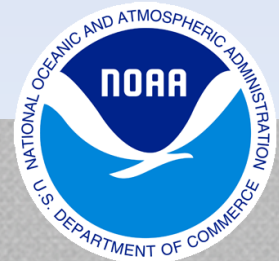# Analysis of the Air Freezing Index using NCDC's Global Historical Climatology Network – Daily (GHCN-D) Dataset

Jared Rennie

Frost and Freeze Workshop

March 21st, 2013

Introduction

- Climate observations of frost and its effect on soil have many applications in agriculture, civil and transportation engineering

- Important for agencies whose day to day observations rely on soil temperature

Air Freezing Index

- AFI represents the seasonal magnitude AND duration of below freezing air temperature

- Important for determining the *severity* of a given winter season

- Calculation
  - Daily departure of the mean temperature above or below freezing (32° F) accumulated over a winter season (August 1st – July 31st)
  - Annual curve generated, pick off peak and valley

# AFI Curve for Bedford, IA (1978-1979)
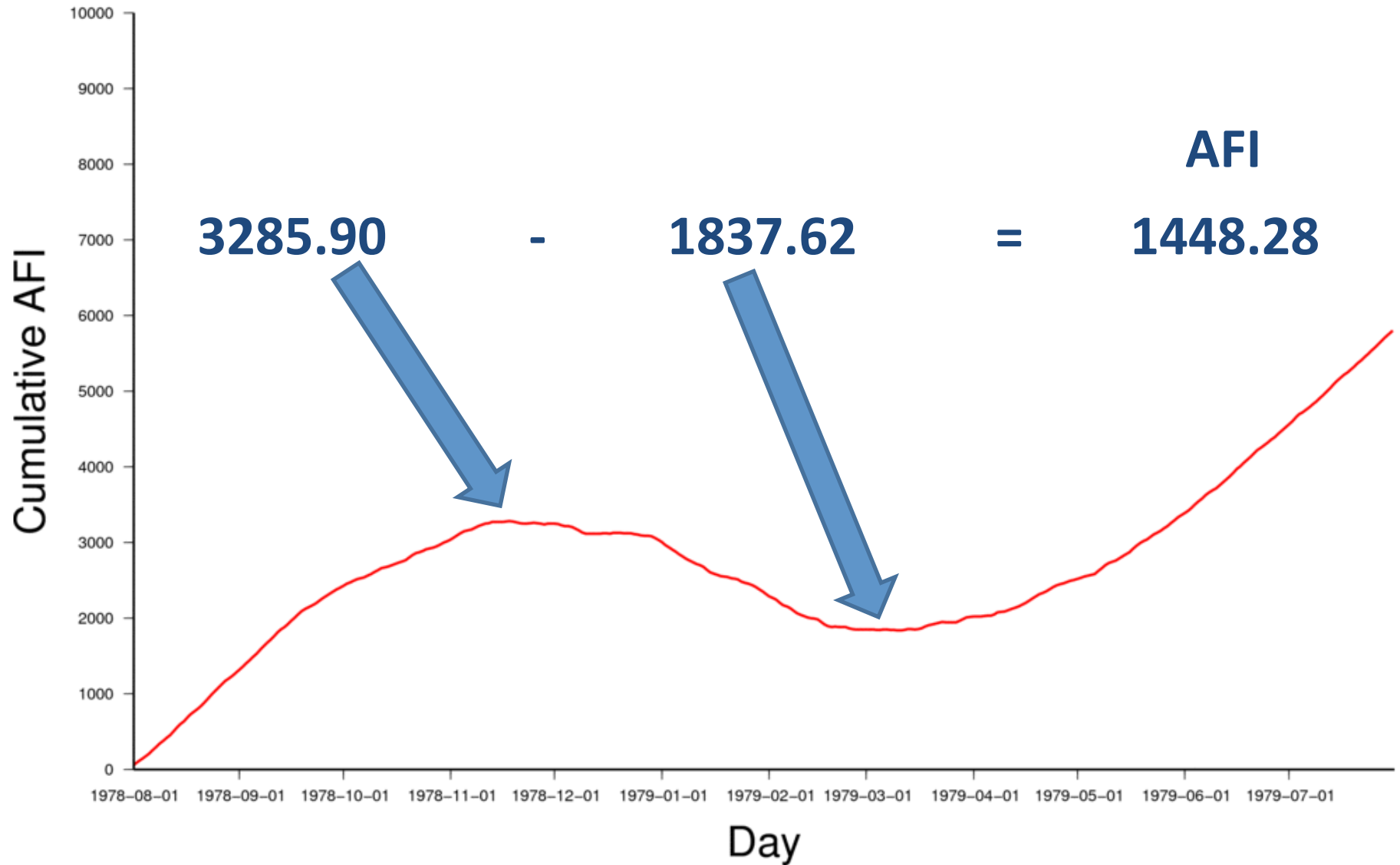
GHCN-Daily

- Over 80,000 surface stations worldwide
  - Nearly 30,000 report temperature
- Subjected to a common suite of quality assurance (QA) reviews
- Official archive for U.S. Daily data
- Primary data set used to compute 1981-2010 Normals and Extended Normals

Methodology

- Select US stations from GHCN-D having 90% of available data spanning at least 80 years.

