantify the impact of adding or removing a key person to the larger visual structure of the tree (alluded to in the prior animation)?

- Convert database to be more modern and powerful (e.g., MySQL?)

- Using AI/ML to extract unseen patterns & relationships from the tree.

- Will require AMS/QJ/etc. help: Tagging each person with keywords from their publication history to “trace” ideas to their origins and visualize and quantify their spread through the history of scientific understanding. For example, the origins of PV and its spread....

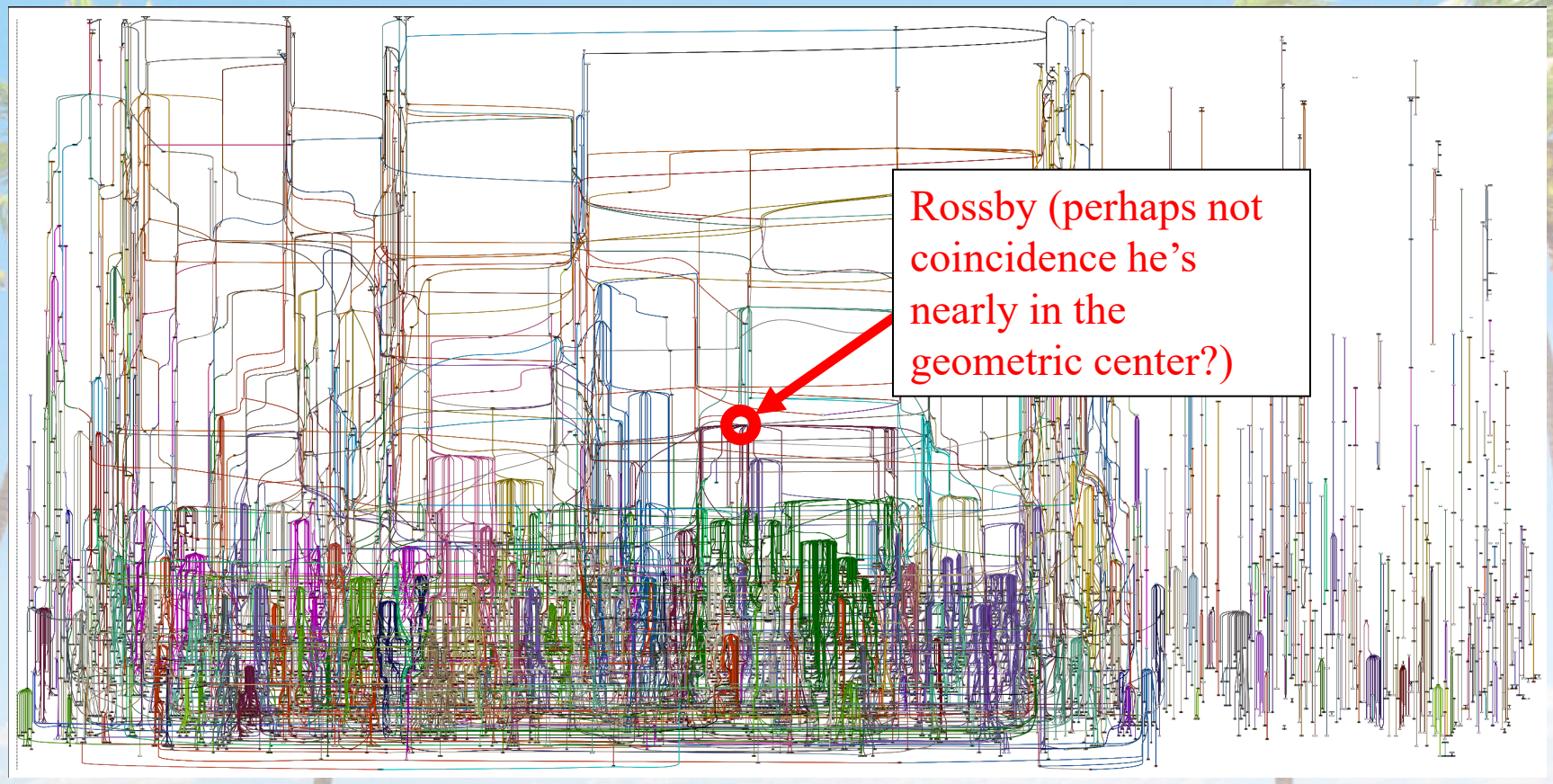
Future "Plans" (continued)

- First use of the phrase "potential vorticity" in the literature (to the best we can determine):

- Rossby (1940; QJRMS): "Planetary Flow Patterns in the Atmosphere", page 13:

The constant occurring in (10) and (10b) is obviously a characteristic of the particular air column to which the analysis pertains. It has been suggested by my collaborator, Mr. V. P. Starr, that this characteristic constant which presumably varies from one fluid element to another might be used for identification purposes in the analysis of air masses. A report on this ingenious method of utilizing the vorticity theorem will be given by Messrs. Starr and Neiburger (Starr and Neiburger, 1940) in another place. Here it is enough to mention that the constant c, the physical meaning of which is not very clear, may be replaced by the ζ_0 in (11) or (11b). *This quantity, which may be called the potential vorticity, represents the vorticity the air column would have if it were brought, isopycnically or isentropically, to a standard latitude (f_0) and stretched or shrunk vertically to a standard depth D_0 or weight Δ_0.*

Example: Origins and viral spread of PV…?



- Then colorize members of tree instead by whether the phrase PV has been used in their publication history (e.g. red=Y; blue=N).

- Repeat for numerous other key scientific phrases in our field.

Closing Thought: Thanks and unexpected impacts

Late November 2020-Early December 2020:

An adult child of a foreign atmospheric scientist [name redacted here] in the tree contacted us searching for her father, who had lost contact with her in the 1980s after military confict in their home country.

Her internet search for her father's name finally turned up in the tree.

After a lengthy set of emails, her father was found alive and living in the USA.

December 14, 2020:

From these efforts, they finally reached each other by email and then phone for an emotional reunion. They asked me to thank everyone in the tree.

***Personal note from Hart**: Since this date was my own birthday and during COVID, it was one of the best gifts I ever received. Thank you all for not only all your contributions to the tree, but for making this reunion possible.*