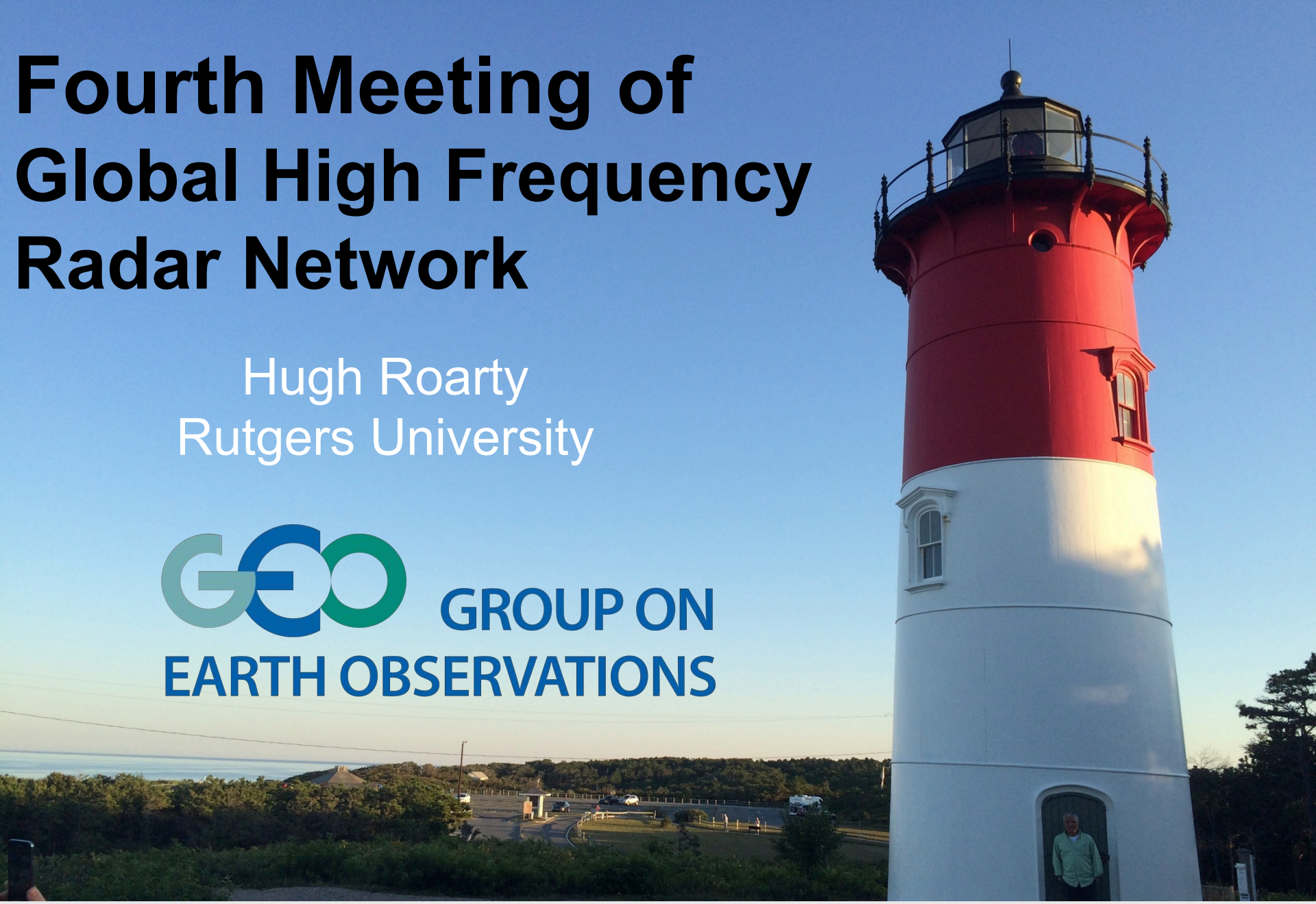
Fourth Meeting of Global High Frequency Radar Network

