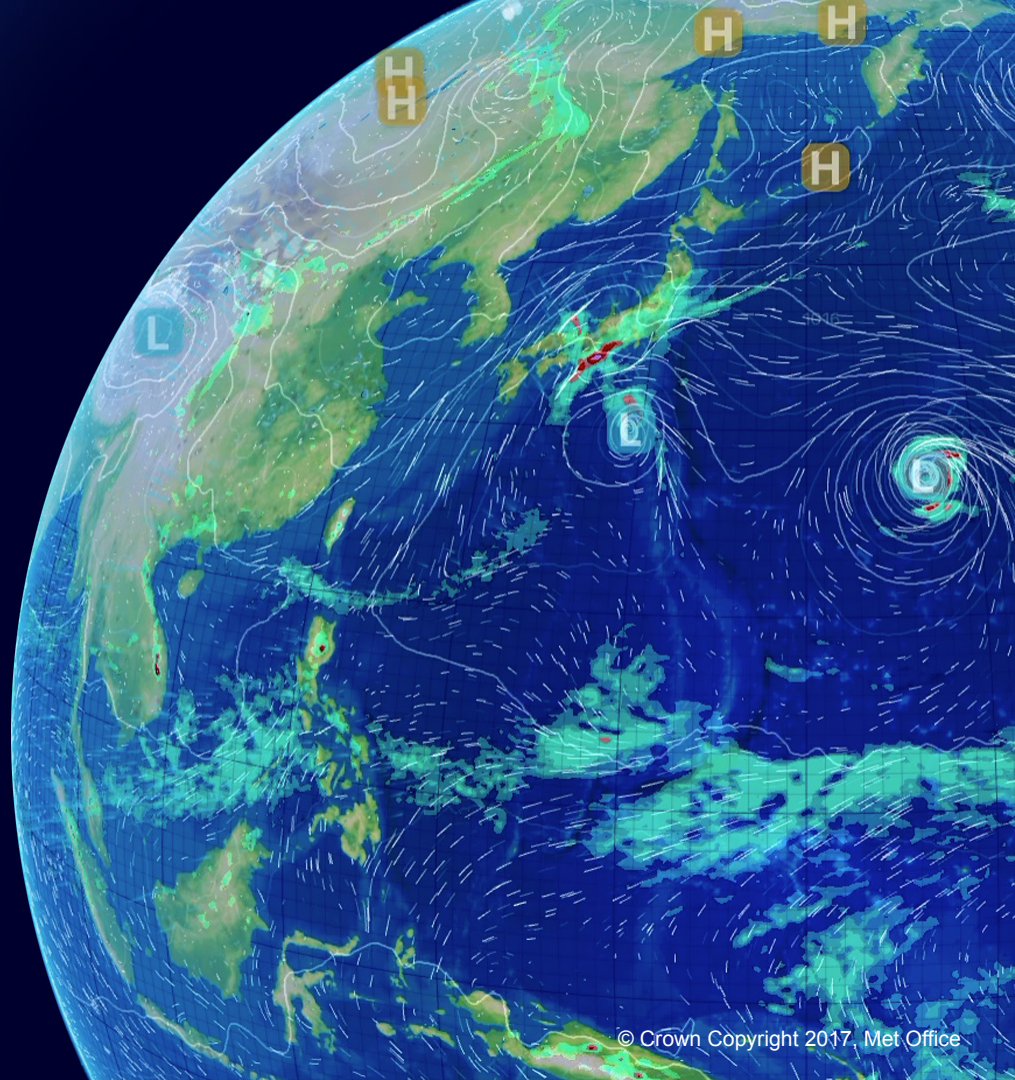


Met Office contribution to WP3 in 2017

Nick Rayner, Met Office Hadley Centre

ERA-CLIM2 General Assembly, University
of Bern, 12th-13th December 2017



Overview

Met Office contribution to WP3 (Earth System Observations)
in 2017

- Rescue of historical data, including imaging of Southern Ocean data for the early 20th century
- Advice on use of early data (D3.9, delivered in late Jan 2017) and delivery of PMR and SSU data to ECMWF
- Bringing together surface and sub-surface ocean temperature and salinity with bias corrections and uncertainty estimates for each observation, the HadIOD data set

