

Improvement to NCAR's Historical Upper Air Archive

By

Joey Comeaux

Steve Worley

Bob Dattore

Will Spangler

Roy Jenne

Dennis Joseph

DSS/CISL/NCAR

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Reanalysis Model Output

Available from NCAR : dss.ucar.edu

Model	Period	Forecast
NCEP/N		Y
NCEP/D		Y
ERA-15		
ERA-40		Y
NARR		
JRA-25		Y
20 th Cer		Y
CFSRR		Y
ERA-Int		Y
ASR		
JRA-55	????	
ERA-Clim	????	

In Situ Datasets

- ISPD
- ISD
- GHCN
- NCEP GTS Sfc
- UA

Reanalysis Model Output

Available from NCAR

Model	Period	Forecast
NCEP/NCAR I	1948-Cont	Y
NCEP/DOE 2	1979-2008	Y
ERA-15	1979-1993	
ERA-40	1957-2002	Y
NARR	1979-2010	
JRA-25	1979-2010	Y
20 th Century	1869-2008	Y
CFSRR	1979-2010	Y
ERA-Interim	1989-2010	Y
ASR	????	
JRA-55	????	
ERA-Clim	????	

NCAR Upper Air Data

Description	Period	ERA-40	NNR
C-CARDS Raobs	1949-1965		1949-1956
CARDS 542	1946-1947		
China R & P	1954-1962	1957-1962	
Countries R & P	1946-1993	1957-1978	
French R & P	1948-1979	1958-1978	
GATE R & P	1974		1974
Line Island	1967		1967
MIT Raobs	1958-1963		1958-1963
Navy Kunia	1966-1969		
Navy Spot Soundings	1966-1973	1966-1973	
NCEP ADP	1973-Cont	1980-1994	1973-2000
NCEP B3	1962-1972	1962-1972	1962-1972
Permanent Ships	1973-1980		
Ptarmigan Drops	1950-1961		1950-1961

New Data

Changed

Unknown

Not DSS

NCAR Upper Air Data

Description	Period	ERA-40	NCEP
Russian NP	1950-1991		1954-1957
Russian Ship	1947-1990		1948-1967
Russian Upper Air	1960-1990	1960-1978	
Scherhag Raobs	1954-1962		1954-1962
South African	1961-1967		1961-1967
TD390 Raobs	1943-1962		
TD52 Pibals	1922-1971	1957-1971	1948-1971
TD53 Pibals	1919-1969	1957-1969	1948-1957
TD54 Raobs	1943-1974	1957-1973	1948-1967
TWERLE	1975-1976	1975-1976	
US Control	1946-Cont	1958-1978	
USAF Upper Air	1973-1980		
BAS Raobs	1948-2005		
US Navy Raobs	1985-1996		
Galapagos Island	1990-1998		
SHEBA	1998		

