WIND AND MOUNTAIN CLIMATOLOGY IN SEVERE ENVIRONMENTS:

MOUNT WASHINGTON TRENDS IN SELECTED CLIMATOLOGICAL VARIABLES

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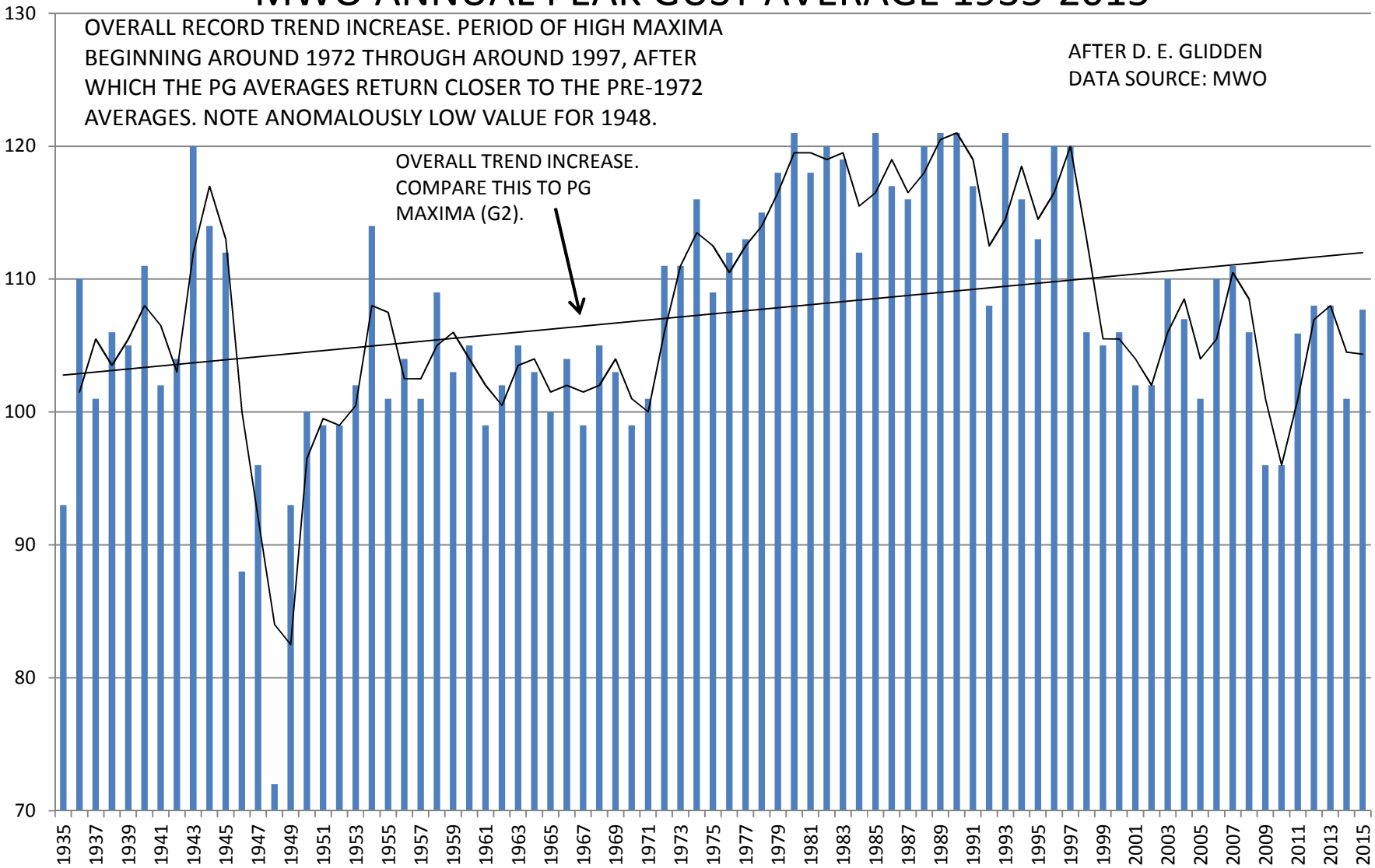
INTRODUCTION

THE PLATFORM AND PROGRAMS FOR THESE MOUNT WASHINGTON DATA ANALYSES BEGAN DURING THE NEARLY TWO-DECADES OF WEEKEND SEMINARS IN MOUNTAIN CLIMATOLOGY EDUTRIPS (WHICH STARTED IN 1992), WHERE LIVELY DISCUSSIONS WERE HELD AMONG PARTICIPANTS. ACTIVE ENGAGEMENT FOCUSED ON INTERPRETING THE POTENTIAL SIGNIFICANCE OF GRAPHICS AND TRENDS OF THE MANY MWO PARAMETERS. PARTICIPANTS GAINED VALUABLE INSIGHT ON THE IMPORTANCE OF HOW DATA TRENDS AND OBSERVATIONS RELATE TO CHANGES IN PARAMETERS AND TIME SCALES.

A FEW SELECTED GRAPHS HAVE BEEN UPDATED THROUGH 2015, AND THUS OFFER A SOURCE FOR OTHERS TO DISCOVER NEW POTENTIAL TRENDS AND ANOMALIES IN THE MWO DATA (AND TO SUGGEST POTENTIAL EXPLANATIONS). THIS IS ESPECIALLY RELEVANT AS THE OBSERVATORY MOVES AHEAD IN ITS ROLE OF ACQUIRING AND INTERPRETING CLIMATOLOGICAL DATA FROM ITS UNIQUE MOUNTAINTOP SITE.

