

Hot Science Cool Talks

UT Environmental Science Institute

92

Extreme Weather and Uncertainty in Forecasting

Dr. Kevin Kloesel

October 6, 2014

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Extreme Weather and Uncertainty in Forecasting

**Dr. Kevin Kloesel
@TexasEmbassy**

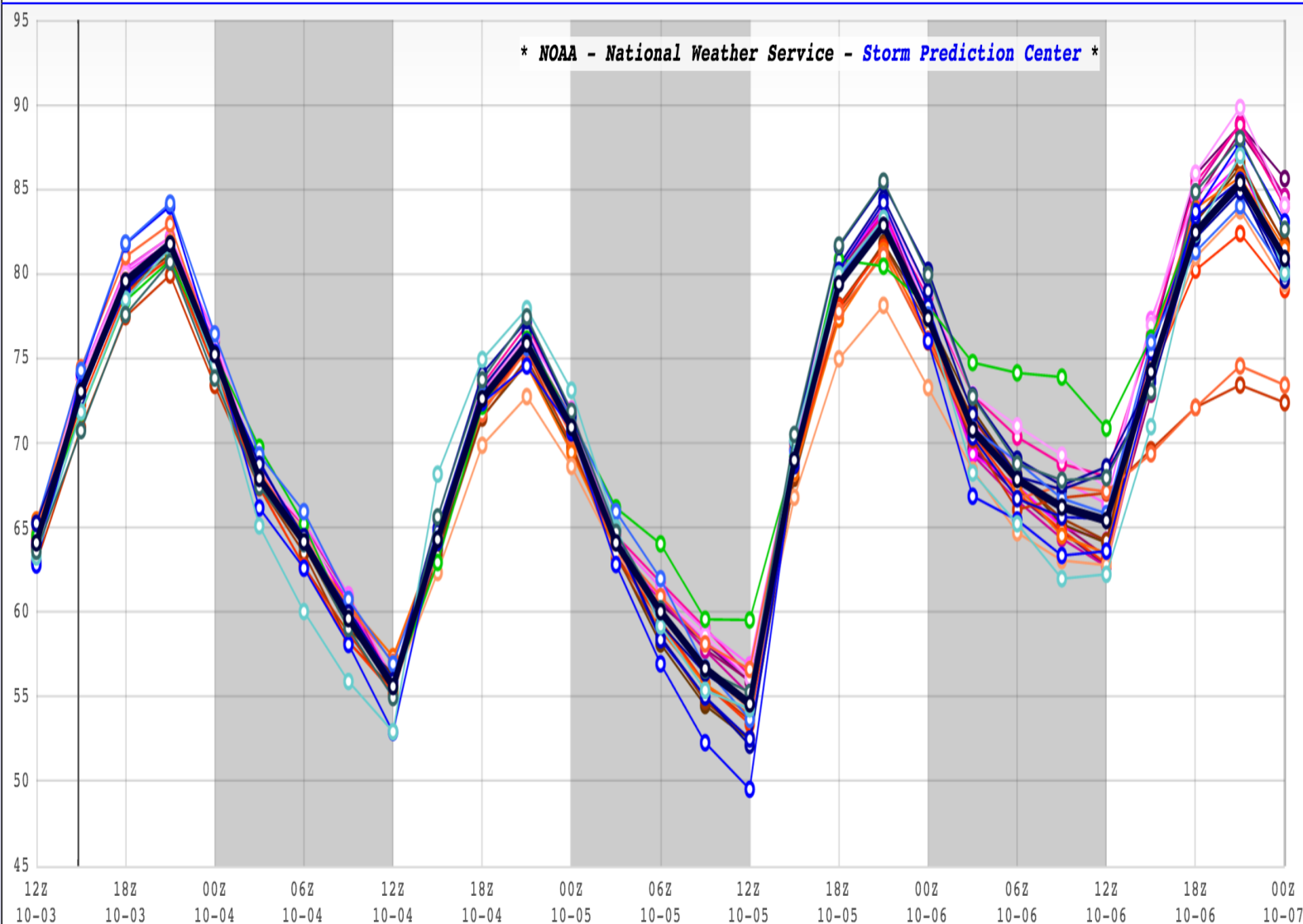
May 4, 1922 courtesy Austin History Center

NCEP SREF plume for 3hrly-TMP at AUS from 20141003/09 UTC run.

Oldest Run ---> 20141002_15 20141002_21 20141003_03 20141003_09 <--- Latest Run

Forecast Parameter Selection - Hover over buttons for more information.

- 3hrly-TMP 3hrly-DWP 3h-MUCAPE 3h-MLCAPE 3h-EFFSHR 3hrly-QPF Total-QPF 3hrly-SNO Total-SNO Ptype-POP 3hr-2mRH% 3h-10mWND



Members Displayed

- ARWC ARN1 ARN2 ARN3
- ARP1 ARP2 ARP3 NMMC
- NMN1 NMN2 NMN3 NMP1
- NMP2 NMP3 MBCN ONAM
- MBN1 MBN2 MBN3 MBP1
- MBP2 MBP3 Mean

Membership Selection

ARWC ARN1 ARN2 ARN3

ARP1 ARP2 ARP3 NMMC

NMN1 NMN2 NMN3 NMP1

NMP2 NMP3 MBCN ONAM

MBN1 MBN2 MBN3 MBP1

MBP2 MBP3 Mean

Show Model Family

ALL ARW NMM NMB

Remove Model Family

ALL ARW NMM NMB

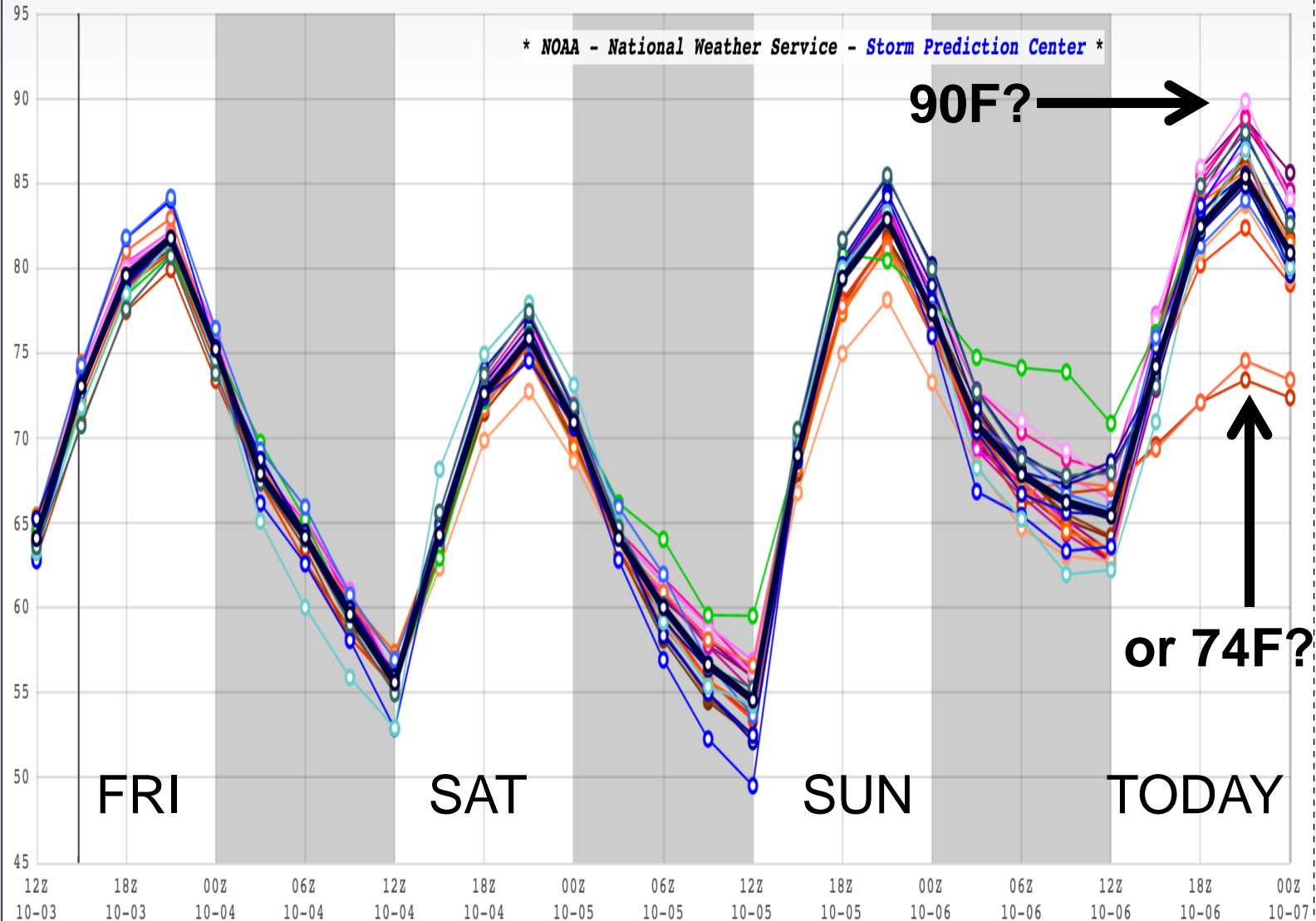
dProg/dt (mean) Last 4 Runs
[Help/Credits](#) | [SREF Info](#) | [Reset](#)
[SREF Loops](#) | [SPC](#) | [Feedback](#)

NCEP SREF plume for 3hrly-TMP at AUS from 20141003/09 UTC run.

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Members Displayed

- ARWC ARN1 ARN2 ARN3
- ARP1 ARP2 ARP3 NMMC
- NMN1 NMN2 NMN3 NMP1
- NMP2 NMP3 MBCN ONAM
- MBN1 MBN2 MBN3 MBP1
- MBP2 MBP3 Mean

Membership Selection

- ARWC ARN1 ARN2 ARN3
- ARP1 ARP2 ARP3 NMMC
- NMN1 NMN2 NMN3 NMP1
- NMP2 NMP3 MBCN ONAM
- MBN1 MBN2 MBN3 MBP1
- MBP2 MBP3 Mean

Show Model Family

- ALL ARW NMM NMB

Remove Model Family

- ALL ARW NMM NMB

[dProg/dt \(mean\) Last 4 Runs](#)

[Help/Credits](#) | [SREF Info](#) |

[Reset](#)

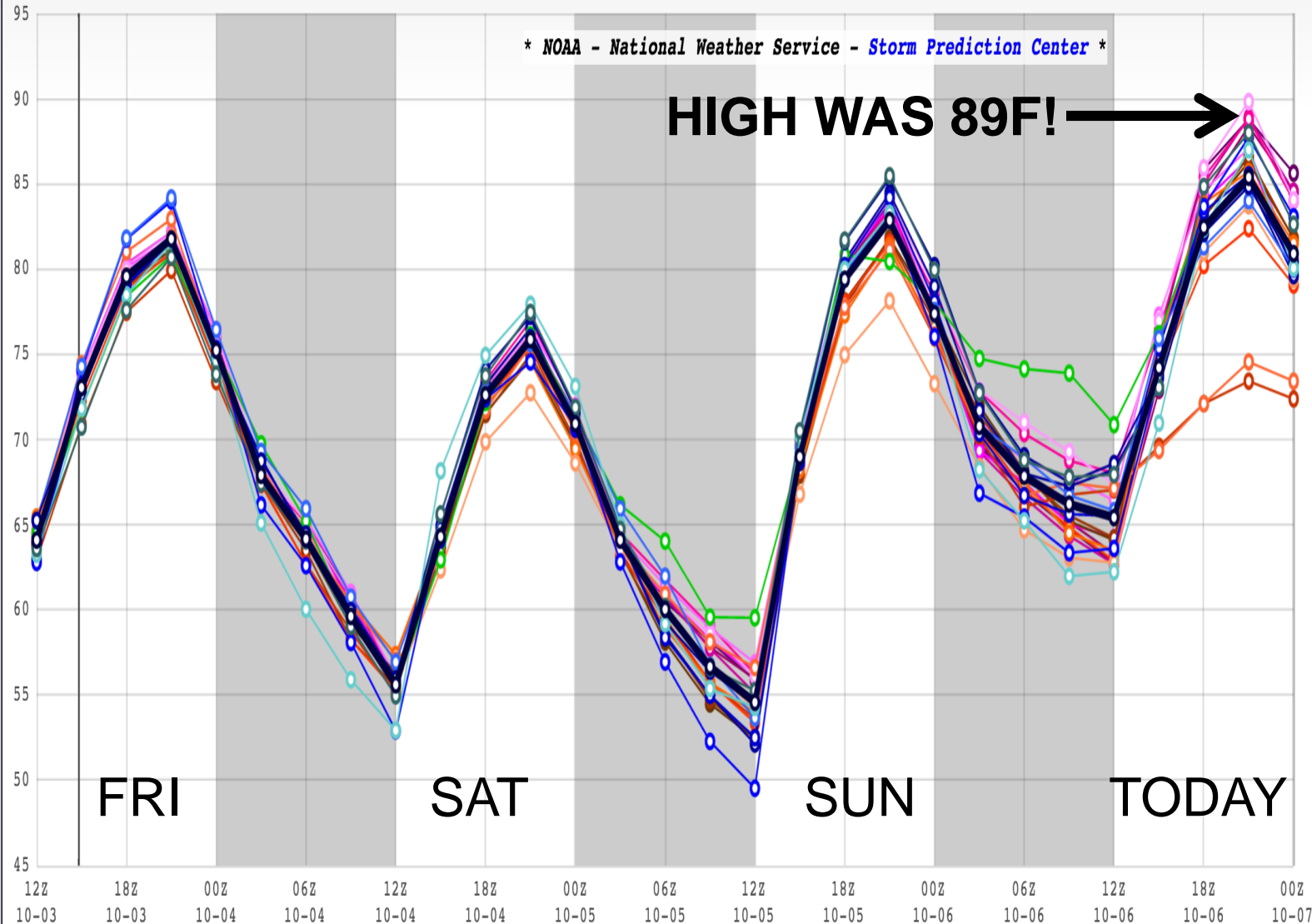
[SREF Loops](#) | [SPC](#) | [Feedback](#)

NCEP SREF plume for 3hrly-TMP at AUS from 20141003/09 UTC run.

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Members Displayed

- ARWC ARN1 ARN2 ARN3
- ARP1 ARP2 ARP3 NMMC
- NMN1 NMN2 NMN3 NMP1
- NMP2 NMP3 MBCN ONAM
- MBN1 MBN2 MBN3 MBP1
- MBP2 MBP3 Mean

Membership Selection

ARWC ARN1 ARN2 ARN3

ARP1 ARP2 ARP3 NMMC

NMN1 NMN2 NMN3 NMP1

NMP2 NMP3 MBCN ONAM

MBN1 MBN2 MBN3 MBP1

MBP2 MBP3 Mean

Show Model Family

ALL ARW NMM NMB

Remove Model Family

ALL ARW NMM NMB

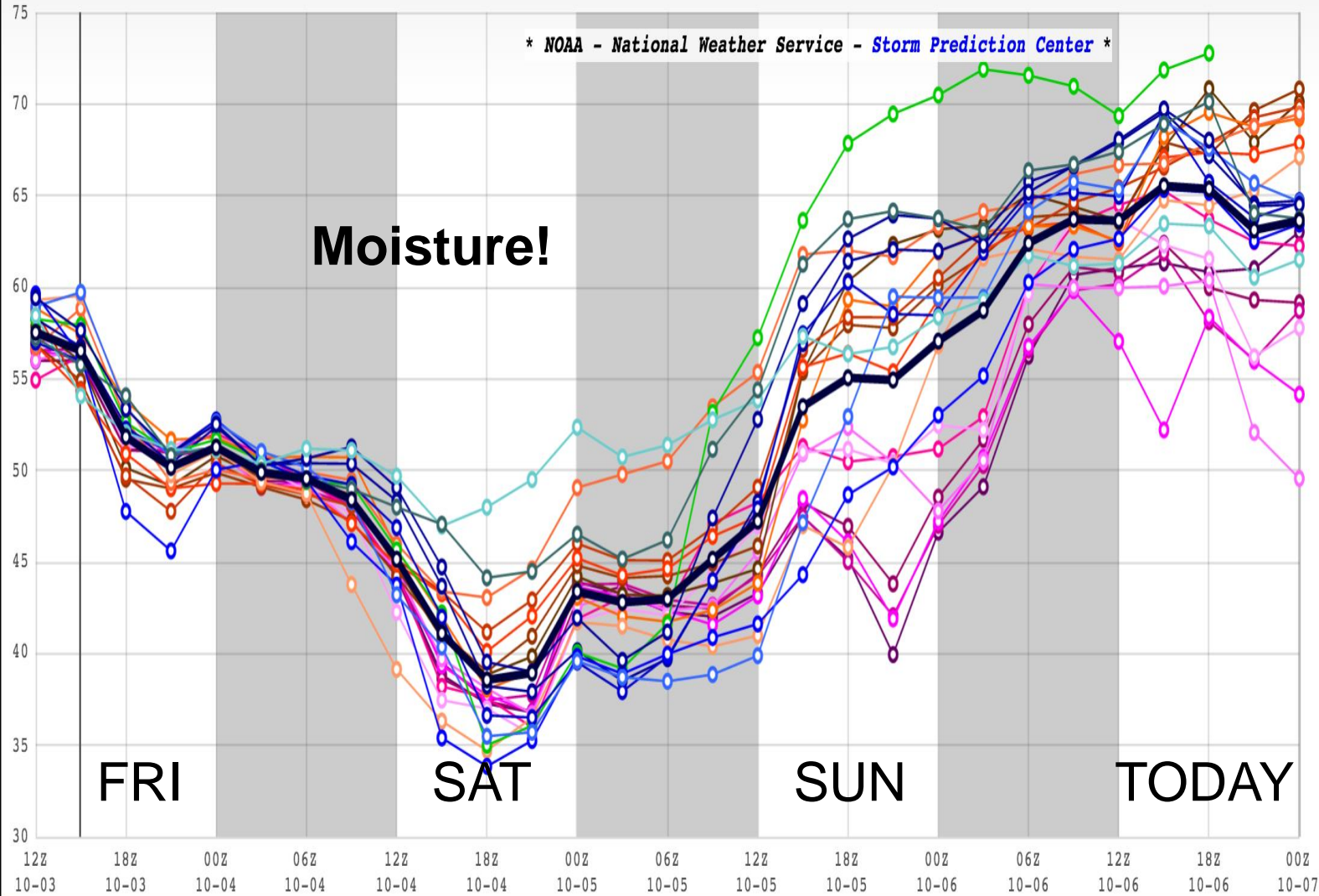
dProg/dt (mean) Last 4 Runs
[Help/Credits](#) | [SREF Info](#) | [Reset](#)
[SREF Loops](#) | [SPC](#) | [Feedback](#)

NCEP SREF plume for 3hrly-DWP at AUS from 20141003/09 UTC run.

Oldest Run ---> 20141002_15 20141002_21 20141003_03 20141003_09 <--- Latest Run

Forecast Parameter Selection - Hover over buttons for more information.

- 3hrly-TMP
- 3hrly-DWP
- 3h-MUCAPE
- 3h-MLCAPE
- 3h-EFFSHR
- 3hrly-QPF
- Total-QPF
- 3hrly-SNO
- Total-SNO
- Ptype-POP
- 3hr-2mRH%
- 3h-10mWND



Members Displayed

- ARWC ARN1 ARN2 ARN3
- ARP1 ARP2 ARP3 NMMC
- NMN1 NMN2 NMN3 NMP1
- NMP2 NMP3 MBCN ONAM
- MBN1 MBN2 MBN3 MBP1
- MBP2 MBP3 Mean

Membership Selection

- ARWC ARN1 ARN2 ARN3
- ARP1 ARP2 ARP3 NMMC
- NMN1 NMN2 NMN3 NMP1
- NMP2 NMP3 MBCN ONAM
- MBN1 MBN2 MBN3 MBP1
- MBP2 MBP3 Mean

Show Model Family

ALL ARW NMM NMB

Remove Model Family

ALL ARW NMM NMB

dProg/dt (mean) Last 4 Runs
[Help/Credits](#) | [SREF Info](#) |
 Reset
[SREF Loops](#) | [SPC](#) | [Feedback](#)

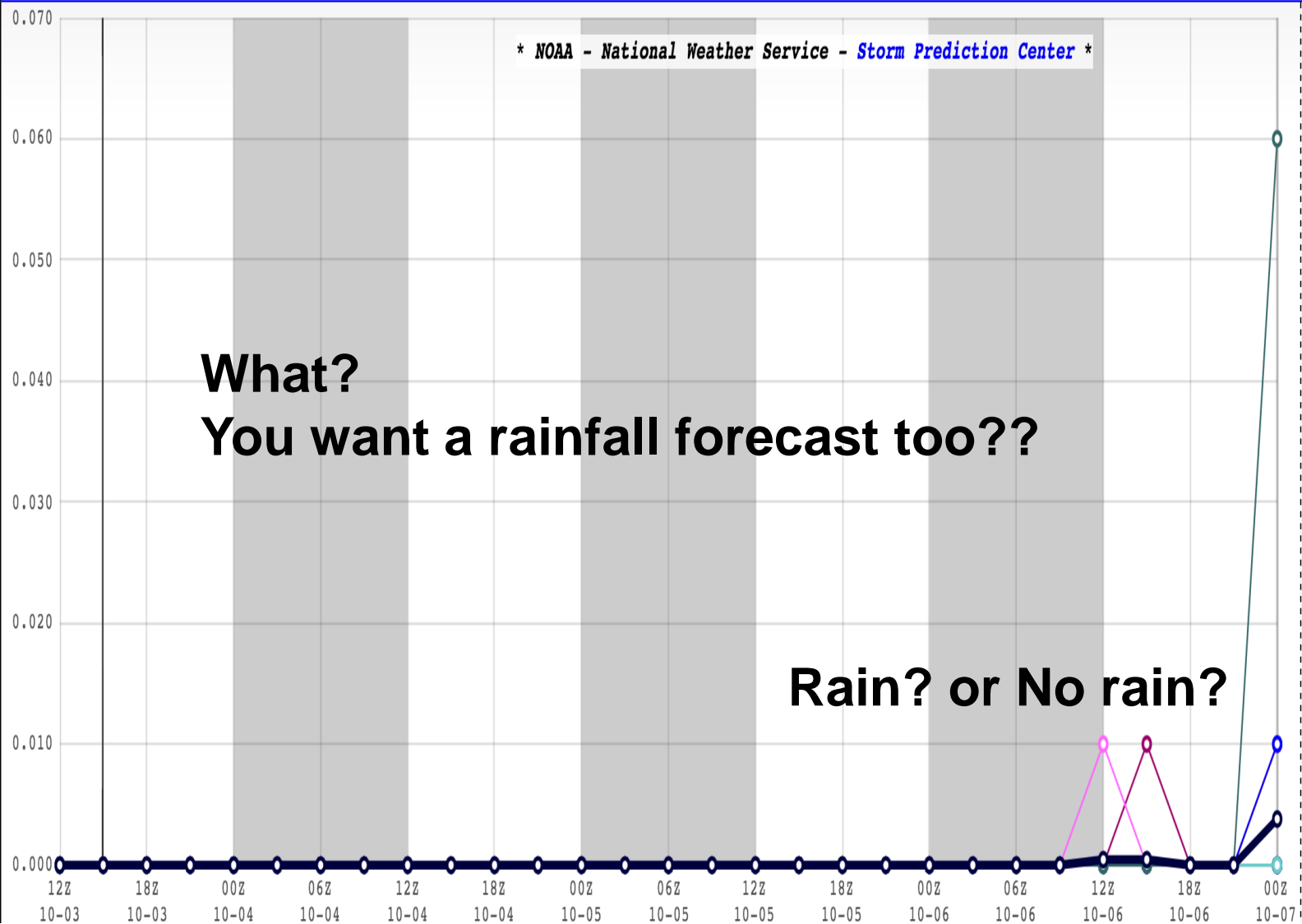
Min(y) Max(y) SET CLR

NCEP SREF plume for 3hrly-QPF at AUS from 20141003/09 UTC run.

Oldest Run ---> 20141002_15 20141002_21 20141003_03 20141003_09 <--- Latest Run

Forecast Parameter Selection - Hover over buttons for more information.

- 3hrly-TMP
- 3hrly-DWP
- 3h-MUCAPE
- 3h-MLCAPE
- 3h-EFFSHR
- 3hrly-QPF
- Total-QPF
- 3hrly-SNO
- Total-SNO
- Ptype-POP
- 3hr-2mRH%
- 3h-10mWND



**What?
You want a rainfall forecast too??**

Rain? or No rain?