Hugh Roarty
Rutgers University

GEO GROUP ON EARTH OBSERVATIONS



IOOS INTEGRATED OCEAN OBSERVING SYSTEM

MARACOOS
Ocean Information for a Changing World

Tuesday, September 22, 2015	
8:30 am to 9:00 am	Continental Breakfast
9:00 am to 9:30 am	Opening Remarks, Dr. Hugh Roarty Introductions Group Photo
9:30 am to 9:45 am	Introduction to the Group on Earth Observations, Dr. Douglas Cripe
9:45 am to 10:30 am	**Goal 1**: **Increase the number of coastal radars**, Dr. Vassilis Zervakis, “HF radar “Dardanos”: measuring the outflow of the Black Sea in the Aegean” Julien Mader, “European Coordination for Coastal HF Radar: EuroGOOS HF Radar Task Team”
10:30 am to 11:15 am	**Goal 2: Ensure HFR data is available in a single standardized format in near-real-time**, Ms. Lisa Hazard, “ Status of the US Radar Network” Dr. Lorenzo Corgnati, “Coordination of coastal radar network at national level: the RITMARE project experience in Italy”
11:15 am to 11:30 am	**Break**
11:30 am to 12:15 pm	**Goal 3: Assimilate data into ocean and ecosystem models** Dr. Julien Marmain, “ SOCIB HF radar: A Key Contribution to Multi-Platform Ocean Observation” Dr. Simone Cosoli, “HF radar observations of ocean currents, waves and winds in Australia”
12:30 pm to 1:30 pm	Lunch

1:30 pm to 2:15 pm	**Goal 4: A set of easy to use standard products** Prof. Giuseppe Ciraolo, “HF Radar Monitoring Systems and response against Marine Oil Spills in The Malta Channel” Ana Rubio, “Progress on Short Time Prediction from the Basque Country HFR Network
2:15 pm to 3:00 pm	**Goal 5: Worldwide Quality Standards** Dr. Eric Terrill, “HF Radar Quality and Analysis Efforts”
3:00 pm to 3:15 pm	Break
3:15 pm to 4:00 pm	**Goal 6: Develop emerging uses of HF radar** Dr. Enrique Alvarez Fanjul, “Description of the Spanish HF Radar Network” Dr. Burt Jones, “HF Radar in the Red Sea: Present and Future Applications”
7:30 pm to 10:00 pm	Dinner at Cretaqurium http://www.cretaquarium.gr

Wednesday, September 23, 2015

08:30 am to 10:30 am	Joint Session with Global Ocean Observing System (GOOS) Regional Alliance Forum • Introduction to GEO HF Radar Task, Dr. Hugh Roarty • Introduction to EuroGOOS HF Radar Task Team, Julien Mader
10:30 am to 11:00 am	Break
11:00 am to 11:45 am	Review from Day 1, 2016 Goals and Meeting Location
11:45 am to 12:00 pm	Closing Remarks
12:30 pm to 1:30 pm	Lunch
01:30 pm to 5:00 pm	Local Field Trip

Goals for Global HF Radar Network

1) **Increase the number of coastal radars**
2) **Ensure HFR data is available in a single standardized format in near-real-time,**
3) **Assimilate data into ocean and ecosystem models**
4) **A set of easy to use standard products**
5) **Worldwide Quality Standards**
6) **Develop emerging uses of HF radar**

Goal Inventory

	1	2	3	4	5	6
USA						
Germany						
Spain						
Australia						
Italy						
Malta						
Portugal						
Philippines						
Saudi Arabia						
United Kingdom						
Greece						

home >

search our site here

GROUP ON EARTH OBSERVATIONS

what is GEO | what we do | global initiatives | meetings | resources | how to get involved | contact

GEO 2016-2025

GEO Strategic Plan 2016-2025: Implementing GEOSS

The transitional GEO Work Programme 2016

GEO wide activities

GEO Work Plan

Capacity Building

Data Sharing

Emerging Initiatives

Featured articles

GEO-XII Plenary & Mexico City Ministerial Summit

What's new?

> GEO News - June 2015 <

In Memory: A Tribute to Len Hirsch - GEO Champion

National Remote Sensing Center of China (NRSCC) released Report on Remote Sensing Monitoring of Global Ecosystem and Environment

Join us September 1 for the SERVIR Showcase via live webcast

The status of topographic mapping in the world. A UNGGIM-ISPRS project 2012-2015

Societal Benefit Areas

Agriculture | Biodiversity | Climate | Disasters | Ecosystems | Energy | Health | Water | Weather

IOOS INTEGRATED OCEAN OBSERVING SYSTEM

MARACOOS
Ocean Information for a Changing World

Global HF Radar Network

- Co Chairs
  - **Jack Harlan (USA)**
  - **Lucy Wyatt (Australia)**
  - **Enrique Alvarez-Fanjul (Spain)**