G1

MWO ANNUAL PEAK GUST AVERAGE 1935-2015

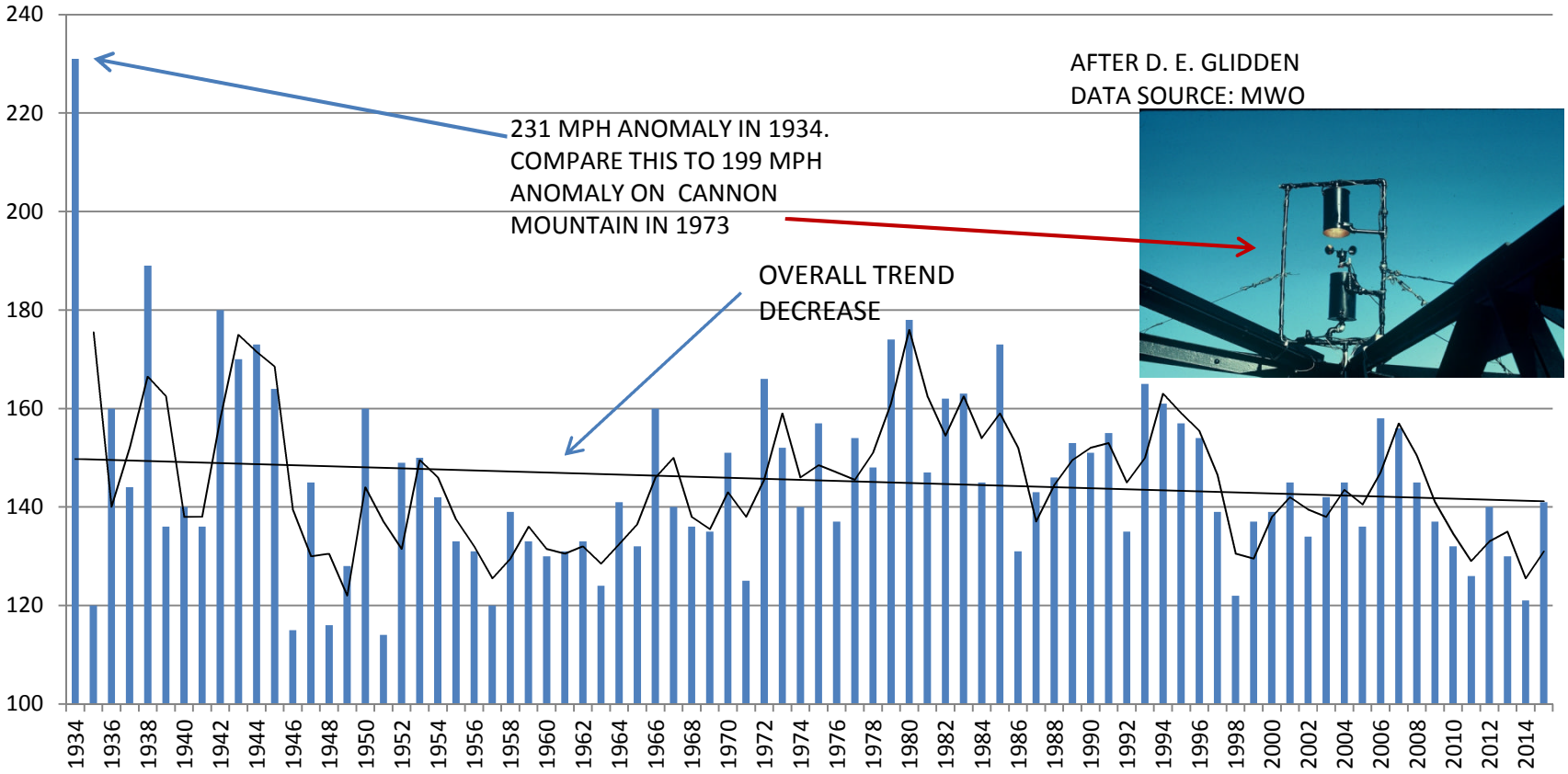


DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY

ANNUAL PG AVERAGE IS THE AVERAGE OF 12 MONTHS FOR EACH YEAR. MPH

G2

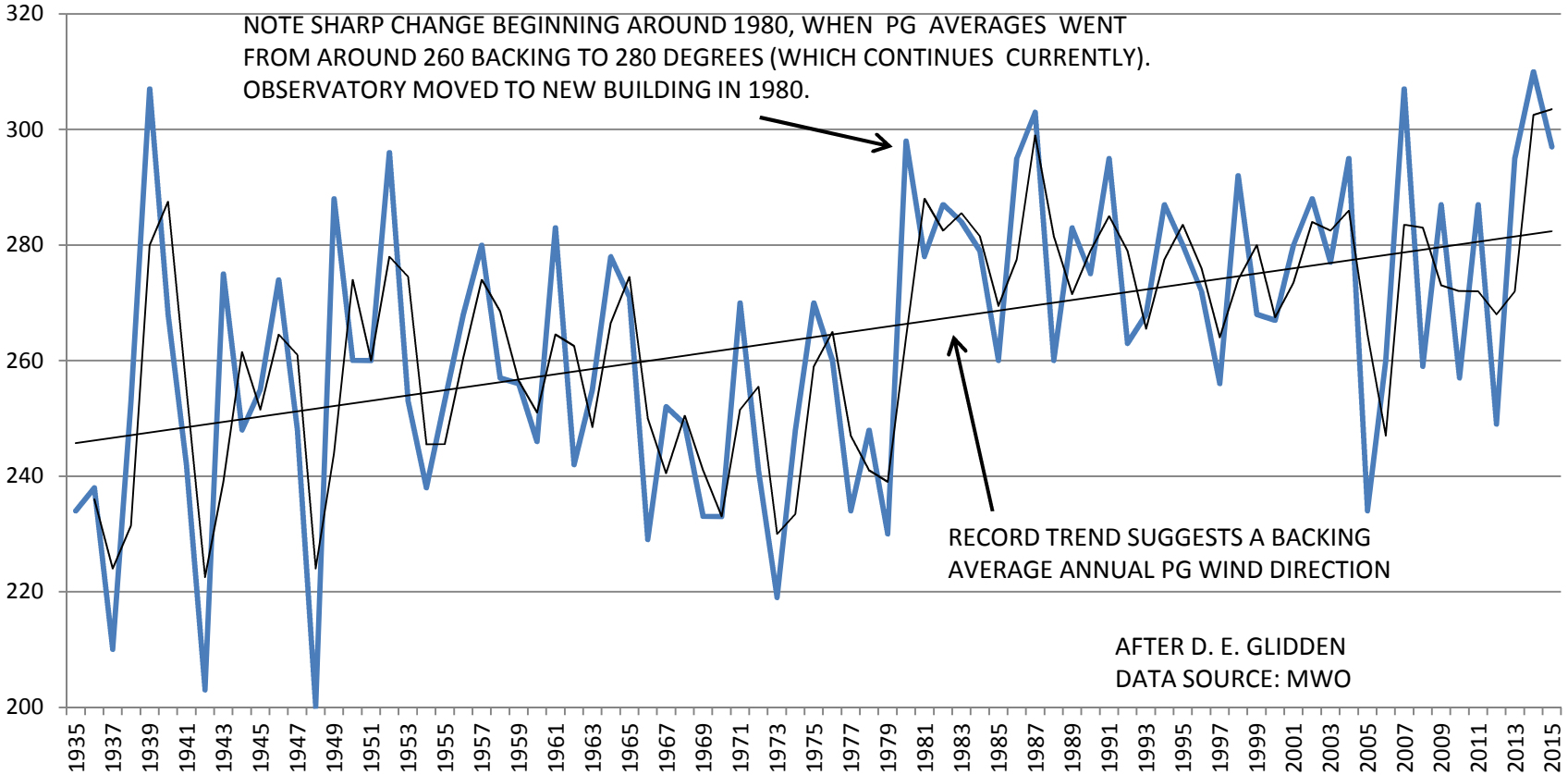
MWO ANNUAL PEAK GUST MAXIMA 1934-2015



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY MPH

G3

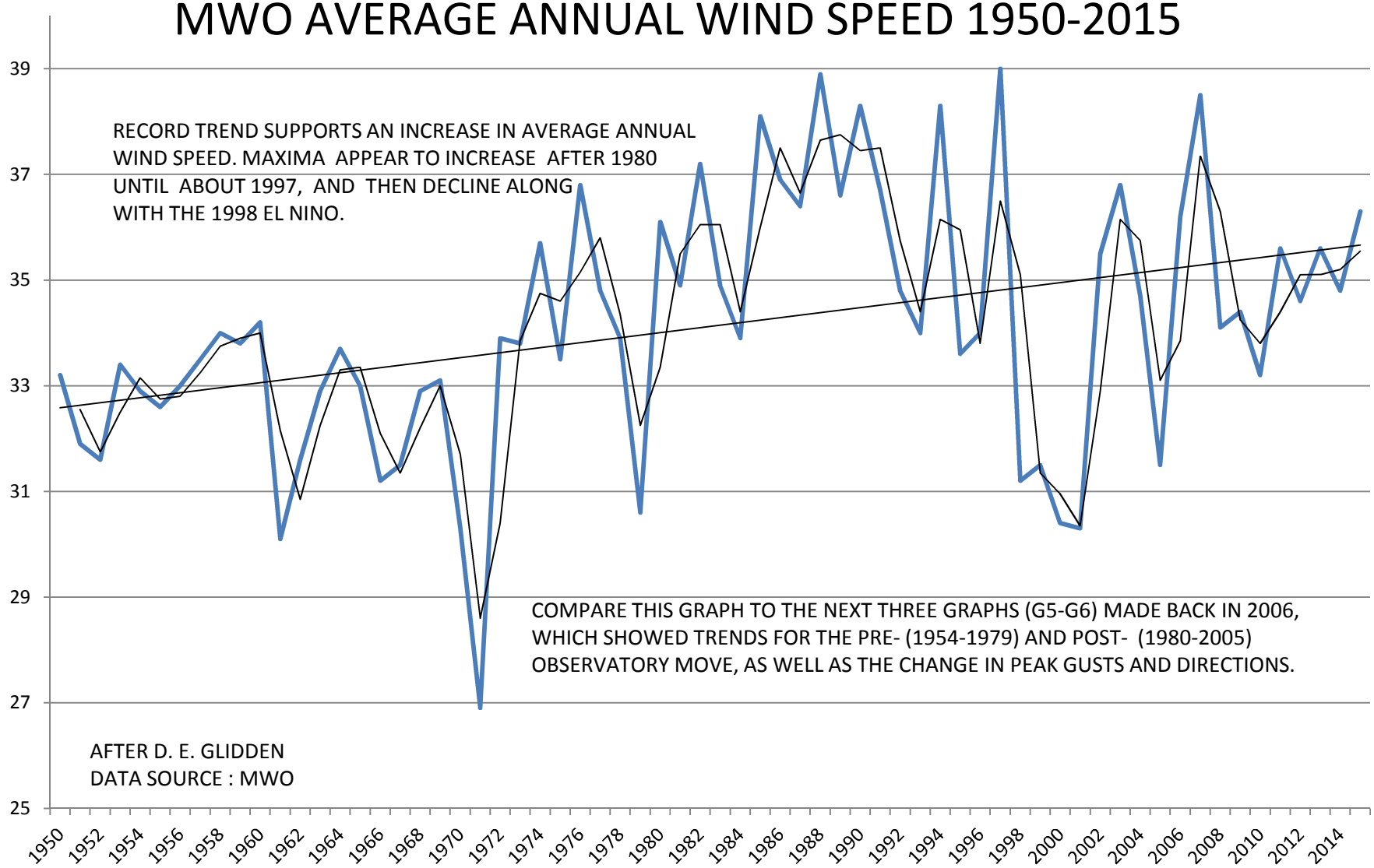
MWO AVERAGE ANNUAL PEAK GUST WIND DIRECTON 1935-2015



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY

G4

MWO AVERAGE ANNUAL WIND SPEED 1950-2015



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY MPH

SOME PRELIMINARY OBSERVATIONS MADE IN 2006:

COMPARE THESE TO THE TRENDS DISCOVERED IN CURRENT GRAPHS (G1-G4)

FOR THE 18 YEARS PRECEDING THE 1980 MOVE, OR AT THE OLD OBSERVATORY, THERE WERE 40 OCCURRENCES OF MONTHLY PEAK GUST MAXIMA FROM 45-135 DEGREES (NORTHEAST-SOUTHEAST); FROM 1980 THROUGH 1997, THERE WERE 11, A 72.5% DECREASE. (TABLES 1 AND 2)