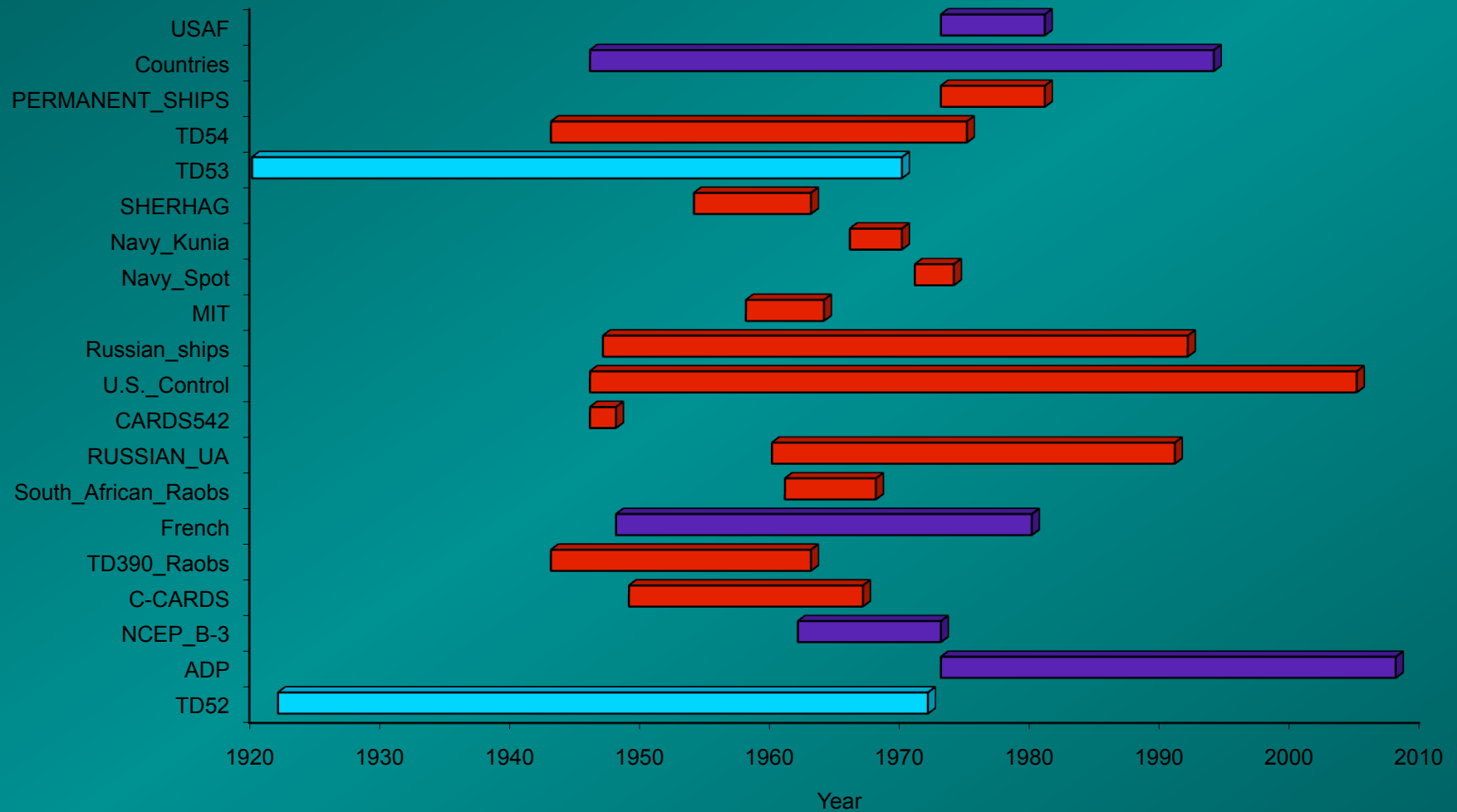
New Data

Changed

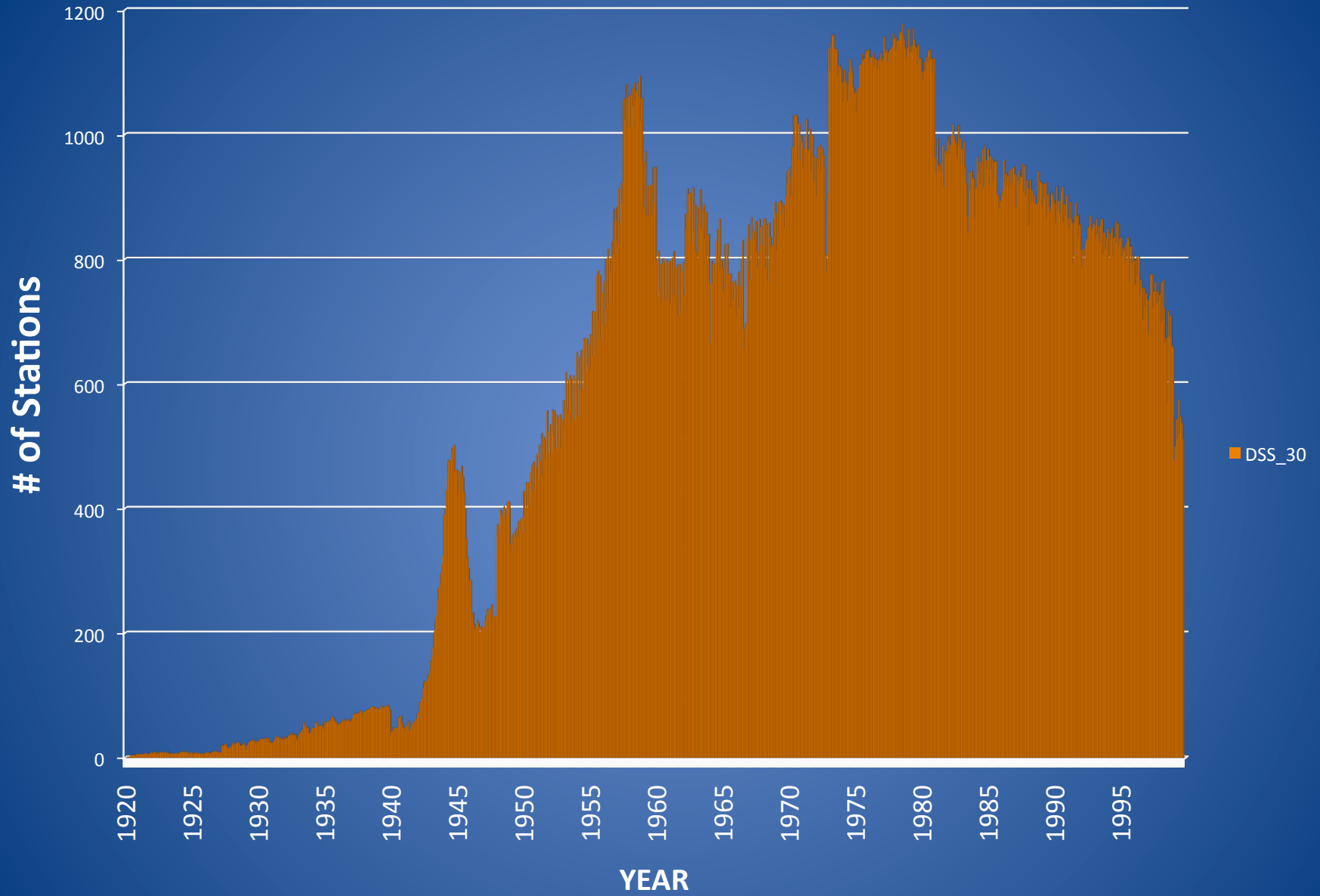
Unknown

Not DSS

Unique Sources of Radiosondes in DSS Archive



Stations in NCAR U/A Archive Reporting At Least 30 Times/ Month



Previous Work

- Many problems already fixed
- Many sources reformatted
- Station locations, elevations corrected
- Hydrostatic checks on most soundings
- Loose QC performed
- Many intra-source dupes removed

Problems

- Varying Units
- Multiple Formats
- Varying Station ID Metadata
- Inconsistent QC
- Duplicates
 - Inter source
- Organization / Discovery
 - Datasets
 - Stations -> data

GOALS

1. Provide an archive of U/A data that contains homogeneous units, format(s), station metadata and QC
2. Support usage of data in multiple ways
 - Output in synoptic or time series
 - Multiple discovery options
 - Access various sources and/or merged version
3. Ability to track **all** reports
4. Support both research and reanalysis communities
5. Easy to Update
 - New Data
 - Bias corrected data
 - Meta data

USAF

NCEP
ADP
B3


MIT

TD53

Navy

TD52

TD54



Relational
Database

Why Relational DB?

- Access options
- Separate sources, yet together
- Reproducibility
- Tracking
- Easily expandable

Version 3

- Units homogenized
- Standardized all descriptive flags
- Unique record identifier from V1
 - Sounding ID, Source, Version #
- Standardized DB tables
- Output by source
- Improved station meta data
- Complex merge/duplicate elimination
- Multiple output formats