Global HF Radar Network

- Co Chairs
  - **Hugh Roarty (USA)**
  - **Lisa Hazard (USA)**
  - **Simone Cosoli (Australia)**
  - **Jack Harlan (USA)**
  - **Lucy Wyatt (UK)**
  - **Enrique Alvarez-Fanjul (Spain)**

earthzine.org http://earthzine.org/2014/10/30/the-global-high-frequency-radar-network/

The Global High Frequency Radar Network

Amanda
Lewan

By Dr. Hugh Roarty
Research Project Manager
Coastal Ocean Observation Laboratory
Rutgers University

Co-authors: Ms. Lisa Hazard, Dr. Lucy Wyatt, Dr. Jack Harlan and Dr. Enrique Alvarez Fanjul

The Global High Frequency Radar Network is a vision for a global operational system measuring ocean surface currents to support monitoring of marine and coastal ecosystems. The measurement of ocean currents is fundamental to ocean forecasting. High frequency (HF) radar has proven to be an efficient tool for the measurement of surface currents along the coast out to 200 kilometers.

ROW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Rowg

ROW

I	2000	USA, OR
II	2001	
III	2003	Italy
IV	2004	Australia
V	2005	USA, CA
VI	2006	Germany
VII	2007	
VIII	2008	USA, HI
IX	2009	Croatia
X	2010	USA, OR
XI	2012	France
XII	2014	USA, GA
XIII	2015	USA, MA

I	2005	Miami, FL
II	2006	Charleston, SC
III	2007	La Jolla, CA
IV	2009	Norfolk, VA
V	2011	Santa Barbara, CA
VI	2012	St. Petersburg, FL
VII	2014	San Francisco, CA
VIII	2015	Woods Hole, MA

Previous Meetings

- London 2012
- Bergen, Norway 2013
- Taiwan 2014

Oi12
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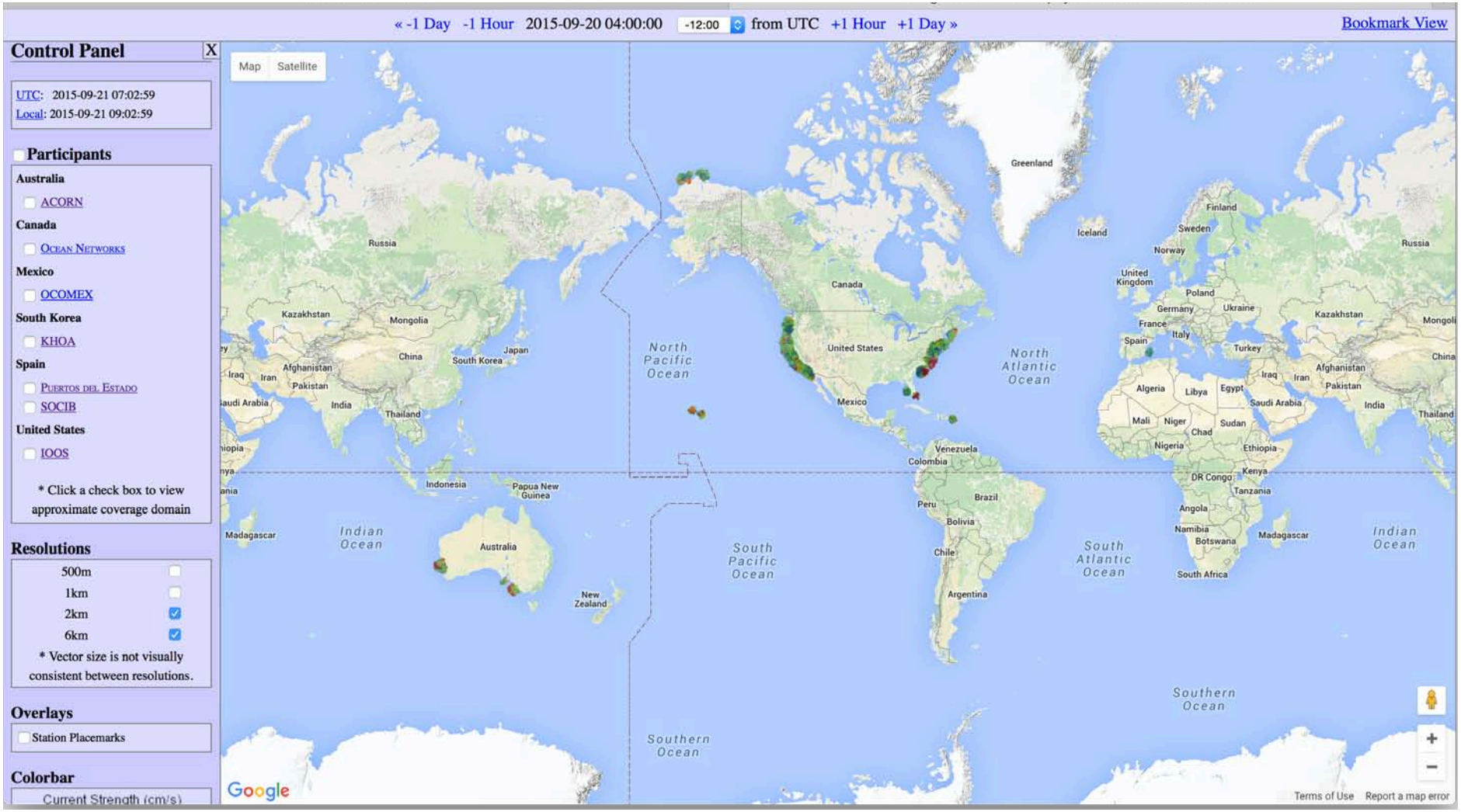
13–15 MARCH 2012 LONDON EXCEL