FOR GUSTS =>130 MPH FROM 45-135 DEGREES, THERE WERE 13 OCCURRENCES PRE-1980 AND ONLY 5 FOLLOWING THE MOVE, A 61.5% DECREASE. (TABLES 3 AND 4)

FOR THE 18 YEARS PRECEDING THE 1980 MOVE, THERE WERE 171 OCCURRENCES OF MONTHLY PEAK GUSTS FROM 225-320 DEGREES (SOUTHWEST-NORTHWEST); FROM 1980 THROUGH 1997, THERE WERE 191 OCCURRENCES, A 10.5% INCREASE. (TABLE 5)

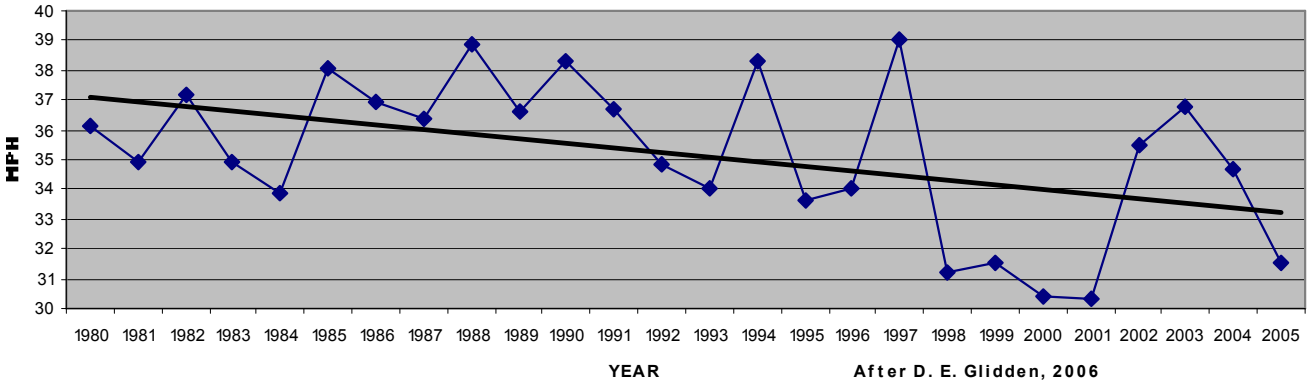
FOR GUSTS =>130 MPH FROM 225-320 DEGREES, THERE WERE 28 OCCURRENCES PRE-1980 AND 56 FOLLOWING THE MOVE, A 50% INCREASE TABLE 6)

ASSUMING NO DIFFERENCES IN OVERALL CLIMATOLOGICAL ATMOSPHERIC PERSISTENCIES, OR DIFFERENCES AS A RESULT OF CHANGES IN INSTRUMENTATION, REVIEWING THIS LIMITED DATA MORE OR LESS QUANTIFIES WHAT WE ALREADY SUSPECTED: ON THE SURFACE, THE 1980 MOVE MAY HAVE HAD SIGNIFICANTLY MORE IMPACT ON FREQUENCIES OF RECORDED MAXIMUM FLOW FROM THE EAST. WESTERLY MAXIMA INCREASED SOMEWHAT FOLLOWING THE MOVE (FOR EXAMPLE, A PEAK GUST AVERAGE OF 117 MPH VERSUS 105 MPH; 178 MPH VERSUS 160 MPH MAXIMUM; FOR MONTHLY GUST MAXIMA =>130 MPH, A 50% INCREASE.