Members Displayed

- ARWC
- ARN1
- ARN2
- ARN3
- ARP1
- ARP2
- ARP3
- NMMC
- NMN1
- NMN2
- NMN3
- NMP1
- NMP2
- NMP3
- MBCN
- ONAM
- MBN1
- MBN2
- MBN3
- MBP1
- MBP2
- MBP3
- Mean

Membership Selection

- ARWC
- ARN1
- ARN2
- ARN3
- ARP1
- ARP2
- ARP3
- NMMC
- NMN1
- NMN2
- NMN3
- NMP1
- NMP2
- NMP3
- MBCN
- ONAM
- MBN1
- MBN2
- MBN3
- MBP1
- MBP2
- MBP3
- Mean

Show Model Family

- ALL
- ARW
- NMM
- NMB

Remove Model Family

- ALL
- ARW
- NMM
- NMB

dProg/dt (mean) Last 4 Runs
[Help/Credits](#) | [SREF Info](#) | [Reset](#)
[SREF Loops](#) | [SPC](#) | [Feedback](#)

Current Conditions



Fair

71°F

22°C

Humidity 51%
Wind Speed N 5 mph
Barometer 30.13 in (1019.0 mb)
Dewpoint 52°F (11°C)
Visibility 10.00 mi

Last Update on 3 Oct 8:51 am CDT

Current conditions at
Camp Mabry /
Lat: 30.32°N Lon:

[More Local Wx | 3](#)

Austin TX

7 Day Forecast

[Austin/San Antonio](#)

TODAY

TONIGHT

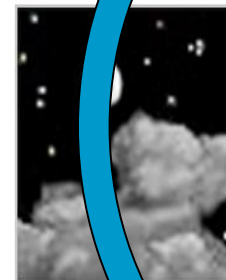
SATURDAY

SATURDAY
NIGHT

SUNDAY

SUNDAY
NIGHT

MONDAY



Sunny

Mostly
Clear

Sunny

Mostly
Clear

Sunny

Partly
Cloudy

Mostly
Sunny

High: 85 °F

Low: 55 °F

High: 78 °F

Low: 57 °F

High: 86 °F

Low: 68 °F

High: 87 °F

THE DAILY TEXAN

Serving the University of Texas at Austin community since 1900

HOME

NEWS

OPINION

SPORTS

LIFE AND ARTS

MULTIMEDIA

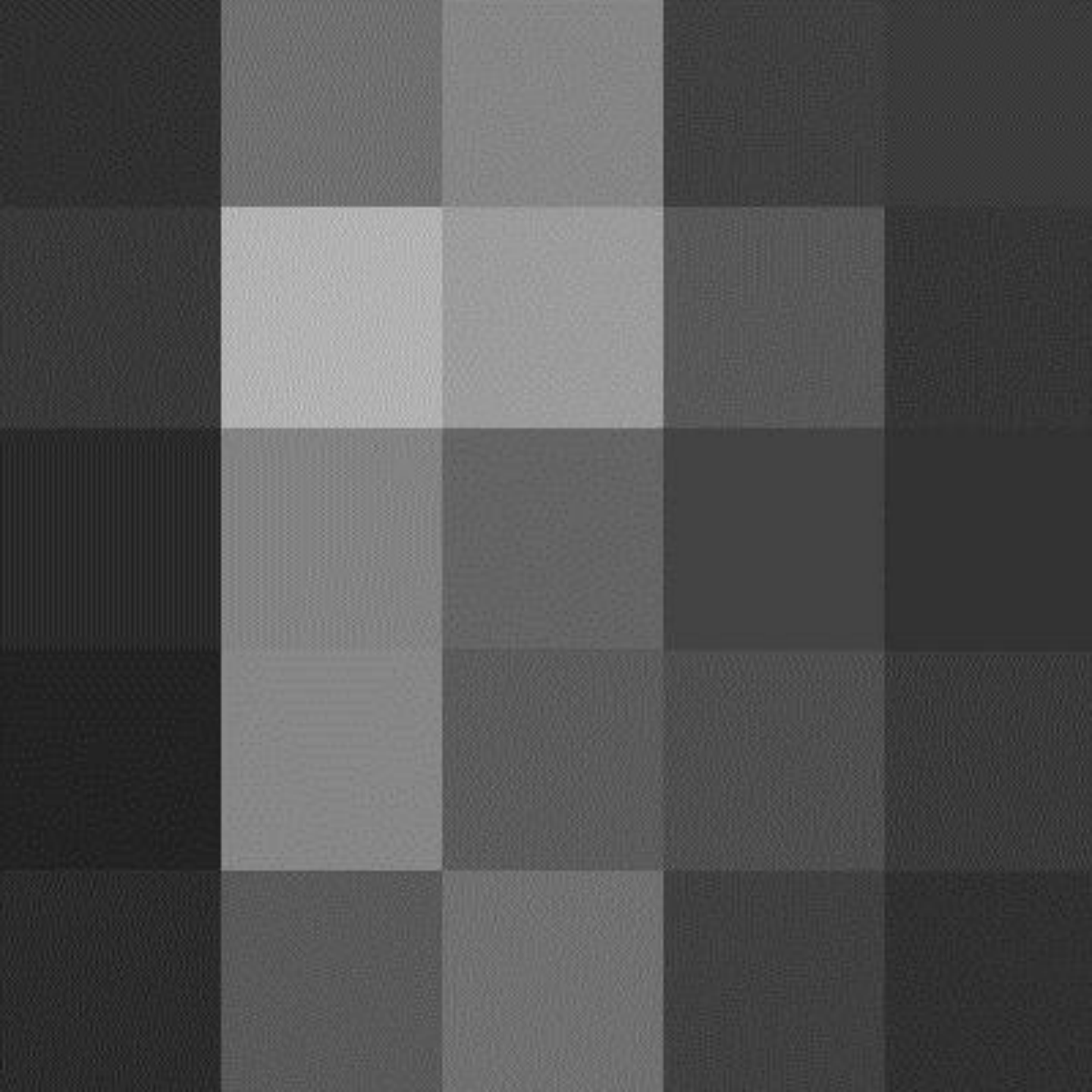
BLOGS

[Home](#) » [News](#) » [University](#) » Meteorologists, UT officials discuss weather conditions when considering school closures

Meteorologists, UT officials discuss weather conditions when considering school closures

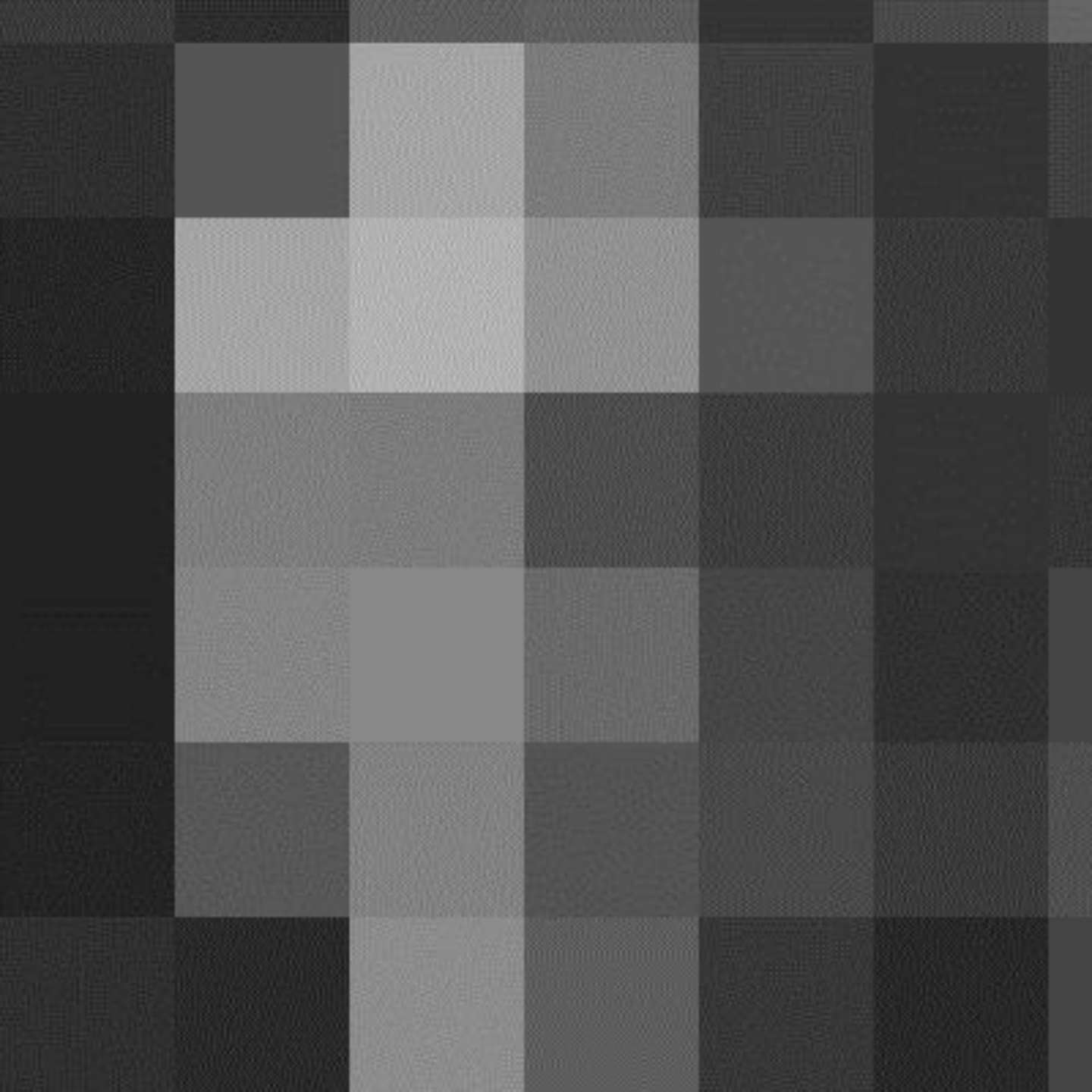


Photo Credit: Connor Murphy | Comics Artist

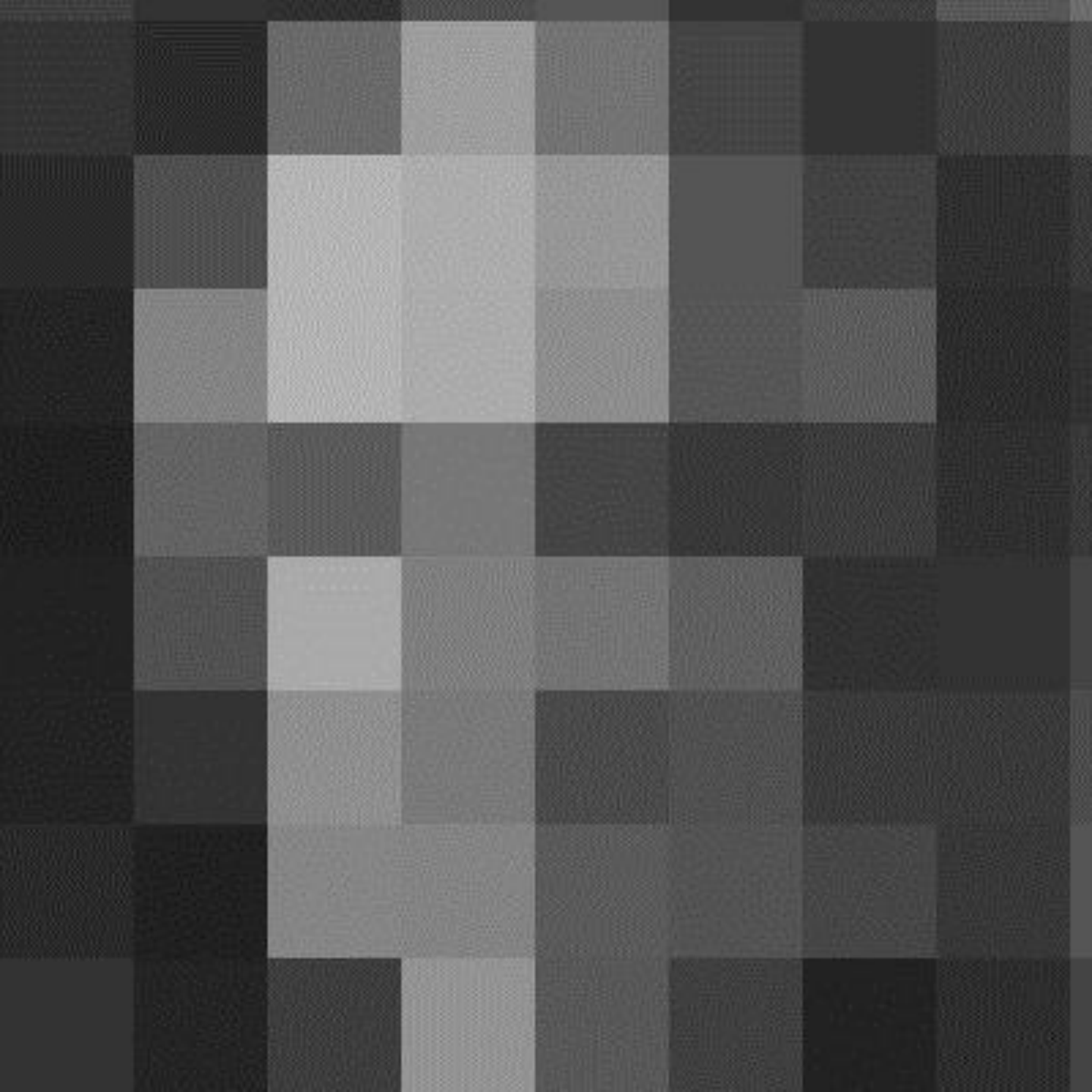


Let's
start by
putting
you in
our
shoes!

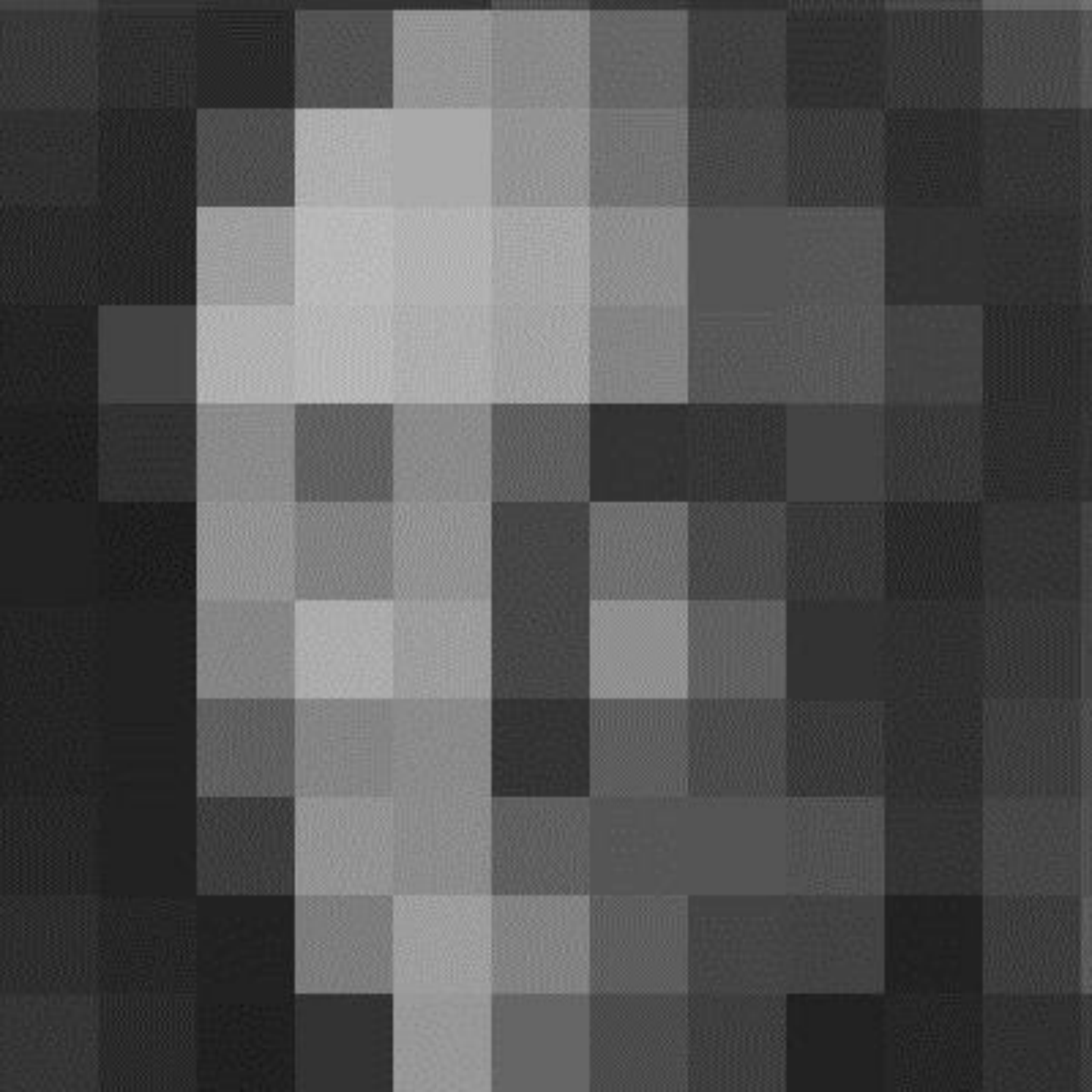
What do
you see?