London 2012

London 2012

- Imagine Global Current Maps

Global HF Radar Viewer



London 2012

- Imagine global current maps
- Inventory of the radars

GROUP ON EARTH OBSERVATIONS

- There are 89 entities in the Group on Earth Observations
- 72 countries have a salty coast
- 35 of those countries have High Frequency radars on their coastline
- Approximately 349 radars worldwide

CODAR SeaSonde Worldwide 2012

- United States 130
- Canada 8
- Mexico 2
- Brazil 2
- Bahamas 2
- Honduras 2

- Norway 6
- Portugal 4
- Italy 6
- Croatia 2
- Spain 16
- Ireland 2
- Russia 1
- France 2
- Israel 2

- Japan 22
- Korea 24
- China 8
- Thailand 6
- Malta 2
- Taiwan 20
- India 12
- Vietnam 3
- Indonesia 2
- Jordan 1
- UAE 2
- Egypt 2
- Azerbaijan 2
- Australia 5

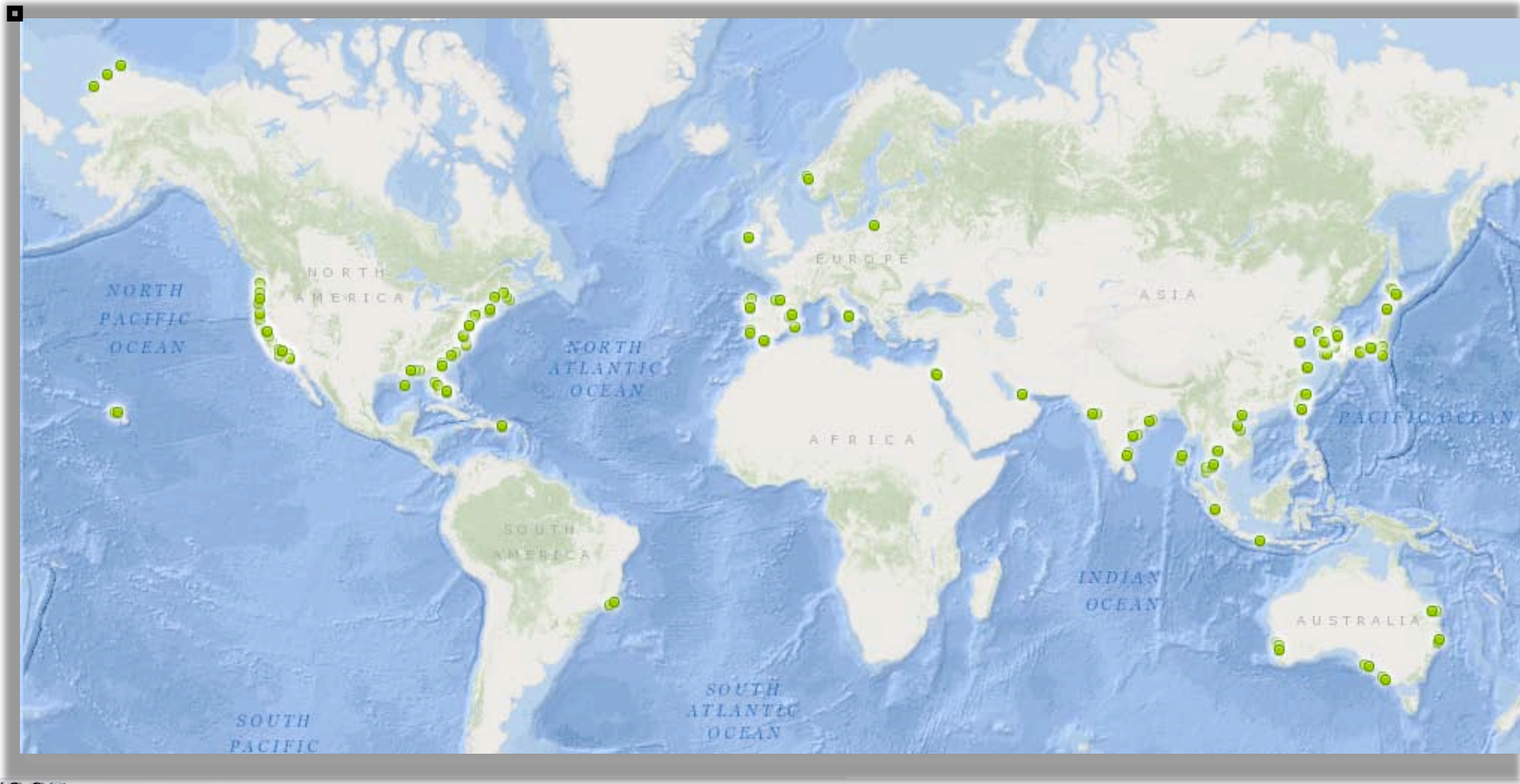
Total Sales: ~298

WERA Worldwide 2012

- USA: 12
- Mexico: 2
- France: 6
- Australia: 8
- Germany: 5
- UK: 2
- Chile: 2
- Oman: 2
- Greece: 2
- China: 4
- Korea: 2