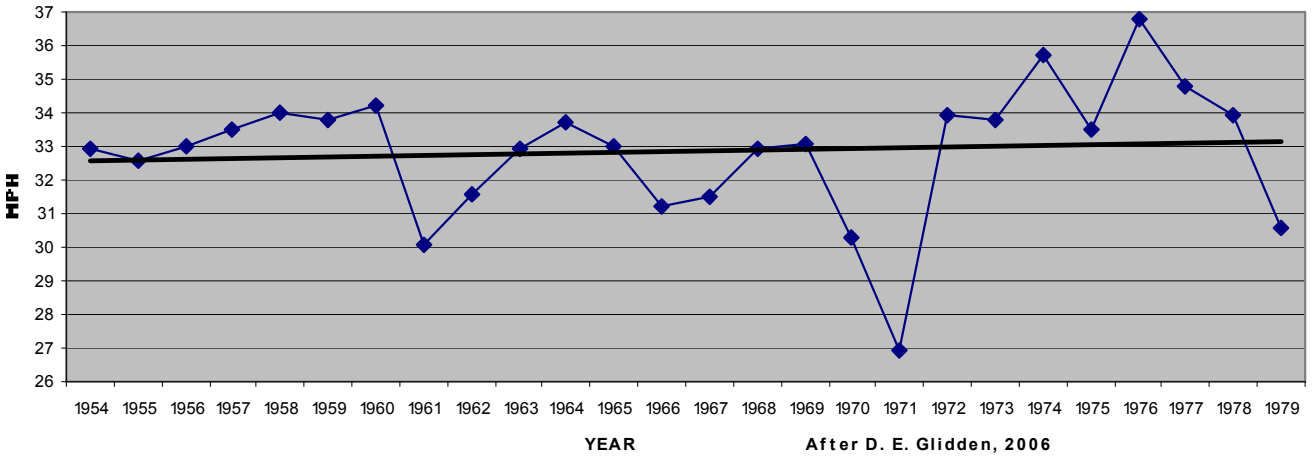
G5

MWO AVERAGE ANNUAL WINDSPEED
1980-2005
AVERAGE ANNUAL WINDSPEED = 35.2 MPH
25-YEAR POST-MOVE TREND: 37.1 to 33.2 MPH, OR ~3.9 MPH DECREASE

(1954-1979 AVERAGE (32.8) VS. 1980-2005 AVERAGE (35.2) = + 2.5 MPH INCREASE)

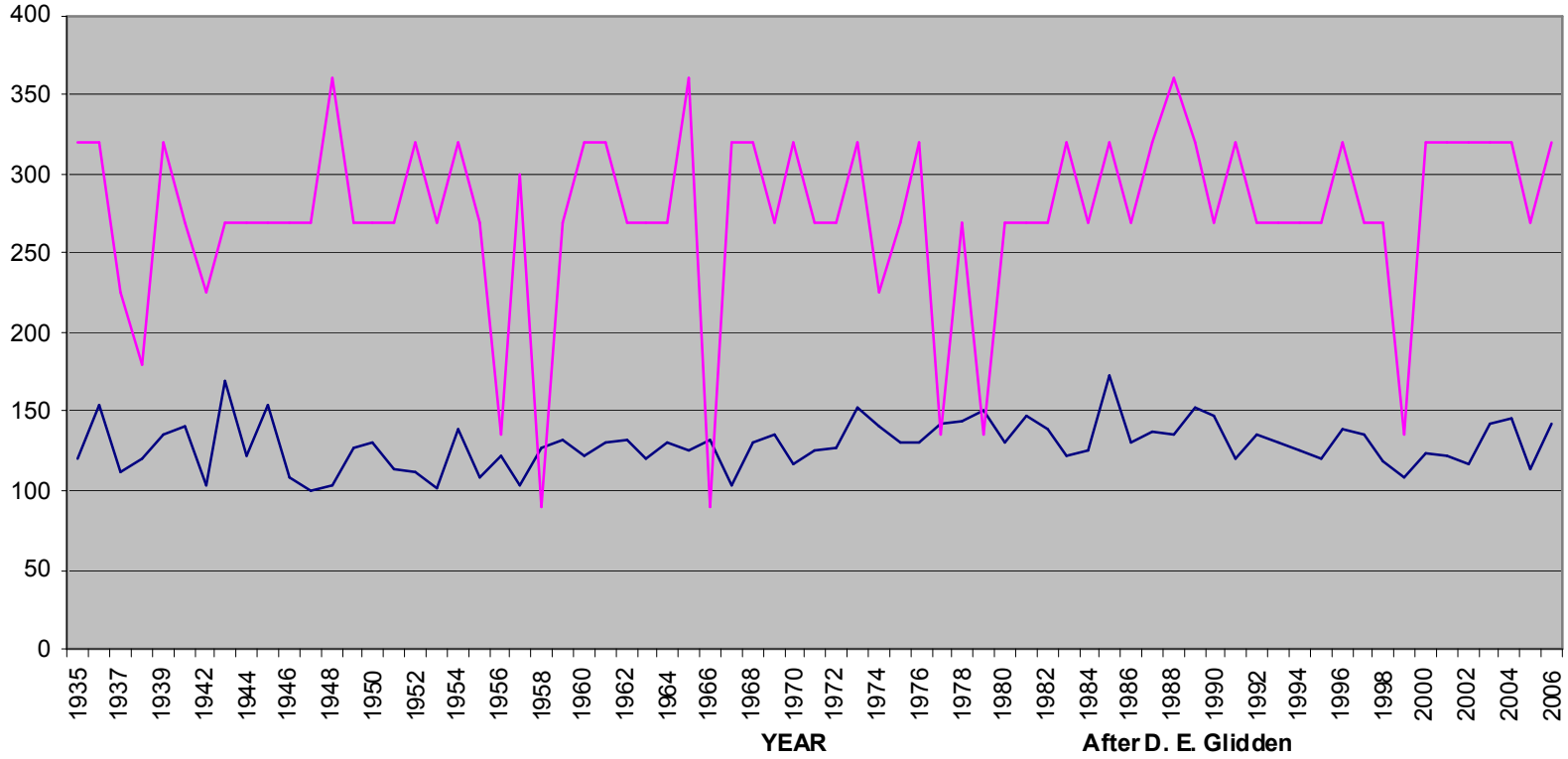


MWO AVERAGE ANNUAL WINDSPEED
1954-1979
AVERAGE ANNUAL WINDSPEED = 32.8 MPH
25-YEAR PRE-MOVE TREND: 32.7 TO 33.1, OR ~0.4 MPH INCREASE