Hot Science
Cool Talks



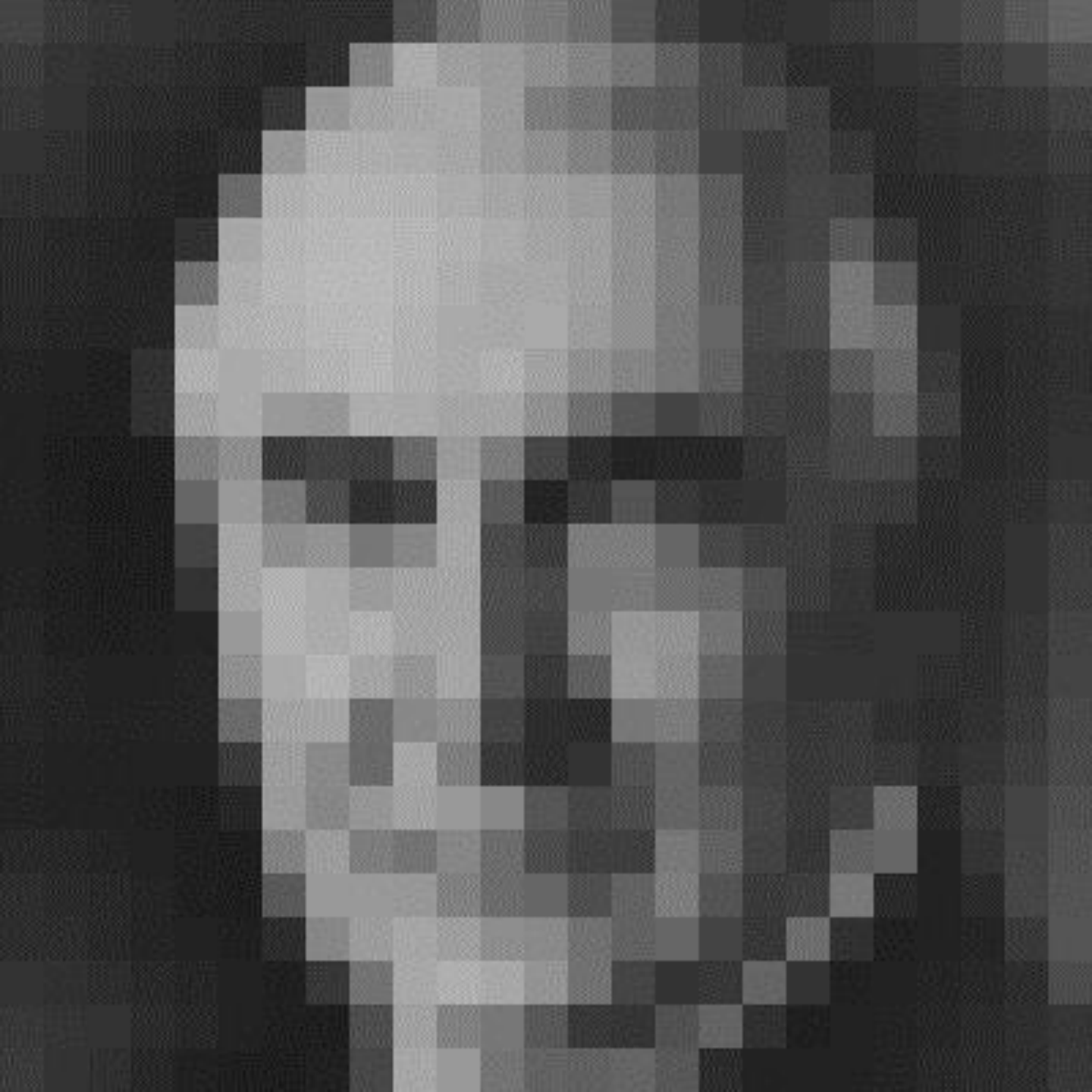
Hot Science
Cool Talks



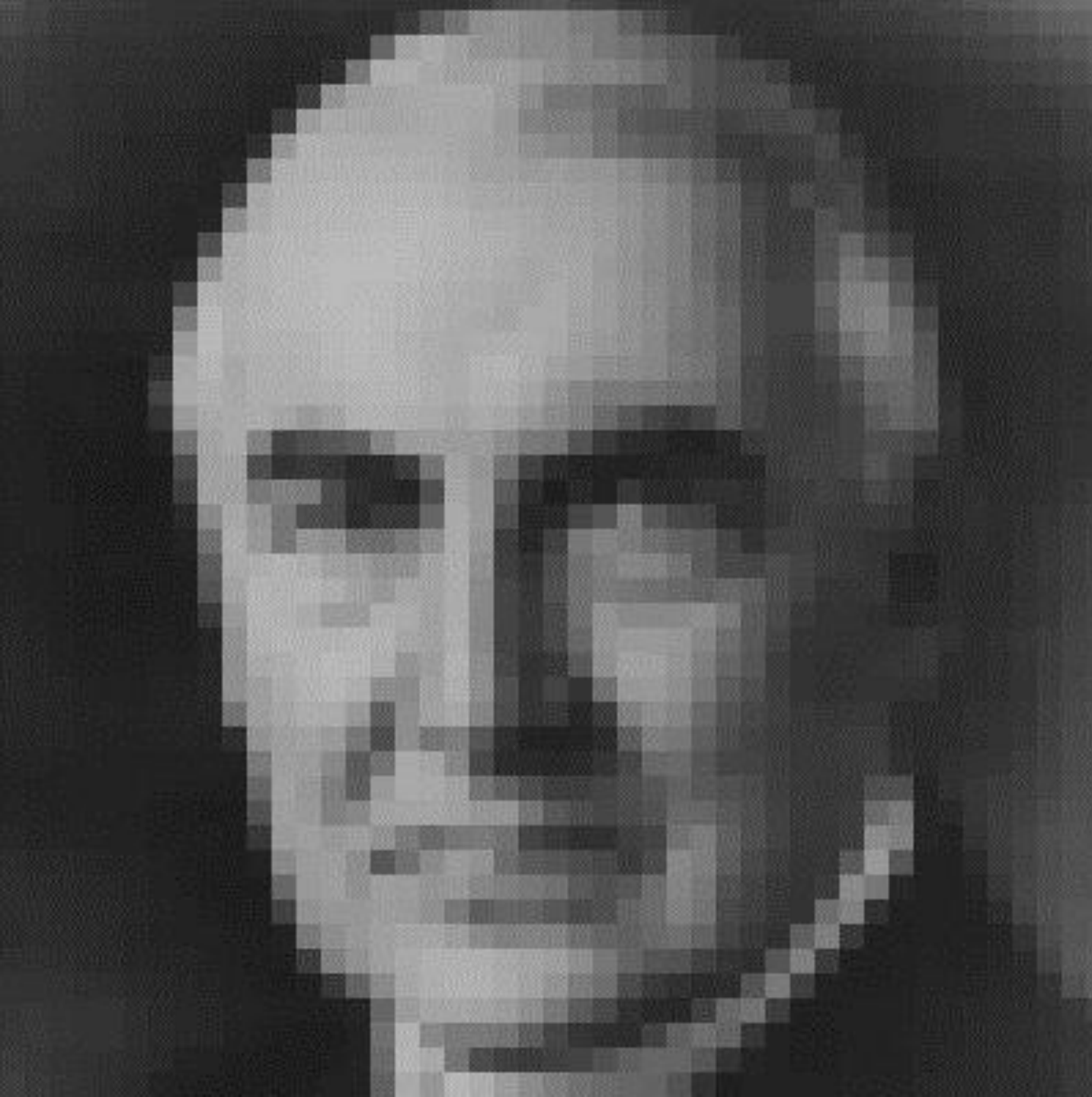
Hot Science
Cool Talks



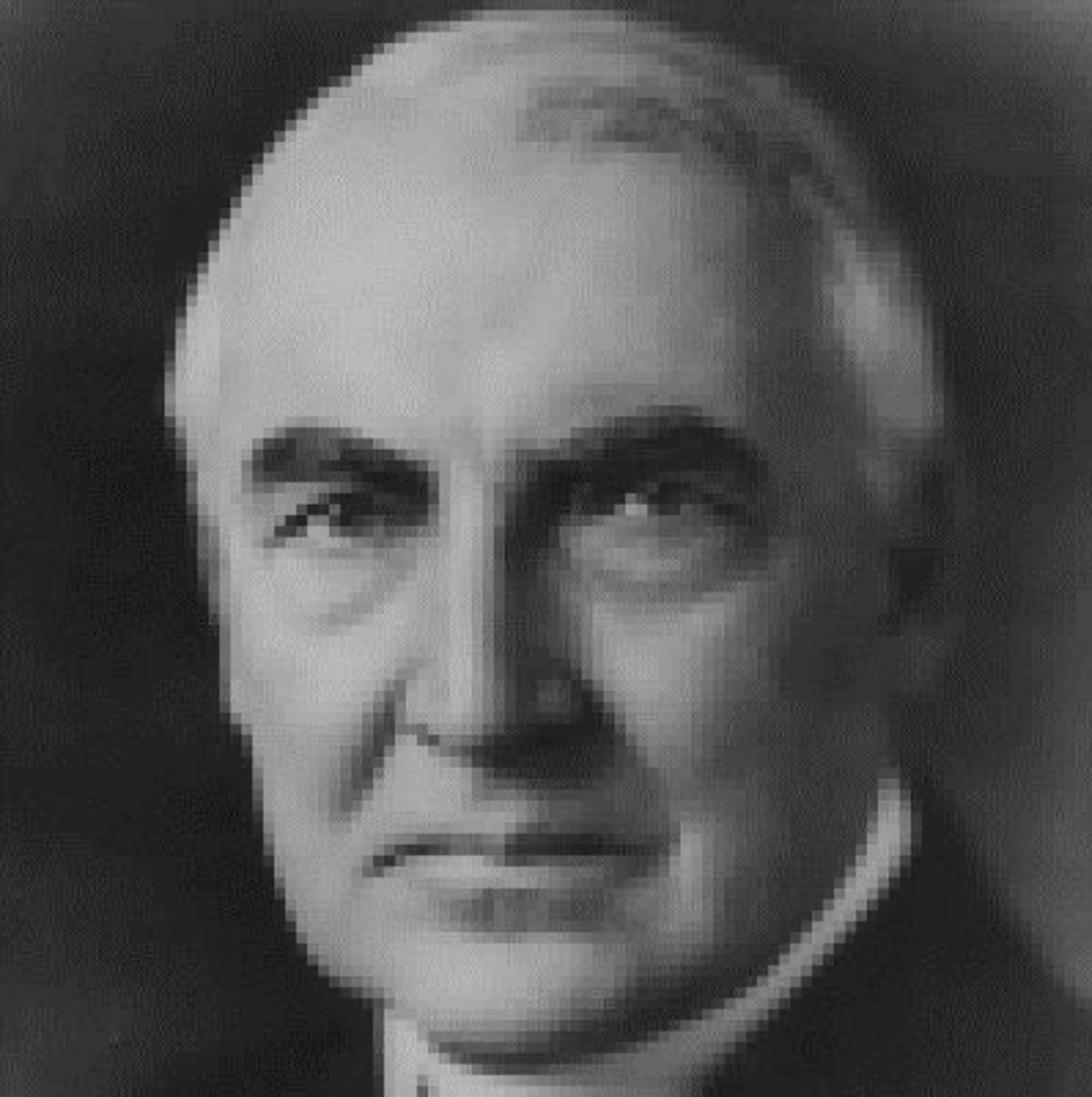
Hot Science
Cool Talks



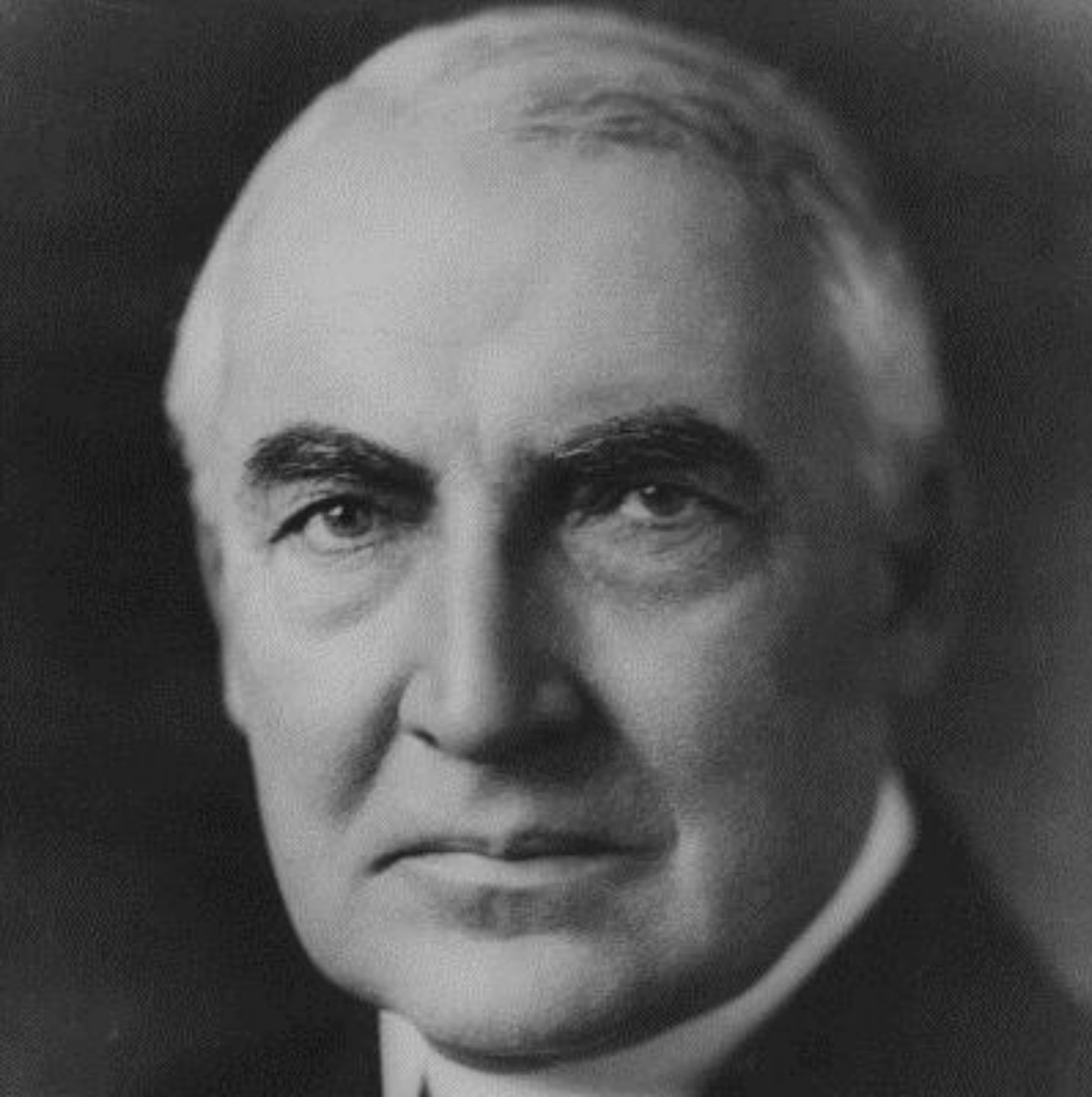
Hot Science
Cool Talks



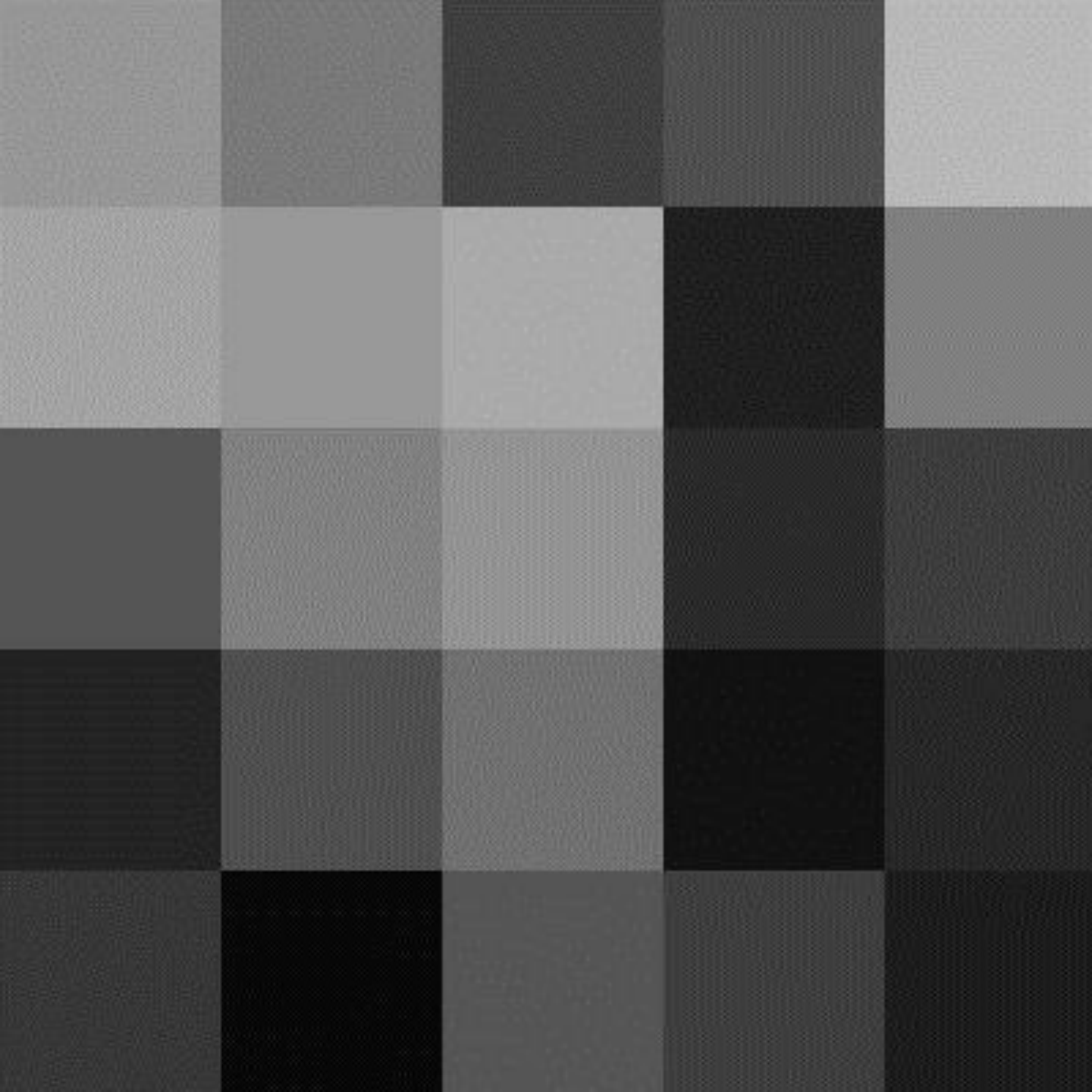
Hot Science
Cool Talks



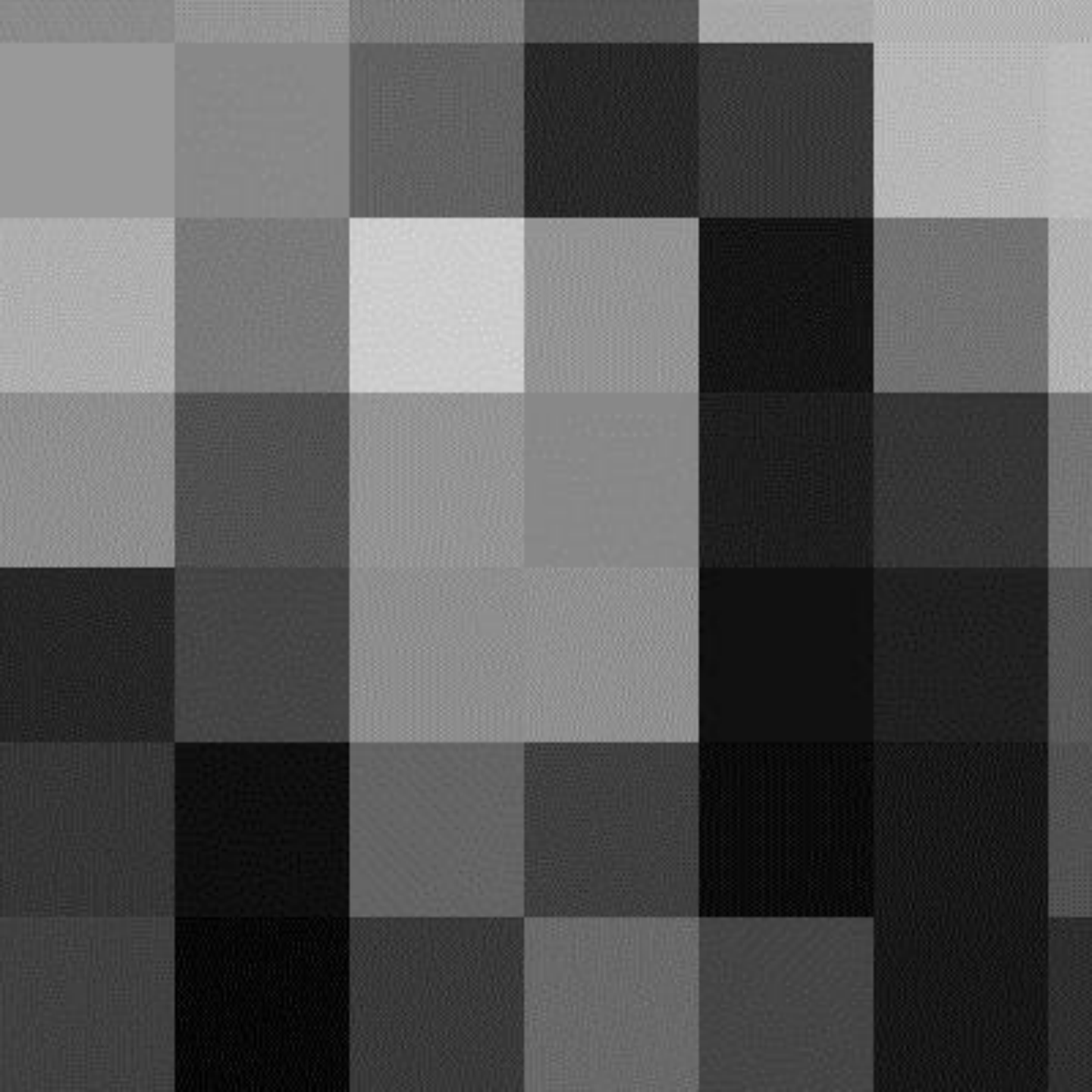
Hot Science
Cool Talks



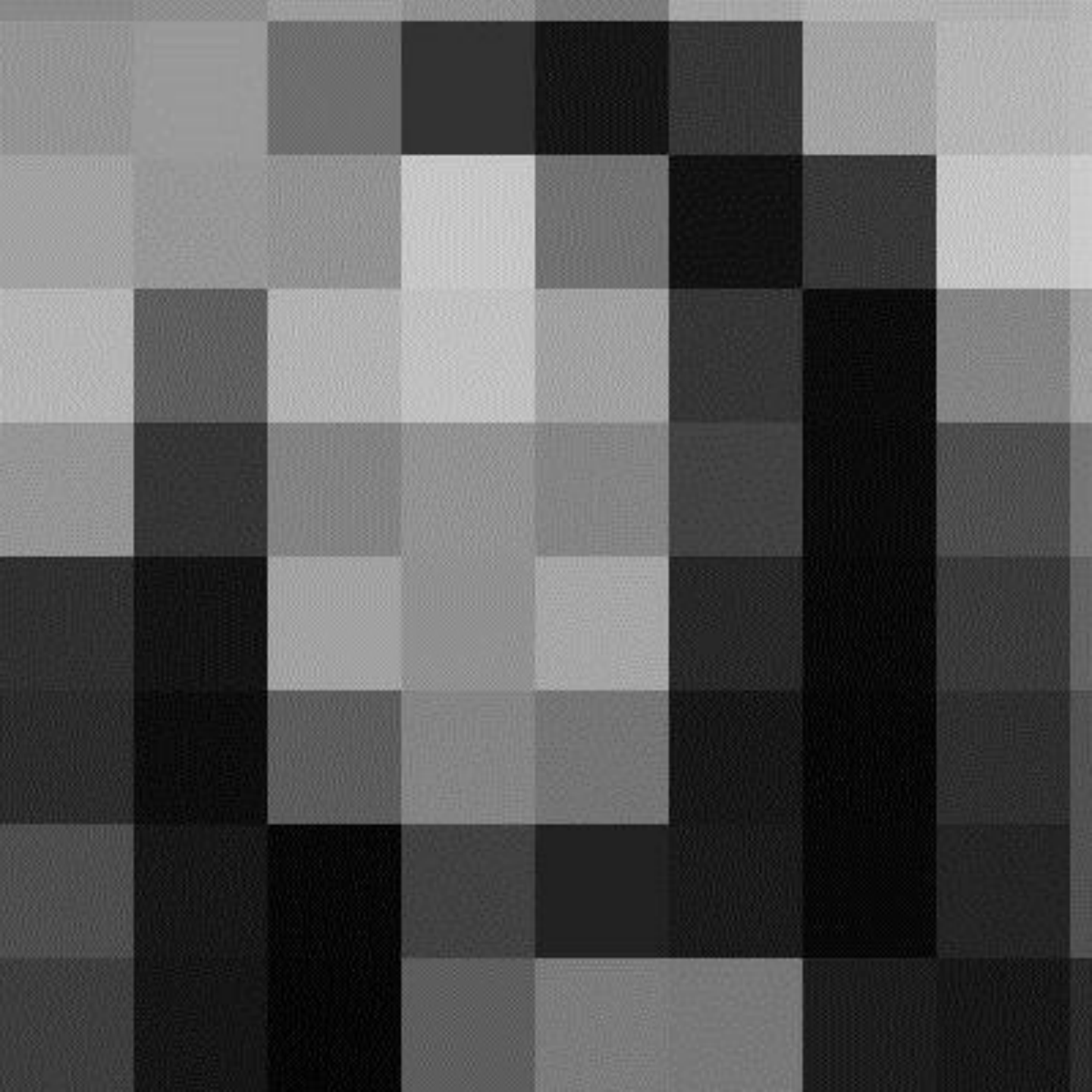
Hot Science
Cool Talks



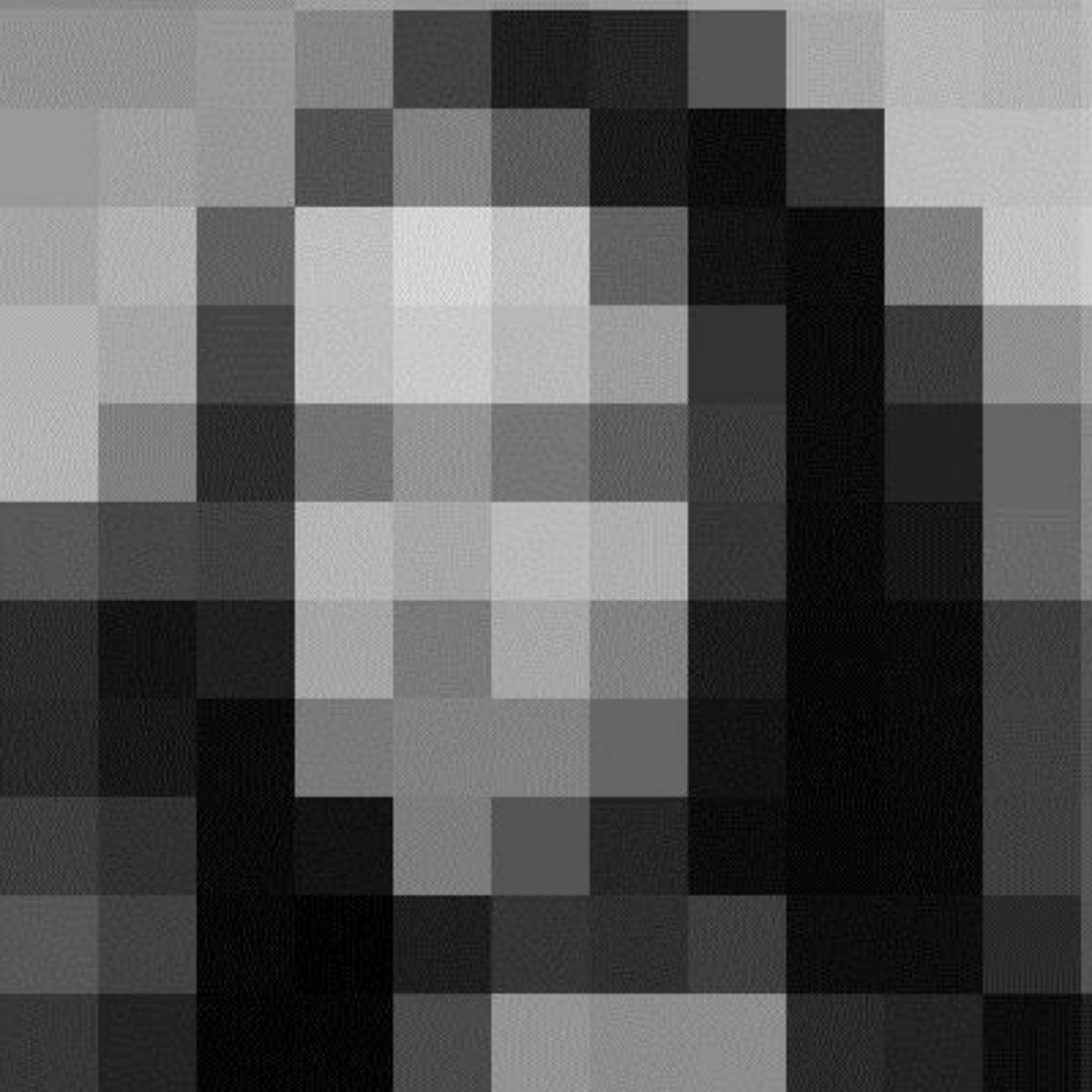
Hot Science
Cool Talks



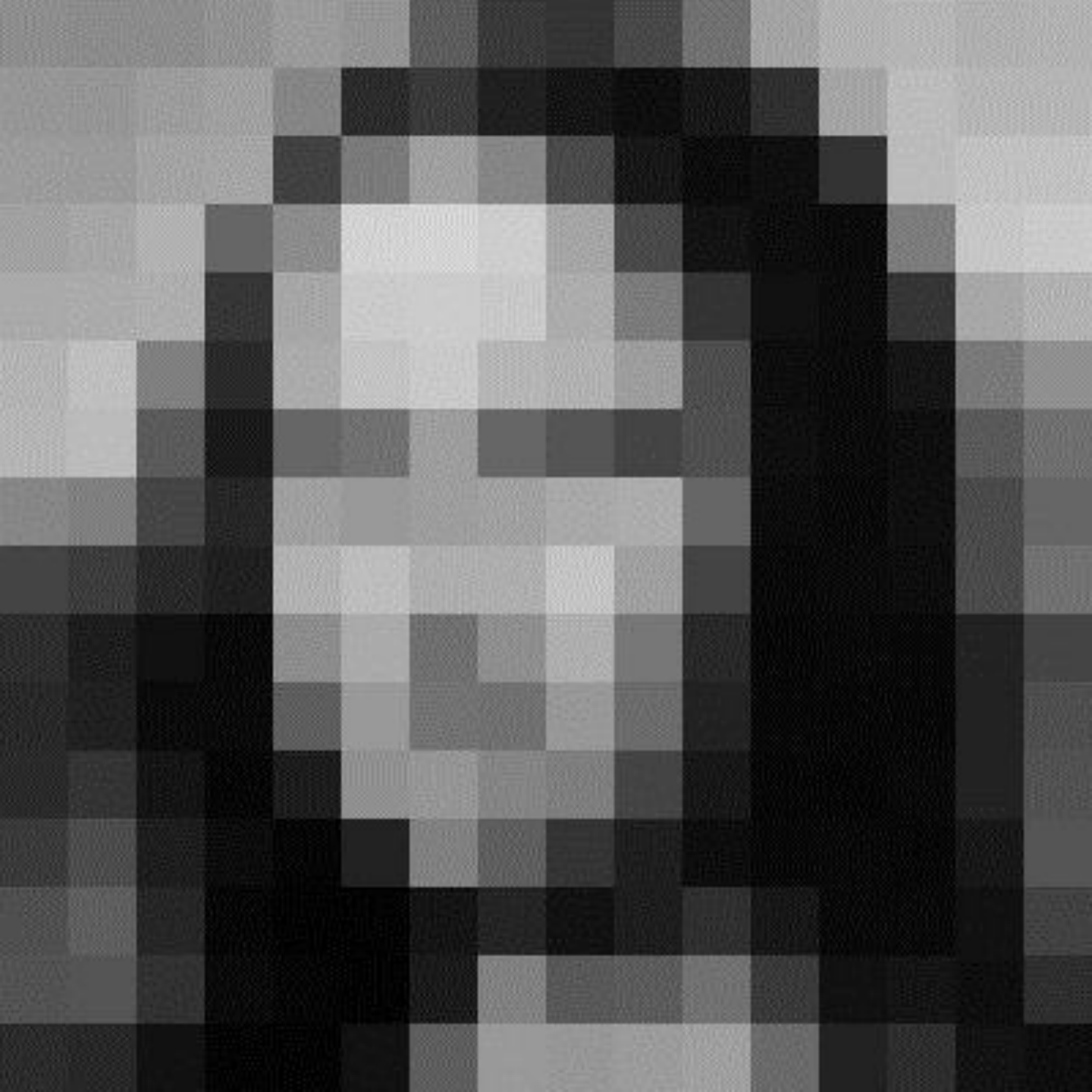
Hot Science
Cool Talks