- Use daily TMAX and TMIN to generate TAVG, then plot annual curves and calculate annual AFI for each station

US GHCN-D Stations that Match Criteria
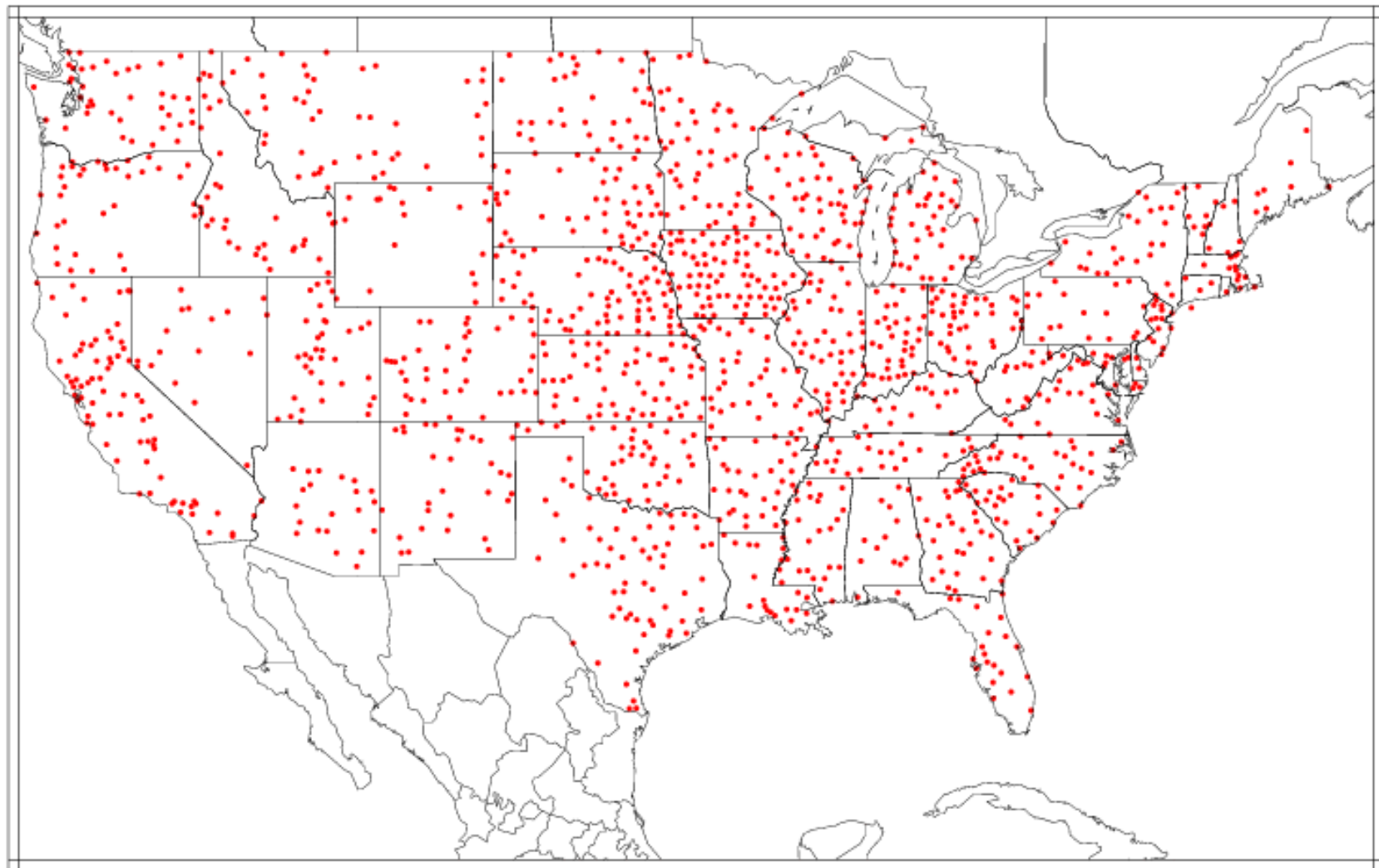
Planned Work

- Test AFI against other metrics in order to measure goodness of fit

- Detect decadal trends of AFI and its effect on soil in a changing climate

- Produce regional analysis
  - Same regions defined by the National Climate Assessment report

- Attempt global analysis

THANK YOU!

Jared Rennie

Research Associate

CICS-NC

Asheville, NC

jared.rennie@noaa.gov

(828)-271-4214