Integrated Ocean Database (HadIOD)

- HadIOD.1.2.0.0 system fully documented and in version control
 - Improvements made to representation of ship call signs
 - Data are available in feedback format and in ASCII. A more general NetCDF format is pending
- HadIOD.1.2.0.0 data used in various forms:
 - In reanalyses of the NW Shelf, seasonal forecast hindcast, and in ERA-CLIM2 WP2;
 - To supply reference SST data to ESA CCI SST project and C3S SST production service
 - To inform development of a new version of Met Office Hadley Centre SST data set (version 4, in draft)

Advice on the use of early satellite data

Provision of old satellite data sets (D3.9)

Much use is made of operational satellite information in reanalyses, but we can enhance their use by:

- Using some of the research satellite data prior to 1979 to improve that period which otherwise largely relies on sparse in-situ data;
- Using more satellite data which were not used in operational NWP at the time, including filling gaps caused by, e.g. near-real-time data transmission issues; and
- Using improved satellite data records through reprocessing efforts to improve the level 1 and level 2 data using consistent processing and more optimal calibration.

D3.9 provided advice on how the above could be achieved.

Sensors from 1970s

Example data sets recommended for inclusion are coloured in green.

Sensors prioritised by:

- access to data record;
- length and continuity of record;
- quality;
- overlap with other instruments;
- availability of observation operator;
- sufficient metadata; and
- ability to screen the data for clouds and precipitation.

Sensor	Platforms	Period	Measured primary variables	Status	Priority
PMR	Nimbus-6	1975-1976	Stratospheric temperature	Data available at U.Oxford and Met Office, copy at ECMWF.	Green
THIR	Nimbus-4→7	1970-1984	Surface/cloud top temperature and upper tropospheric humidity	Data available at NASA.	Red
HIRS-1	Nimbus-6	1975-1976	Temperature and humidity	Data available at NASA.	Green
MVIRI					Green
IRIS					Green
SIRS					Red
ITPR	Nimbus-5	1972-1976	Temperature and humidity profiles	Data not available. Scan mirror problem	Red
VTPR	NOAA-2/3/4/5	1972-1979	Temperature and humidity profiles	Used already in ERA-40 and JRA-55.	Green
SSH	DMSP-F1/F2/F3/F4	1976-1980?	Temperature and humidity profiles	An advanced VTPR for USAF. Data not found, possibly lost.	Red

D3.9 also includes recommended MW, reprocessed and wind data sets

Table 1. Infrared sensors in the 1970's considered for reanalysis. Those with priorities in green are recommended to be considered for reanalyses.

Imaging of Southern Ocean data for the early 20th century

sub-contract with Clive Wilkinson

Imaging of Southern Ocean data for the early 20th century

Aim: Make inventories and undertake imaging, in various archives of historical observations of sea-ice and atmospheric variables from ships in the Antarctic-Southern Ocean region.

Sources:

- Christian Salvesen Archive, U of Edinburgh;
- Sea Mammal Research Unit, U. of St Andrews;
- National Meteorological Archive (Met Office);
- Whaling Museum and the Vestfold Archive, Sandefjord, Norway;
- Maritime Museum, Mareihamn, Finland
- Chilean National Maritime Museum

Making the local news in Mareihamn



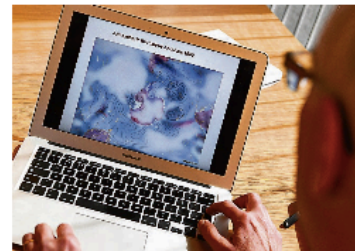
I två veckor arbetar Clive Wilkinson och Mariela Vásquez-Guzman i Ålands sjöfartsmuseums bibliotek.

