

# ***Adding Value to ICOADS through Data Rescue and Other Enhancements***



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*3rd ACRE Workshop, Reanalysis and Applications, Baltimore,  
USA, 3-5 November 2010*



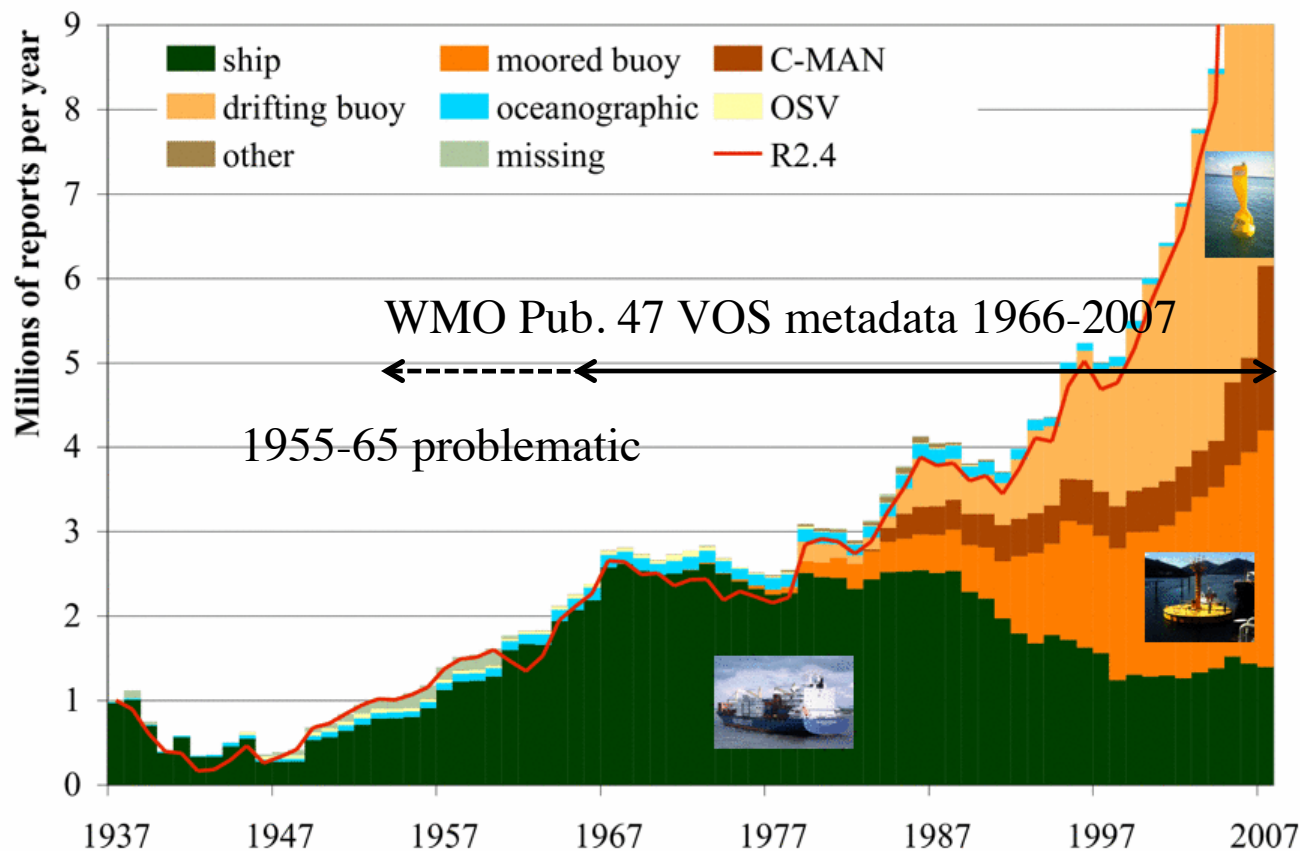
# *Main Topics*



- (1) ICOADS – joint project in US between:
  - NOAA (ESRL and NCDC) and NCAR
  - plus national/international contributions
  - plans to improve both recent and historical data
- (2) RECLAIM project
  - RECOVERY of LOGbooks AND International MARINE data
  - Closely linked with ACRE and NOAA's CDMP
- (3) IVAD proposal
  - ICOADS Value-Added Database

# (1) ICOADS <http://icoads.noaa.gov>

- *International Comprehensive Ocean-Atmos. Data Set*
- Widely used for climate research etc. – reanalyses
- VOS plus buoys and other surface marine data types