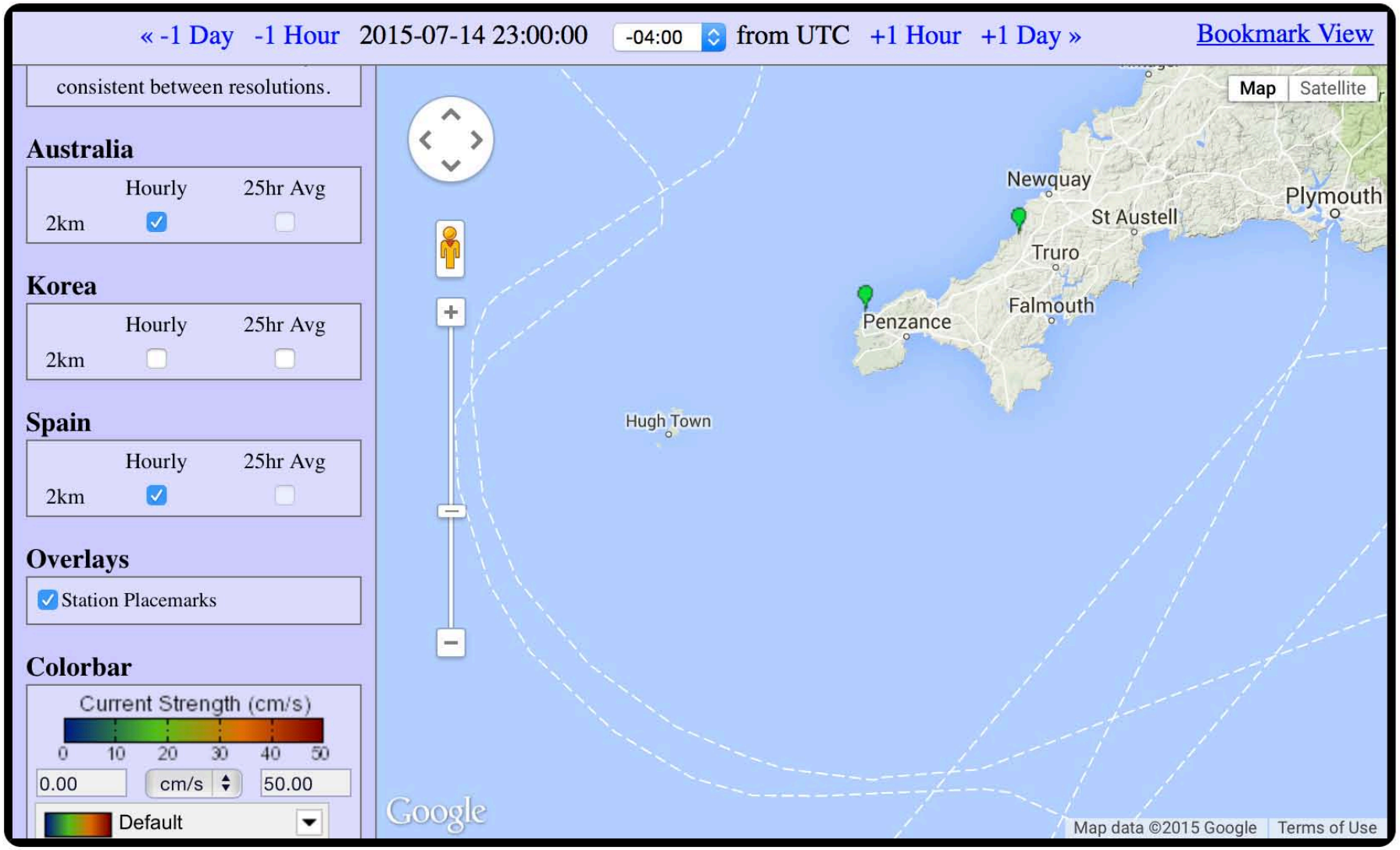
- Total Sales: 47

258 Stations Located So Far



Interactive Map of High Frequency Radar

This map shows all of the locations of the HF Radar sites all over the world.