Historiska loggböcker används i klimatforskning

Loggböckerna från Rederi Ab Gustaf Erikssons flotta innehåller väderinformation som är viktig för dagens klimatforskning.

Under två veckor fotograferar forskarna Clive Wilkinson och Mariela Vásquez-Guzman cirka 40.000 loggbokssidor på Åland. Målet är att återskapa vädret runt hela jorden tillbaka till 1870.

Sedan en vecka tillbaka befinner sig den maritima historikern Clive Wilkinson och hans kollega Mariela Vásquez-Guzman på Åland. Clive Wilkinson arbetar världen över med uppdrag för



med två loggbokssidor på varje bild.

Helt av allt hoppas Clive Wilkinson finna information om isarna i området.

– Men det är inte troligt att jag gör det. Befälen var försiktiga och ville inte stöta på is.

I stället finns mängder av annan viktig väderinformation, till exempel barometertryck, vindstyrka och vindriktning samt luft- och vattentemperaturer. Att texten är på svenska gör inget.

– Det är inte så svårt som man kan tro. Jag har jobbat i många länder och formaten liknar varandra. Siffror är siffror. Projektet finansieras bland

5 Driftsoversikt for ^F/_K SOURABAYA

1. Dag	2. Datum	3. Middagsposisjon		TERMO = METER	BARO- METER	4. Værforhold
		Bredde SYD	Lengde VEST			
Søndag	23/12	59°50'	30°41'	38°	29.26	Frisk vind fra bygen. Pakis rent.
Mandag	24/12	58°36'	29°55'	38°	29.47	Javn bris overkjøl. — " —
Tirsdag	25/12	58°37'	29°14'	36°	29.22	Løi med blandet luft. — " —
Onsdag	26/12	58°41'	29°00'	37°	29.25	Lite dugg luft. Pakis i S. endel isfjell.
Torsdag	27/12	57°45'	27°49'	37°	29.10	Løi dugg luft Pakis.
Fredag	28/12	57°43'	28°01'	36°	29.15	Løi vind fakte. — " —
Lørdag	29/12	57°41'	28°19'	35°	29.14	— " — lett fakte Skiltret is.
						Sum
				7. Påfyllinger		

Example Document: Logbook *Norvegia* - 4 December 1928
Vestfold Archive, Sandefjord

Aar 1928 Skibets sted *Lyst* *Illustration* / *Udvisningen paa fangstfeltet*

1	2	3	4	5	6
Maaned	Klokkeslet	Parentfloggen vint	Vind. Styrke Veir.	Sjegang Barometer Termometer	pr. styrekoi
<i>Desbr</i>					
<i>Tirs</i> dag	1				
den	4 ^{de}				
	2				
	3				
	4	<i>SW 7/16</i>	<i>1-d 0°</i>	<i>378°0</i> <i>885°0</i> <i>179°0</i>	
	5				

Meget pakkis Lid. fart.

Fra kl 3 saa man punkt med land

Gr

Bestikoppgjør til middag.

<i>3°0</i> Δbr. <i>N=57.4</i>	Mbr. <i>53°33'</i>	Br. ifølge bestik md. <i>55°20'</i>	Br. ifølge obs. md. <i>55°30'</i>
Avv. <i>0°10'</i>	Δlgd. <i>157</i>	Lgd. ifølge bestik md. <i>0°10'37"</i>	Lgd. ifølge obs. md. <i>11°8'</i>

John Peter Nilan
Dagbokførerens underskrift.

Forevist den *15-12*, 1928
Nils Larsen
Skibets fører.

4-Hourly
Wind direction
Wind force
Weather
Sea state
Pressure
Temperature

[Form 2.]

ROSS DEPENDENCY.

Season : _____

Whale-catcher : *Star 14*

Record of Whales captured.

This book must be returned to the Secretary, Marine Department, Wellington, N.Z., at the end of the whaling season.