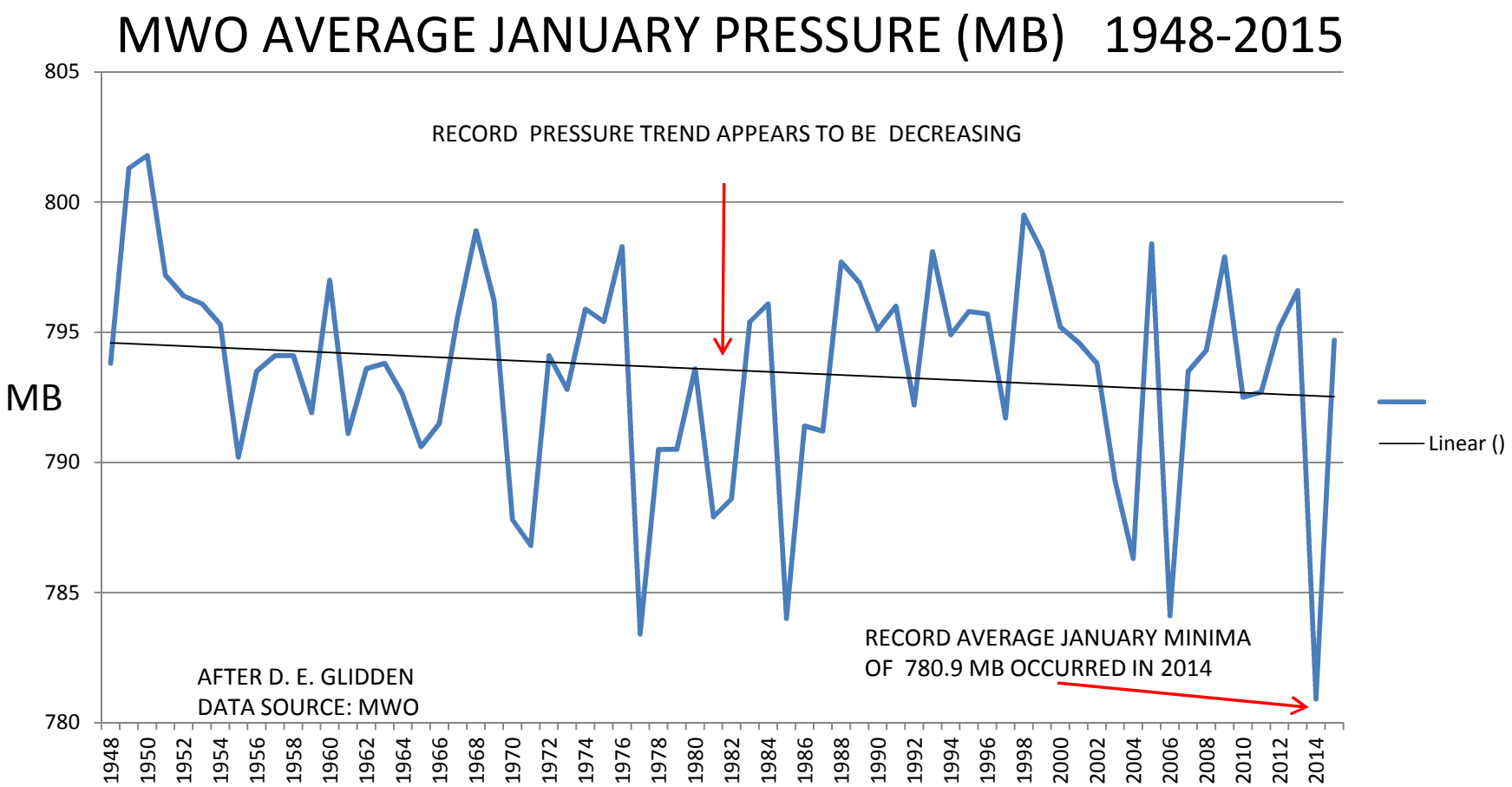
G6

MWO JANUARY PEAK GUSTS AND DIRECTIONS 1935-2006
1954-79 = 5 PEAK GUSTS FROM 45-135 DEGREES
1980-2006 = 1 PEAK GUST FROM 45-135 DEGREES



See Glidden, D. E., 2007, *MOUNT WASHINGTON WIND CLIMATOLOGY: RECENT DATA ANALYSIS AND HISTORICAL CHANGES IN SUMMIT WIND SENSORS*