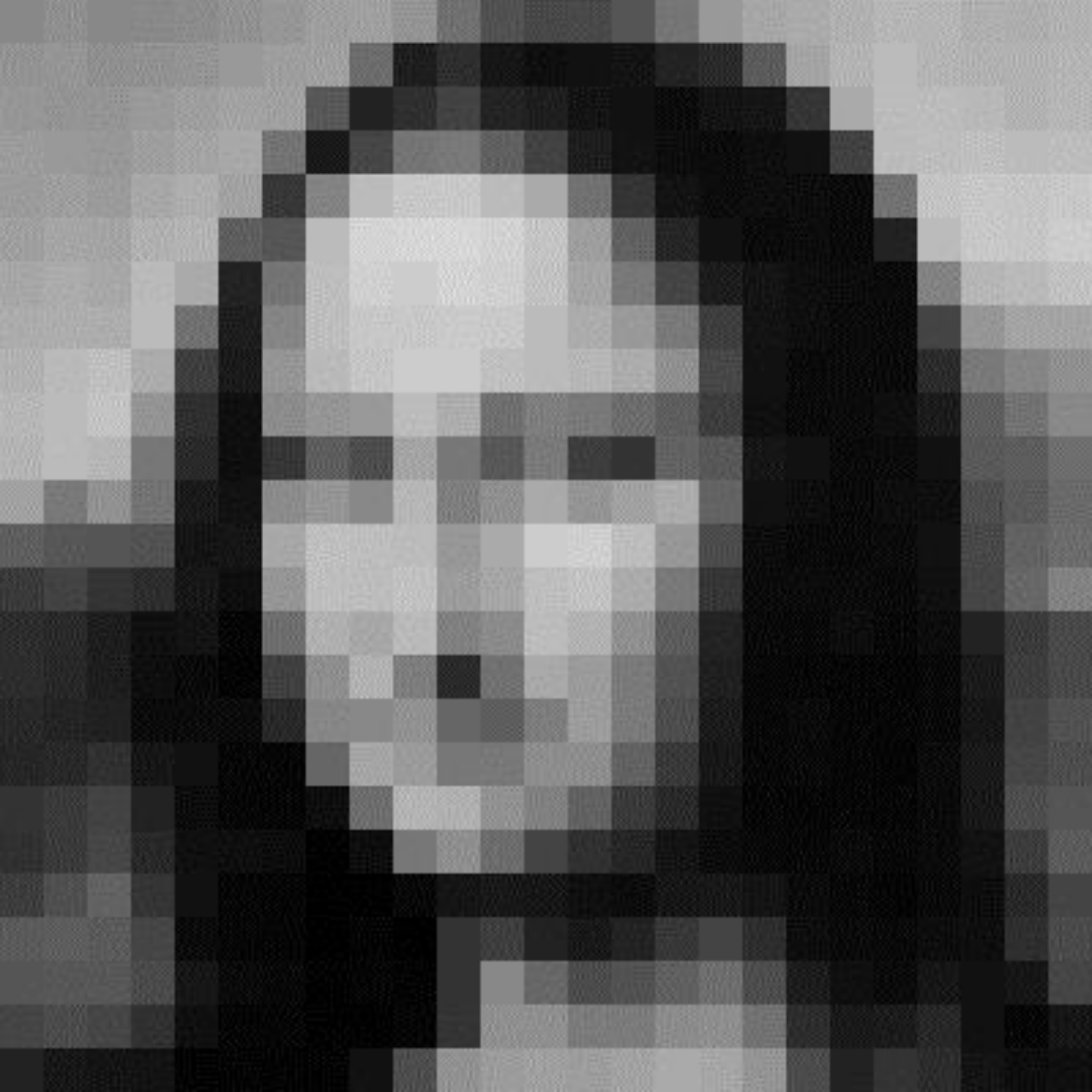
Hot Science
Cool Talks



Hot Science
Cool Talks



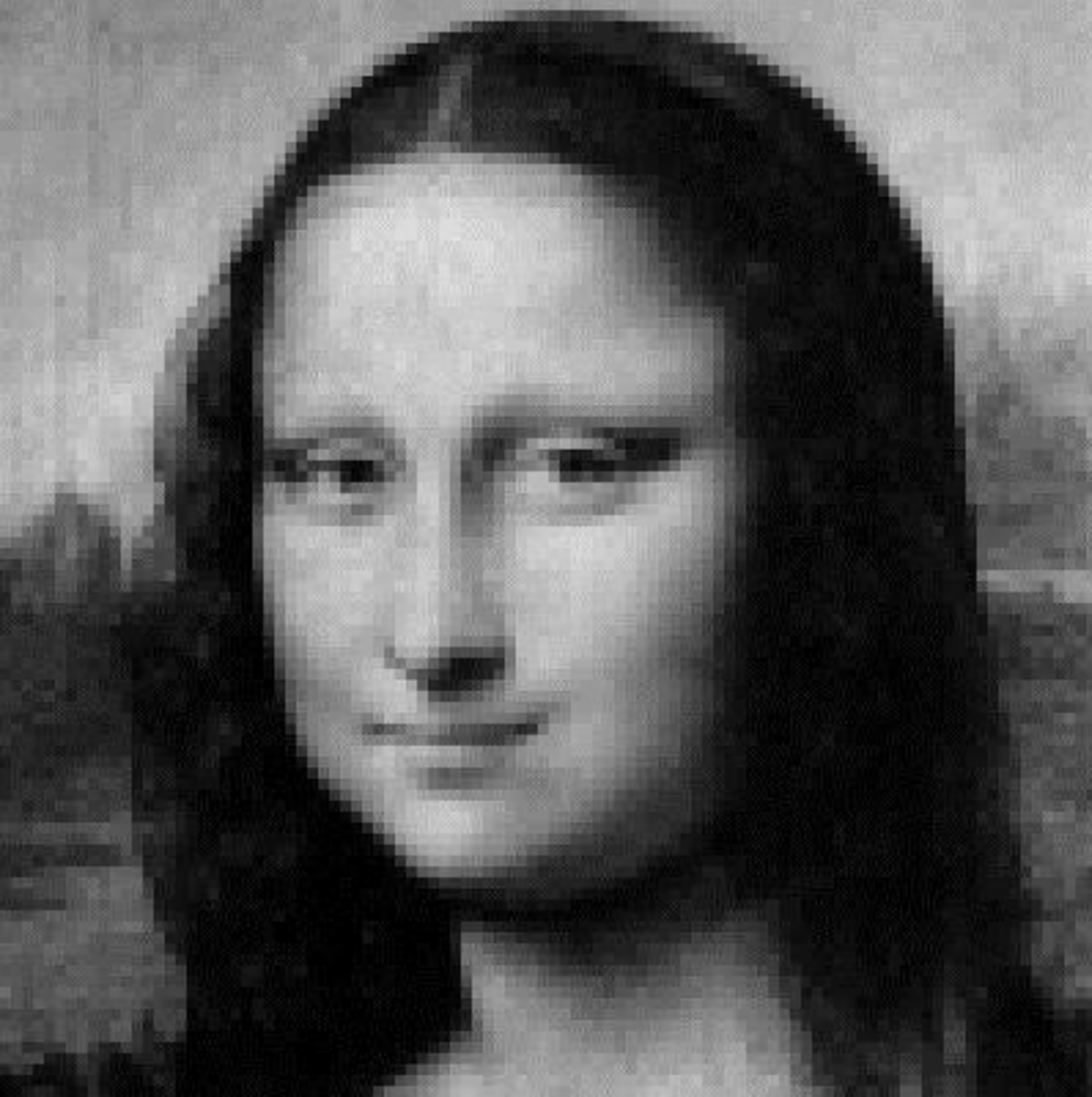
Hot Science
Cool Talks



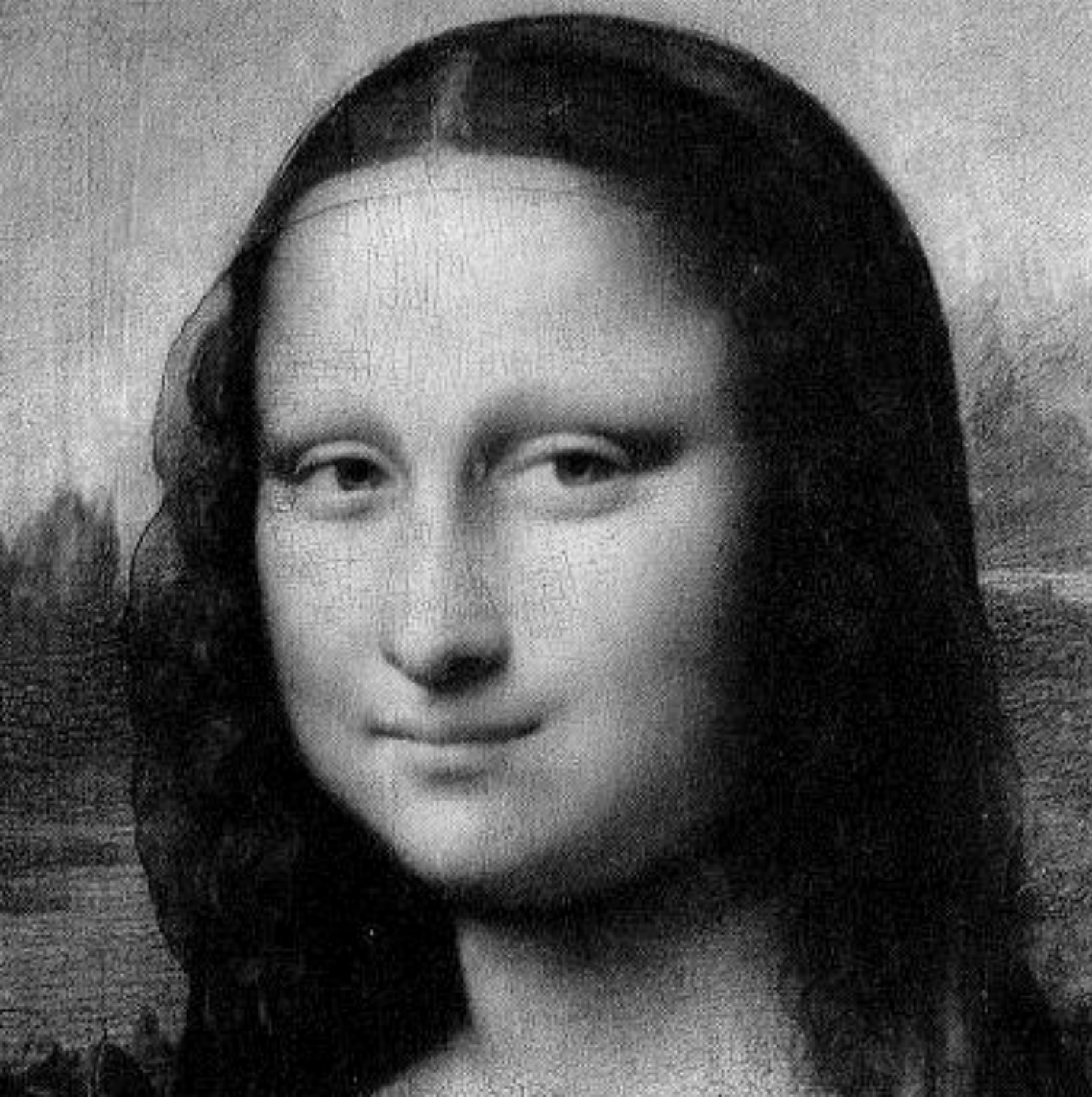
Hot Science
Cool Talks



Hot Science
Cool Talks

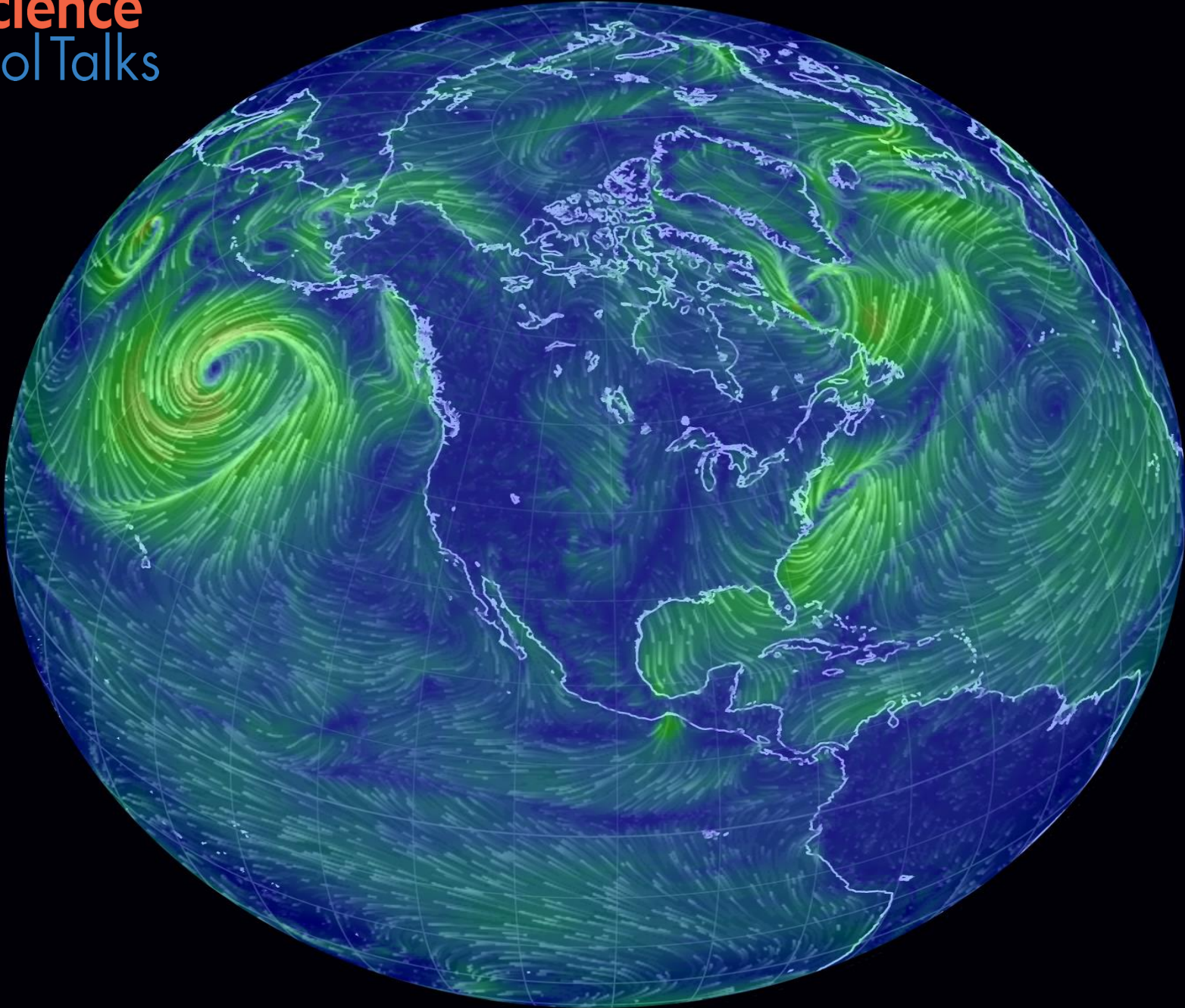


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Cool Talks



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Cool Talks

Hot Science
Cool Talks





Cumulus Godzillus?









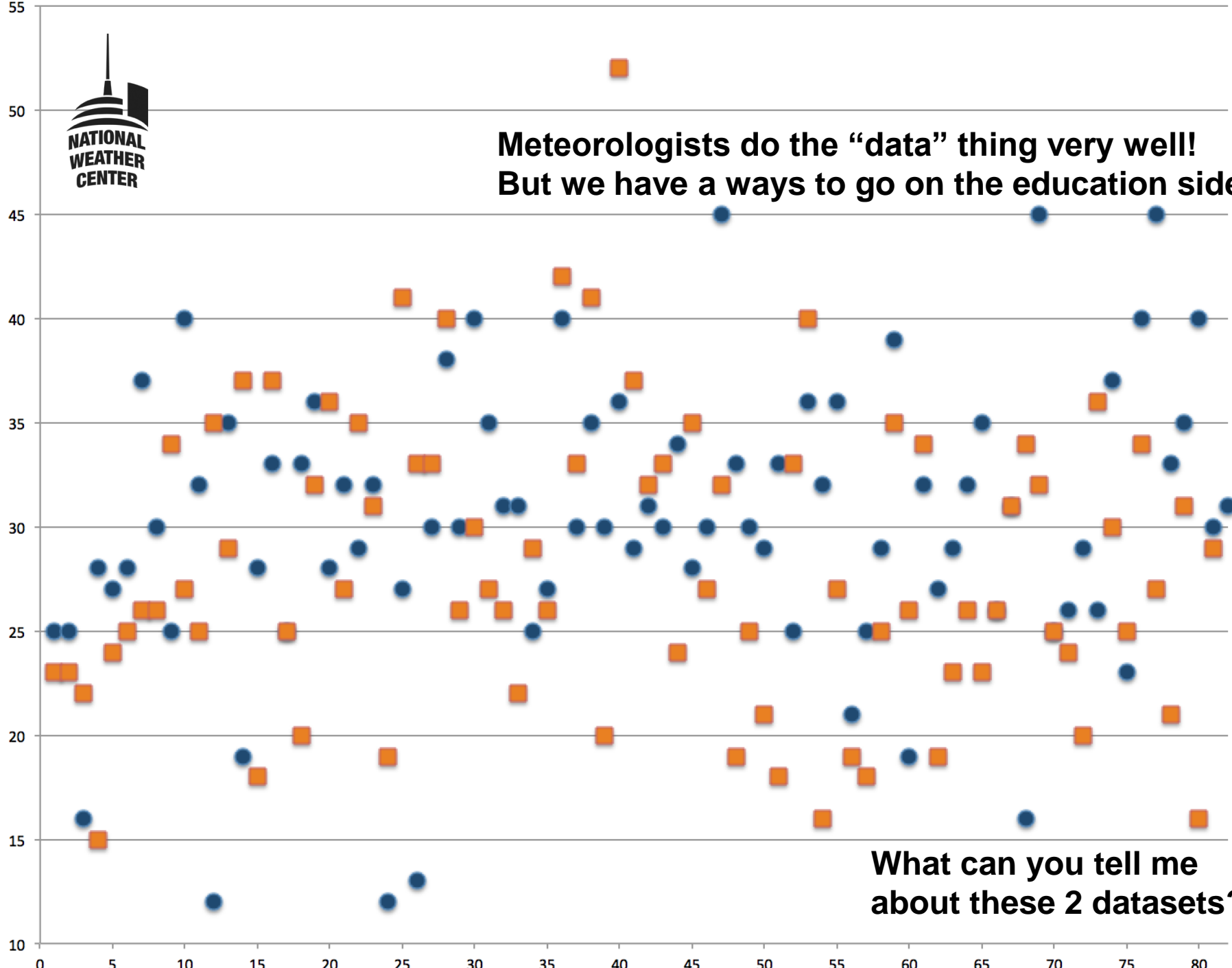
**Meteorologists must calmly and patiently observe..
and try NOT to be distracted by external influences.**