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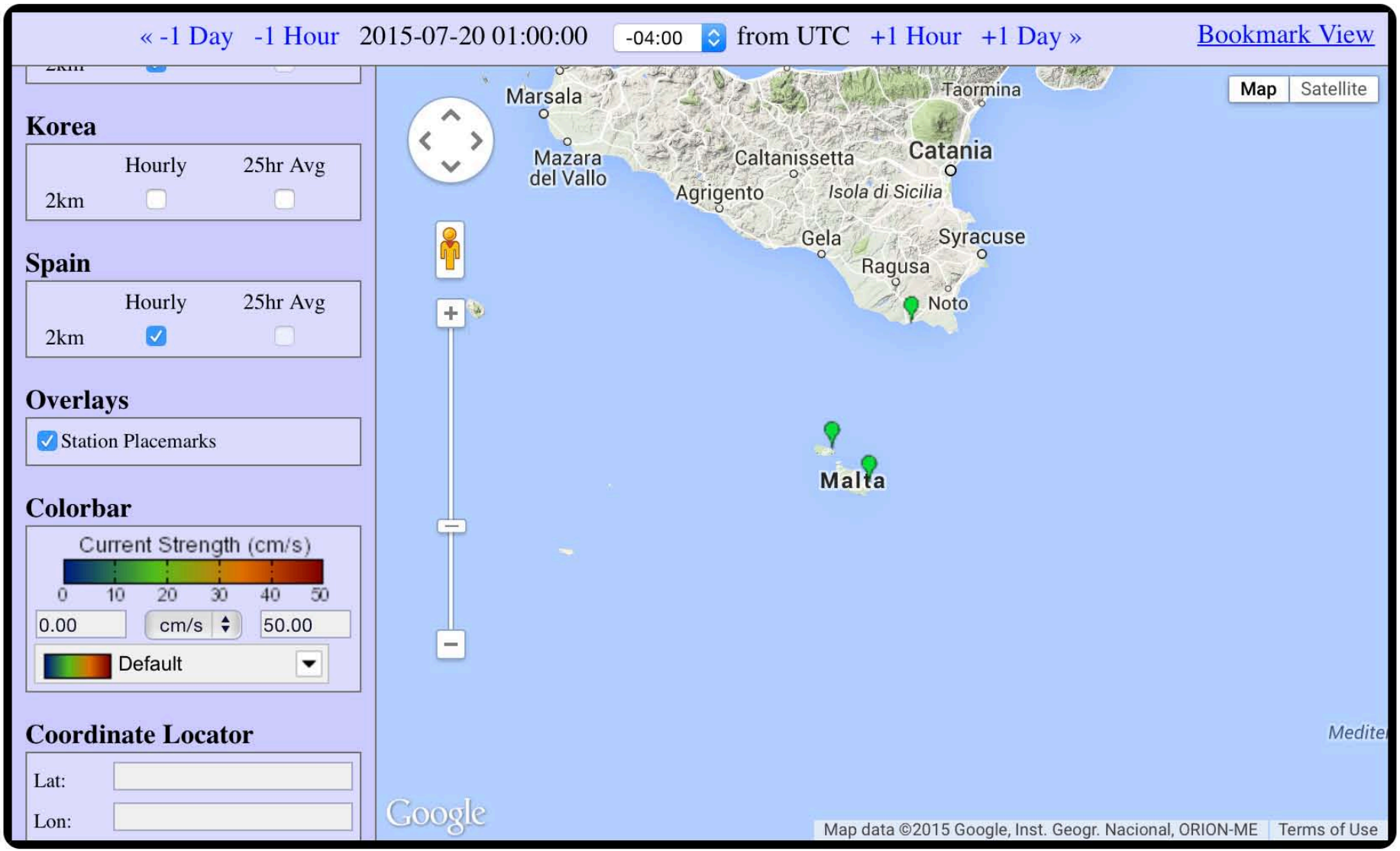
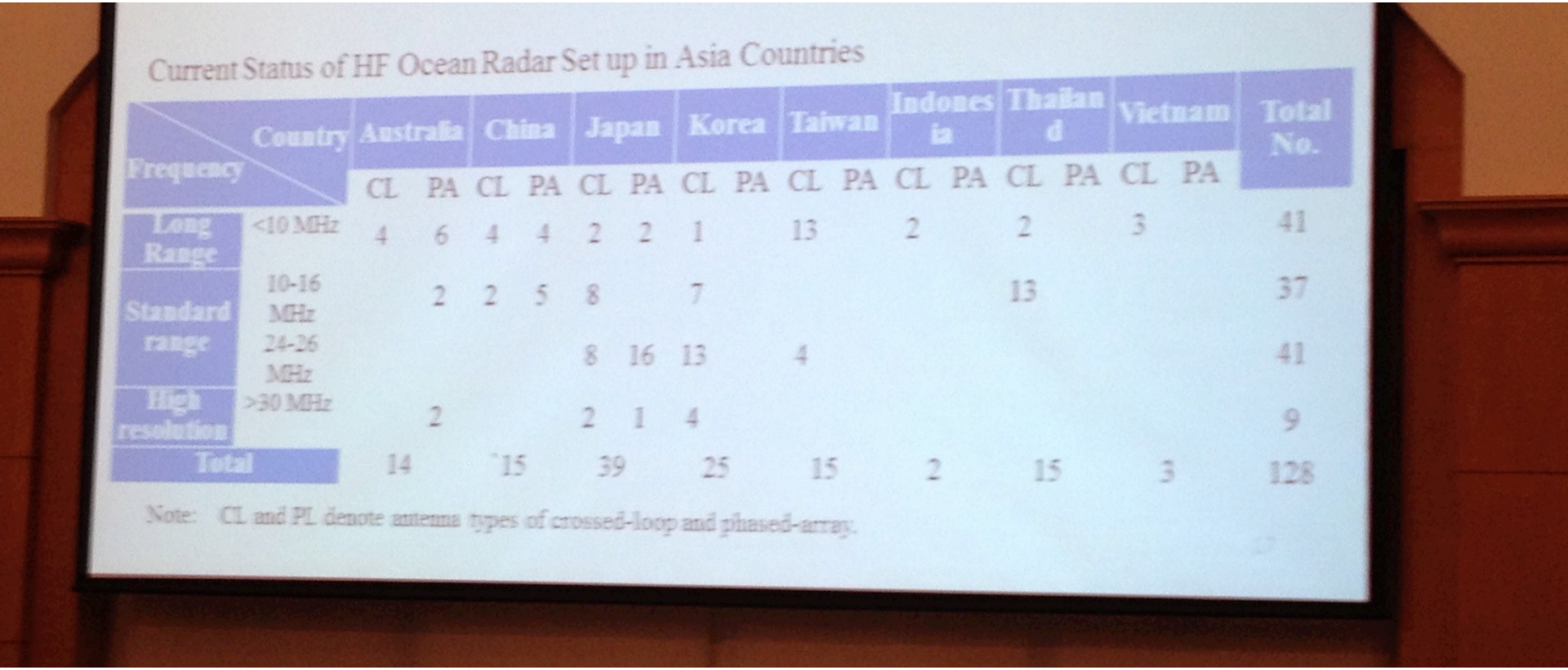