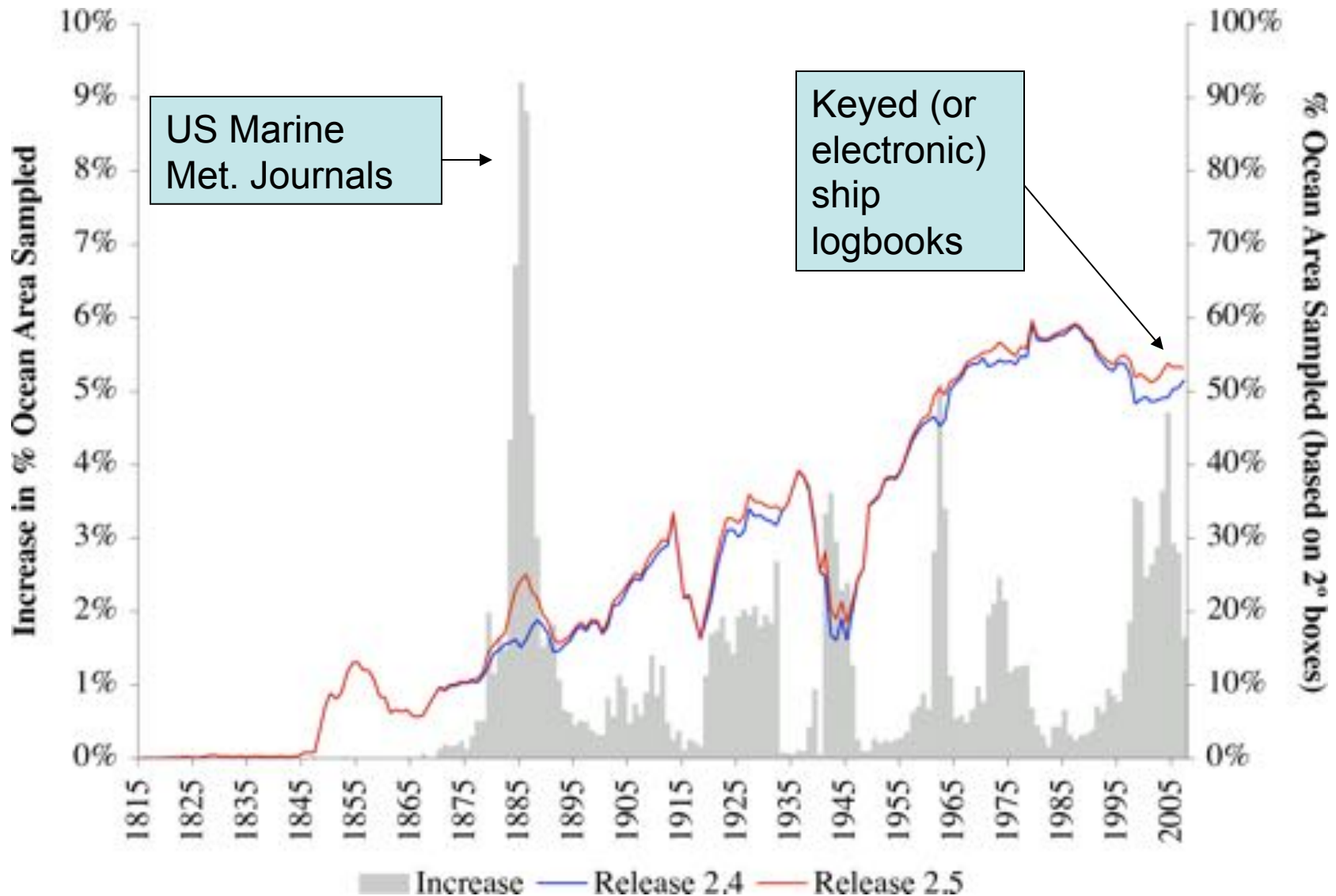


The official Release 2.5 period (1662-2007) is now extended monthly with “preliminary” real-time data and products based on GTS data