source data

unique identifier

Source and Version #

and/corrected

sources / real time

multiple ascii

Version
3.0

Station MetaData

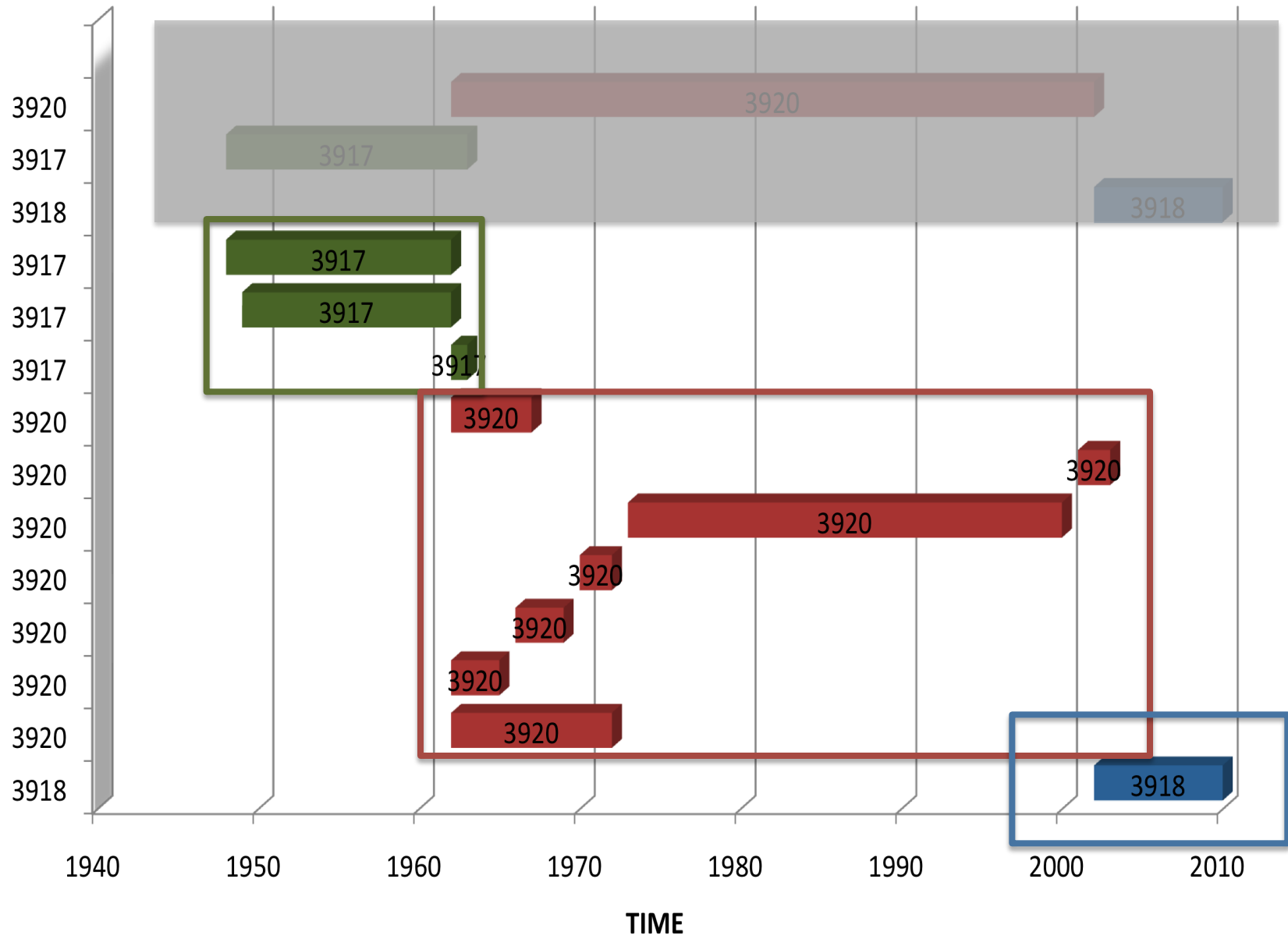
Problems

- Primarily focusing on ID's
- Archive contains WMO, WBAN and other ID's
- Multiple sources use varying WMO libraries
- Not trivial to access full available POR for a station

