

Improvement to NCAR's Historical Upper Air Archive

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Reanalysis Model Output

Available from NCAR : dss.ucar.edu

Model	Period	Forecast
NCEP/NCEP-DOE	1948-2005	Y
NCEP/DOE-2	1948-2005	Y
ERA-15	1950-2005	
ERA-40	1950-2005	Y
NARR	1972-2005	
JRA-25	1950-2005	Y
20 th Century Reanalysis	1950-2005	Y
CFSRR	1950-2005	Y
ERA-Interim	1950-2005	Y
ASR	1950-2005	
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

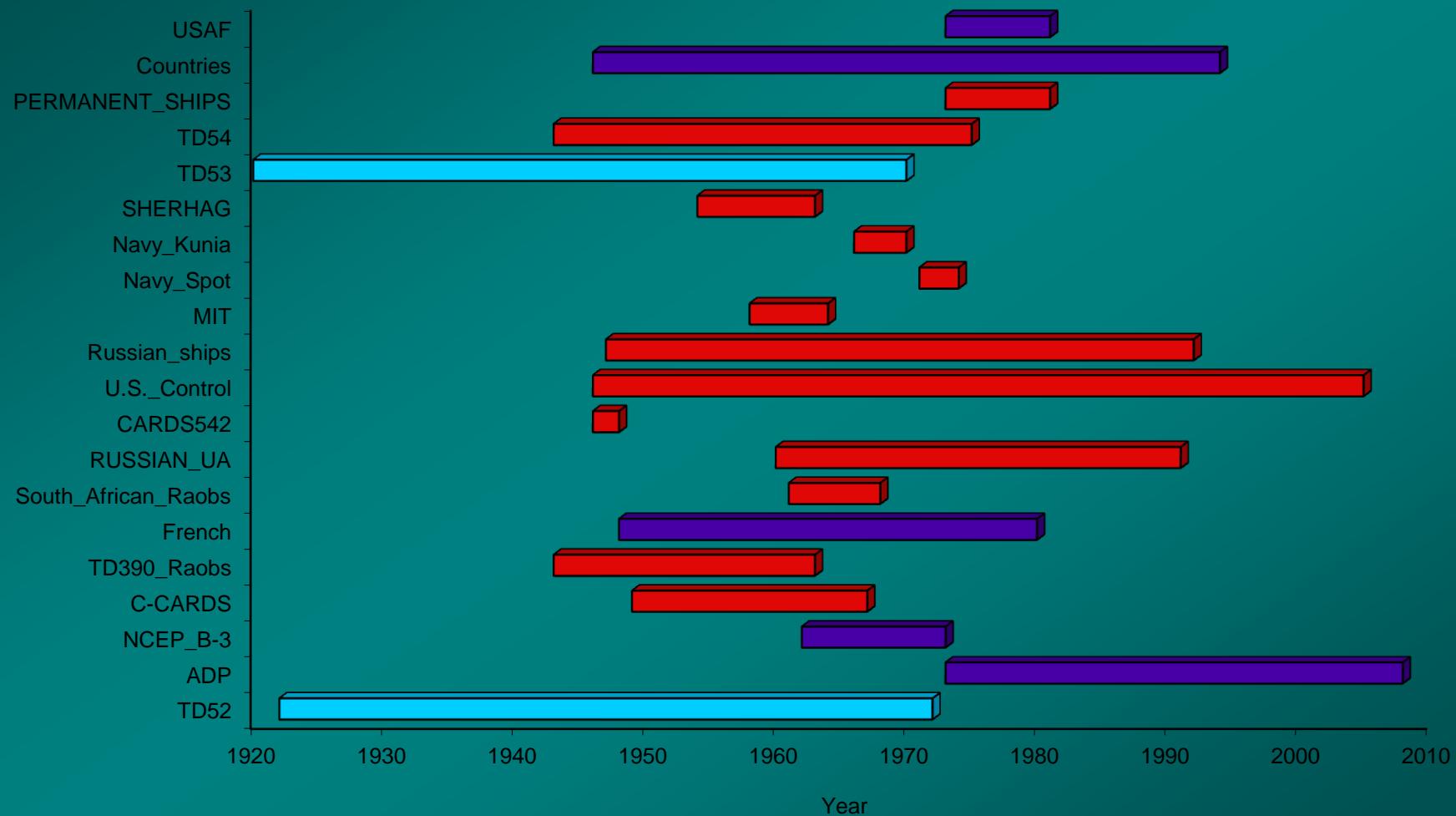


NCAR Upper Air Data

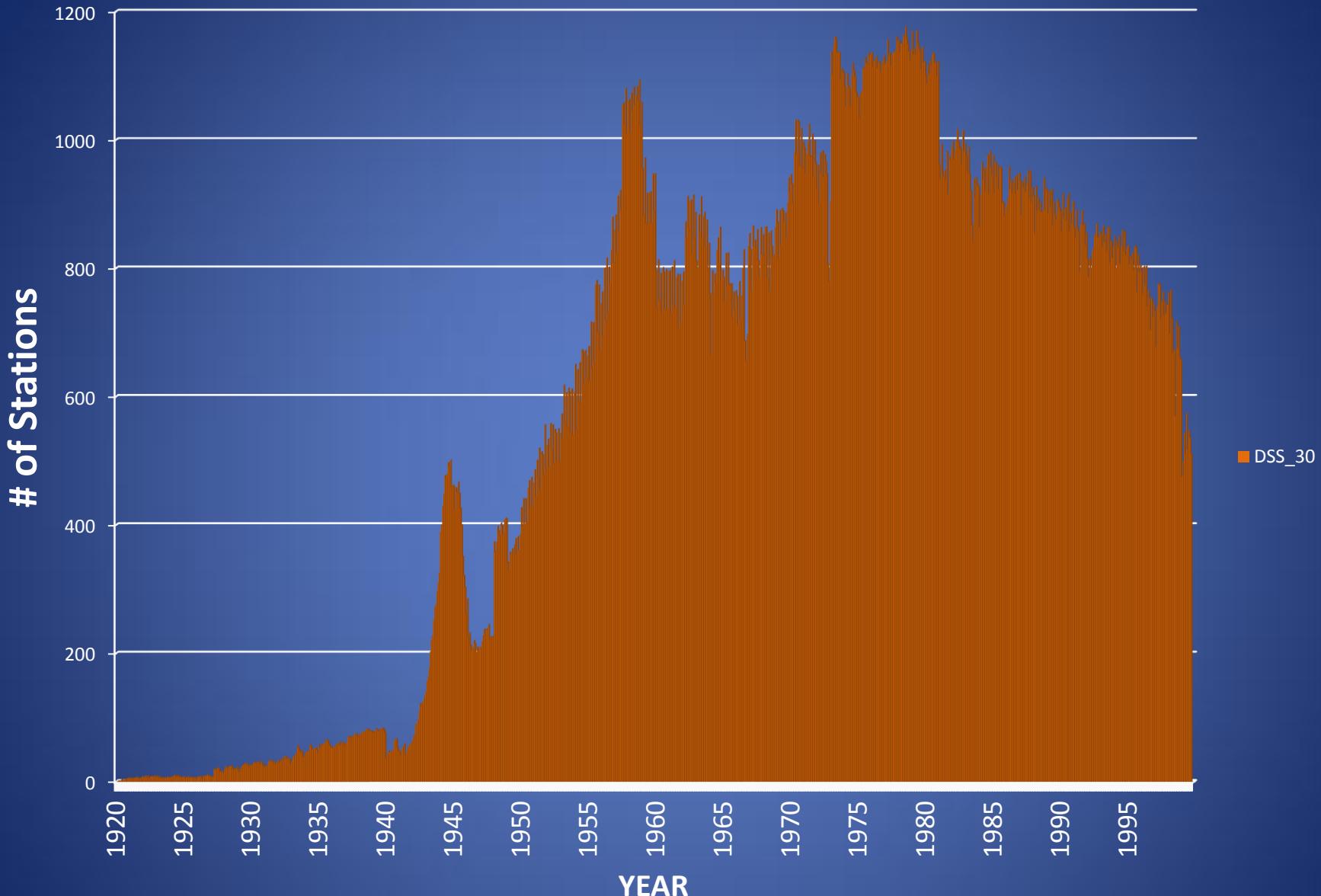
Description	Period	ERA-40	NCEP
Russian NP	1950-1991		1954-1957
Russian Ship	1947-1990		1948-1967
Russian Upper Air	1960-1990	1960-1978	
Scherhag Raobs	1954-1962		1954-1962
South African	1961-1967		1961-1967
TD390 Raobs	1943-1962		
TD52 Pibals	1922-1971	1957-1971	1948-1971
TD53 Pibals	1919-1969	1957-1969	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