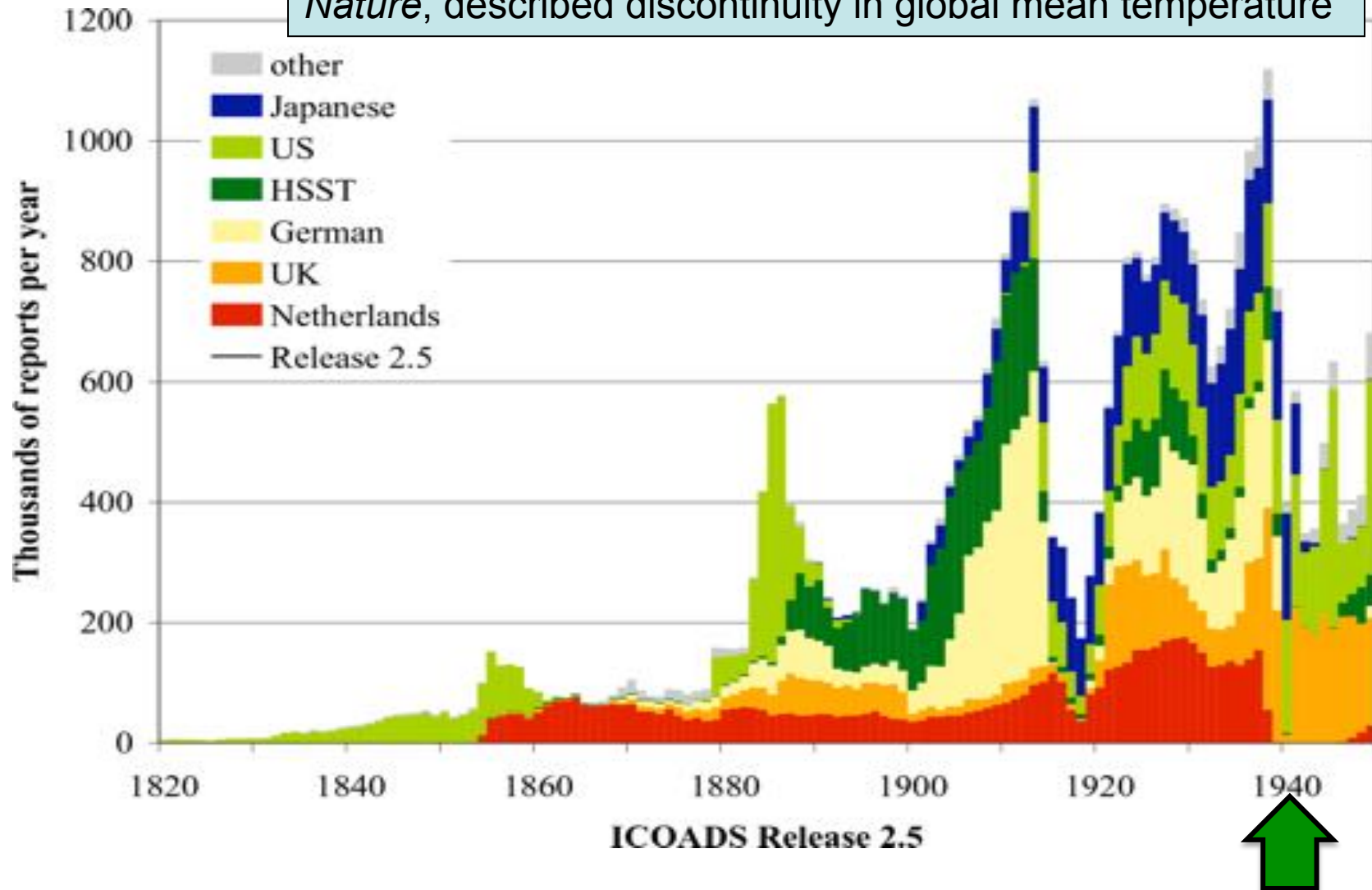
# Improvements in ocean area coverage

Release 2.5 (1662-2007): completed 2009



# Early Data Mixture Changes: Science Impacts

- Relative importance of national collections in early period
- WWII is drastically different – Thompson et al. (2008) *Nature*, described discontinuity in global mean temperature



# *IMMA: A Robust and Extensible Observational Data Format*



- International Maritime Met. Archive (**IMMA**) format (ASCII)
- Core + optional “attachments”
- With metadata for source tracking
- Ship instrumental metadata – thanks to UK NOCS
- Suitable for long-term archiving
  - ✓ Carefully validated translations form “foundation” for all subsequent work

Key requirement:  
attn of original data  
forms: experience  
demonstrates format  
translations **frequently**  
contain errors or  
omissions

Advantage:  
exact copy of original permits  
re-translation and cross-  
checks at any time

# *Other Contemporary Data Challenges (in JCOMM Framework)*

- VOS callsign encryption: since ~Dec 2007
  - ✓ Impacts NCEP datastream now used for ICOADS
- Need for improved international metadata for rigs and platforms
- UK Real-Time Monitoring Center (RTMC) to provide model feedbacks for GTS data
  - ✓ planned to populate ICOADS records
  - ✓ existing IMMA atm dedicated to these feedbacks
  - ❑ similar storage of e.g. 20CR reanalysis feedbacks?