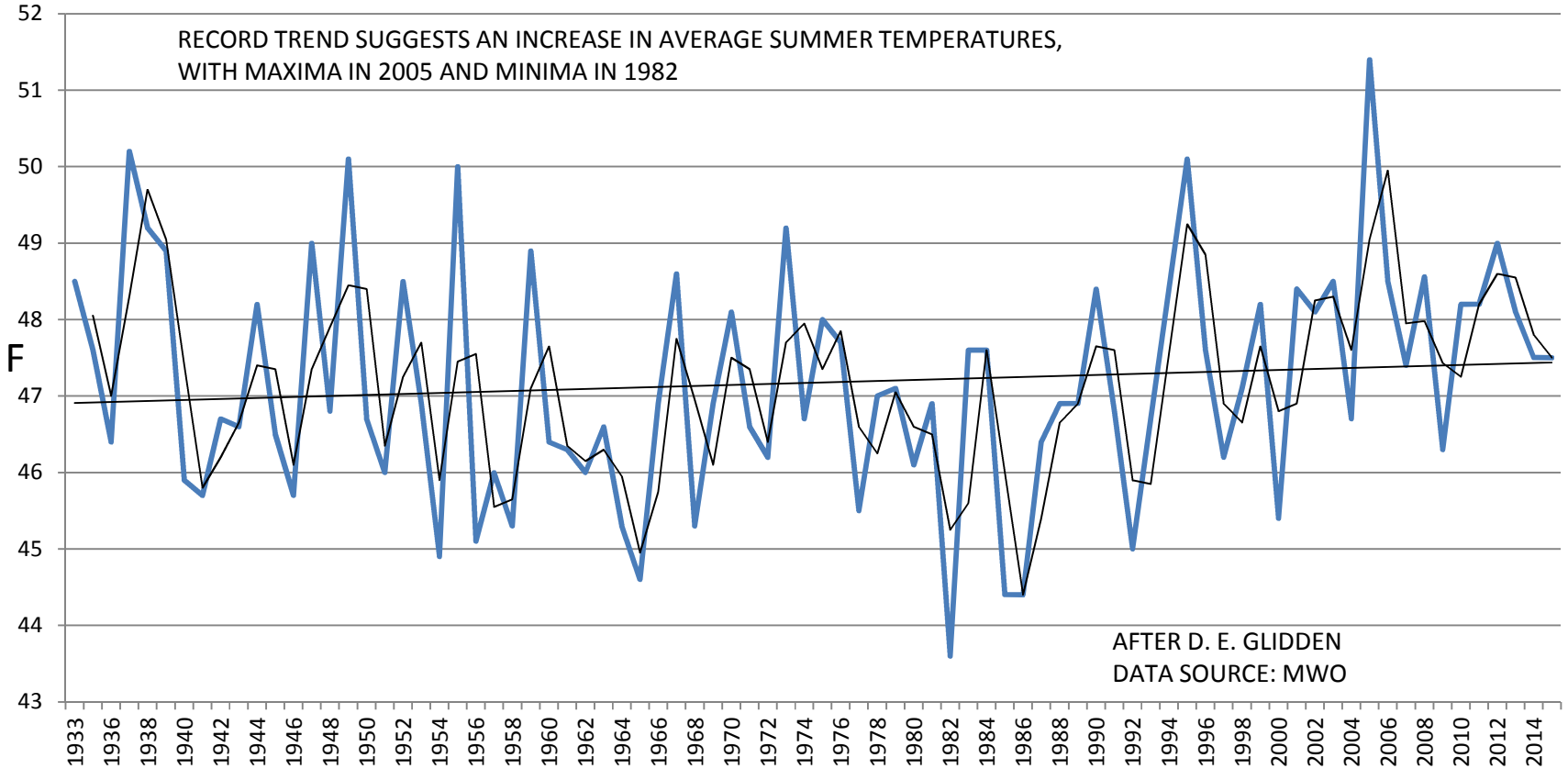
G7



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY

G8

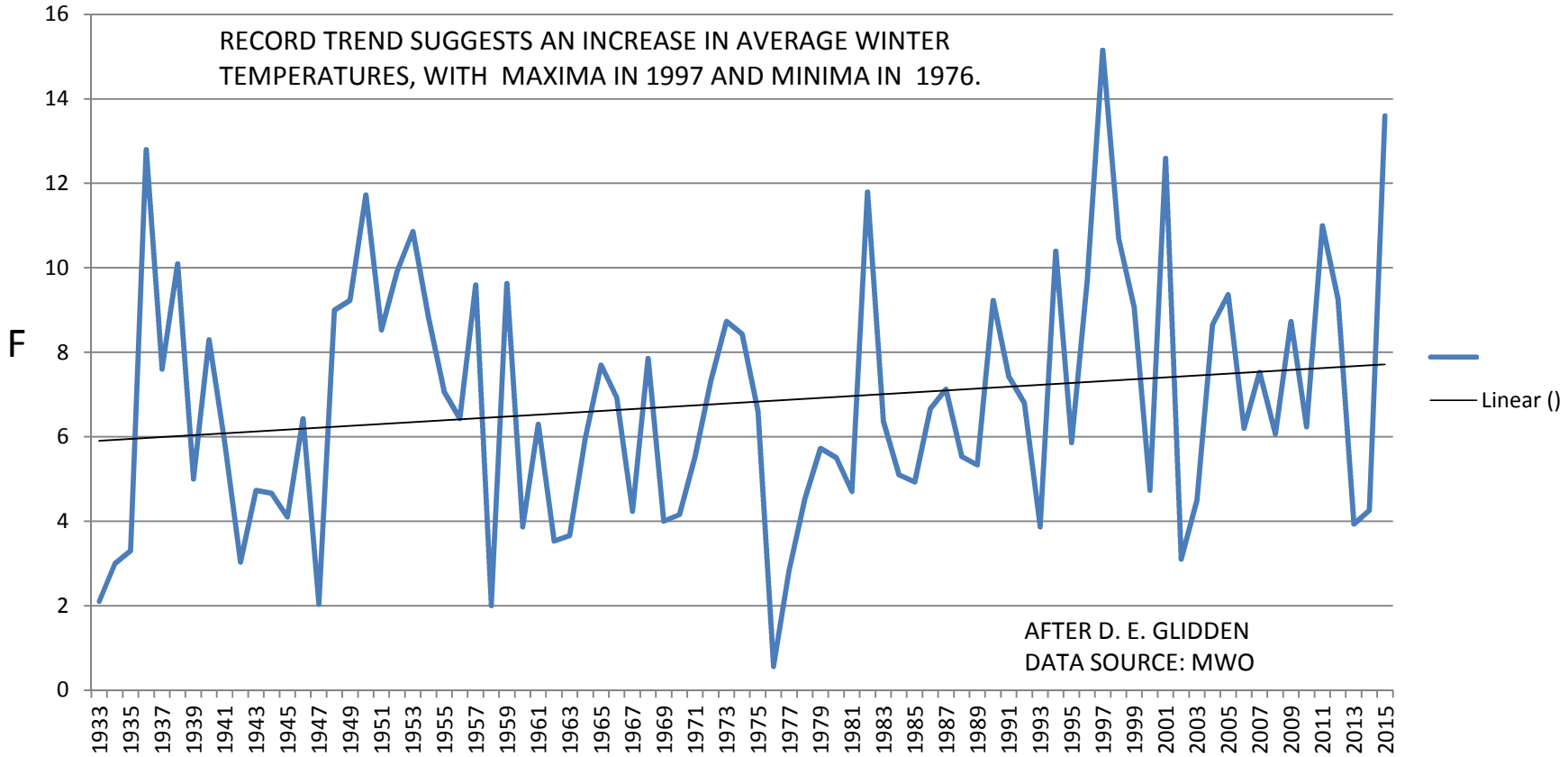
MWO AVERAGE SUMMER TEMPERATURES 1933-2015



