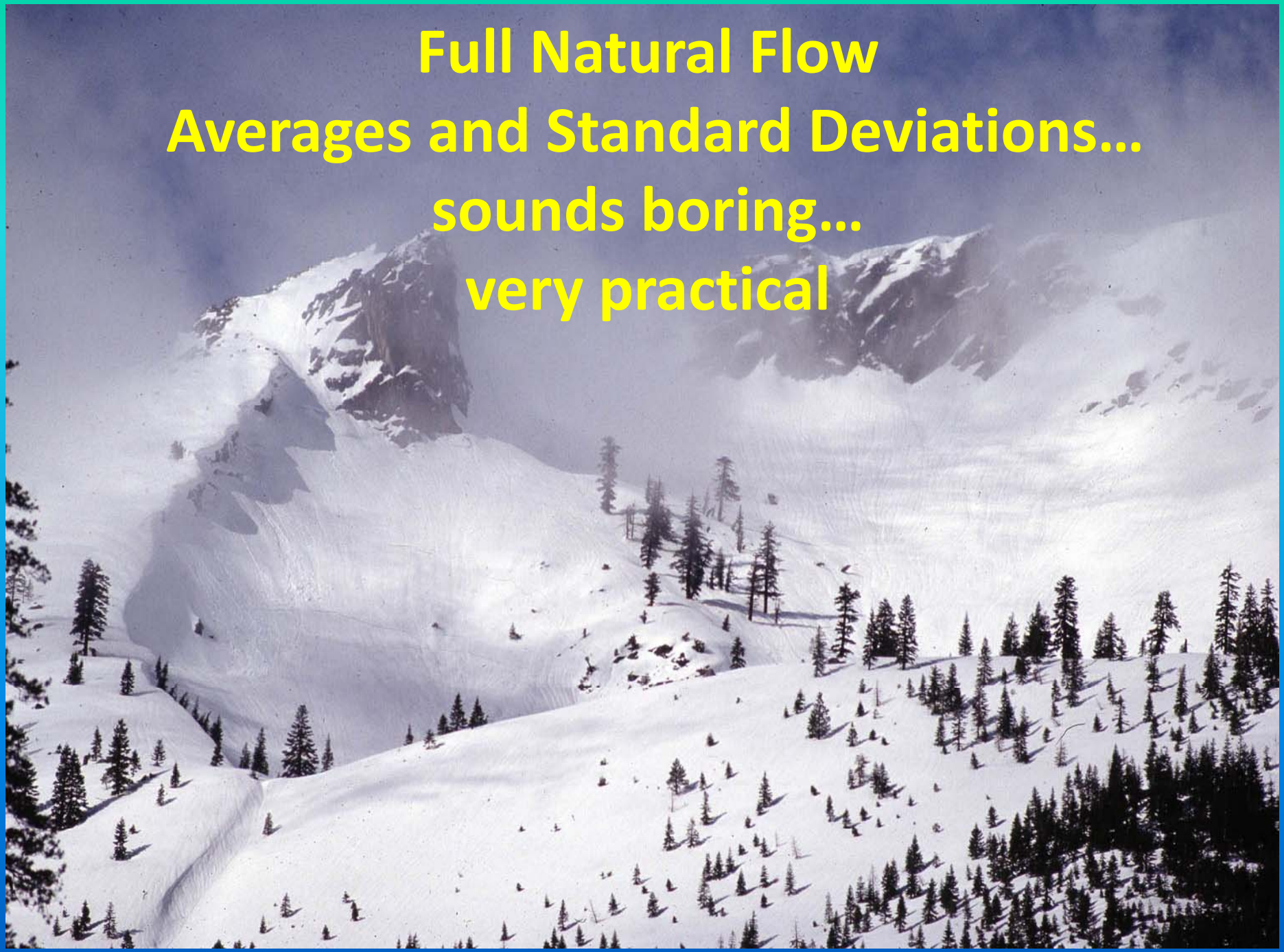
California Cooperator's Snow Conference

Wuksachi Lodge

Sequoia National Park

Nov 7-9, 2012



Full Natural Flow
Averages and Standard Deviations…
sounds boring…
very practical

How often do we experience average?

Kids per class in 5th grade?

160 kids/3 classes

53.3 kids per class

How often do we experience average?

Lightning strikes on a mountain top in a year?

43 strikes/12 years

3.58333 strikes per year

How often have we experienced average Apr-Jul flows in the Mokelumne R from 1961-2010?

Average: 460.7636 taf

Has it happened? Never

How often do we experience

Full Natural Flow (FNF) in the Feather R within

10% of the average in January?

a) 2 out of 107

b) 6 out of 107

c) 13 out of 107

d) 15 out of 107

e) 18 out of 107

How often do we experience

Full Natural Flow (FNF) in the Feather R within

10% of the average in January?

a) 2 out of 107

b) 6 out of 107

c) 13 out of 107

d) 15 out of 107

e) 18 out of 107

How often do we experience

Full Natural Flow (FNF) in the Feather R within

15% of the average in April-July?

a) 8 out of 107

b) 11 out of 107

c) 15 out of 107

d) 22 out of 107

e) 24 out of 107

How often do we experience

Full Natural Flow (FNF) in the Feather R within

15% of the average in April-July?