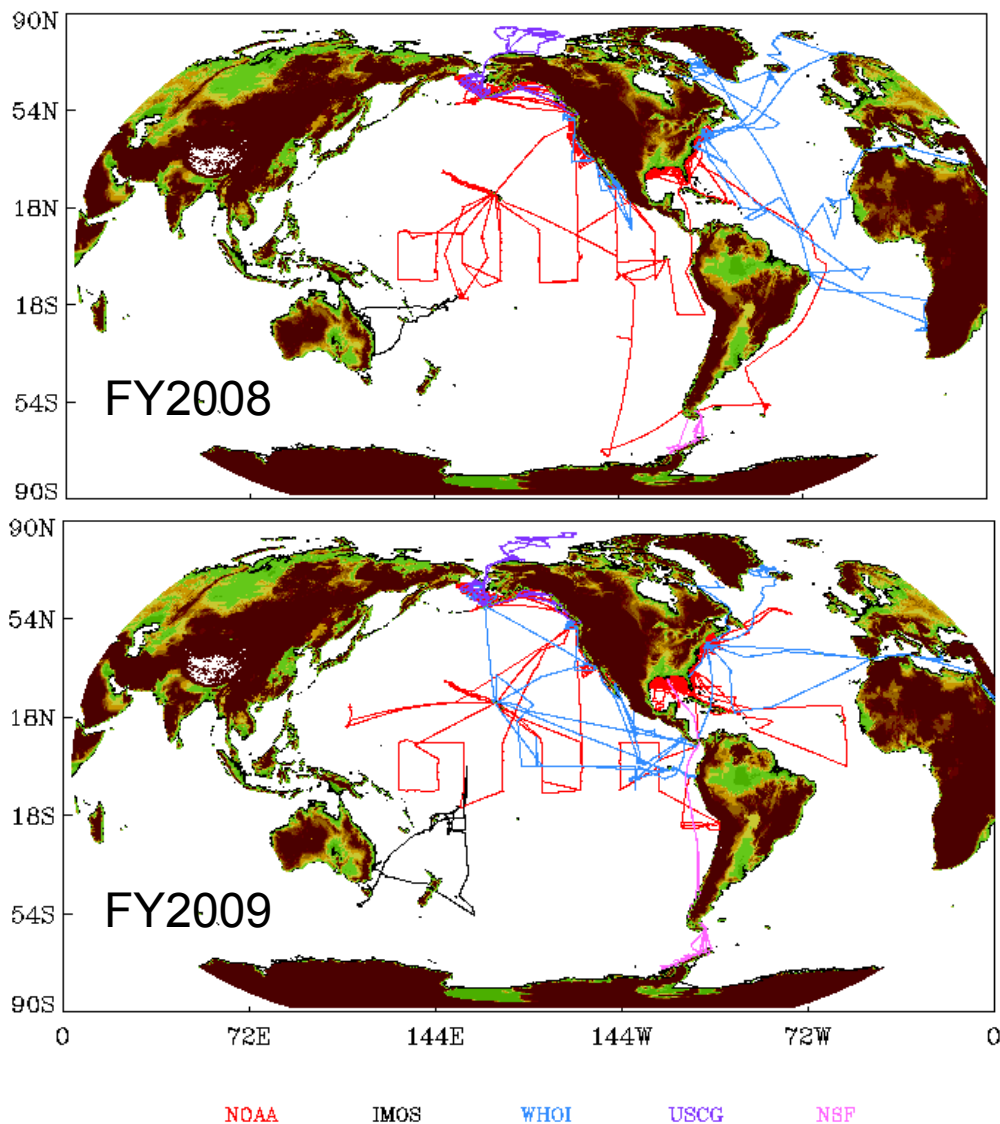


# Adding SAMOS Data to ICOADS

- SAMOS data center has QC'd marine R/V data since 2005
- Data at 1-minute intervals
- Will be sub-sampled to hourly and converted to IMMA
- Method used to provide earlier R/V data to ICOADS
- Est.: ~300K new obs.; 27 RVs
- Once implemented, updates can be sent to ICOADS on monthly basis as part of routine archival process with NODC



SAMOS ship tracks





# (2) RECLAIM Project



- Support from NOAA Climate Database Modernization Program (CDMP)
- Closely linked with ACRE and other international projects
- UK/other archive surveys (e.g. WW2, WW1)
- Published data and literature inventory
- Locating early platform and instrumental metadata

■ Wilkinson, C., S.D. Woodruff, P. Brohan, S. Claesson, E. Freeman, F. Koek, S.J. Lubker, C. Marzin, D. Wheeler, 2009: RECOVERY of Logbooks And International Marine Data: The RECLAIM Project. *Int. J. Climatol.* (in press)

■ Woodruff, S., E. Freeman, C. Wilkinson, et al., 2009: ICOADS Marine Data Rescue: Status and Future CDMP Priorities (draft technical report available from <http://icoads.noaa.gov/reclaim/>).