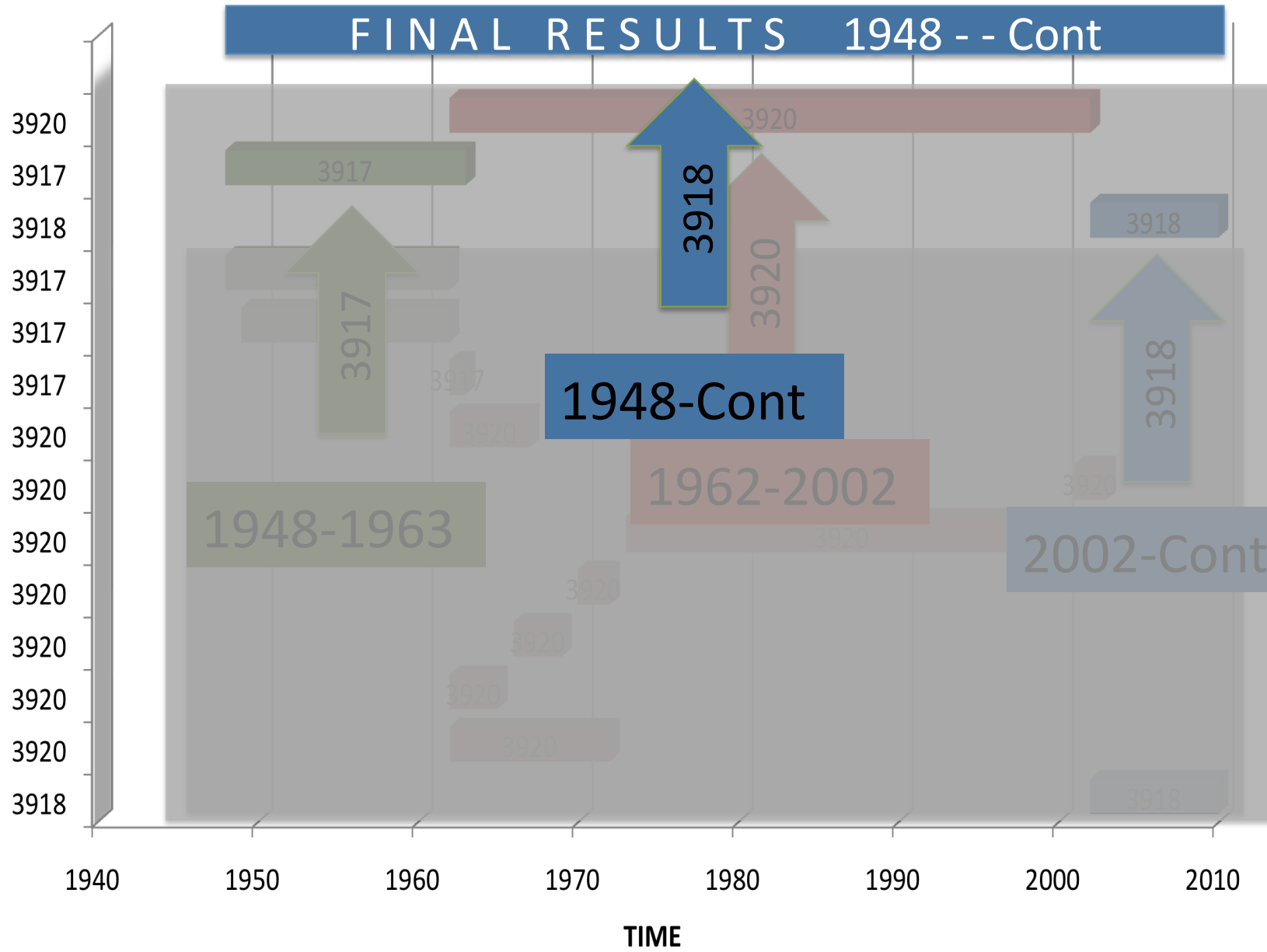
<u>Station</u>	<u>Lat</u>	<u>Lon</u>
3917	54.65	353.78
3918	54.50	353.66
3920	54.48	353.90