Whaling Records – Archive of Sea Mammal Research Unit, University of St. Andrews

- 3/2/1931 – No ice 68°S, 177°E – wind west, fresh
- 28/2/1930 – Icepack 66.25°S, 179.30°E – wind south, fresh

Note: a separate form for each whale captured.

ROSS DEPENDENCY. [Form 2.] 72

USE A SEPARATE FORM FOR EACH WHALE.
BRUG FORSKELLIG FORM FOR ENHVER HVAL.

1. Date : *3-2-31*
Datum.

2. Condition of weather and sea : *Frisk Vest vind kalesje*
Tilstand av veiret og sjøen.

3. Condition of ice : *Ingen is*
Tilstand av isen.

4. Direction in which whales travelling : *SV*
I hvilken retning drog hvalen.

5. Number in school : *1*
Hvor mange i flokken.

6. Position of catcher : *68° 177°*
Bredde og lengde hvor hvalen var skudt.

7. Distance from land : _____
Avstand fra land.

8. Length of whale : *83 ft*
Hvalens lengde.

9. State what sex : *Stim*
Bemerk hvilket kjønn.

Blue : _____
Blaa. }
Fin : _____
Fin. }
Humpback : _____
Knøl. }

Signature : *E. Skelton*
Underskrift.

Whaleboat : "*Star 14*"
Hvalbaat.

136 U.S./29-8005

ROSS DEPENDENCY. [Form 2.] 93

USE A SEPARATE FORM FOR EACH WHALE.
BRUG FORSKELLIG FORM FOR ENHVER HVAL.

1. Date : *28/2-30*
Datum.

2. Condition of weather and sea : *Syd Frisk bygget*
Tilstand av veiret og sjøen.

3. Condition of ice : *Isopakk*
Tilstand av isen.

4. Direction in which whales travelling : *SW*
I hvilken retning drog hvalen.

5. Number in school : *2*
Hvor mange i flokken.

6. Position of catcher : *Star 66° 25' S. 179° 30'*
Bredde og lengde hvor hvalen var skudt.

7. Distance from land : _____
Avstand fra land.

8. Length of whale : *87 ft*
Hvalens lengde.

9. State what sex : *HAN*
Bemerk hvilket kjønn.

Blue : _____
Blaa. }
Fin : _____
Fin. }
Humpback : _____
Knøl. }

Signature : *Mikkelsen*
Underskrift.

Whaleboat : "*Star 2*"
Hvalbaat.

Antarctic & Southern Ocean

Research vessels, whaling vessels, commercial shipping (sail and steam) 1900-1950

National Maritime Museum Valparaíso, Chile	22,000
UK National Meteorological Archive	21,570
Sea Mammal Research Unit, Scotland	14,890
Christian Salvesen Archive, Scotland	2,730
Maritime Museum, Mariehamn Finland	20,300
Vestfold Archive, Sandefjord, Norway	30,500
Total	111,990

When added to previous work total 137K images and estimated up to 7M observations

Plans for further work

- The 5th International Conference on Reanalyses recommended that funding should be sought to digitise these Southern Ocean data
- At the ACRE meeting in New Zealand, 4-8th December 2017, various groups pledged to help digitise the Southern Ocean observations imaged by ERA-CLIM2
- There are likely many more observations for the Southern Ocean in this period to be imaged in various archives, in particular in Norway and Finland
 - further cataloguing needs to take place. Opportunities for funding this will be sought.

Summary

- HadIOD has been demonstrated to be a useful way to serve surface and sub-surface ocean temperature and salinity with bias corrections and uncertainty estimates
- Next generation reanalyses have more historical satellite data to draw upon, but as recommended at ICR5, satellite data rescue needs to be continued to ensure the usability of other such data sets
- ERA-CLIM2 has funded the discovery of a really significant distributed “collection” of historical measurements for the early 20th and late 19th centuries in the Southern Ocean and the generation of a collection of images of some of this information (~7 million observations) which could now be digitised and used to significantly improve representation of this key region.