Engine-room establishment 20  
 Sounding 13  
 Total..... 236

**BAROMETER.**

Mercurial or Aneroid *Mercurial*  
 Name of Maker and number *262*  
 Height of cistern above sea *6 feet*

**Thermometers for Air Temperature.**

Position in Ship *On poop abaft Chart House*  
 Whether in screen *In screen*  
 Date *94*

Maker and No. *207 4564* From *21 Aug* To *4 June 90*  
 " *Asella 1970* - *4 June 90 - 8 March 91*

N.B.—The thermometer attached to barometer should never be used for air temperatures.

**Thermometers for Sea Temperature.**

Date

Maker and No. *Asella 2118* From *25 Nov* To *16 Dec 94*  
 " *h+z 3837* - *16 Dec* " *1 June 90*  
 " *3077* - *1 June 90 - 8 March 91*

N.B.—When new instruments are brought into use, the date of change is to be given.

DEVIATION OF STANDARD COMPASS.

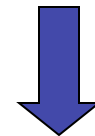


University of  
Sunderland

# Proposed “pipelining”

- As practical, initiate concurrent processing:
  - (b) prior to completing (a)
  - (c) prior to completing (a-b)
- Can be helpful to explore data quality/characteristics in advance (e.g. dups)
- Translation into IMMA format
- Among IMMA benefits:
  - suitability for permanent archival (contrast e.g. WMO’s BUFR)

(a) Imaging



(b) Digitizing (keying)



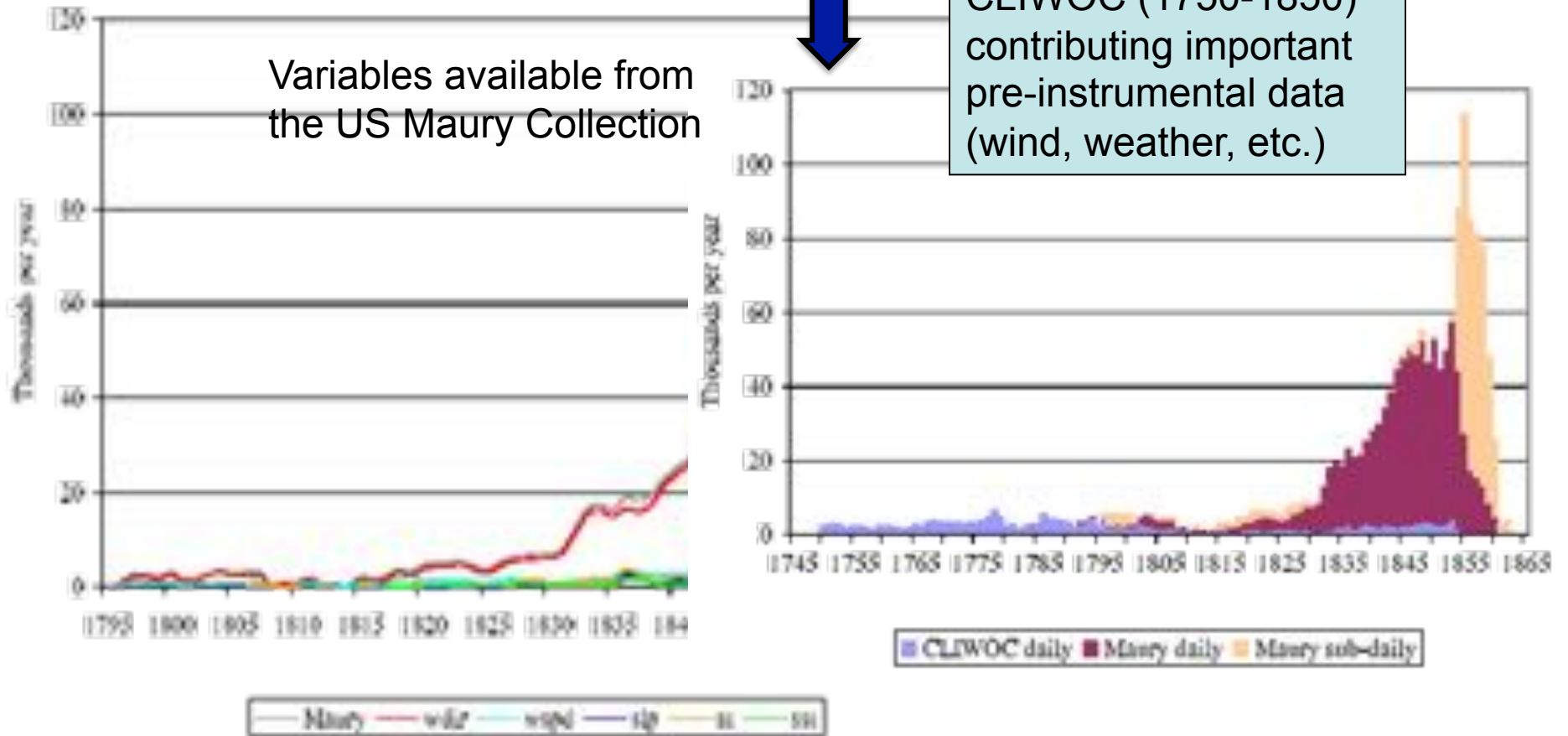
(c) IMMA translation

Critical US resource bottleneck: the translation of data in unique formats to IMMA is very expensive and presently not adequately resourced