a) 8 out of 107

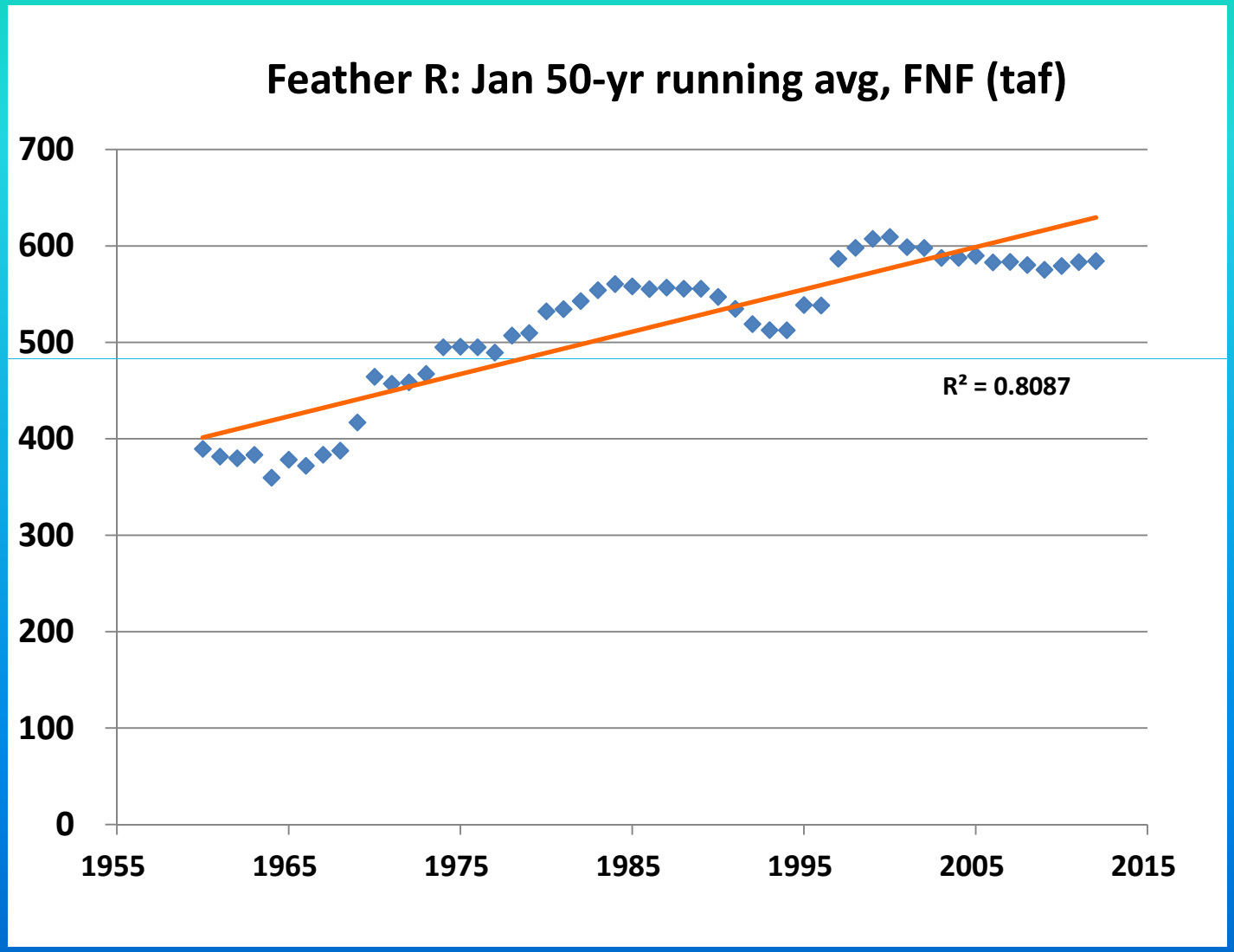
b) 11 out of 107

c) 15 out of 107

d) 22 out of 107

e) 24 out of 107

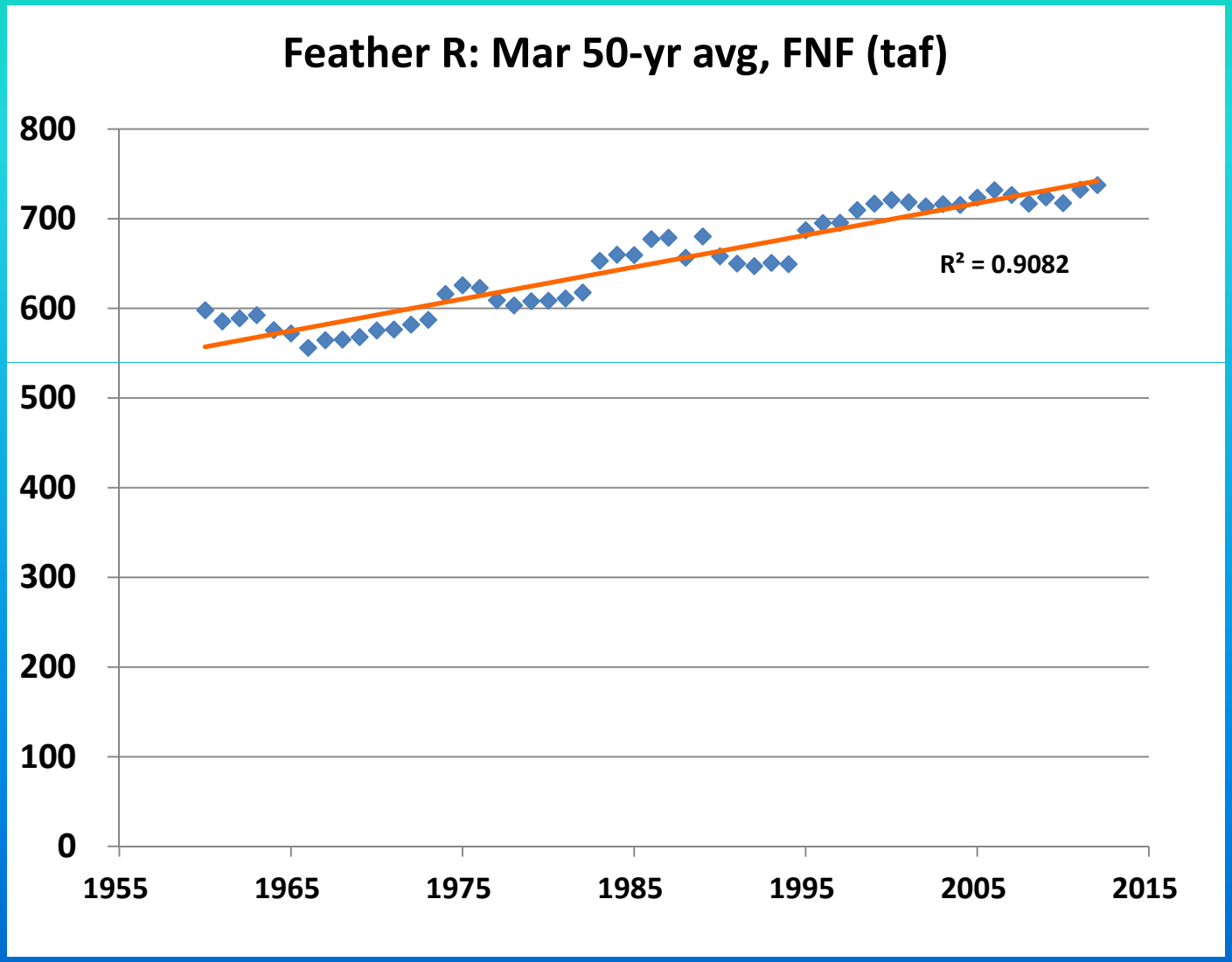
- **What has been the trend in the Feather R for the 50-yr January, March, April and Apr-Jul running average?**