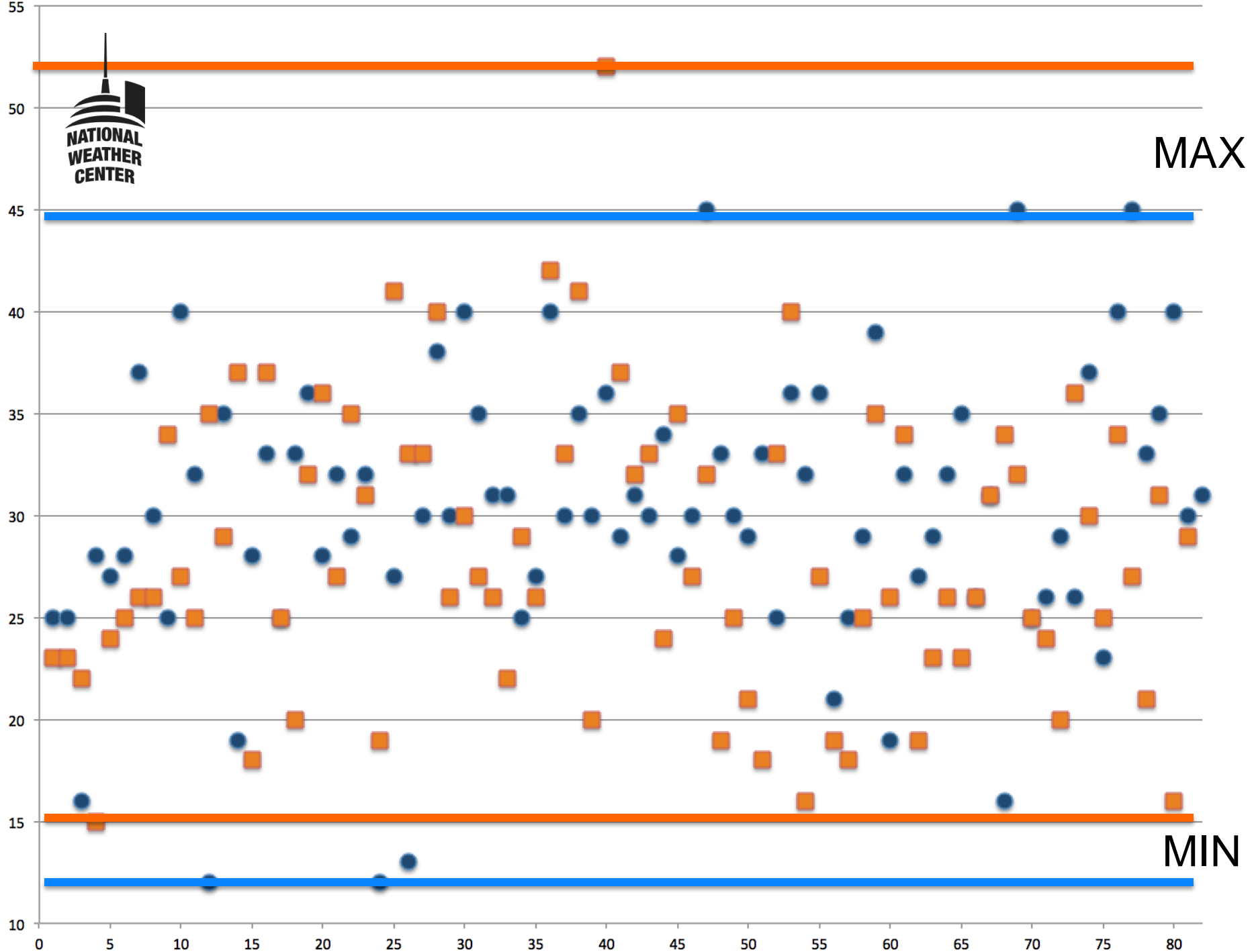




**Meteorologists do the “data” thing very well!
But we have a ways to go on the education side!**



**What can you tell me
about these 2 datasets?**

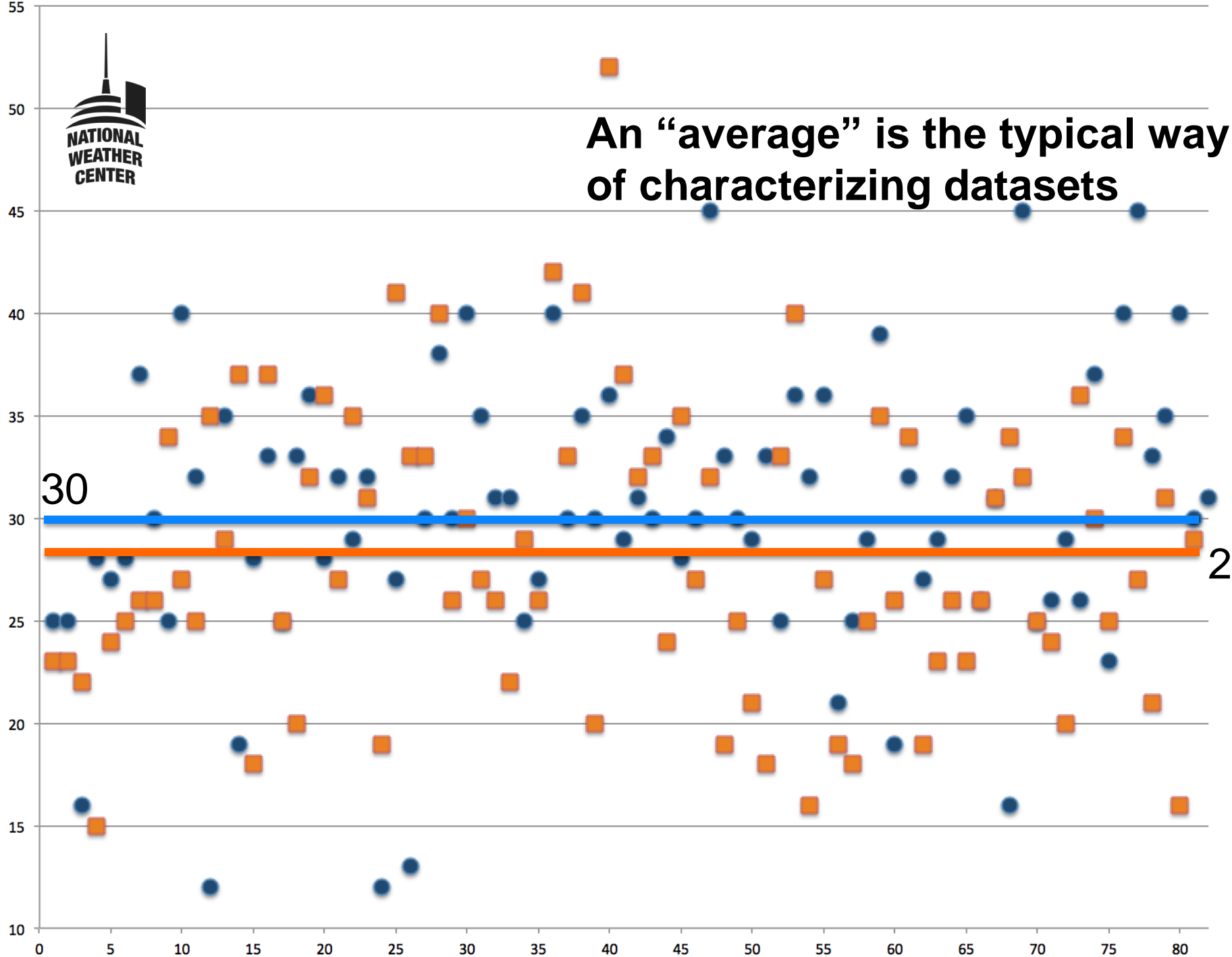




An “average” is the typical way of characterizing datasets

30

28



KVUE
STORM TEAM

ALMANAC

UPDATED: Oct 14, 2013

	HIGH	LOW	RAINFALL TODAY	RAINFALL MONTH	RAINFALL YEAR
ABIA	79°	72°	.26"	5.12"	29.34"
			.42"	7.12"	30.72"
AVG	83°	61°			
	1948	1901			

SUNRISE: 7:32 AM
SUNSET: 7:00 PM

And you see these “averages” presented every day!
Climate is simply the “average” of weather!



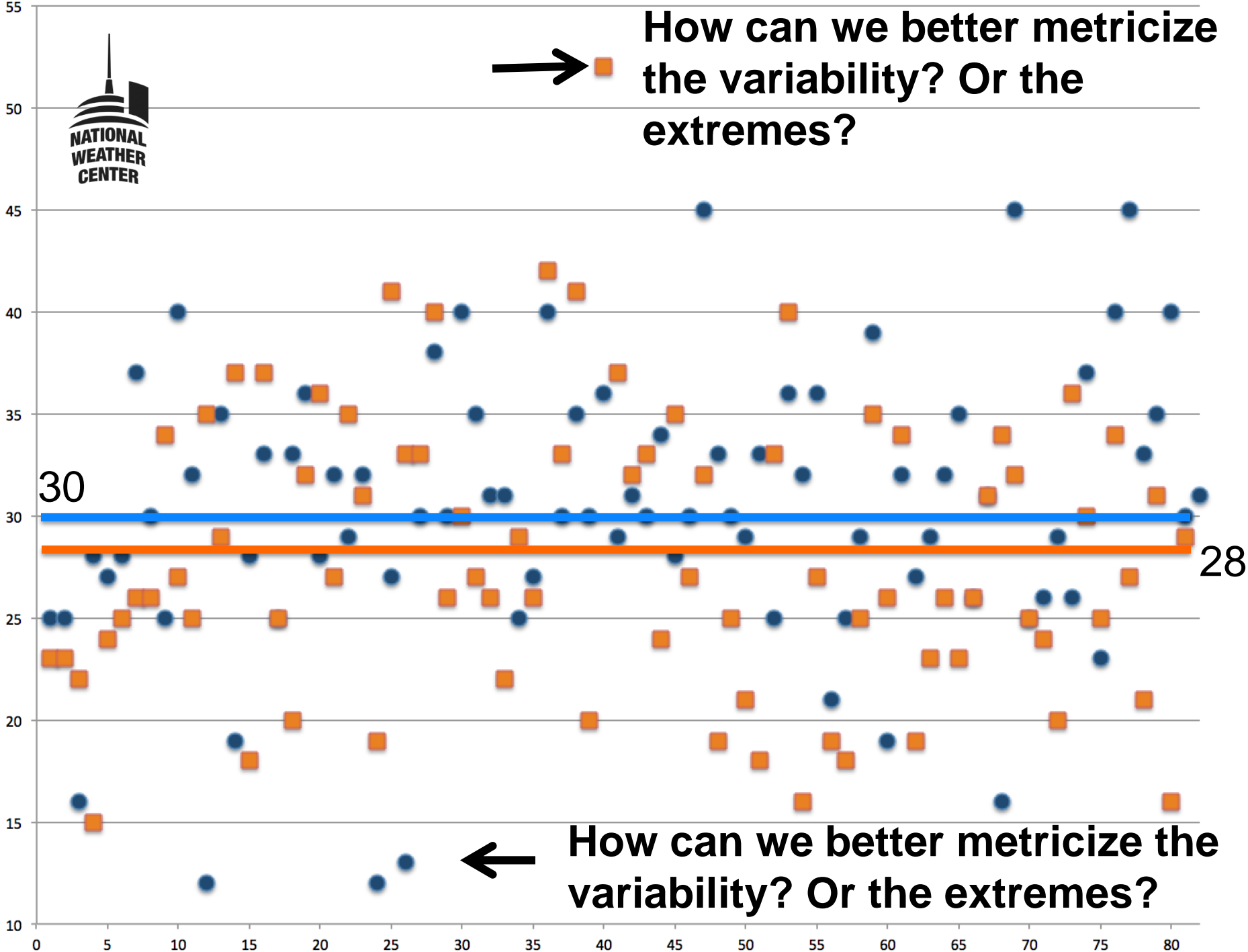
How can we better metricize the variability? Or the extremes?

30

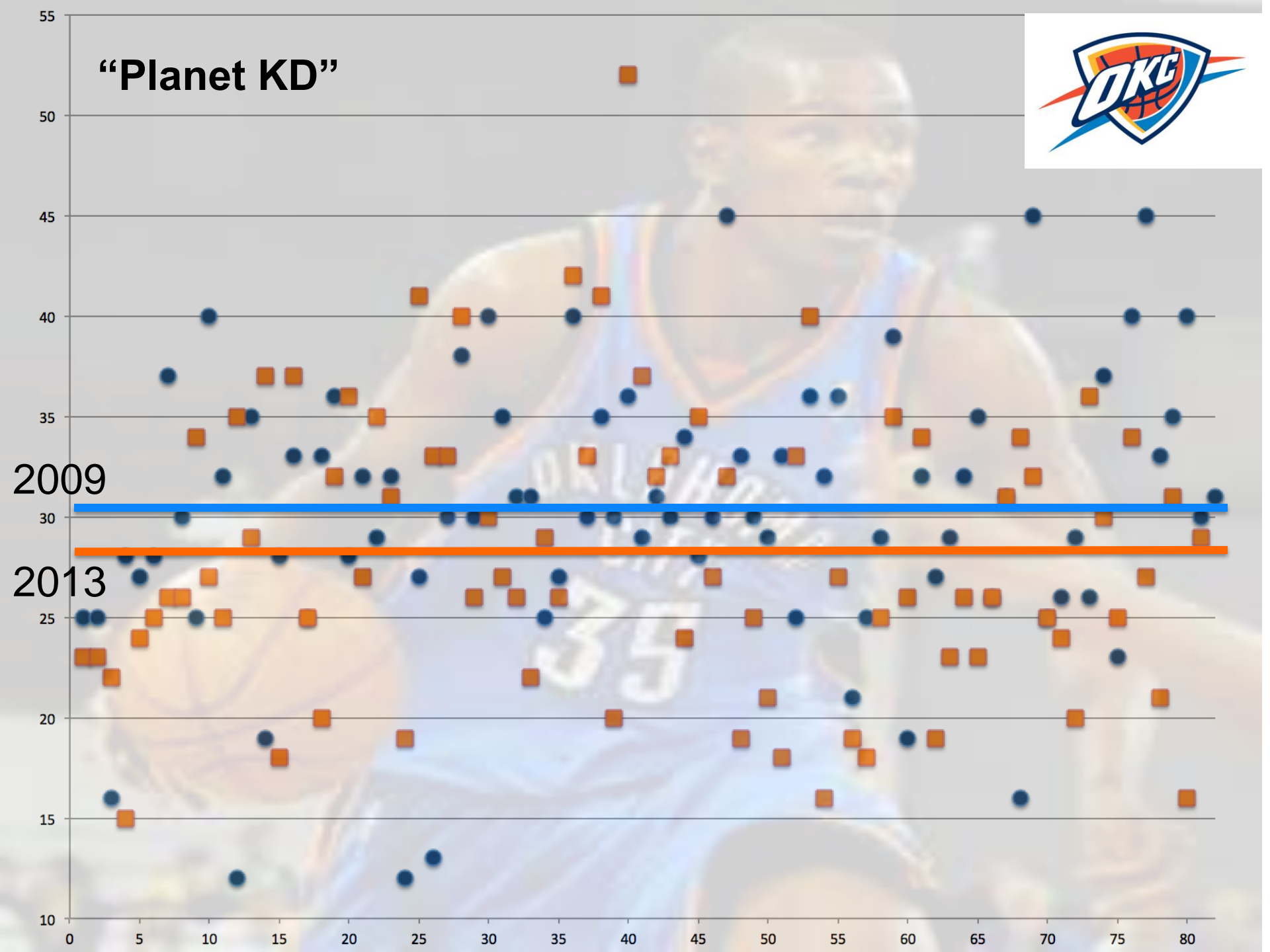
28



How can we better metricize the variability? Or the extremes?



“Planet KD”



2009

2013

Attribution IS the “HOLY GRAIL” of any statistical analysis!

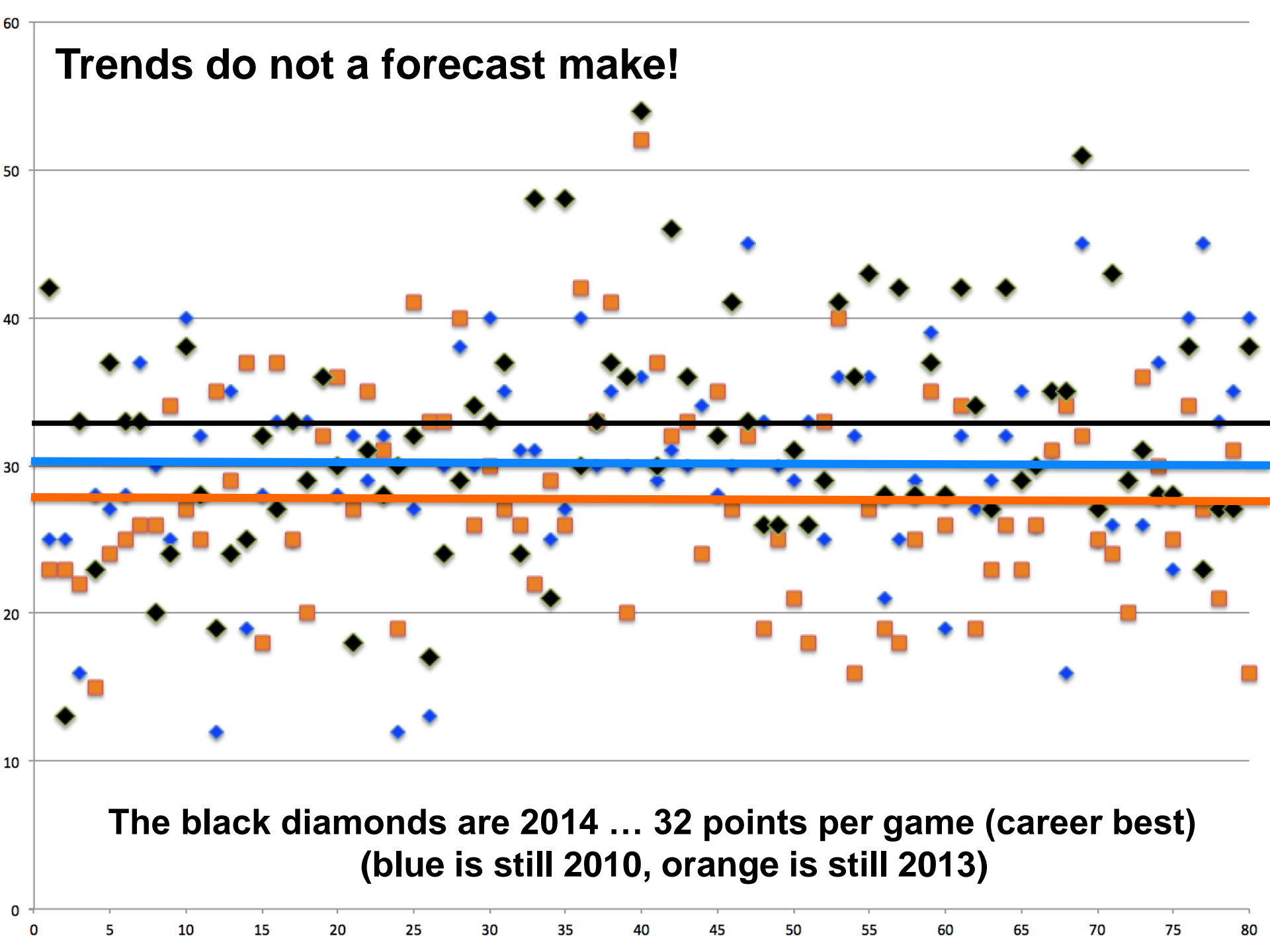
Why did Planet KD35’s “climate” decrease by 2 points per game from 2009 to 2013?

1. Planet KD climate is getting “colder”??
 - a) Getting older?
 - b) Injury?
2. Planet KD climate influenced by teammates?
 - a) Russell Westbrook taking too many shots?
 - b) Kendrick Perkins losing the ball out of bounds too often?
3. Planet KD climate influenced by coaching decisions?
 - a) pass more (assists from 2.8 in 2009 to 4.6 in 2013)?
 - b) play less (played 120 fewer minutes in 2013 than in 2009)?
4. Planet KD climate influenced by defense? (There are 5 players trying to prevent him from scoring!) *(he doesn't go to his left well!)*

Could it be a complex combination of all 4? Or more?

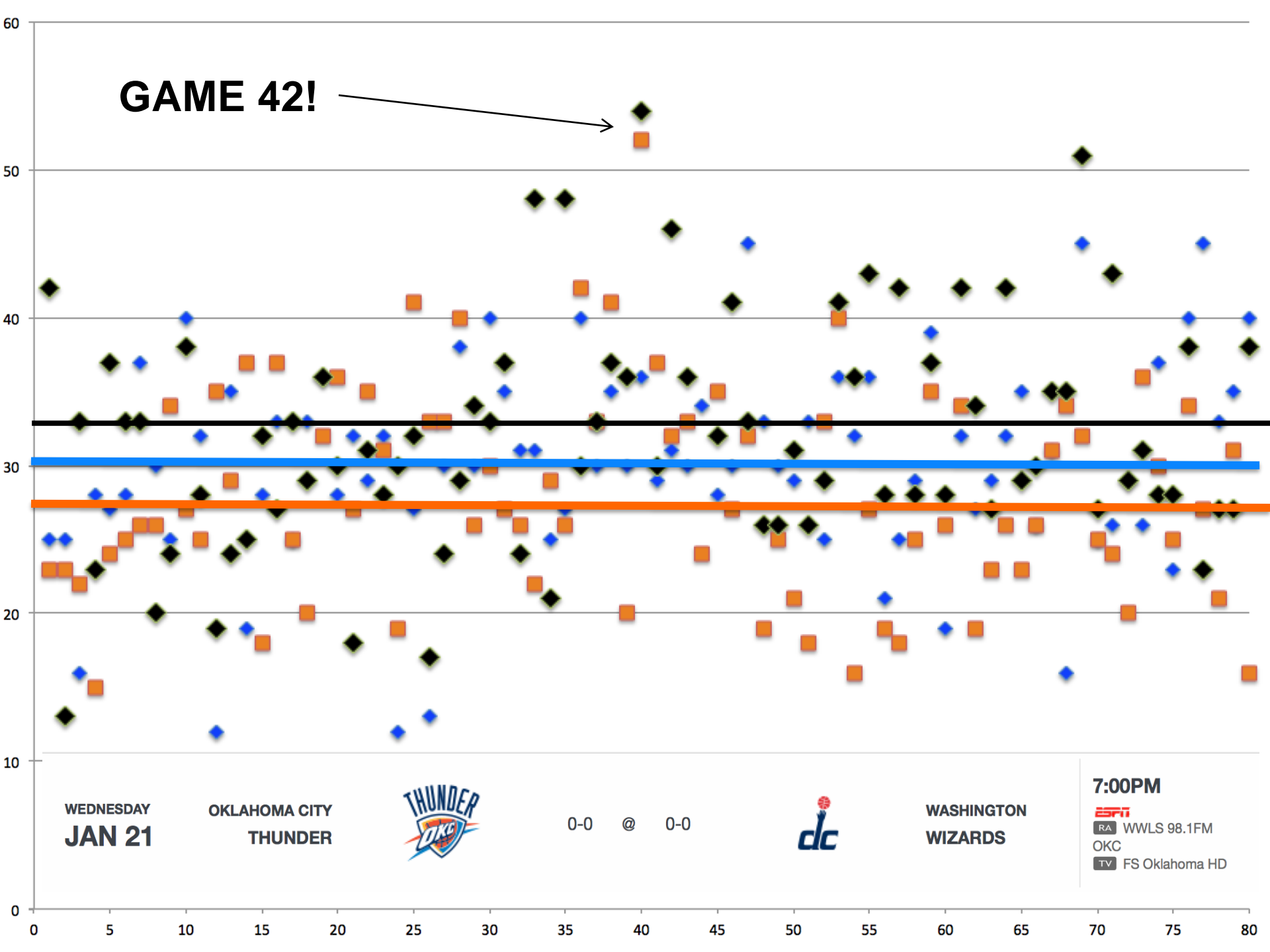
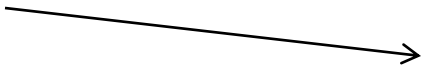
Internal factors? External factors? A combination? Can we even list them all? (and the domain is but 50 feet by 94 feet!!) And... what about the future???

Trends do not a forecast make!



**The black diamonds are 2014 ... 32 points per game (career best)
(blue is still 2010, orange is still 2013)**

GAME 42!