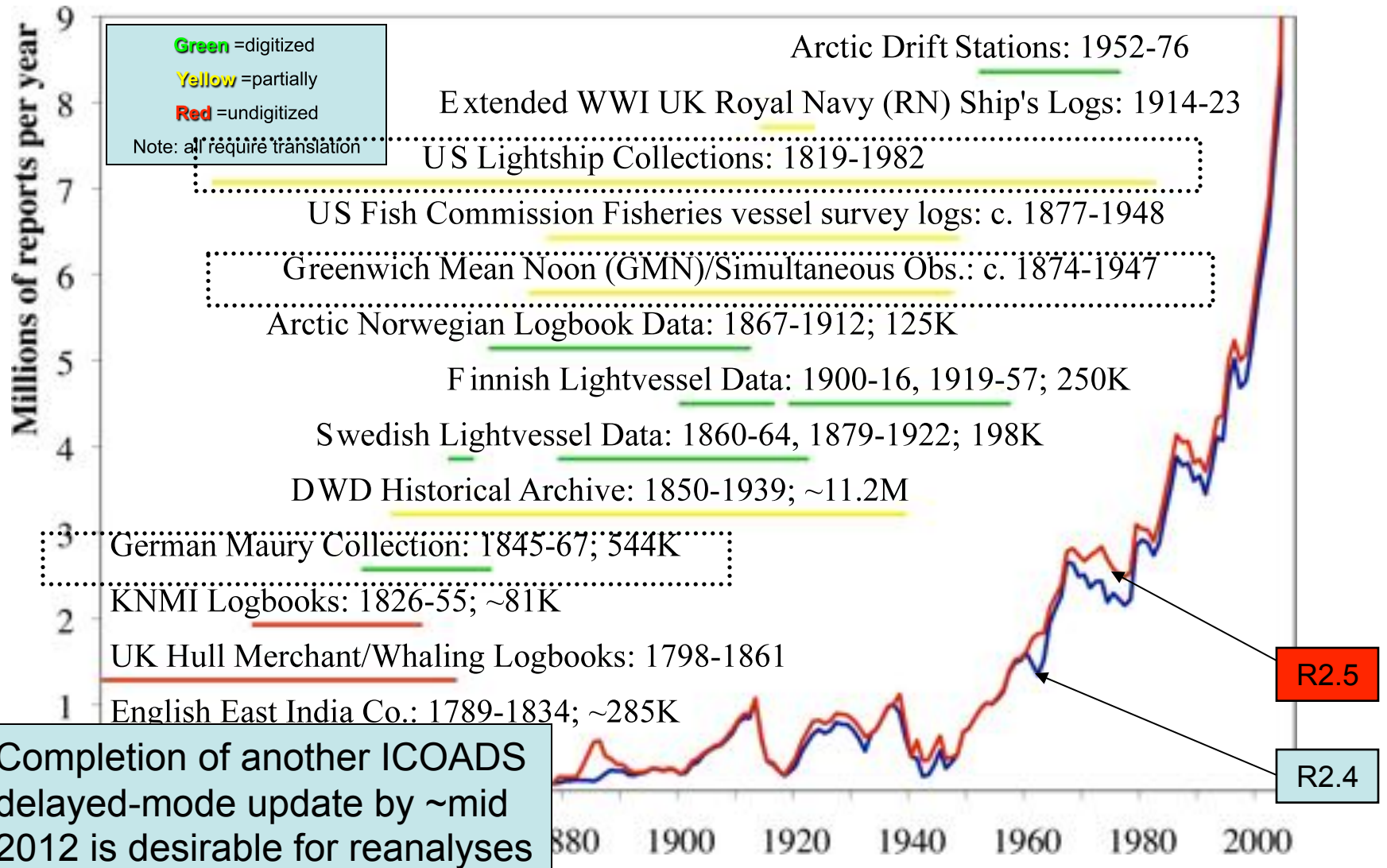
# Untapped marine instrumental data: probably most are ~1854-forward

Brussels Maritime  
Conference, 1853

But successful efforts  
starting with EU's  
CLIWOC (1750-1850)  
contributing important  
pre-instrumental data  
(wind, weather, etc.)