Range of trendline:

Up

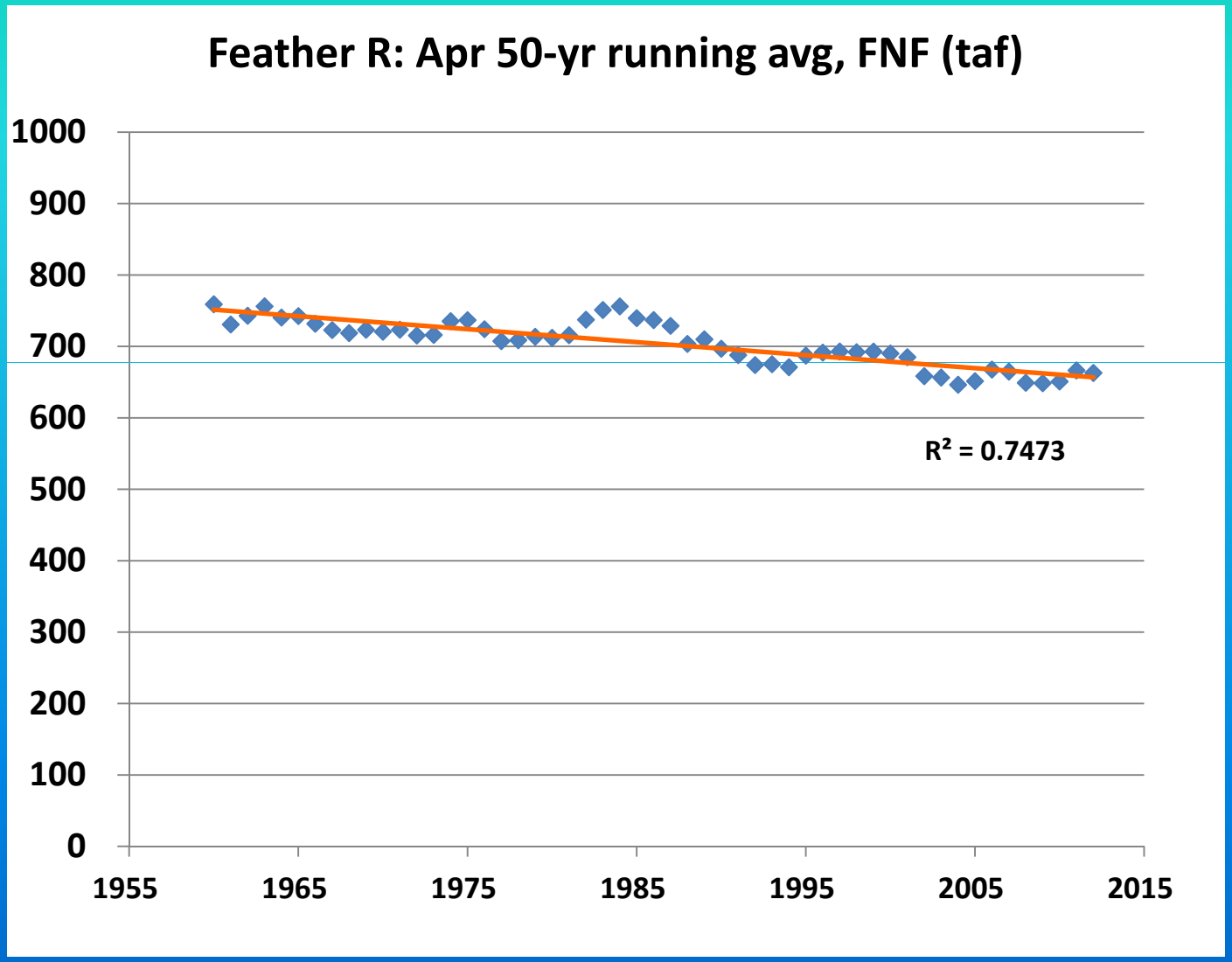
400 – 630



Range of trendline:

Up

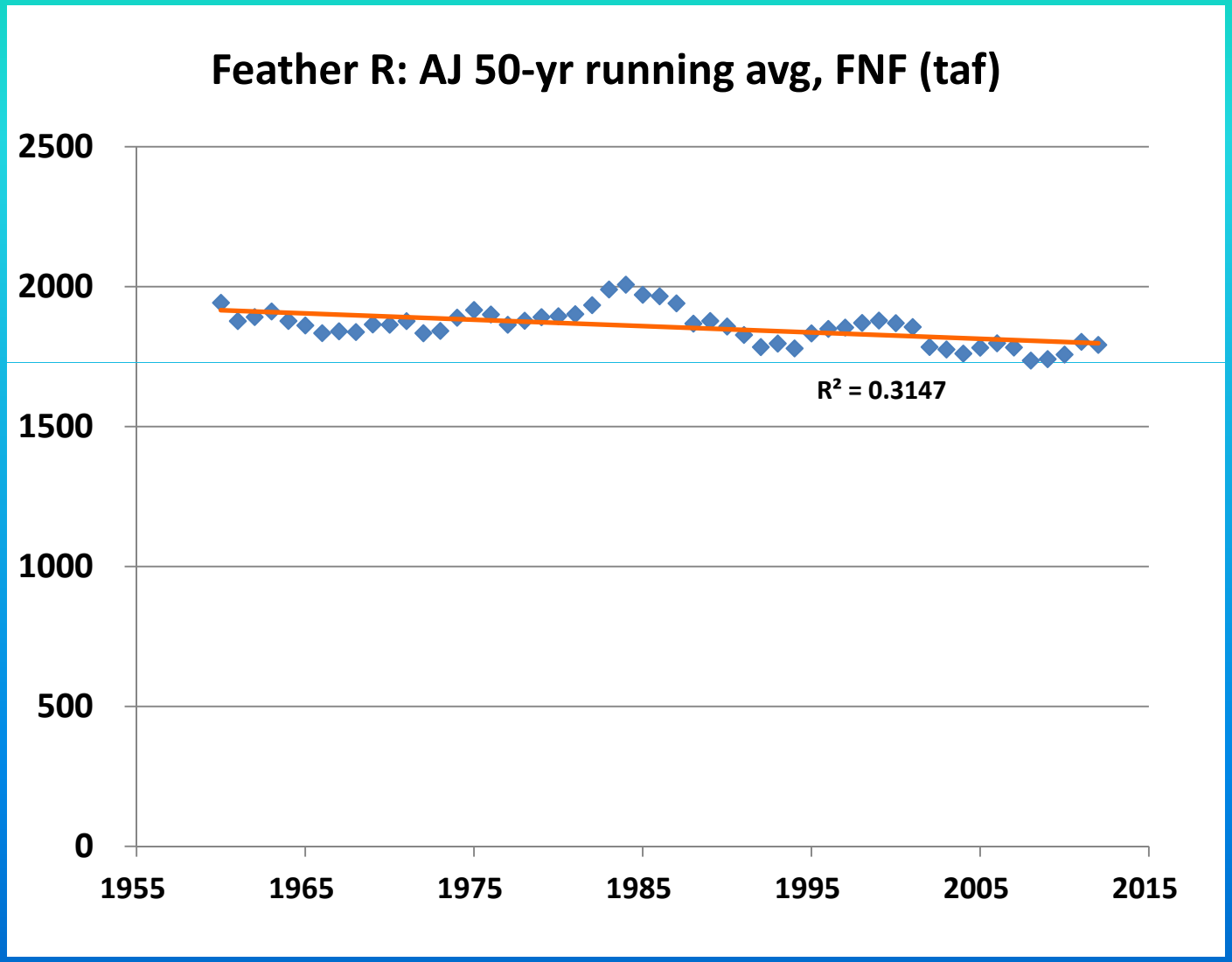
560 – 740



Range of trendline:

Down

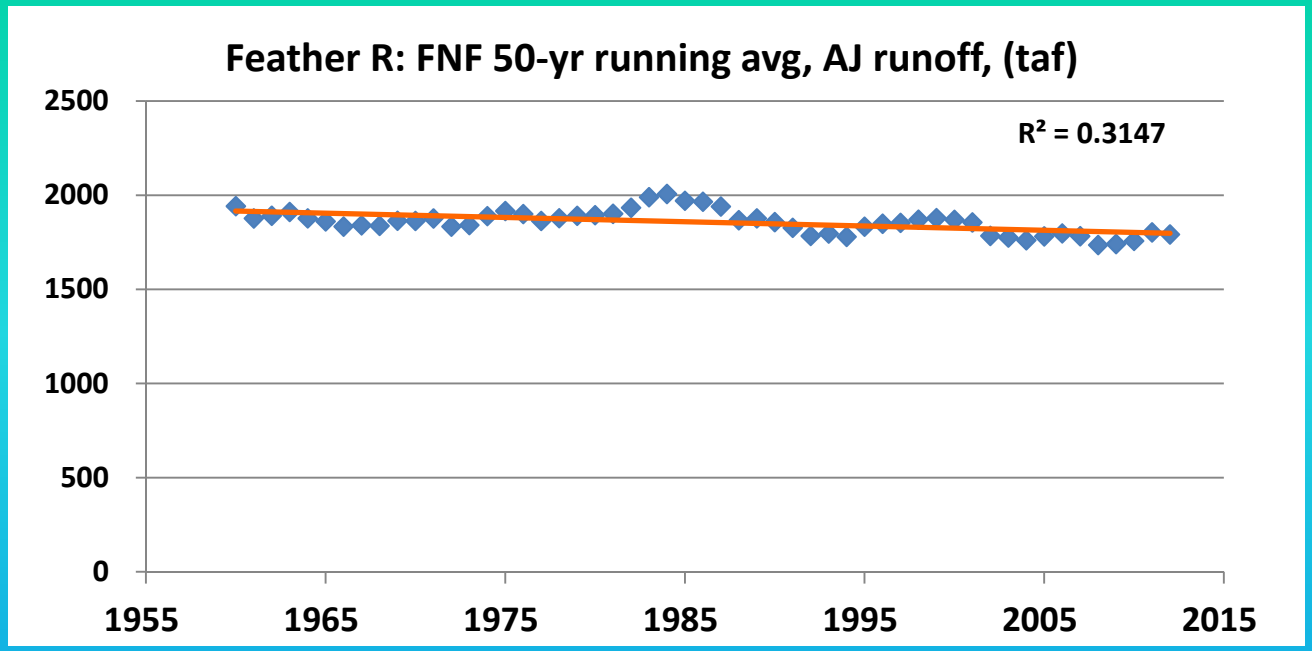
750 – 660



Range of trendline:

Down

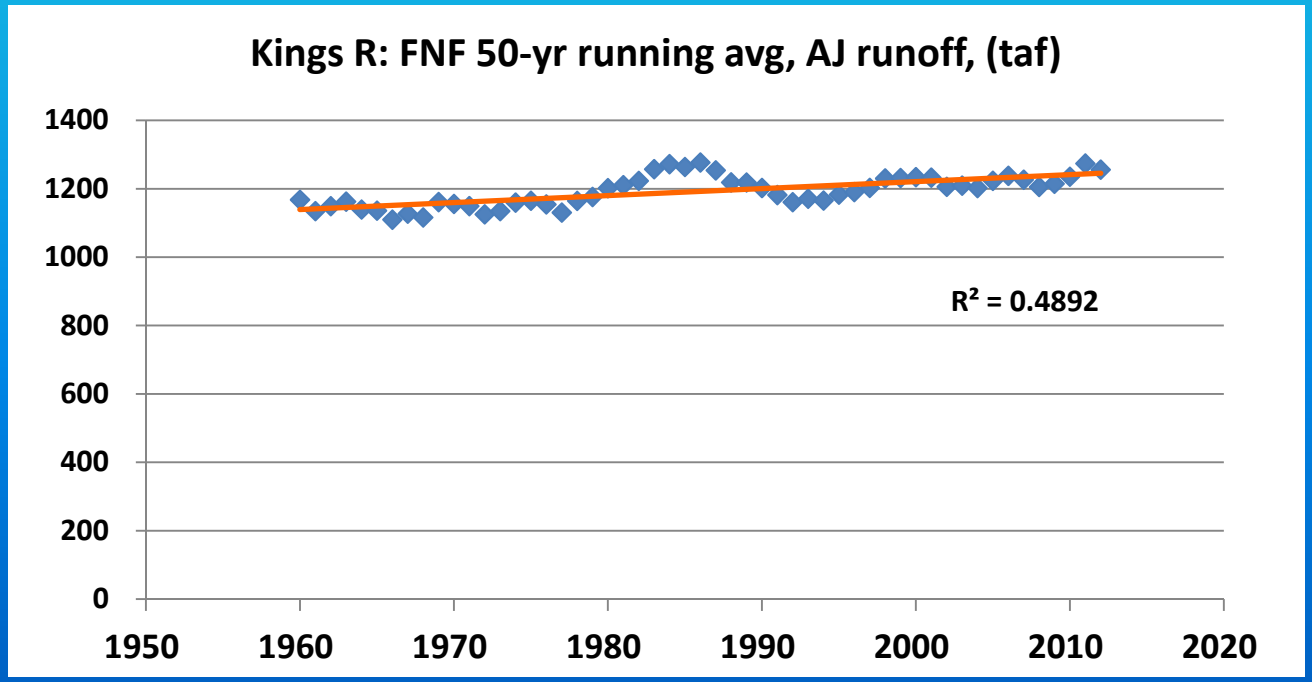
1880 – 1750



Range of trendline:

Down

1930-1800



Range of trendline:

Up

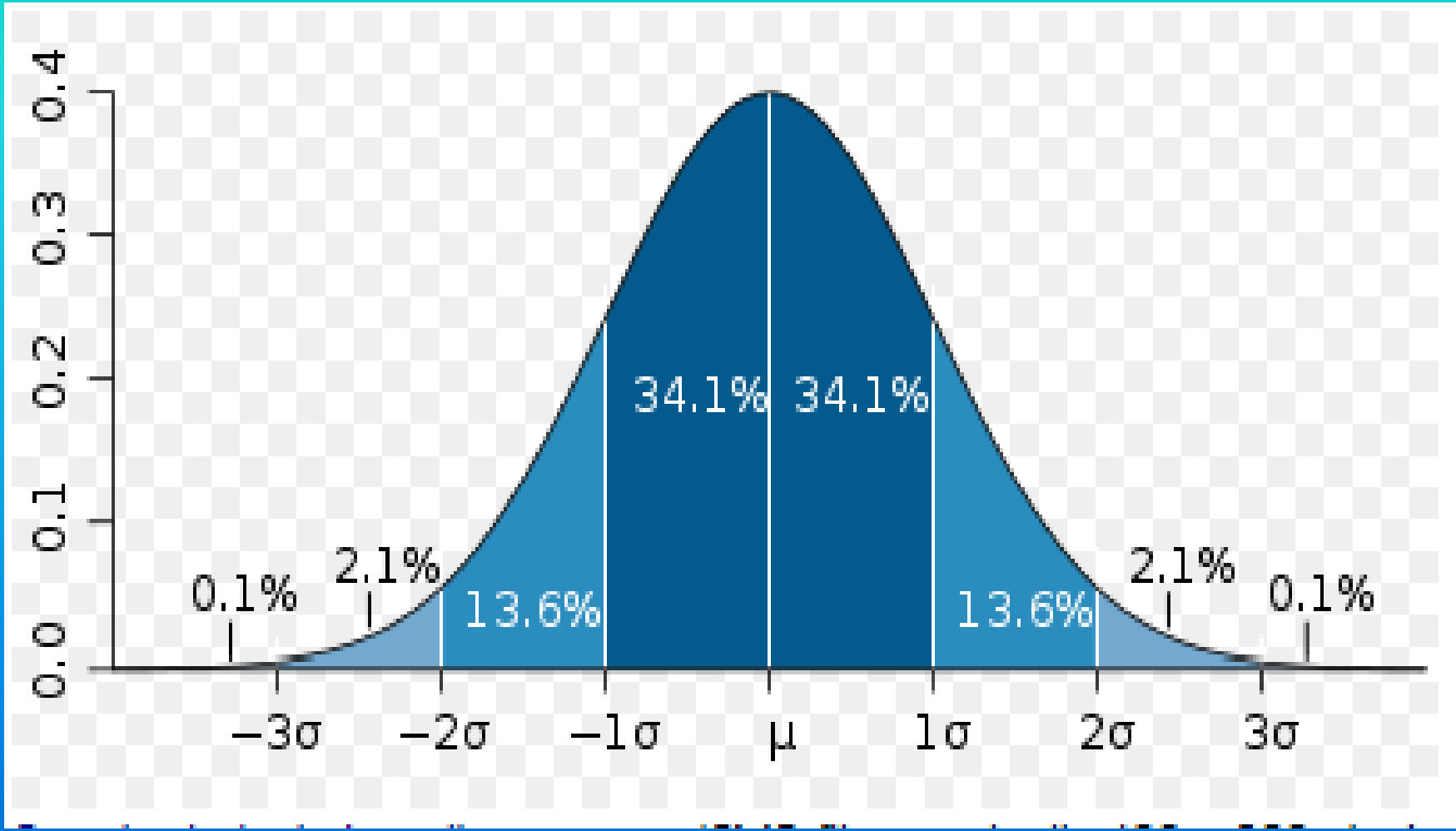
1150-1230

New Question:

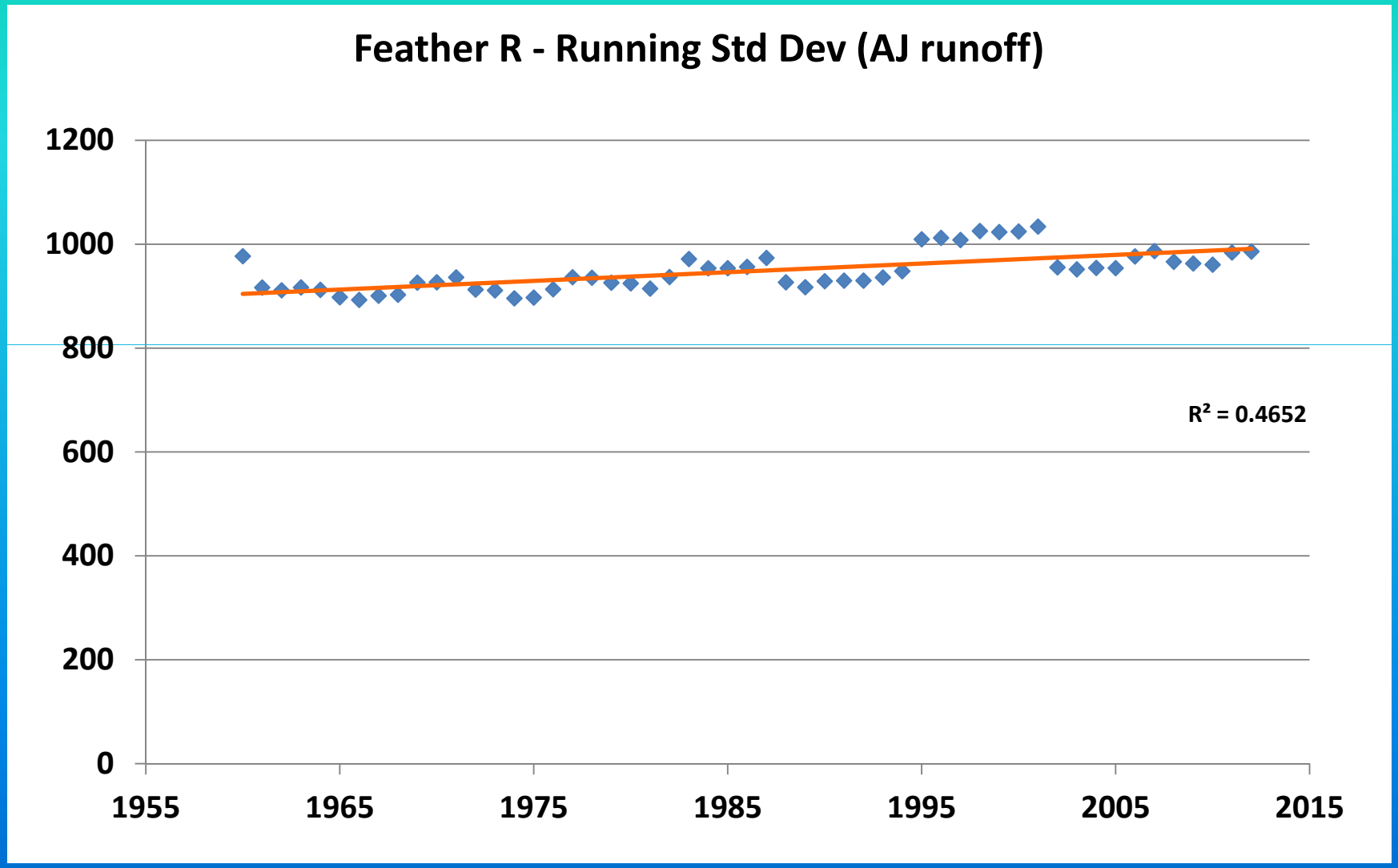
How can the variability of the flows during the last 50 years be measured?