Distance : 15-20KM

Analysis of Station for 3920



Analysis of Station for 3920



Station ID Meta Data Library

All locations for each station

Identify Possible Merge Cases

Start with longest chron stations

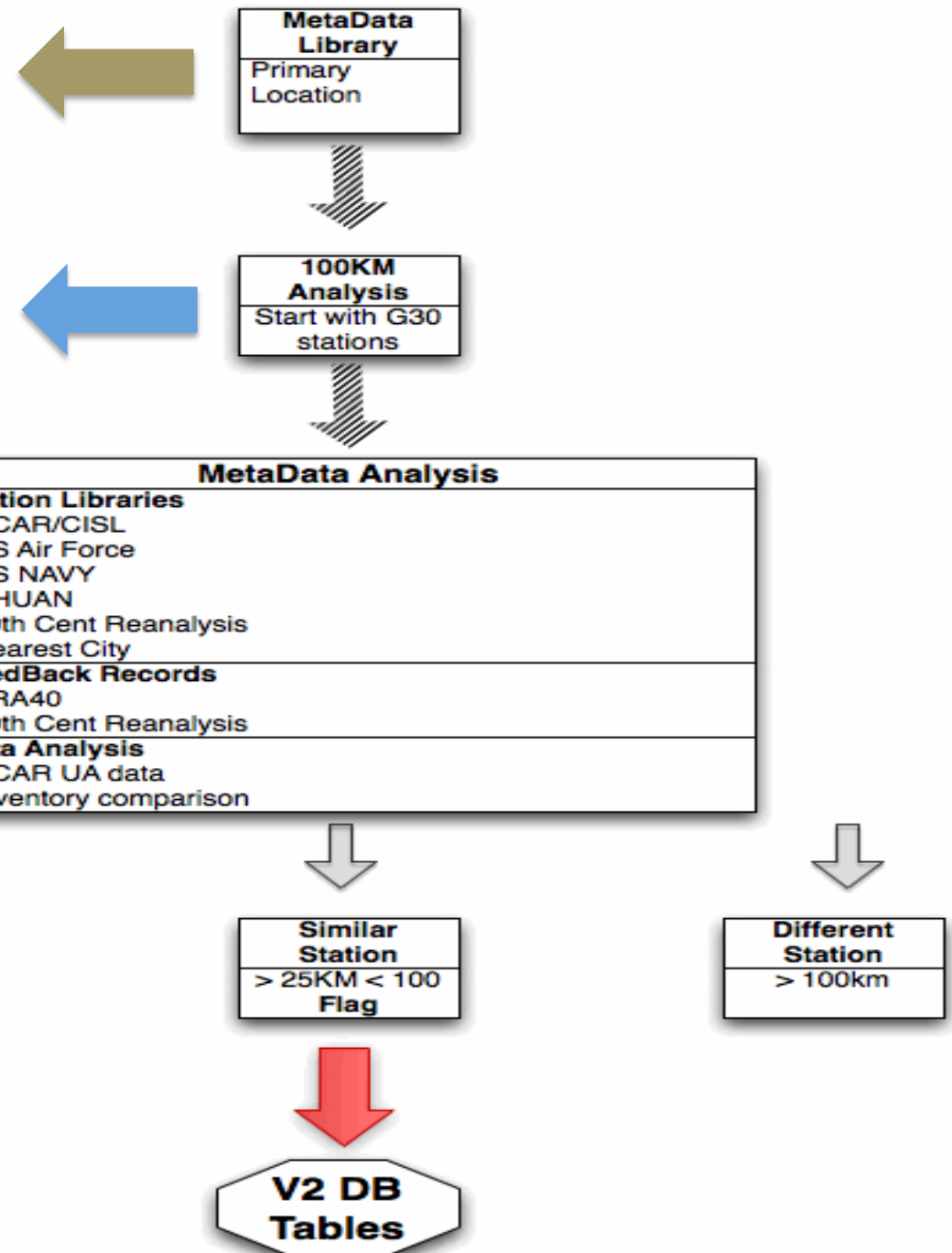
Determine all stations w/i 100KM

-> to DB tables

Results

600 Cases > 20 years

500 cases < 20 years



Meta Data Analysis

- **Inventory analysis**
- **Data analysis**
 - Direct Comparison
 - Huber weight function
 - Location and Scale
- **Feedback Records**
 - ERA-40
 - 20th Cent. Reanalysis
- **Station Libraries**
 - DSS, USAF, US Navy,
 - CHUAN, 20th Cent Rean
 - City Location DB