WEDNESDAY
JAN 21

OKLAHOMA CITY
THUNDER



0-0 @ 0-0



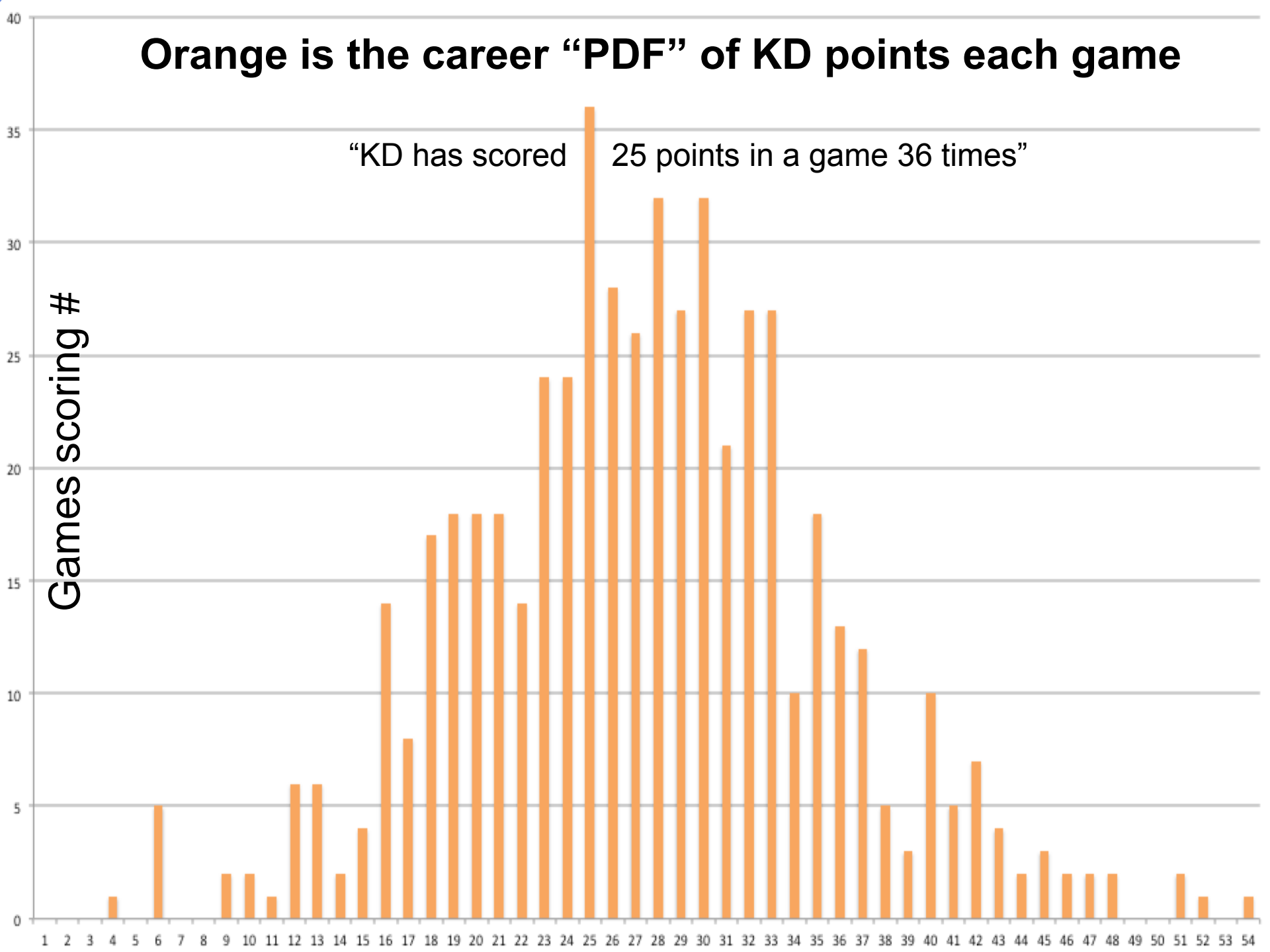
WASHINGTON
WIZARDS

7:00PM
ESPN
RA WWLS 98.1FM
OKC
TV FS Oklahoma HD

Orange is the career “PDF” of KD points each game

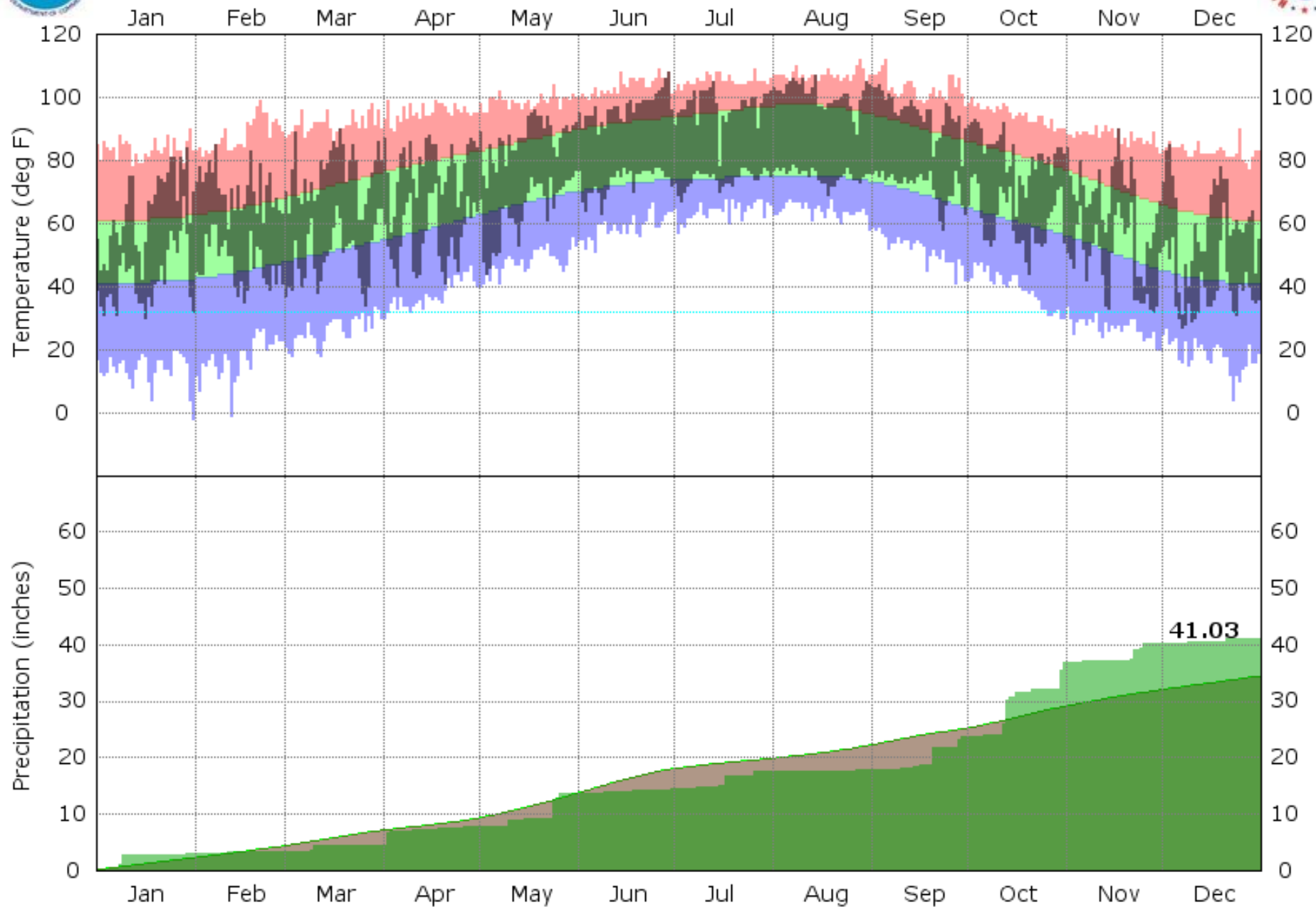
“KD has scored 25 points in a game 36 times”

Games scoring #

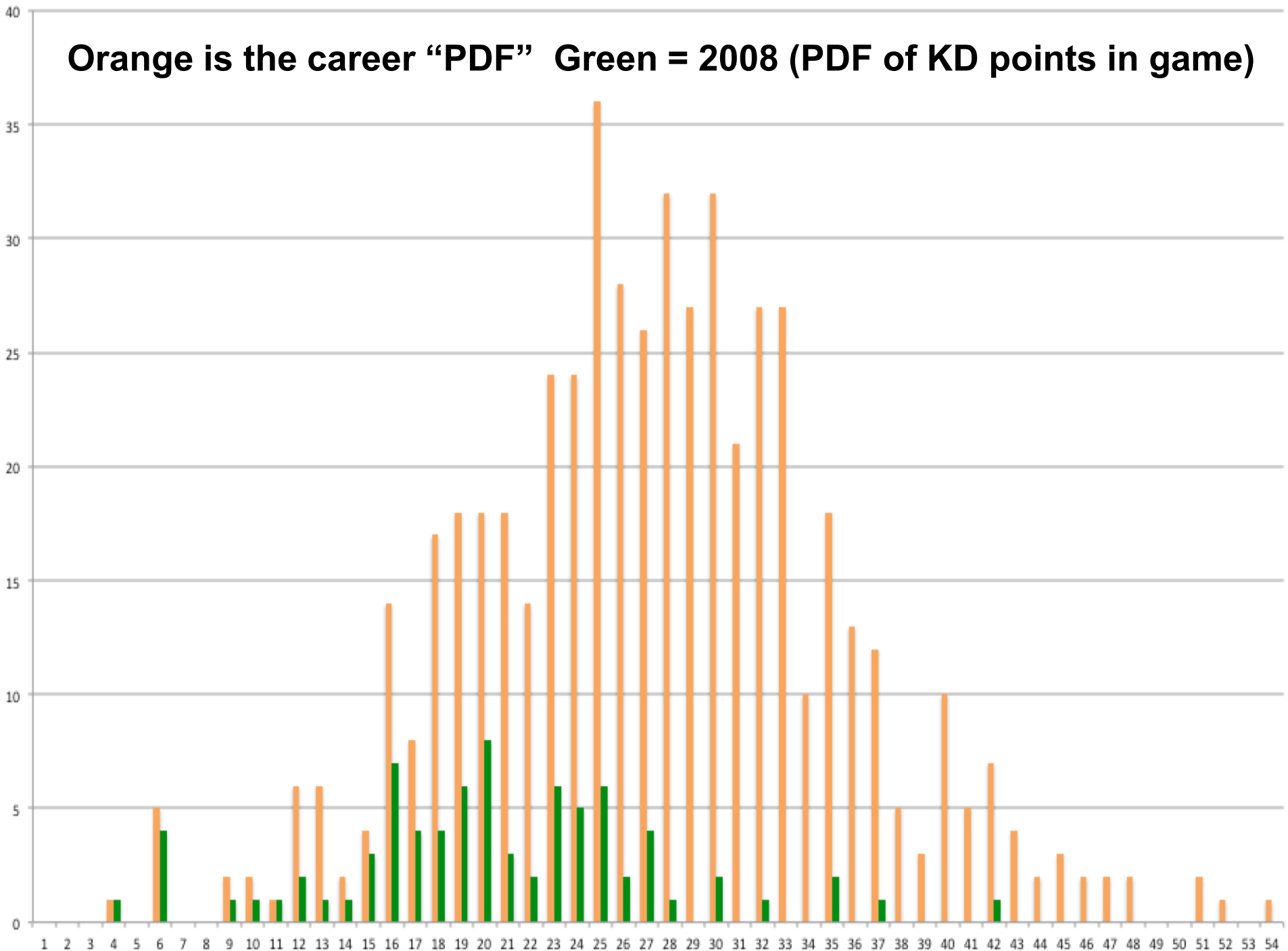




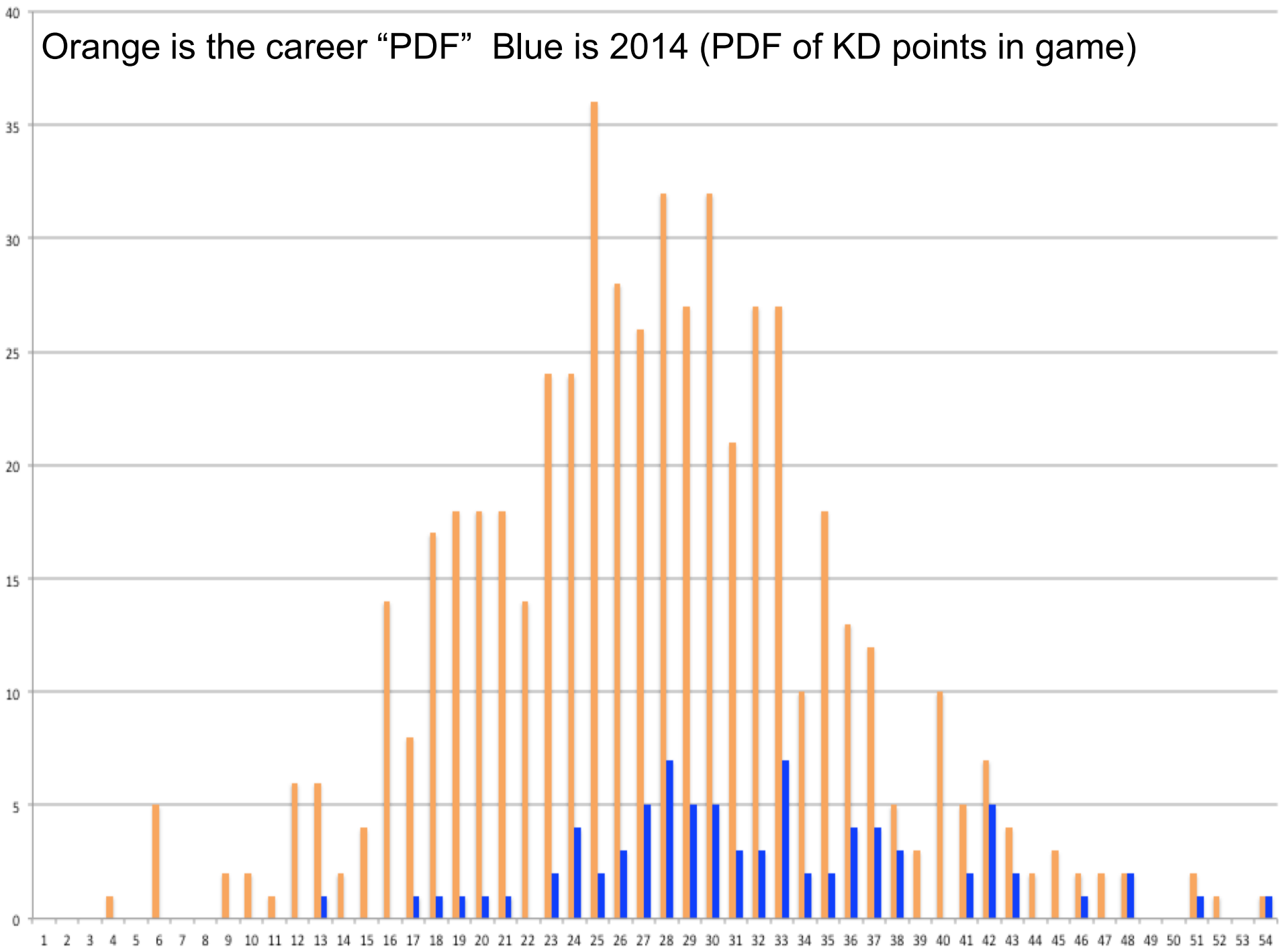
Austin Camp Mabry TX - 2013



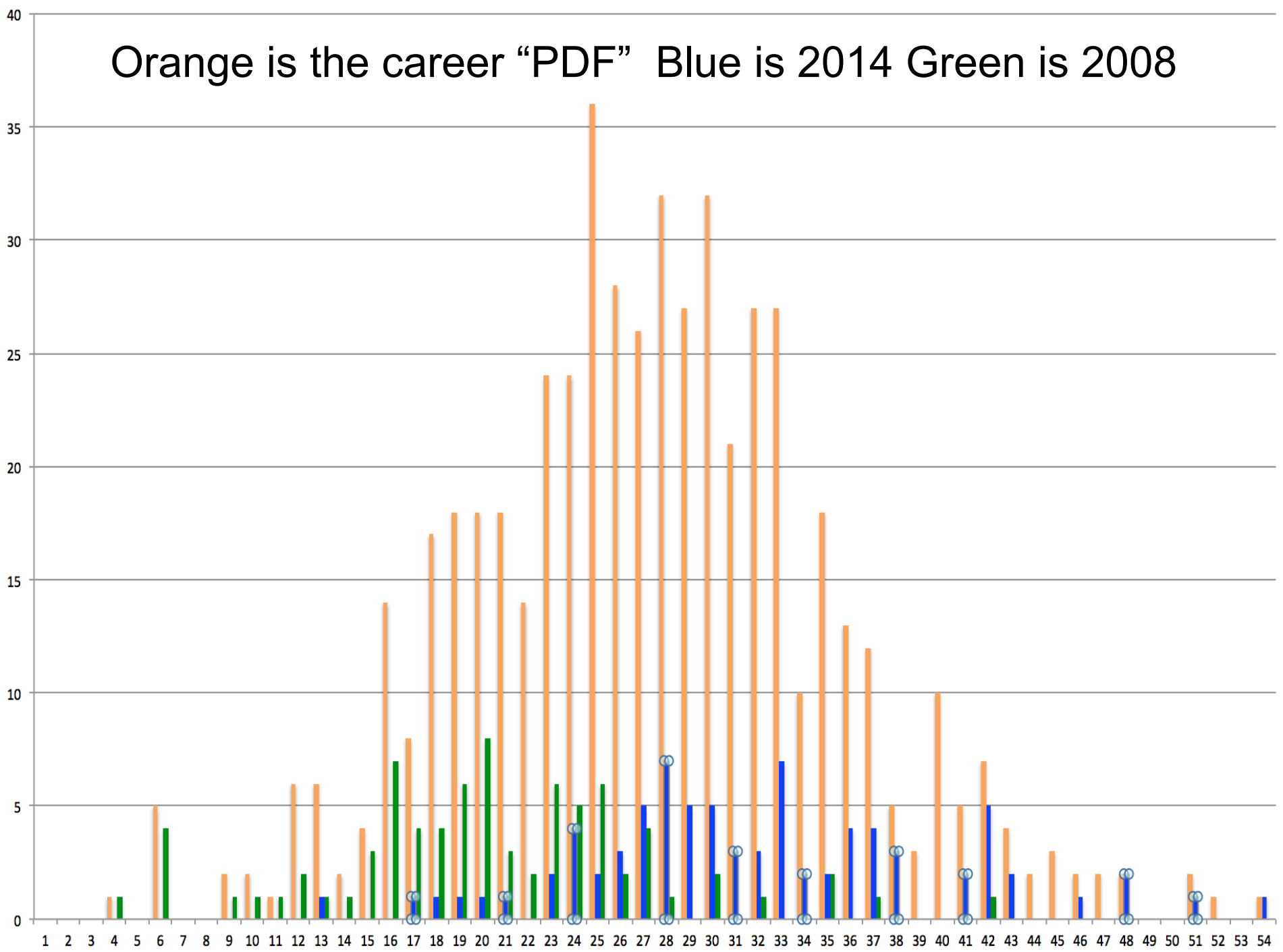
Orange is the career “PDF” Green = 2008 (PDF of KD points in game)



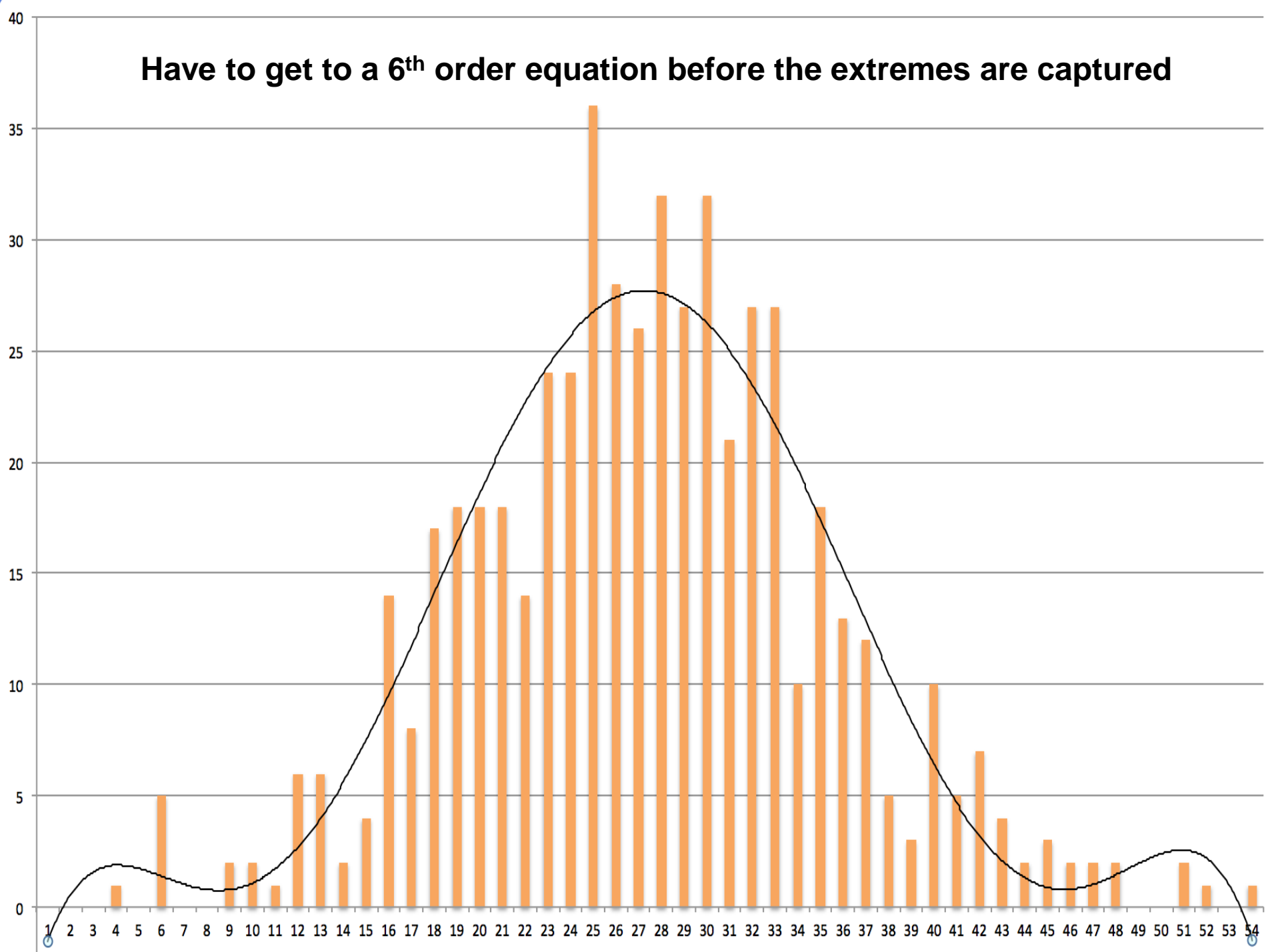
Orange is the career "PDF" Blue is 2014 (PDF of KD points in game)



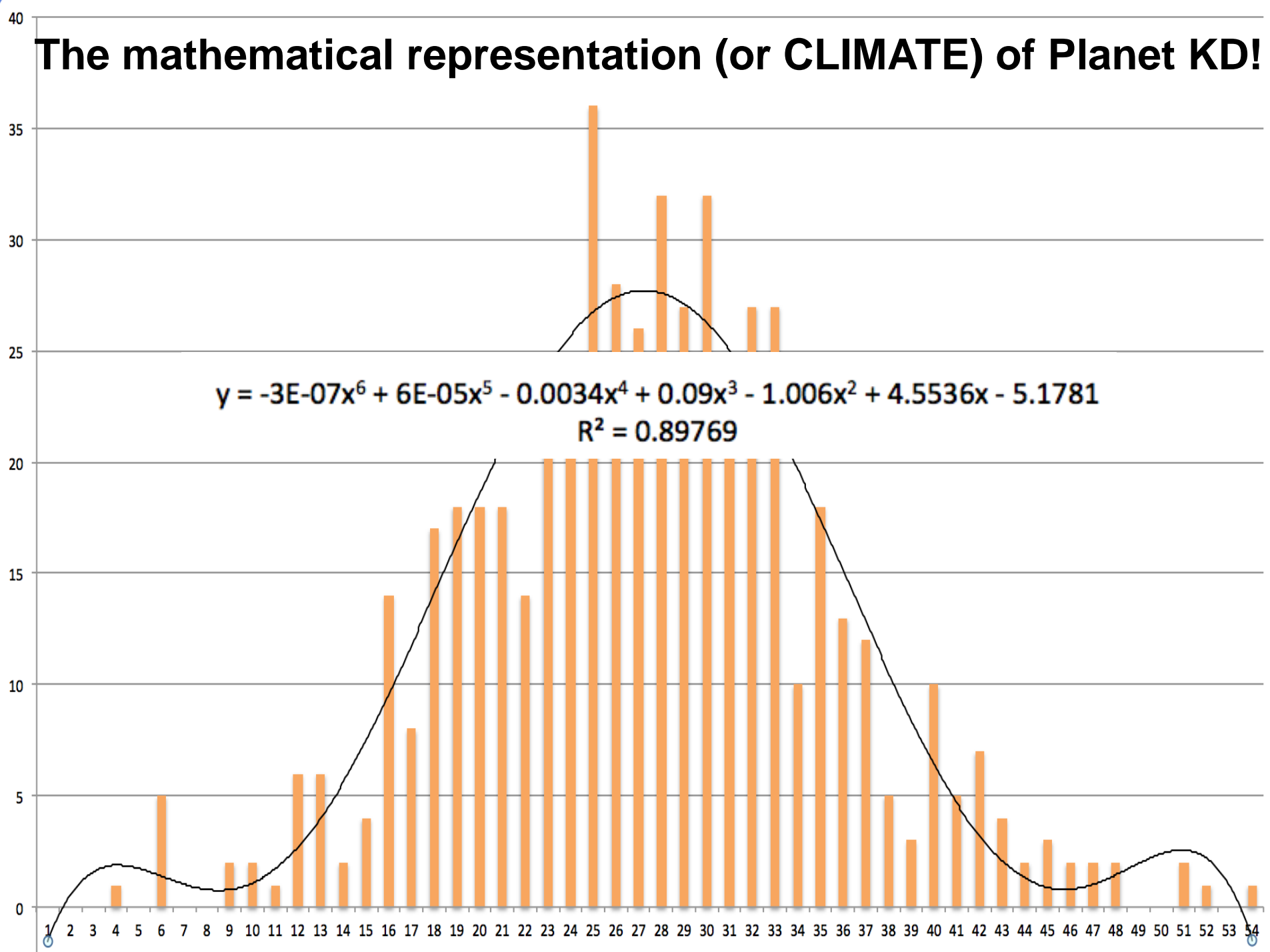
Orange is the career "PDF" Blue is 2014 Green is 2008



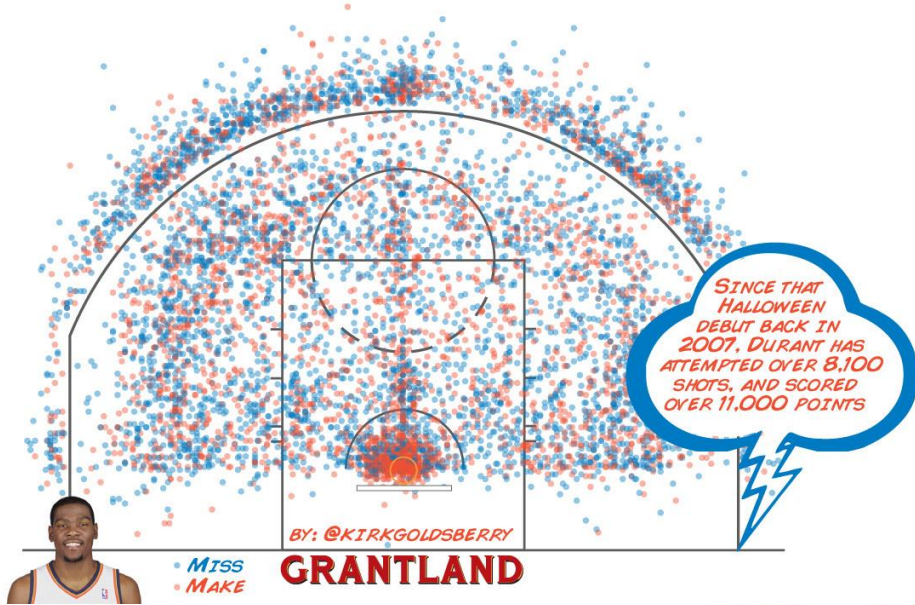
Have to get to a 6th order equation before the extremes are captured



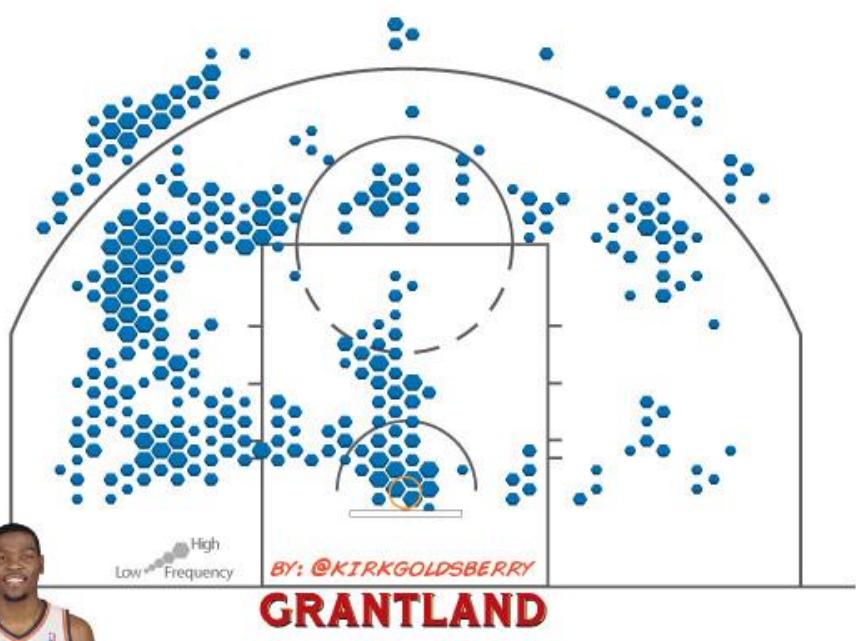
The mathematical representation (or CLIMATE) of Planet KD!