TD5
2

TD5
4

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
 - d/corrected
 - times / real time
 - Improved station meta data
 - Complex merge/duplicate elimination
 - multiple ascii
 - Multiple output formats

Version 3.0

Station MetaData

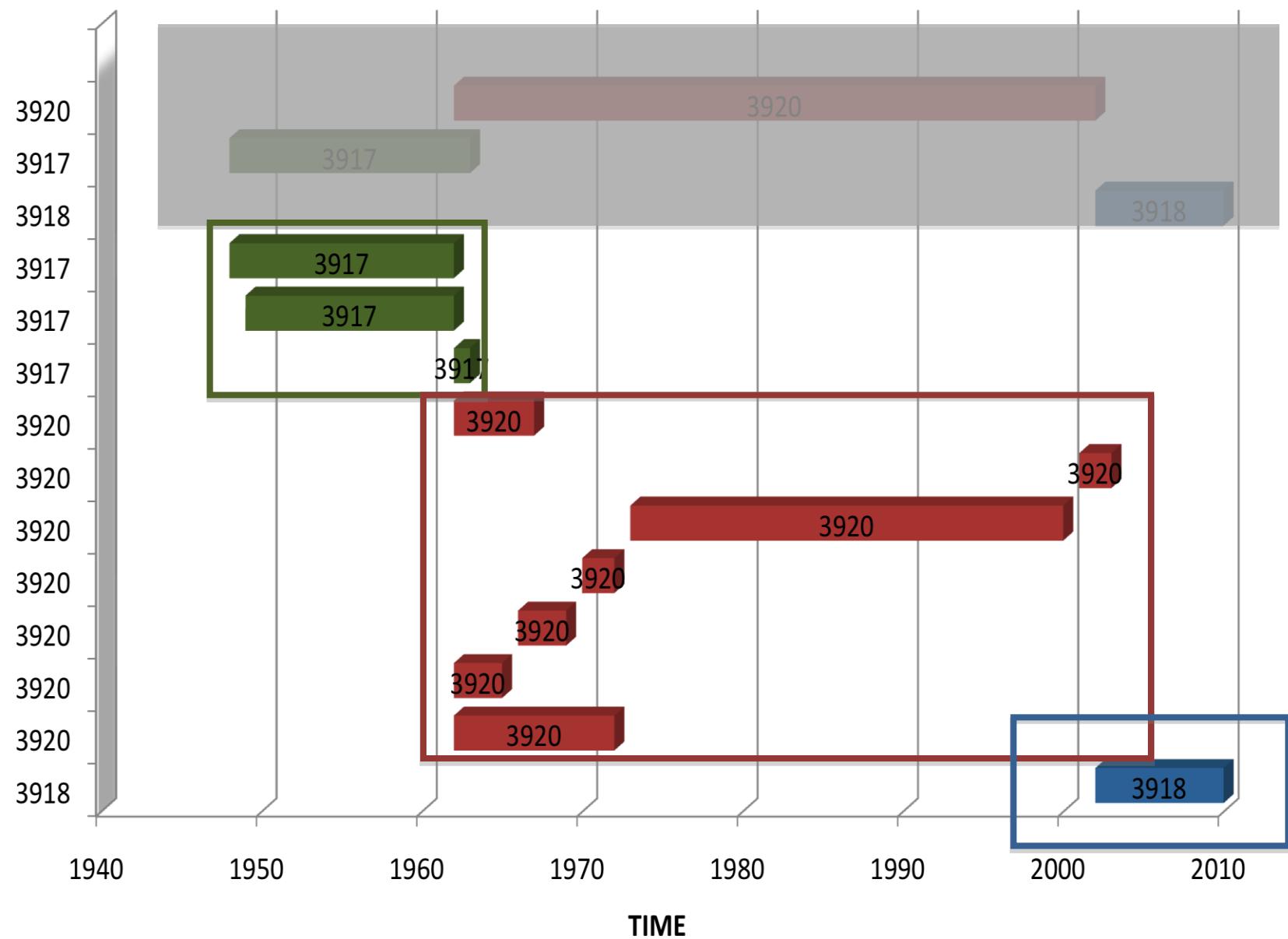
Problems

- 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

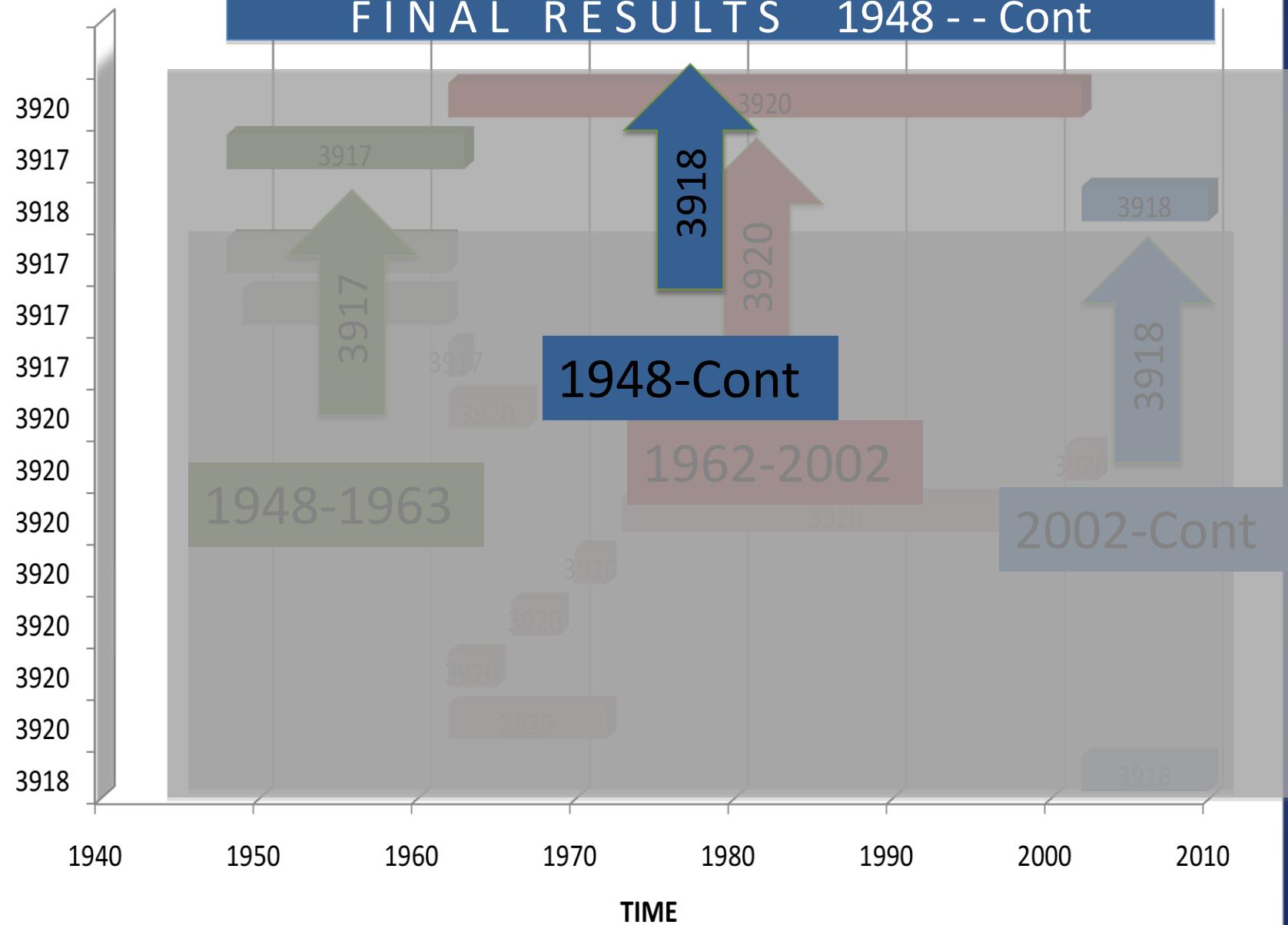
Distance : 15-20KM

Analysis of Station for 3920



Analysis of Station for 3920

FINAL RESULTS 1948 - - Cont



Station ID Meta Data Library

All locations for each station

Identify Possible Merge Cases

Start with longest chron stations

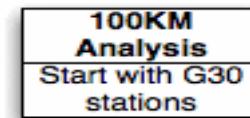
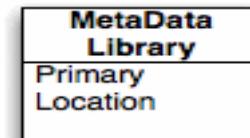
Determine all stations w/i 100KM

-> to DB tables

Results

600 Cases > 20 years

500 cases < 20 years



MetaData Analysis

Station Libraries

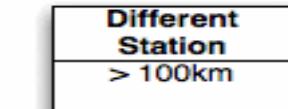
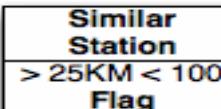
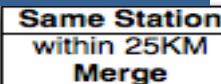
NCAR/CISL
US Air Force
US NAVY
CHUAN
20th Cent Reanalysis
Nearest City