- Nearest city DB

Results

Same Station

- $\leq 25\text{KM}$
- Flag
- Recommend Merge
- Keep Original ID

Close, Not Related

- $>25\text{KM}, < 100\text{KM}$
- Allow Merge
- Flag
- Keep Original ID

Stations Not Related

- Do Nothing

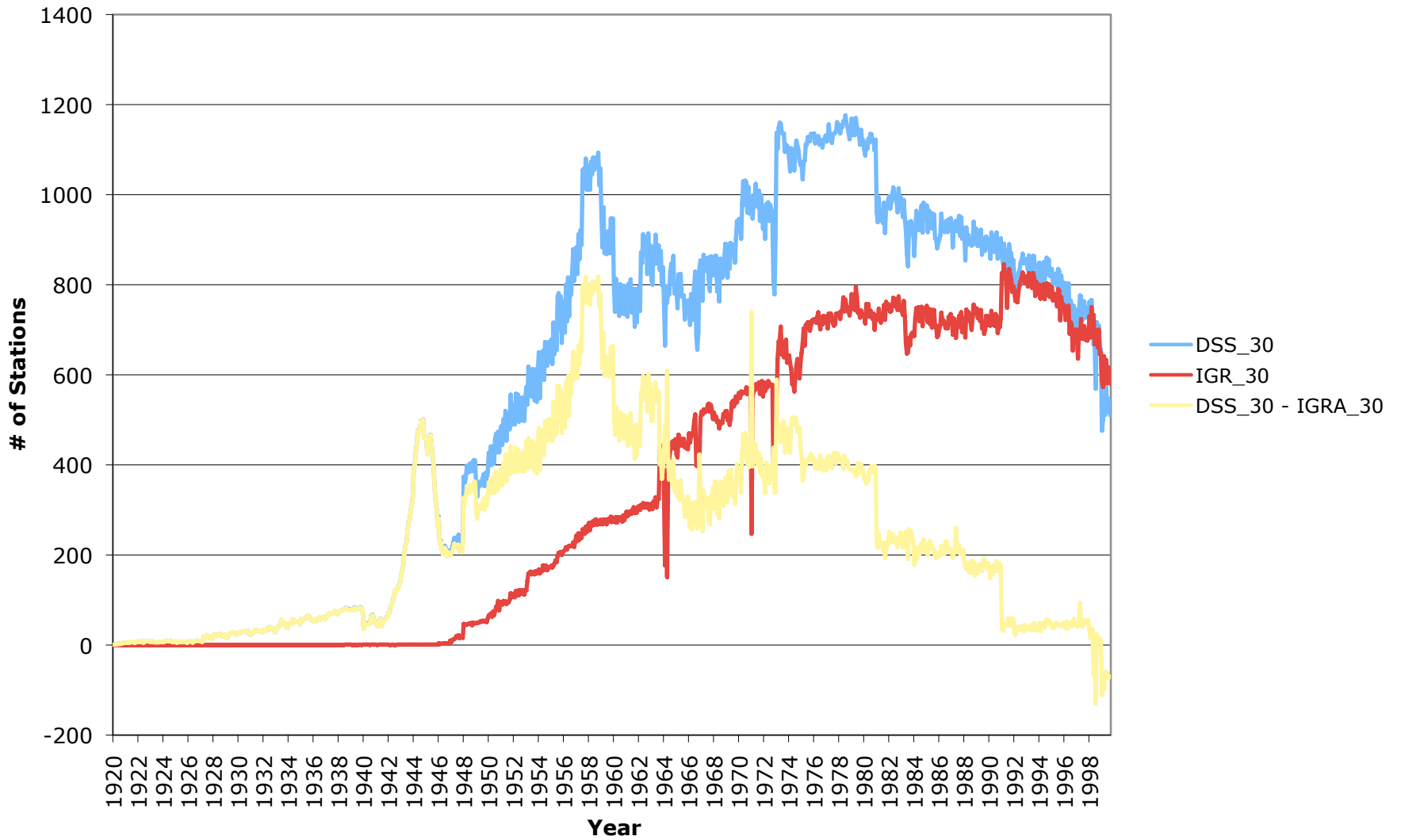
Future Work

- User Interface
- Improve QC
- Possible Cooperation/Coordination of Efforts with NCDC
- More Station Meta Data
 - Instrumentation
- Ingest New Sources
- Ingest Bias Corrections
 - One option for output
- Reanalysis Feedback
- Include Aircraft Data
- Multiple Output Options
- ‘Snazzy’ Acronym?

Summary

- homogeneous ✓ units, ✓ format(s), station metadata and QC
- Support usage of data in multiple ways
 - ✓ Output in synoptic or time series
 - ✓ Multiple discovery options
 - ✓ Access various sources and/or merged sources
- ✓ Ability to track all reports
- ✓ Support both research and reanalysis communities
- ✓ Easy to Update
 - New Data
 - Bias corrected data

DSS - IGRA Monthly Station Counts for Stations with atleast 30 Obs / Month



1-Degree Box Improvements of IGRA over DSS