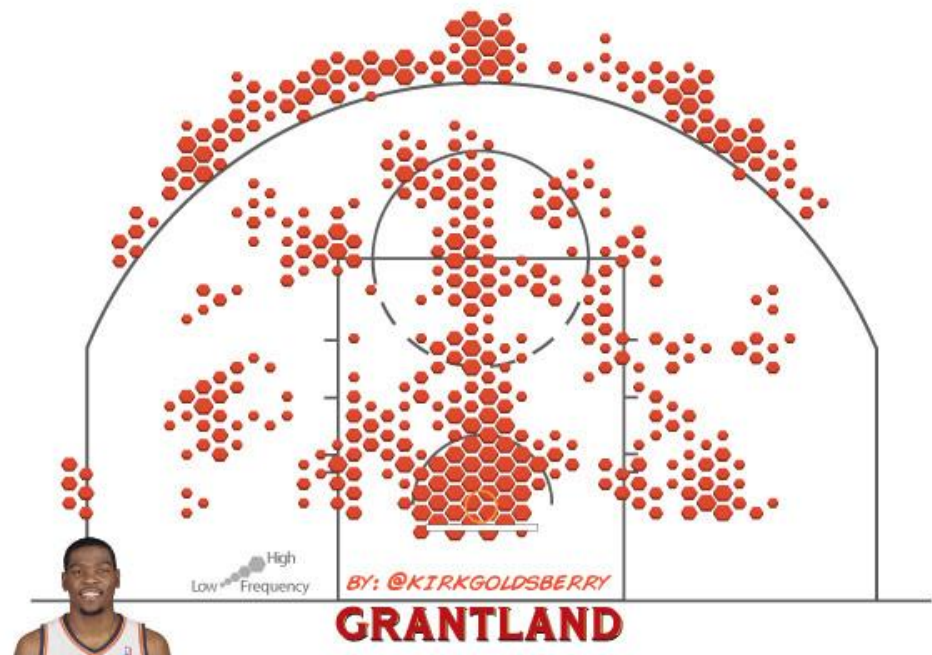
EVERY DURANT SHOT



ROOKIE DURANT



NEW DURANT

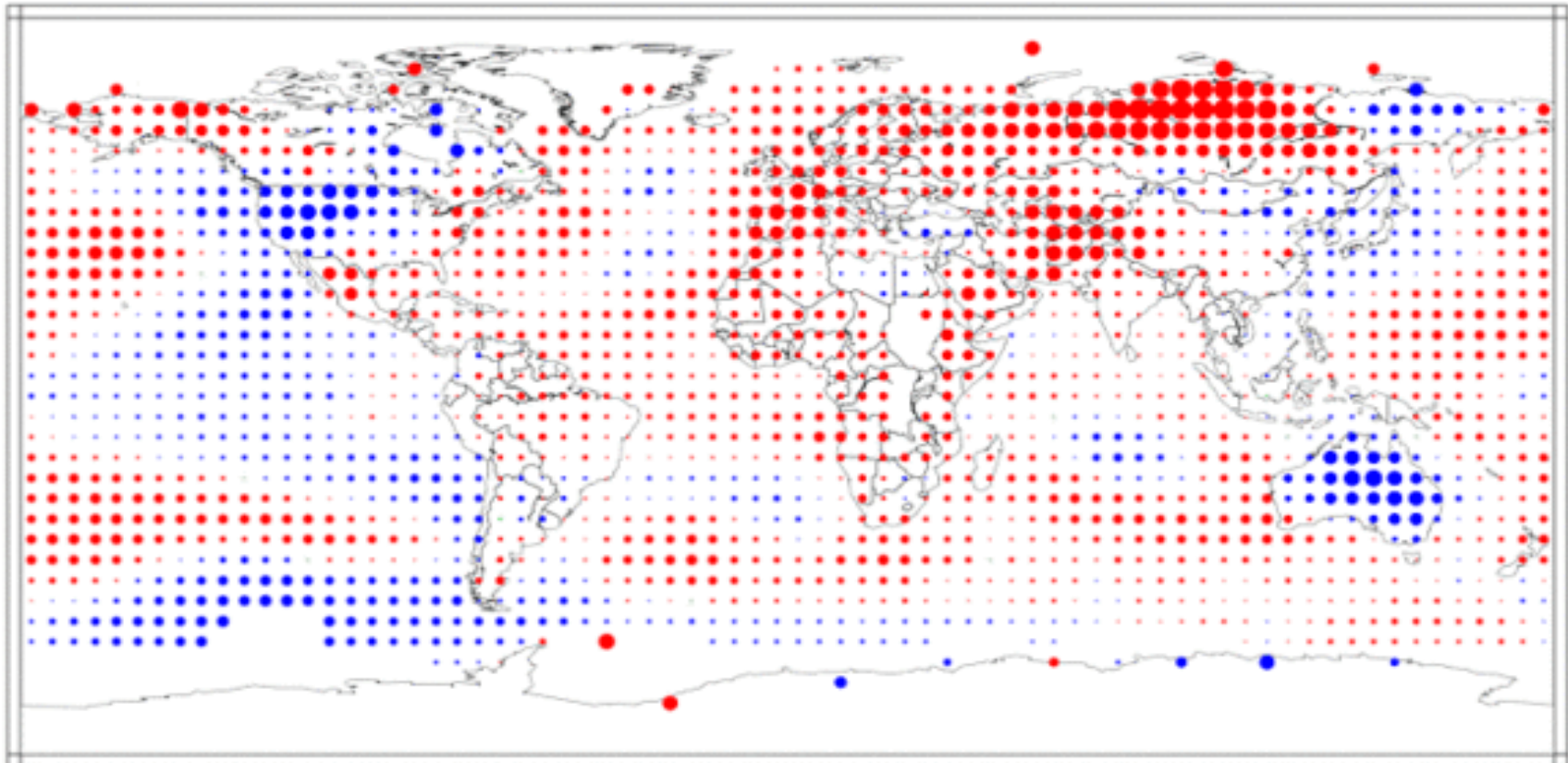


The Climatologist's Shot Chart!!

Temperature Anomalies May 2011

(with respect to a 1971-2000 base period)

National Climatic Data Center/NESDIS/NOAA



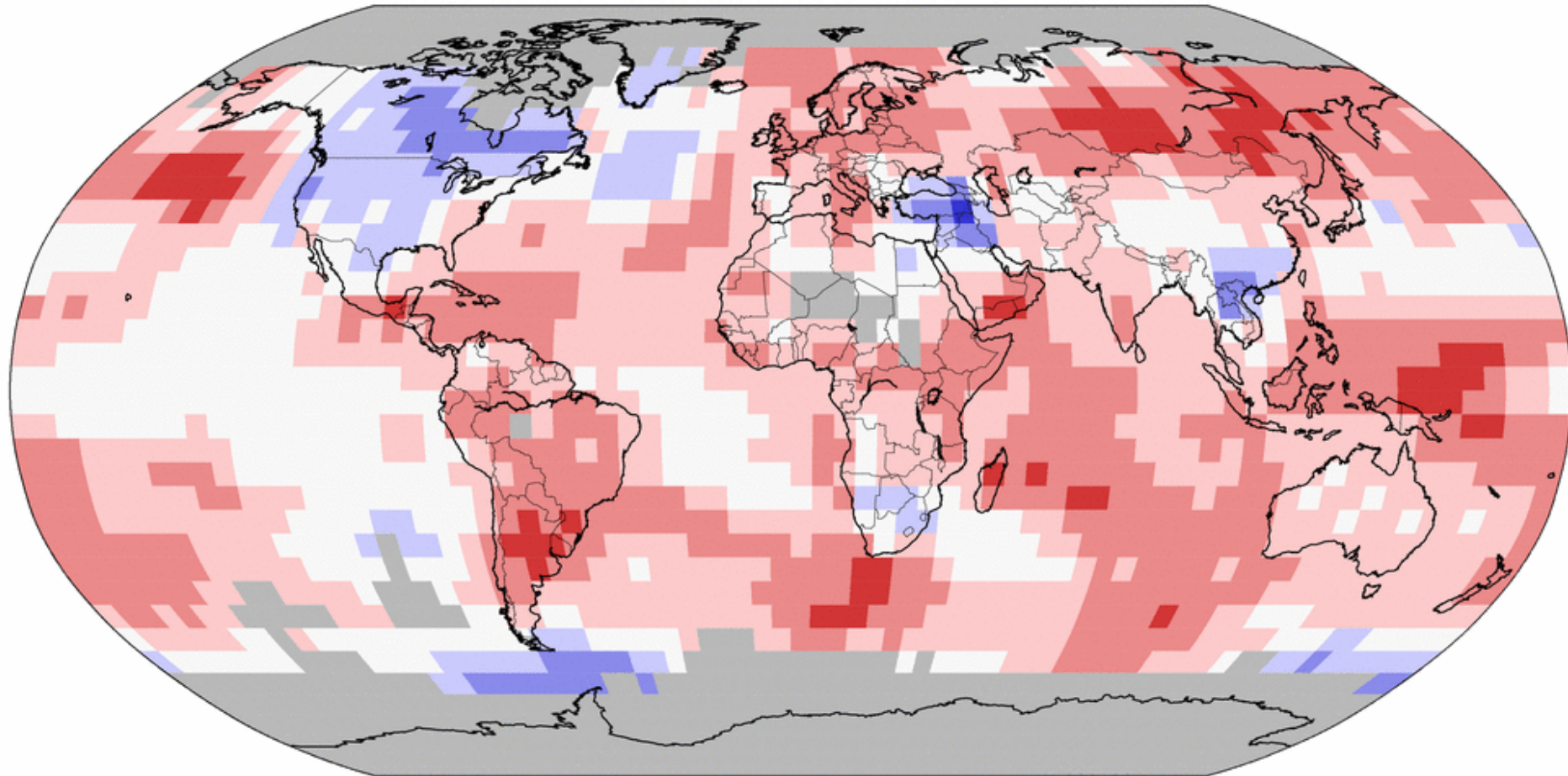
Degrees Celsius



Land & Ocean Temperature Percentiles Dec 2013

NOAA's National Climatic Data Center

Data Source: GHCN-M version 3.2.2 & ERSST version 3b




**Record
Coldest**


**Much
Cooler than
Average**


**Cooler than
Average**


**Near
Average**


**Warmer than
Average**


**Much
Warmer than
Average**

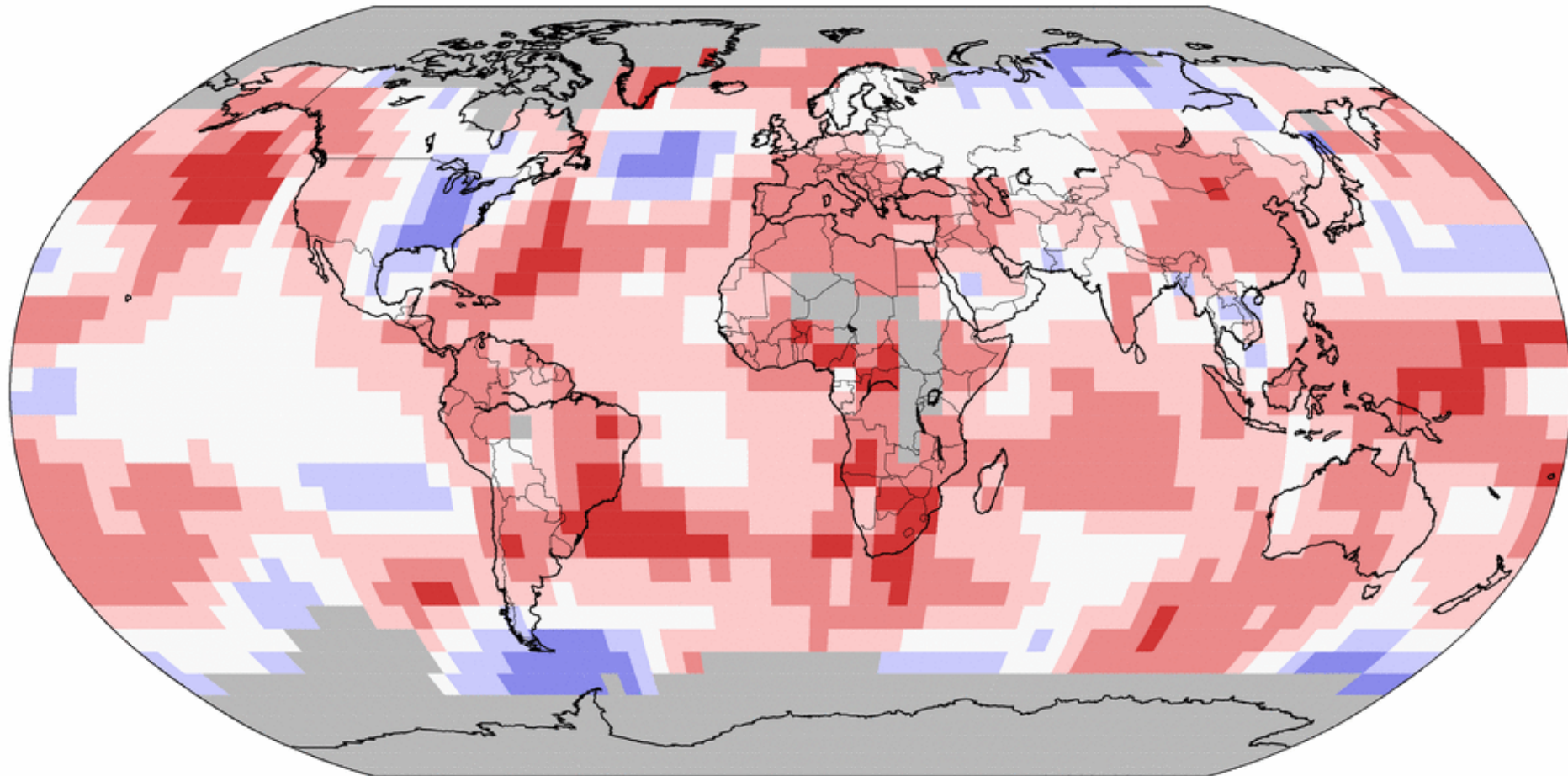

**Record
Warmest**



Land & Ocean Temperature Percentiles Jan 2014

NOAA's National Climatic Data Center

Data Source: GHCN-M version 3.2.2 & ERSST version 3b




**Record
Coldest**


**Much
Cooler than
Average**


**Cooler than
Average**


**Near
Average**


**Warmer than
Average**


**Much
Warmer than
Average**

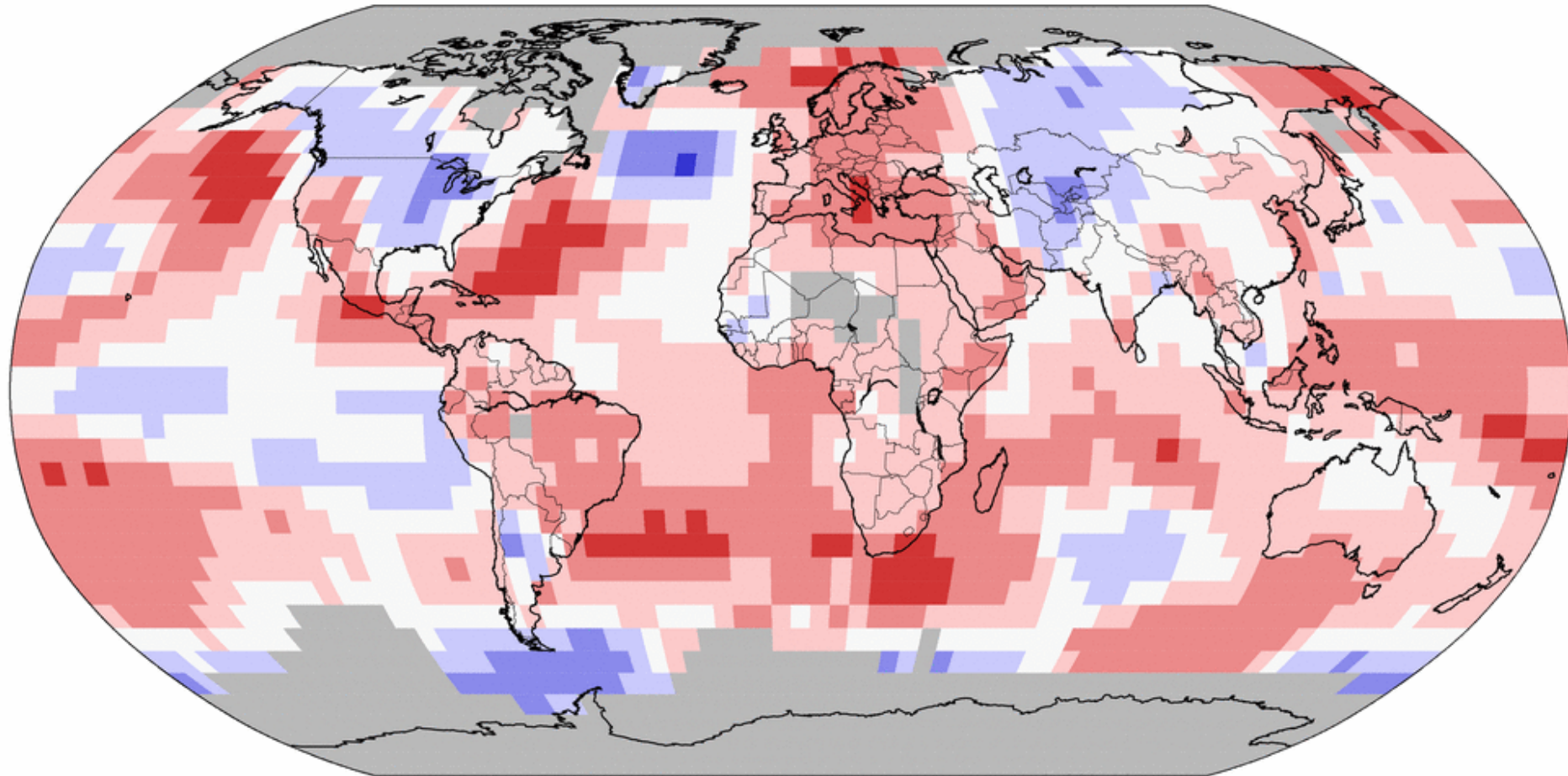

**Record
Warmest**



Land & Ocean Temperature Percentiles Feb 2014

NOAA's National Climatic Data Center

Data Source: GHCN-M version 3.2.2 & ERSST version 3b




**Record
Coldest**


**Much
Cooler than
Average**


**Cooler than
Average**


**Near
Average**


**Warmer than
Average**


**Much
Warmer than
Average**

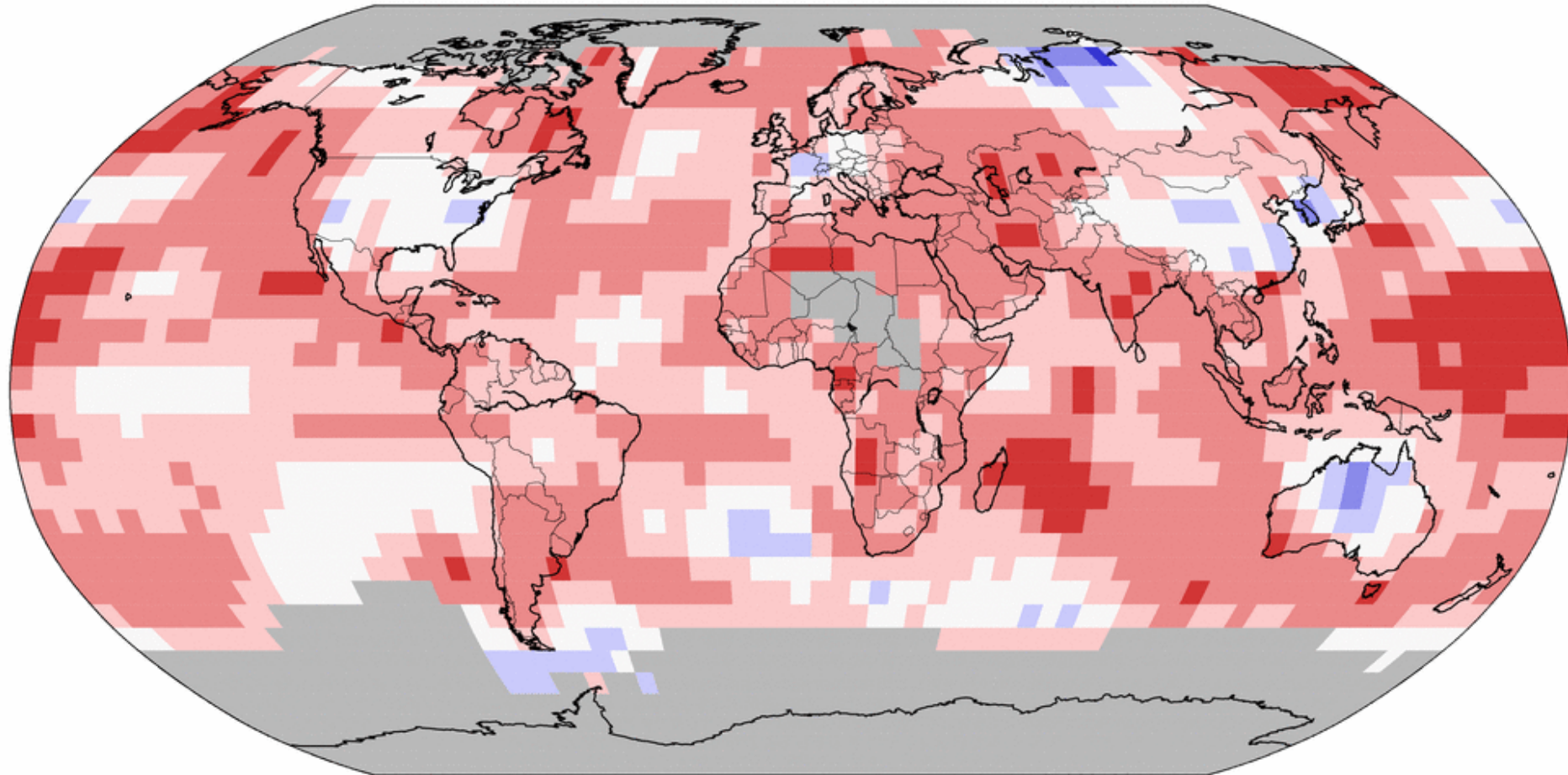

**Record
Warmest**



Land & Ocean Temperature Percentiles Aug 2014

NOAA's National Climatic Data Center


Data Source: GHCN-M version 3.2.2 & ERSST version 3b




Record Coldest


Much Cooler than Average


Cooler than Average


Near Average


Warmer than Average


Much Warmer than Average


Record Warmest



August 2014 marked the 29th consecutive August and 353rd consecutive month with a global temperature above the 20th century average.