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY

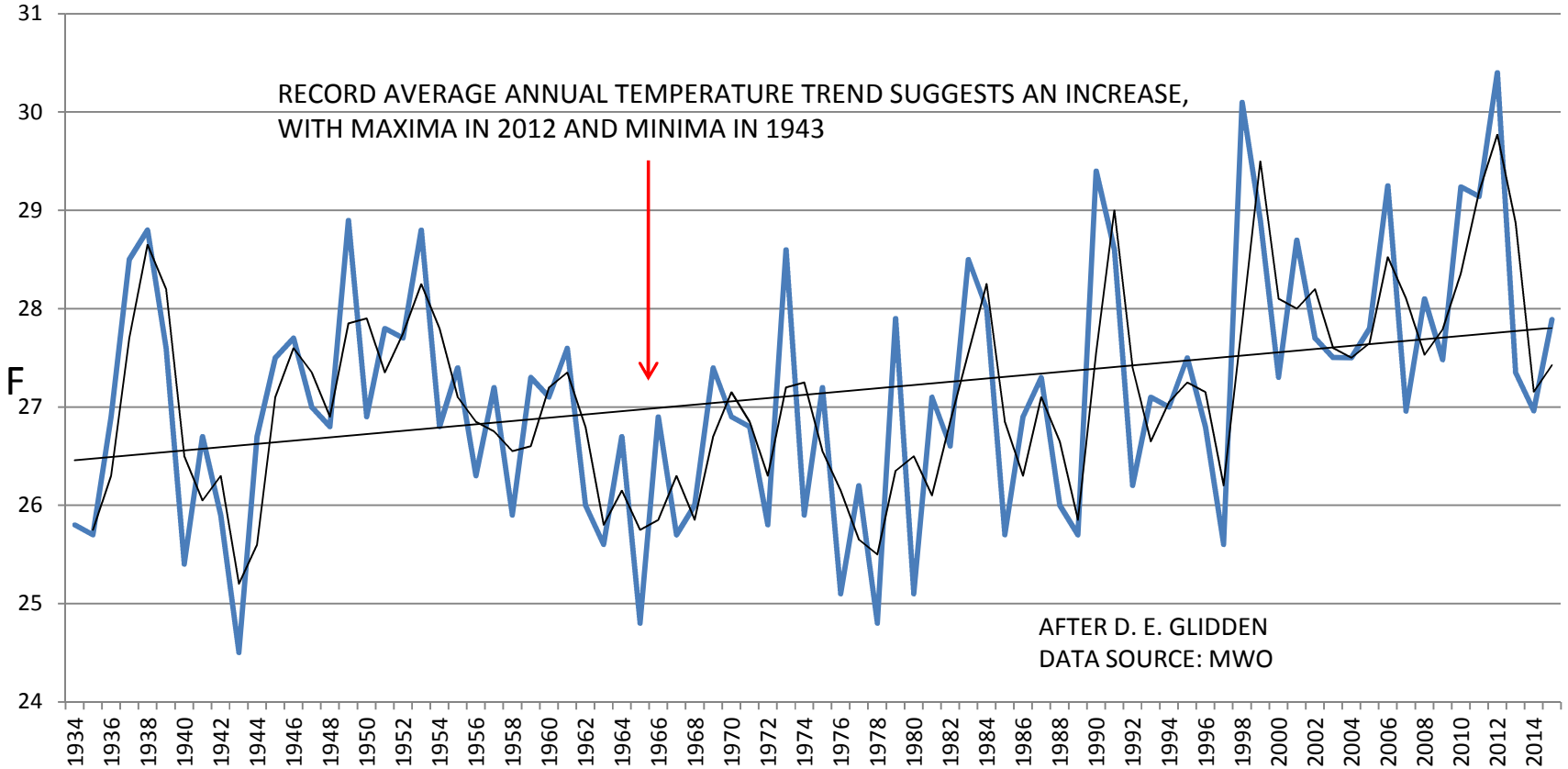
G9

MWO AVERAGE WINTER TEMPERATURES 1933-2015



G10

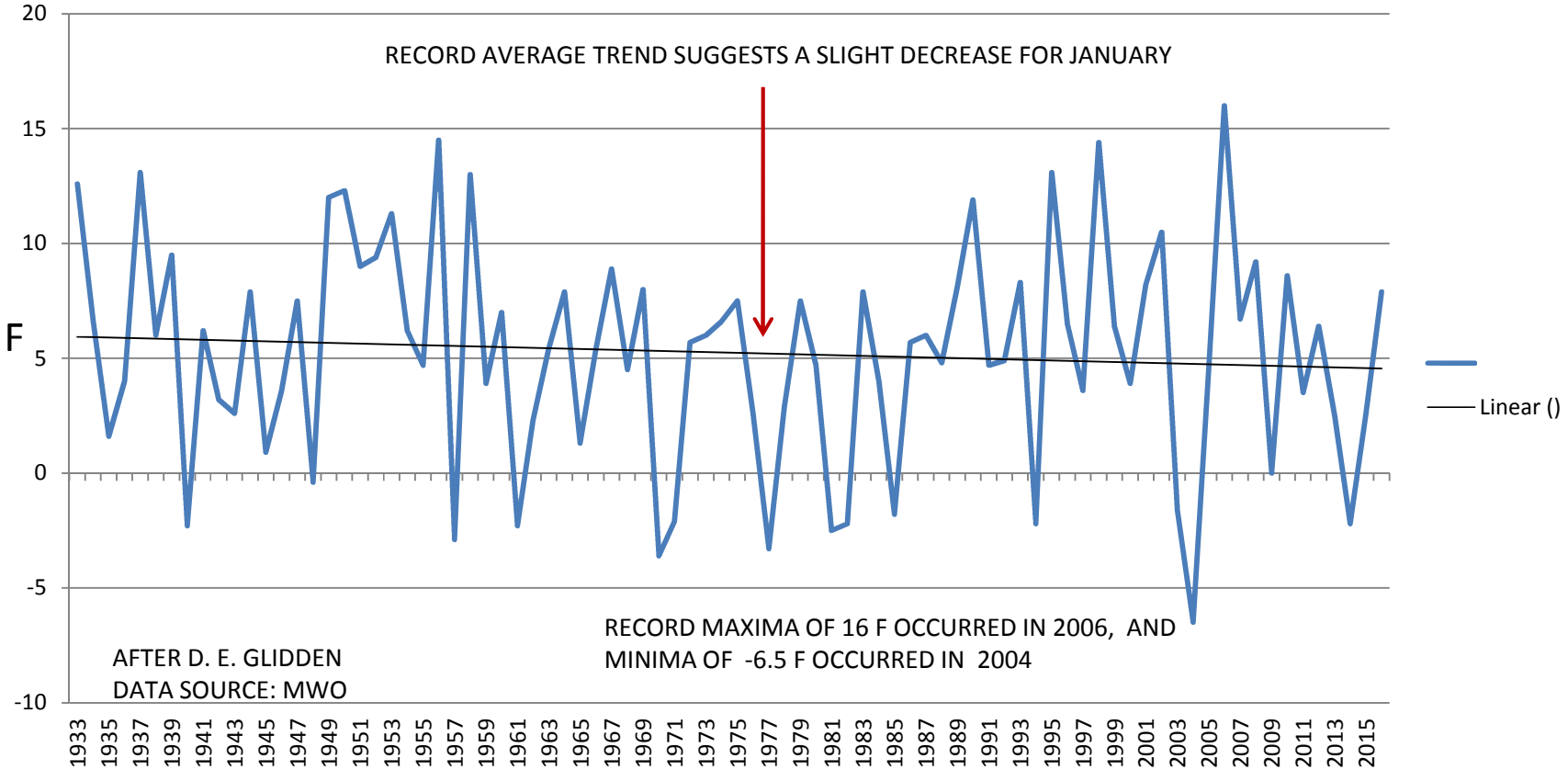
MWO AVERAGE ANNUAL TEMPERATURES 1934-2015



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY

G11

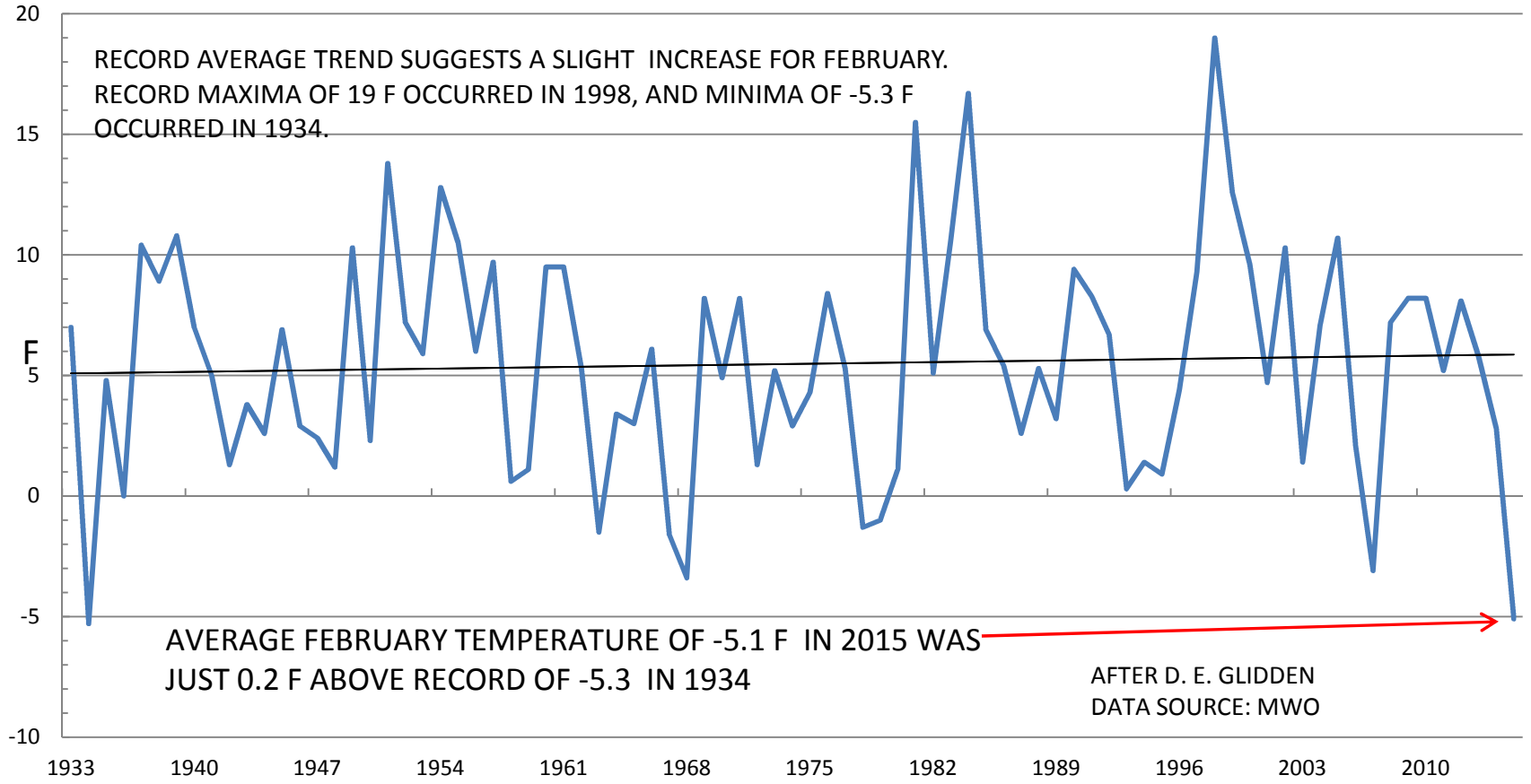
MWO AVERAGE JANUARY TEMPERATURES 1933-2016