# Selected Data Rescue & Blending Candidates (some discussed in other talks)





# US Lightship Collection

1916-82 component; ~430K daily obs.

(CDMP-funding project initiated by WHOI)

<u>Lightship Name</u>	<u>Period(s) of record</u>
Ambrose	1937-74
Barnegat	1947-70
Boston	1958-75
Buzzards Bay	1958-80
<b>Chesapeake</b>	<b>1947-79</b>
Delaware	1961-70
Diamond Shoals	1947-74
Five Fathoms	1957-72
Frying Pan Shoals	1936-79
Georges Shoal AFS	1956-60
Nantucket	1916-18 and 1947-82
Pollock Rip	1947-69
Portland	1956-66
Savannah	1954-64



# Greenwich Mean Noon (GMN) Obs. 1910-47; Daily and Monthly Forms (plus other 19thC published forms etc.)

- Imaging complete
- Digitization underway
  - ✓ Goal: late 2011/early 2012
- 2.6M global reports
- Pipelining candidate
- Concern: Globally, this sampling strategy creates a day/night bias



R.M.S. *Laconia* (1912), courtesy of the Steamship Historical Society of America, Inc.

6  
Form No. 1801—March, 1910. A

Data on this sheet transferred to punch card 2

SIBIR GREENWICH MEAN NOON OBSERVATIONS.  
See instructions, pages 1, 2, 3, and 4.

Vessel *Sibir* Captain *K. Kozlov*  
Nationality and kind *Russian, steamer* Observer *D. Kozlov*  
Voyage, from *Cebu* toward *Singapore*

(The Daily Journal is back.)

CIVIL DATE.	PORT OR POSITION.		WIND.	BAROMETER.				TEMPERATURE.				WEATHER.	CLOUDS.		
	Latitude.	Longitude (Greenwich).		Time Observed.	Form 9-11.	Actual Obs.	At Sea.	At Deck.	At Mast.	At Gun.	State of sky by symbols.		Force of wind by symbols.	Direction (true or local).	Amount, each 10 mi.
Year, 12	N	E			C	R	R	E							
Dec. 15	5° 49'	117° 45'	ENE 3	29.92	26	21 1/2	20 1/2	21 1/2	C. 2	C. 2	NE	9	6		
14	5° 37'	117° 45'	NE 3	29.92	26	21	21	21	C. 2	N	NE	10	1		
15	5° 36'	116° 4'	NE 5	29.91	25 1/2	20	20	21	C. 2	N	NE	10	1		
16	5° 37'	115° 30'	SSE 6	29.86	26	21 1/2	21 1/2	21	C. 2	N	SSE	10	1		
17	6° 1'	110° 55'	ENE 1	29.91	28	22	21 1/2	22 1/2	C. 2	C. 2	NE	2	3		
18	5° 38'	103° 49'	NE 4	29.91	27 1/2	21 1/2	21 1/2	21	C. 2	C. 2	NE	8	1		
19	5° 37'	96° 51'	E 2	29.91	26 1/2	21	20 1/2	21	C. 2	A. S.	E	1	8		
20	5° 17'	99° 1'	E 1	29.87	28	24	23 1/2	24	C. 2	C. 2	SSE	4	4		
21	4° 32'	101° 28'	NE 3	29.93	28 1/2	22	21 1/2	22	C. 2	C. 2	NE	9	6		

afk

Weather Bureau List Barometer No. .... Kind of Barometer (Anser. or Merc.) *Torrucid*  
 Barometer reads { too high ..... Barometer was last compared at .....  
 { too low ..... (Date) ..... 191

Record barometer and thermometers positively as read. All necessary corrections are applied by the U. S. Weather Bureau.