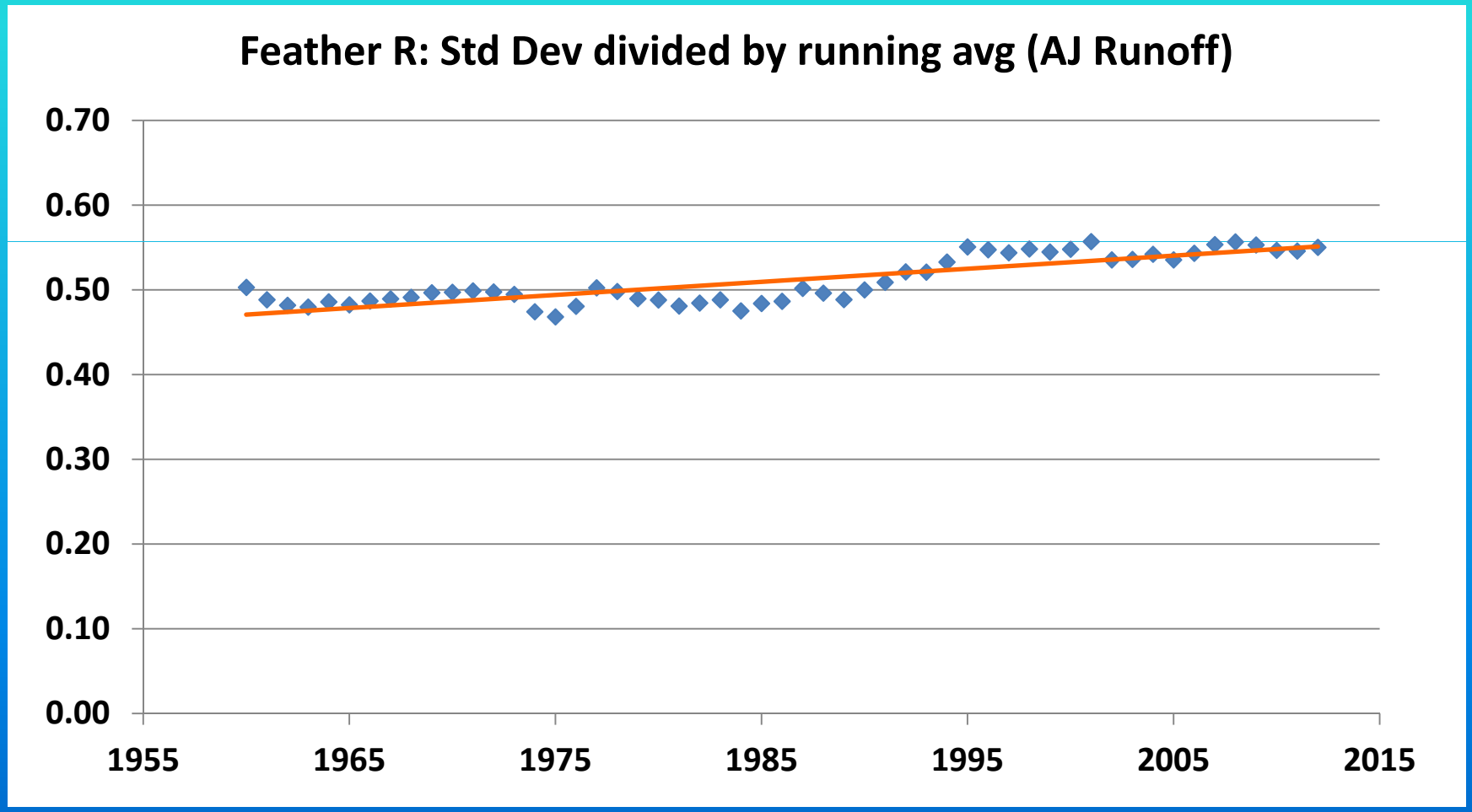
Answer: Standard Deviation

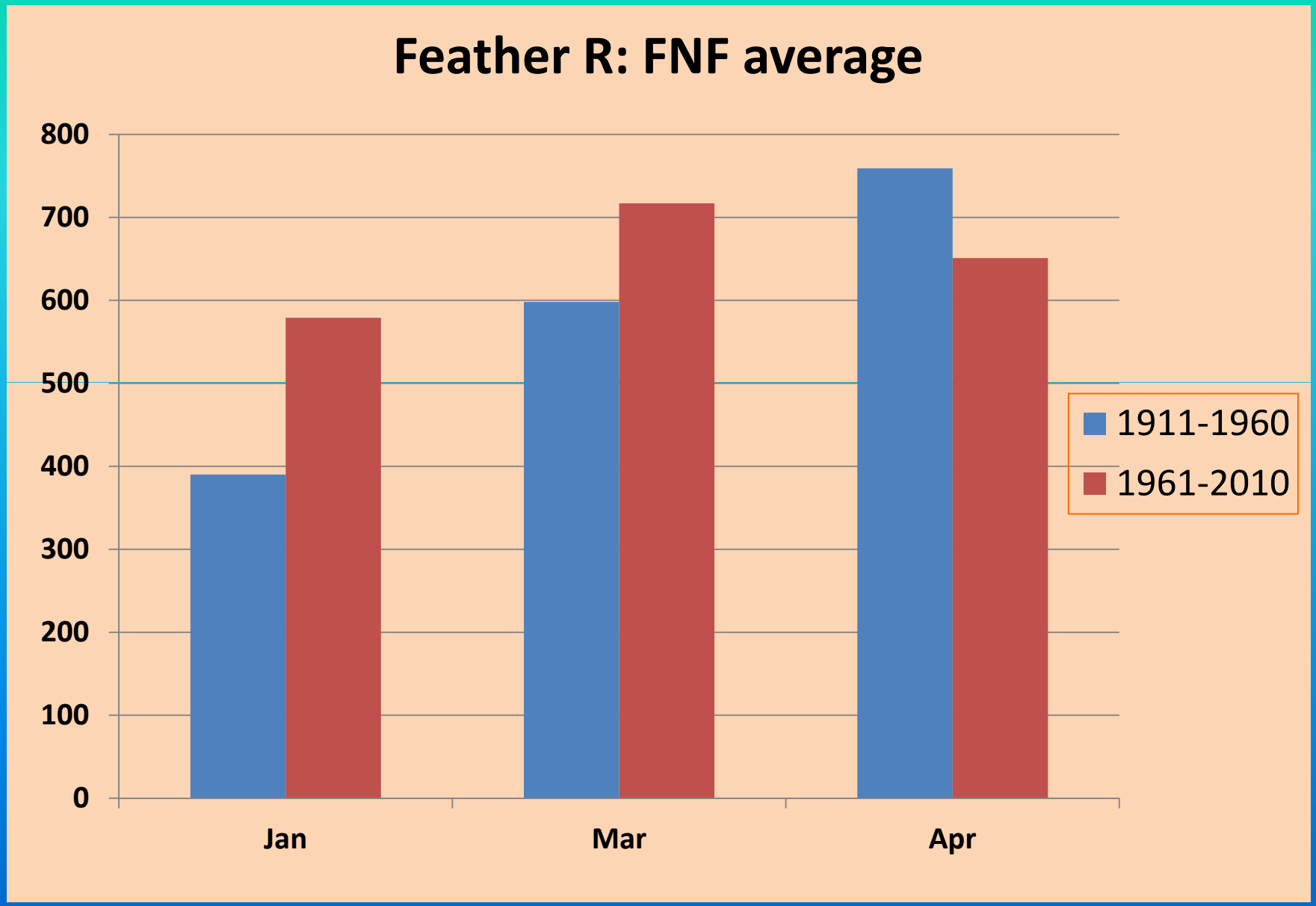
Standard Deviation

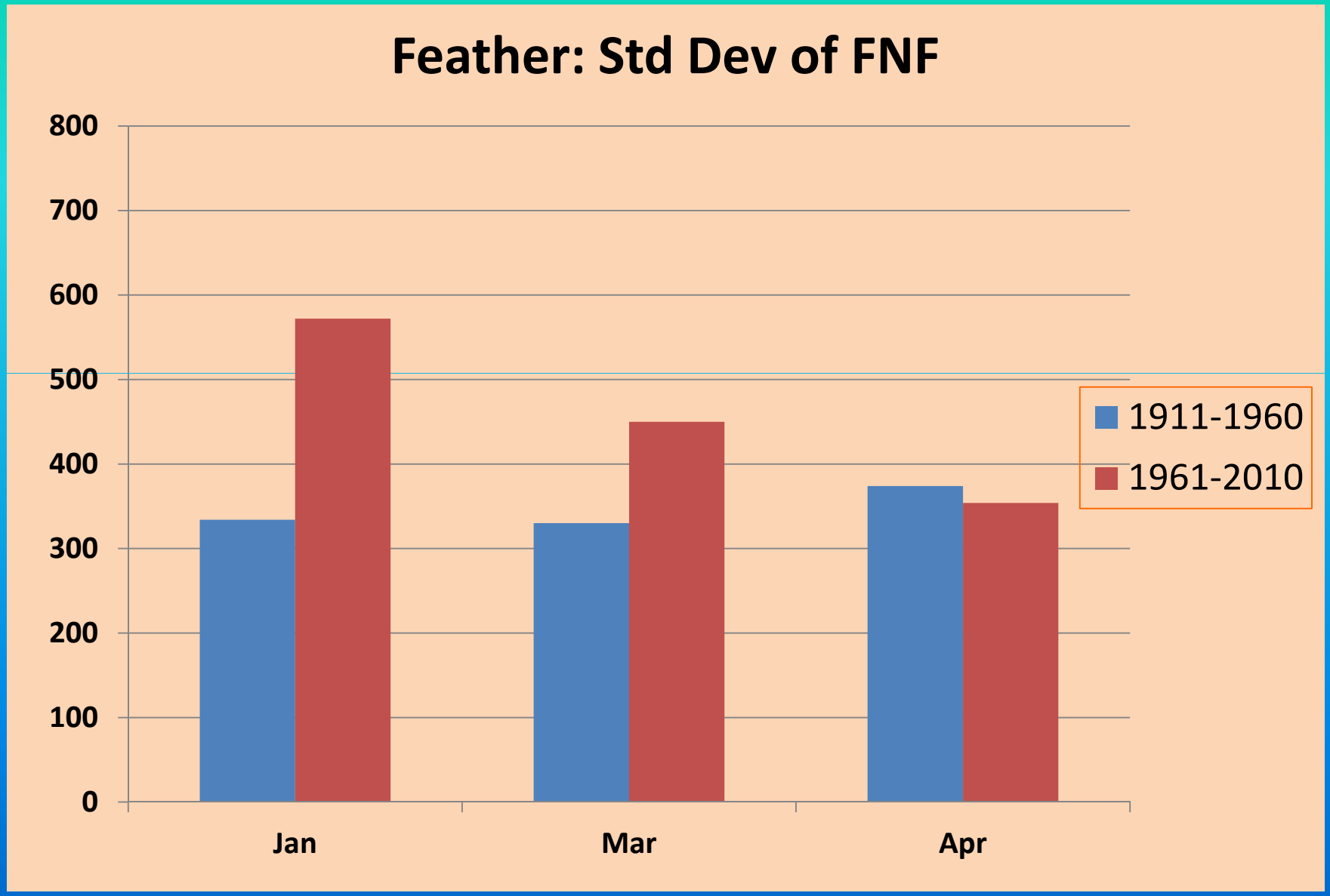


Percentages vary with a skewed histogram


Feather R - Running Std Dev (AJ runoff)
1200
1000
800
600
400
200
0
1955
1965
1975
1985
1995
2005
2015
R² = 0.4652


Feather R: Std Dev divided by running avg (AJ Runoff)
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1955
1965
1975
1985
1995
2005
2015


Feather R: FNF average
800
700
600
500
400
300
200
100
0
Jan
Mar
Apr
1911-1960
1961-2010


Feather: Std Dev of FNF
800
700
600
500
400
300
200
100
0
Jan
Mar
Apr
1911-1960
1961-2010

Concluding thoughts:

- Increase in March avg could be a shift from AJ

- How is the increase in January Std Dev explained?
  - Increased variability of the storm track?
  - Increased variability of the temperatures?

- Averages are, for the Feather River:
  up for Jan and Mar
  down for Apr and Apr-Jul

Thank you

Thoughts or questions?