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY

G12

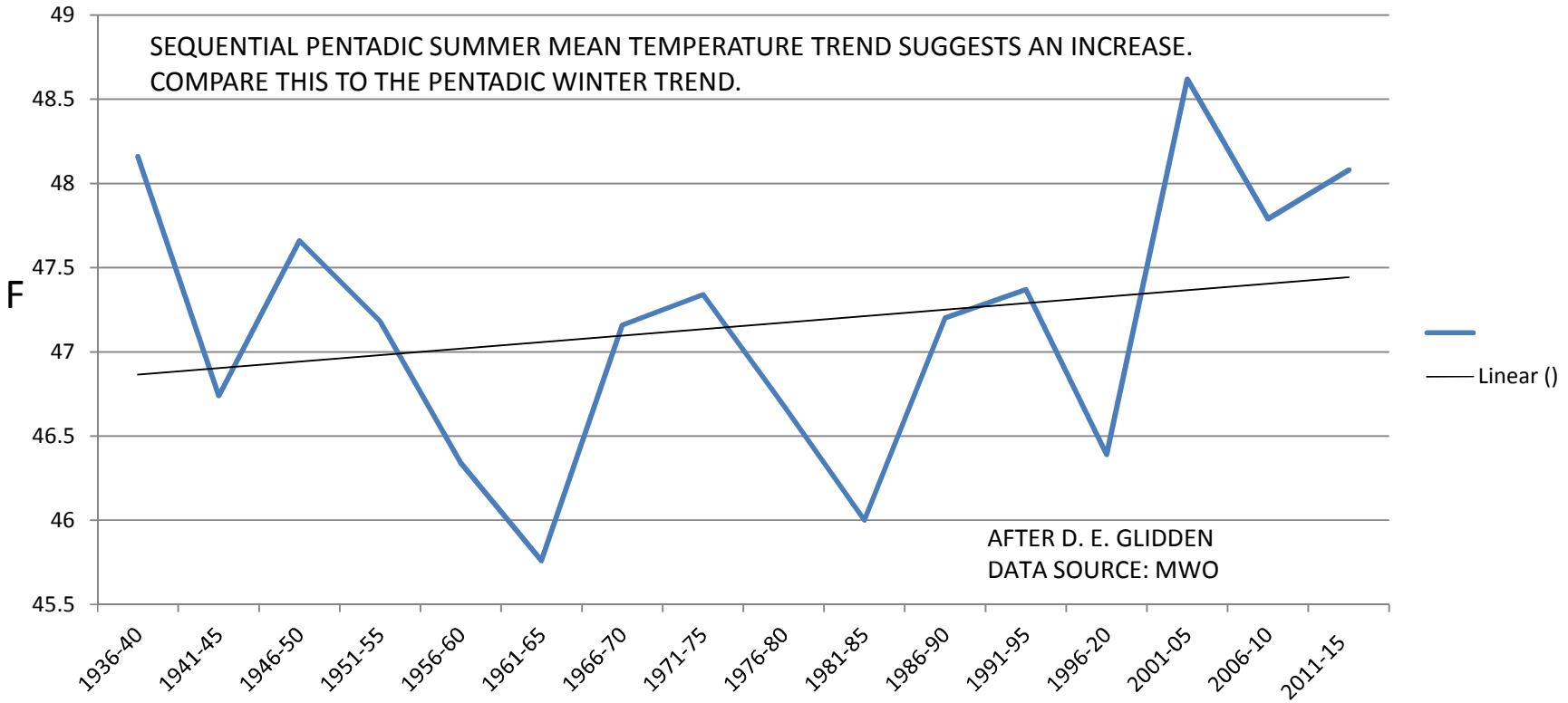
MWO AVERAGE FEBRUARY TEMPERATURES 1933-2015



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY

G13

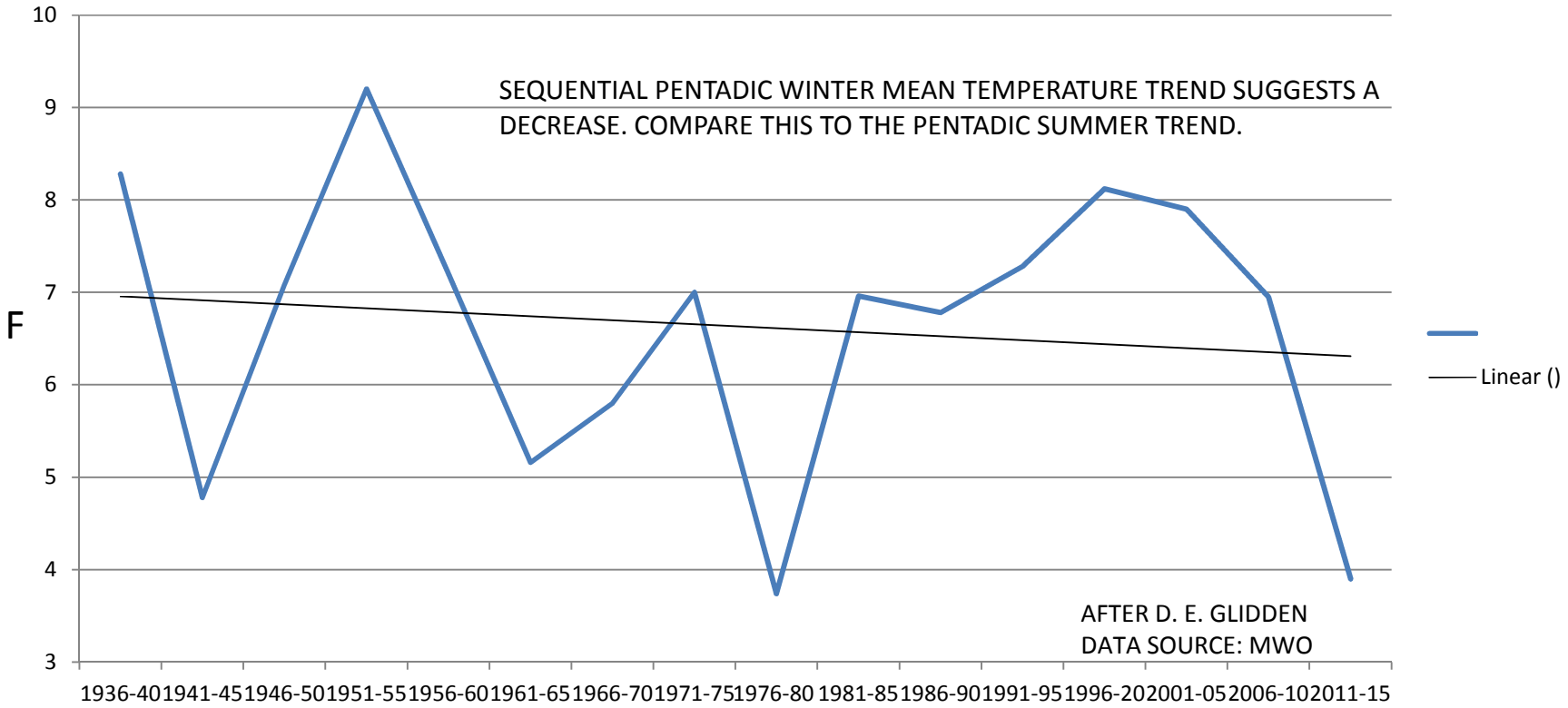
MWO 5-YEAR (PENTADIC) SUMMER TMEAN
1936-40 - 2011-15



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY

G14

MWO 5-YEAR (PENTADIC) WINTER TMEAN
1936-40 - 2011-15



DATA PLATFORM DEVELOPED DURING THE EDUTRIP PROGRAM IN MOUNTAIN CLIMATOLOGY

MOUNT WASHINGON OBSERVATORY HAYS RECORDER