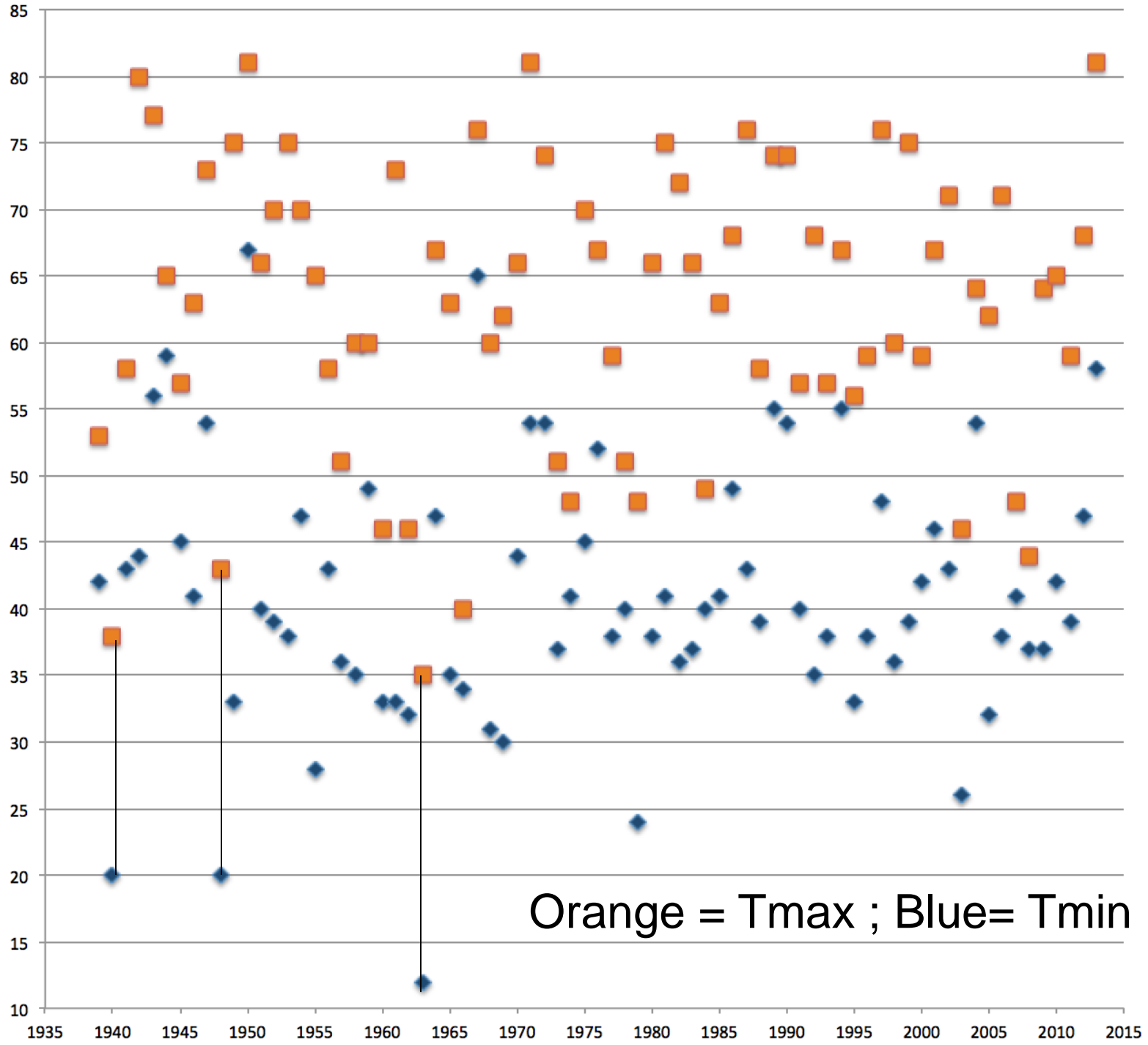
The last global, below-average monthly temperature for any month was February 1985.

August 2014 marked the 29th consecutive August and 353rd consecutive month with a global temperature above the 20th century average.

The last global, below-average monthly temperature for any month was February 1985.

**Imagine if KD went 30 years and never scored less than his career average on ANY night. (27 points/game)
(1/2 a year was nightly news!)**

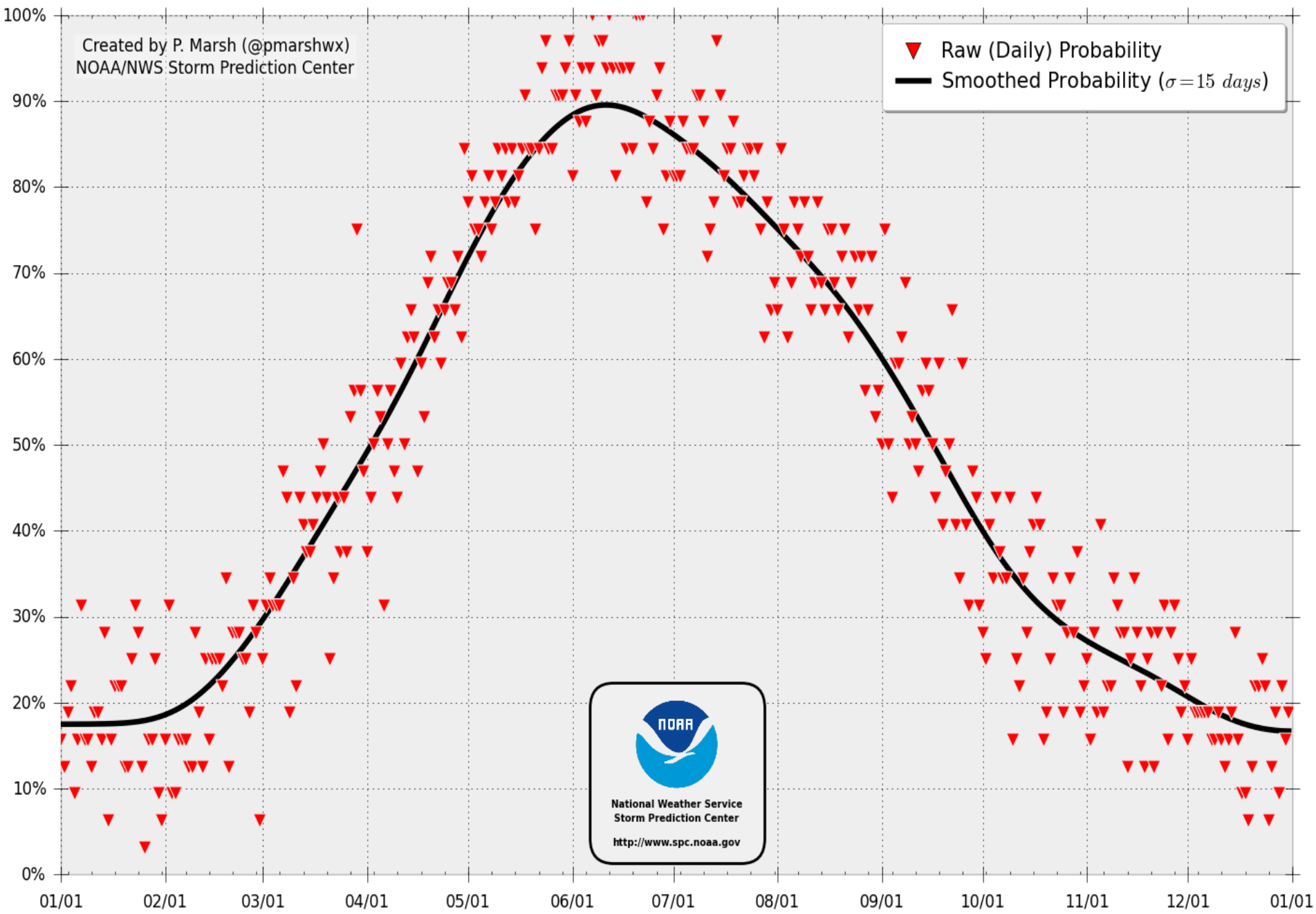
AUSTIN MABRY MAX/NIM TEMP (F) ON JAN 24



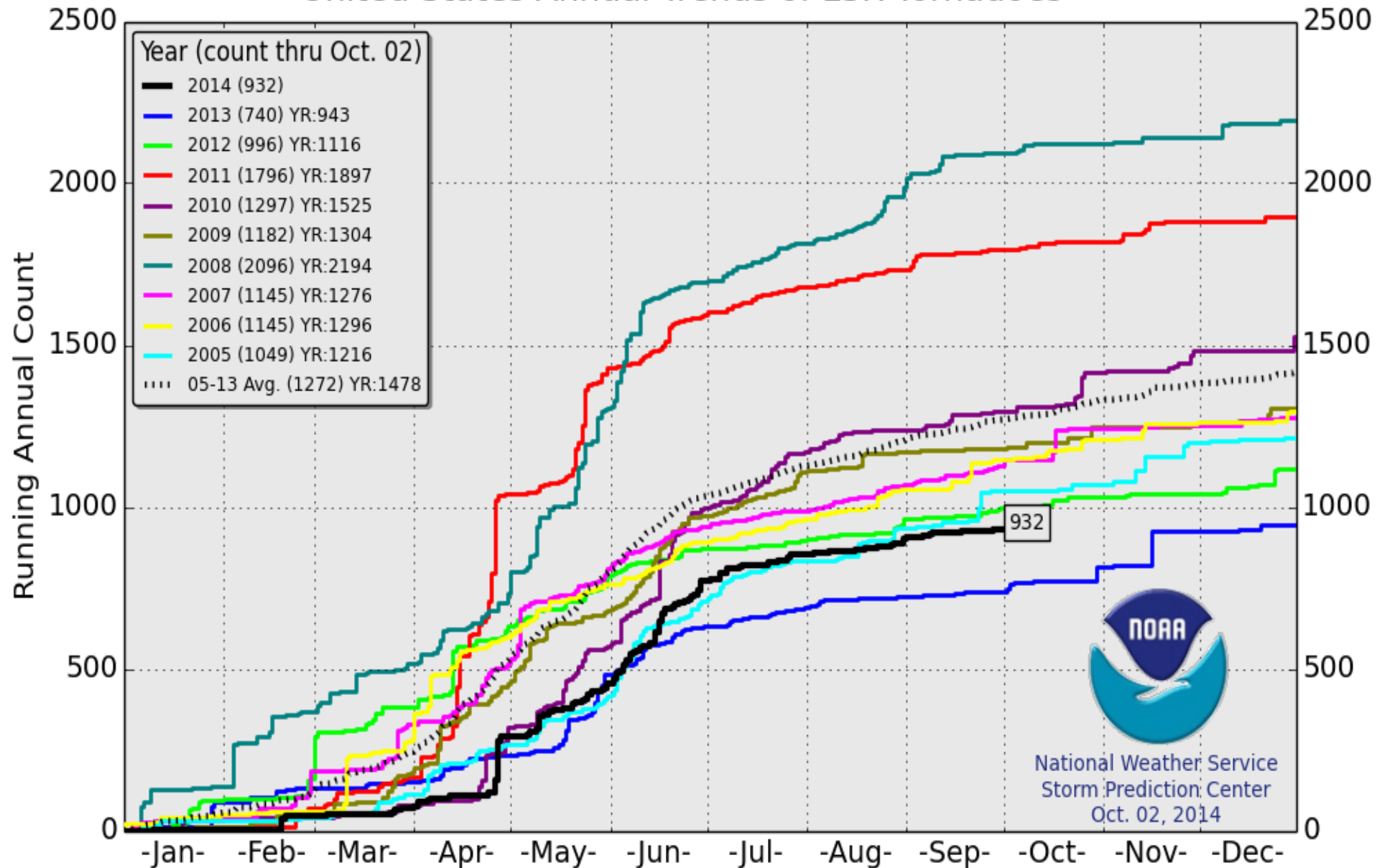


01 Aerial Views of Austin, showing Camp Mabry. 5/64 bg

Daily Probability of 1+ Tornadoes in the United States Derived From 1980-2011



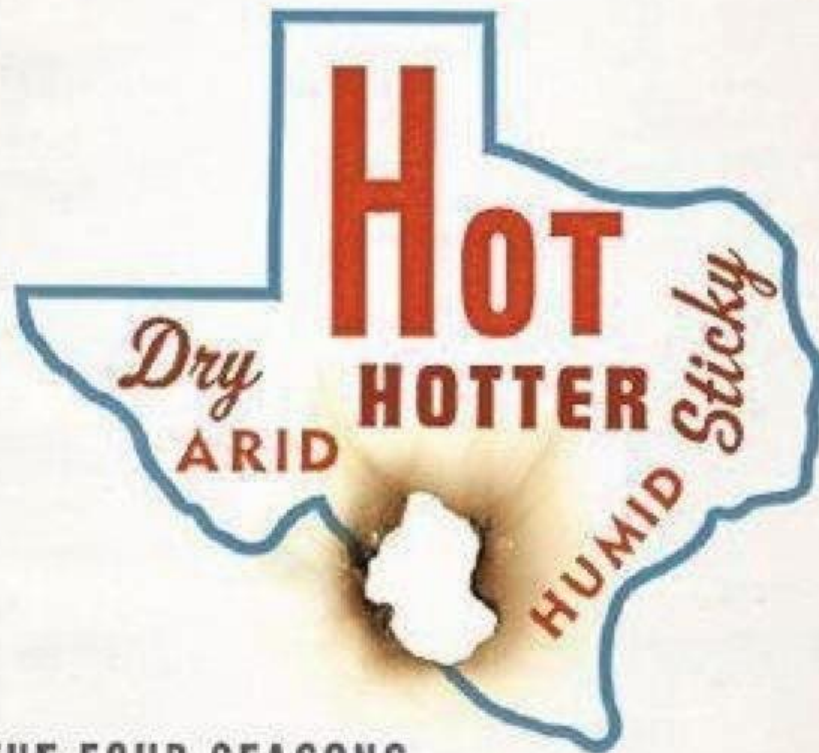
United States Annual Trends of LSR Tornadoes*



National Weather Service
Storm Prediction Center
Oct. 02, 2014

*Preliminary sightings/events from NWS Local Storm Reports (LSRs)
Annual average is based on preliminary LSRs 2005-2013

A CRASH COURSE IN
TEXAS WEATHER



THE FOUR SEASONS



JANUARY



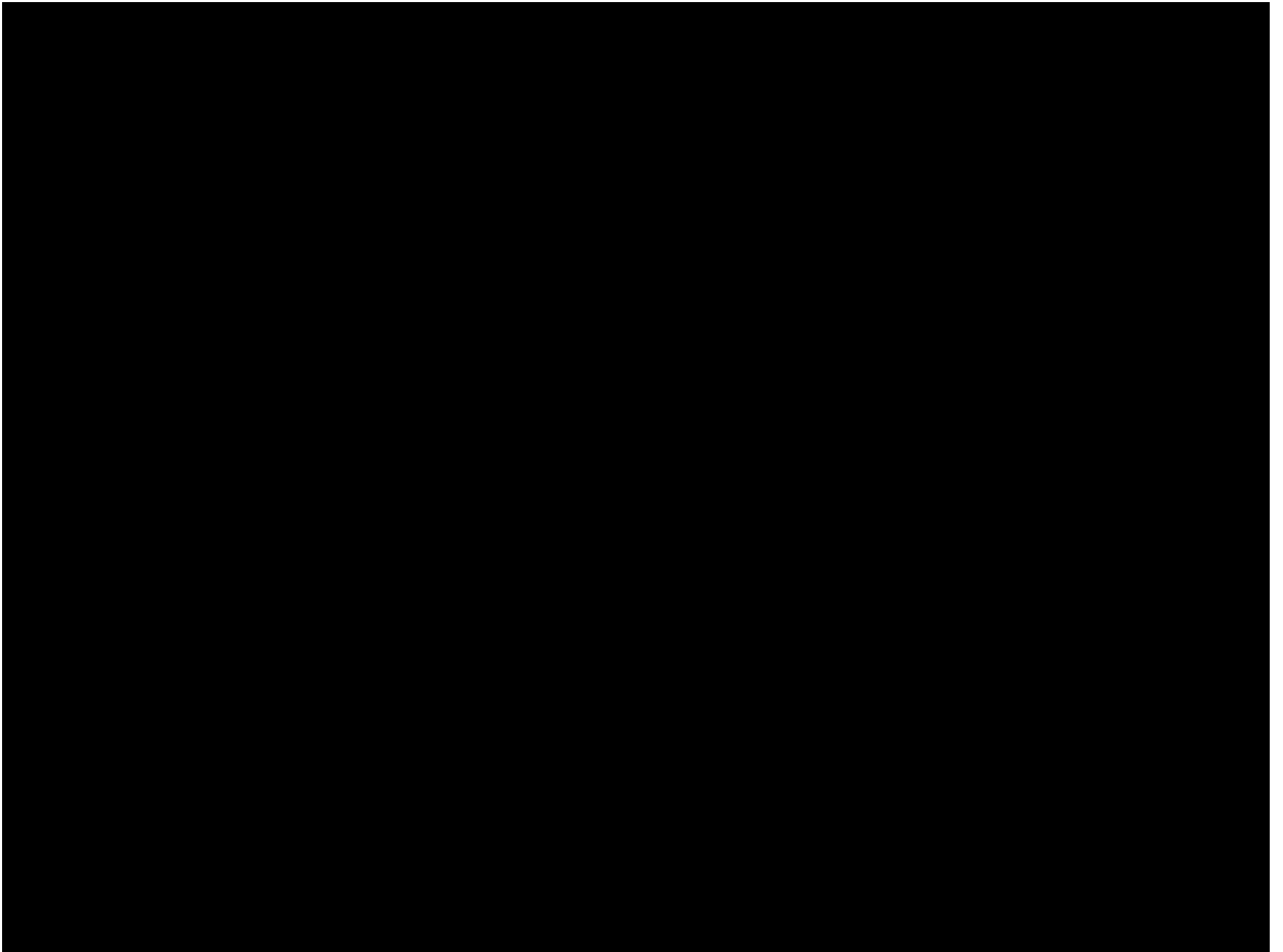
SUMMER

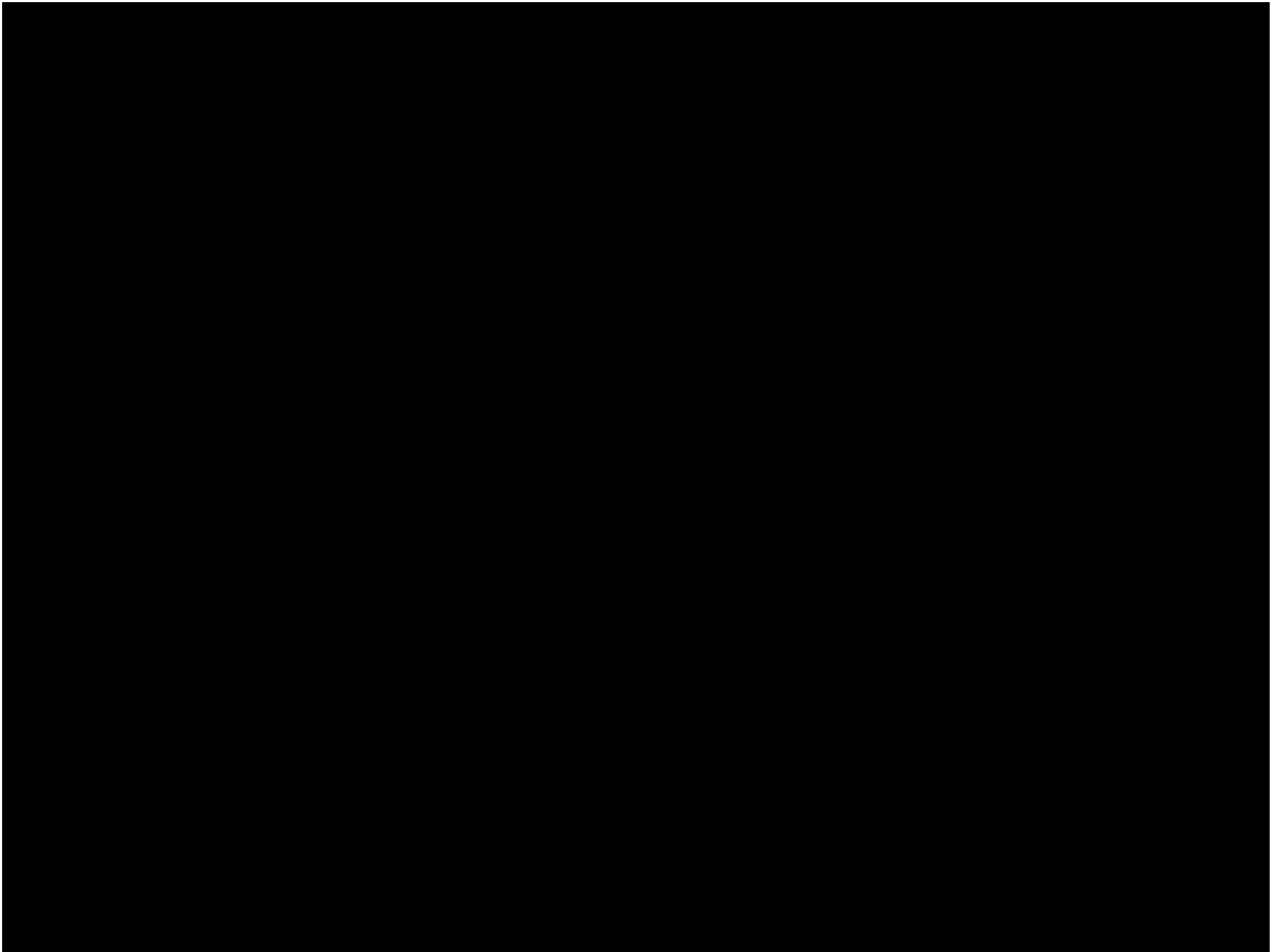


SUMMERER



CHRISTMAS









CONTACT: Longhorn@OU.edu



@TexasEmbassy



Hot Science
Cool Talks

THANK YOU and HOOK EM HORNS!
Dr. Kevin Kloesel, UT-Austin Class of 1984

Dr. Kevin Kloesel



Kevin Kloesel provides weather data, analysis and expertise to stakeholders and decision-makers throughout the state of Oklahoma and OU. Make no mistake when it comes to sports however, as Kevin is a Lifetime Longhorn.

Kevin works with thousands of K-12 students and teachers and has provided weather-related training to several foreign countries, the NFL, NCAA, NASCAR, as well as numerous sports venues, concert halls, and amusement parks. He was the content designer for Scholastic's The Magic School Bus Kicks Up a Storm children's museum exhibit currently on tour.