70

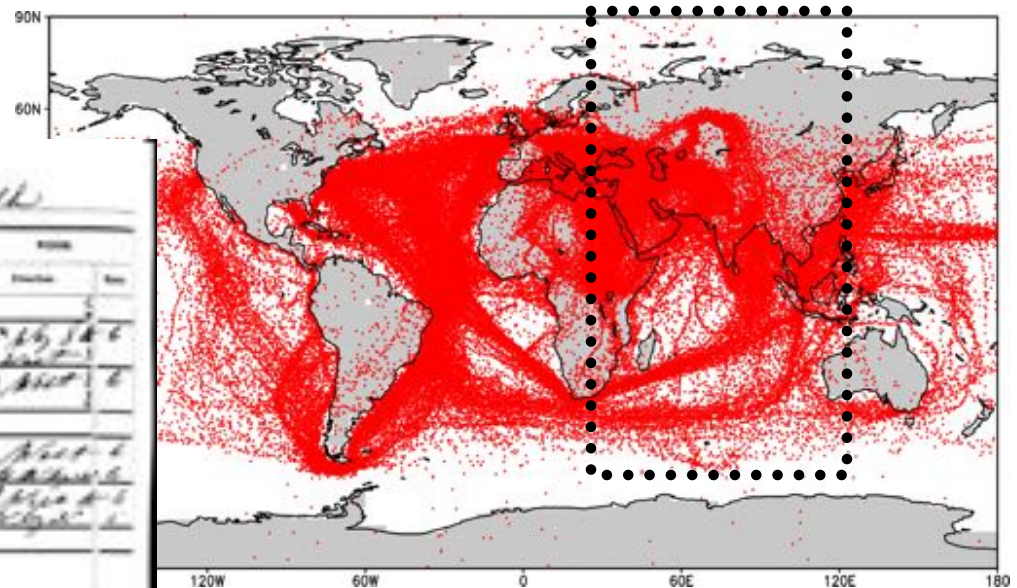


# German Maury (1845-67)

- 850 logbooks loaned by DWD
- Imaged and digitized by CDMP; ~544K reports
- QC and translation into IMMA underway (by ~mid 2011)
  - ✓ problems with interpretation of time elements and location
- SLP biases in other data from this era (needs research)

Abstract Log of *Sasquie* Aischief Captain John Walk

No.	Date	Latitude	Longitude	WIND			WIND DIRECTION	WIND FORCE	WIND STATE	WIND EFFECT	WIND REMARKS
				Force	Dir.	Dir. of Force					
IV	4	14	27 30 47	N	1						
	10		27 30 47	N	0						E 1/2 S 1/2 E
	11										M. 1/2 E
	12	14	27 30 47	N	5						
	13	14	27 30 47	N	9						
	14	14	27 30 47	N	9						
	15	14	27 30 47	N	9						
	16	14	27 30 47	N	9						
	17	14	27 30 47	N	9						
	18	14	27 30 47	N	9						
	19	14	27 30 47	N	9						
	20	14	27 30 47	N	9						



# *Proposal for Formal WMO-IOC Recognition through JCOMM*

- To establish a network of mirrored WMO-IOC Centres for Marine-meteorological and Ocean Climatological Data (**CMOC**)
- Proposed requirements:
  - ✓ Host standardized formats and QC processing
  - ✓ Reliably mirror data and products
  - ✓ Open data access; **WIS (WMO Information System)** interoperability
- Benefits e.g. historical data exchange
  - Countries can be reluctant to exchange historical data without assurance of formal international repository



## ***(3) ICOADS Value-Added Database (IVAD)***

- 3-year research proposal
  - To NOAA/CPO Climate Obs. and Monitoring Program
- Partners
  - COAPS FSU, NOAA ESRL & NCDC, NCAR
- Main Features
  - Enhance IMMA data format
  - Deploy ICOADS in a database
  - Receive and include some community parameter adjustments (e.g. wind, SST, AT)
  - Provide user access to both original and adjusted parameters
  - Demonstrate impact on marine surface flux estimates

IMMA format improvements will include: Unique Record ID (UID) and improved ICOADS version tracking



# *International Marine Climatology Workshops*

- Regular meetings, with a stated data focus, help drive progress and develop shared project ownership
- Next: **MARCDAT-III** 2-6 May 2011, Frascati, Italy
- Closely linked with satellite community (ESA, NASA)
  - ✓ also linked with the International Land Surface Temperature Databank Initiative (initial meeting: Sept. 2010, Exeter UK)
- Overall objective of recommending a 10-year action plan for improved integration & accessibility of climatological observations

<http://icoads.noaa.gov/marcdat3/>

**Abstract submission deadline: 15 Nov**



# ***Data Rescue: A Need and Challenge***

- Need for augmented (and documented) “Best practices”
  - ❑ For imaging/digitizing e.g. 19th and 20thC marine obs.
  - ❑ For translations (e.g. standardized software libraries)
- Rationale
  - ✓ Past efforts often limited by early technology (e.g. punched cards)
  - ✓ Thus omitting key metadata (e.g. ship names: *Challenger*)
  - ✓ But enhancing existing digital collections can be difficult to justify/fund
- Challenge
  - How to prioritize candidates given limited resources?
  - Seeking community agreement, but different research applications may foresee different priorities
  - Content assessment (if feasible) may be useful prior to decision (e.g. est. of parameter availability in time/space, accessibility)
  - Comparative studies needed to gauge cost/benefits against existing digital records?

Overall objective: Get the most climate data record benefit from highly distributed and very limited international resources





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