FeedBack Records

ERA40
20th Cent Reanalysis

Data Analysis

NCAR UA data
Inventory comparison



**V2 DB
Tables**

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

Results

Same Station

- <= 25KM
- Flag
- Recommend Merge
- Keep Original ID

Close, Not Related

- >25KM, < 100KM
- Allow Merge
- Flag
- Keep Original ID

Stations Not Related

- Do Nothing

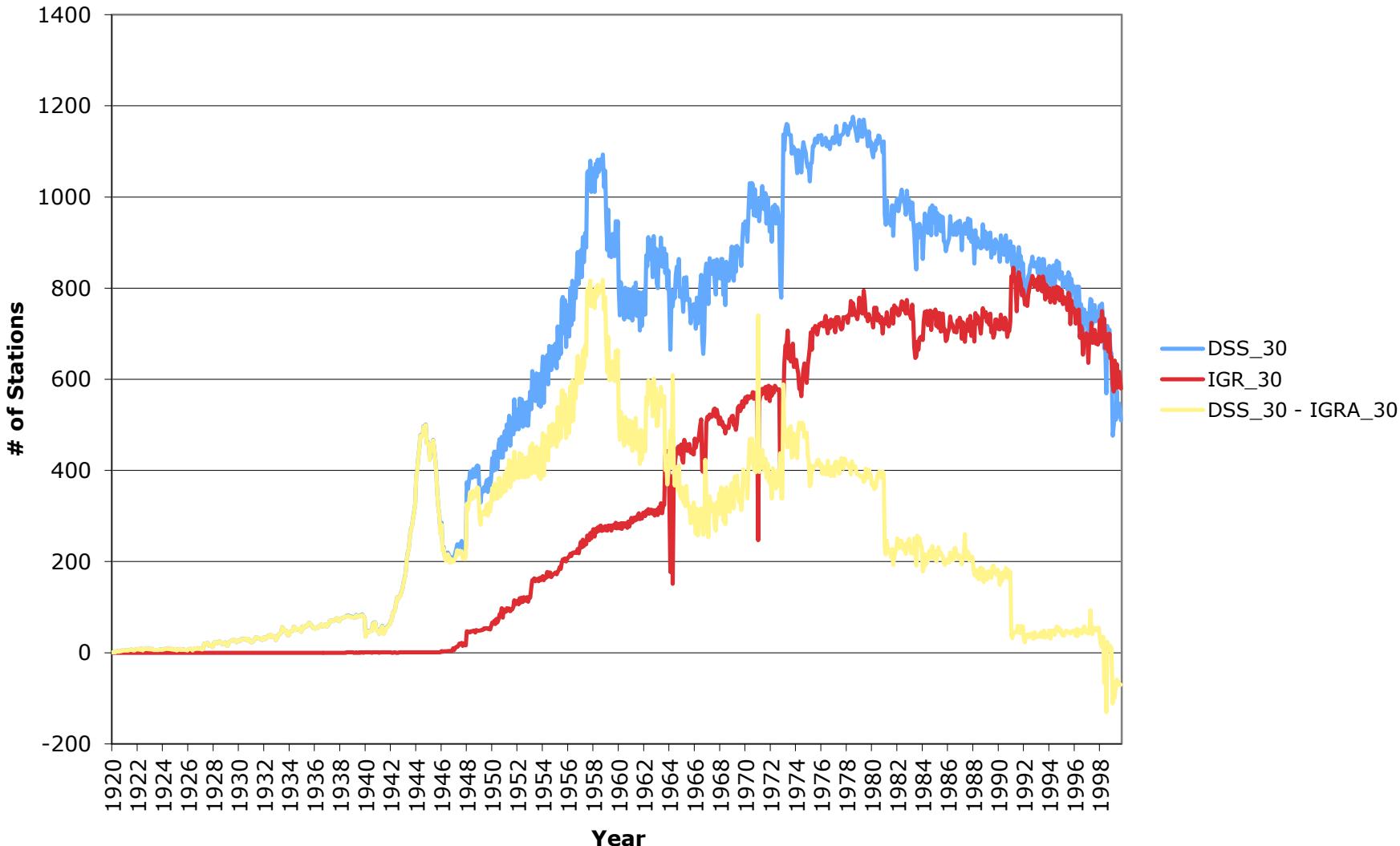
Future Work

- 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