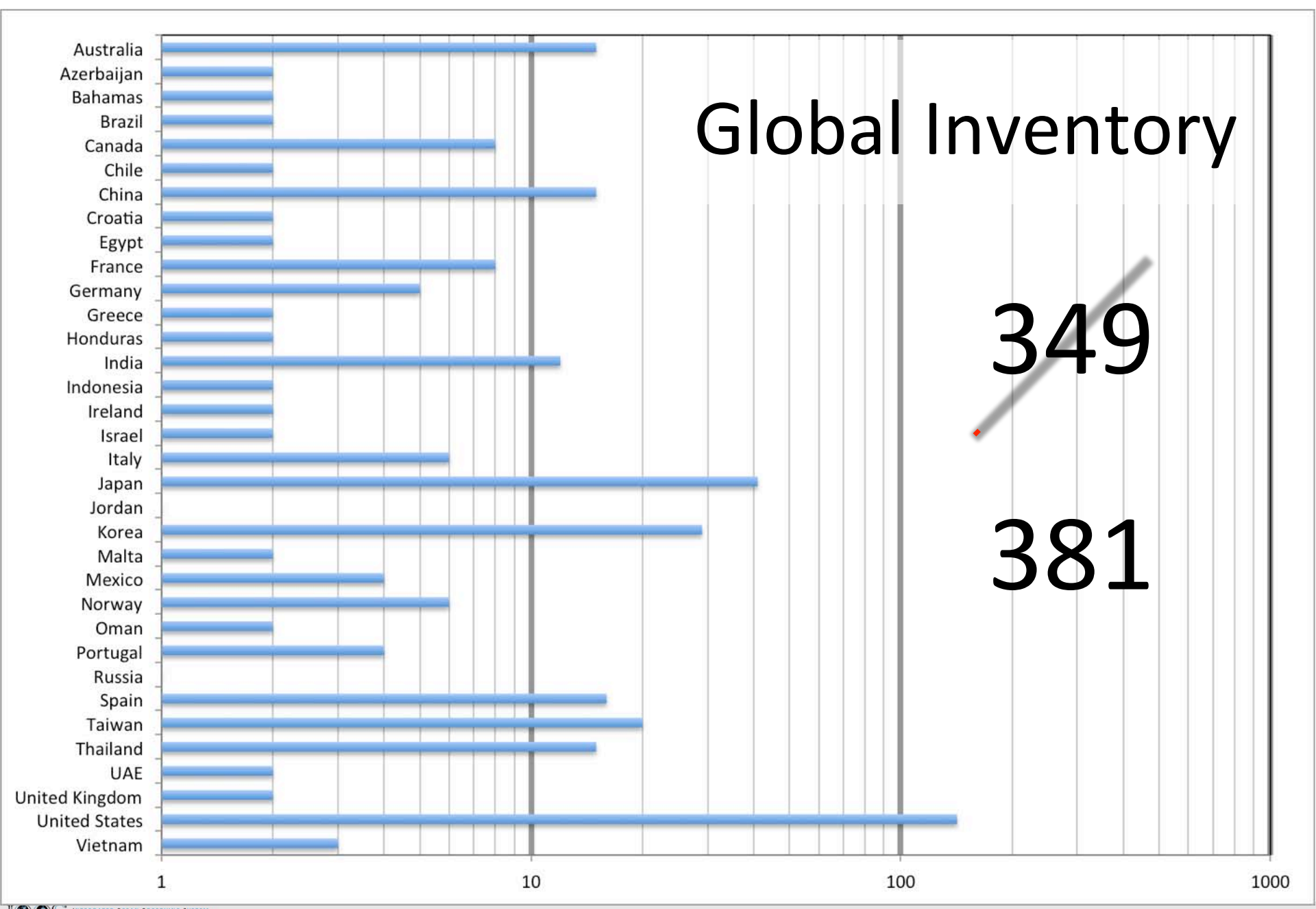
ORCA Meeting Inventory



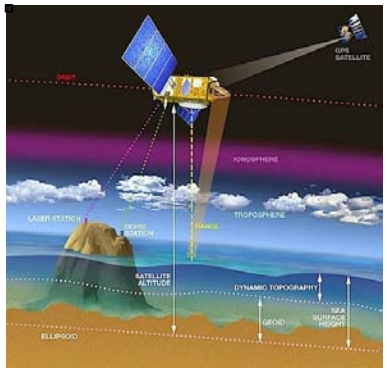
Current Status of HF Ocean Radar Set up in Asia Countries

Frequency \ Country		Australia		China		Japan		Korea		Taiwan		Indonesia		Thailand		Vietnam		Total No.
		CL	PA	CL	PA	CL	PA	CL	PA	CL	PA	CL	PA	CL	PA	CL	PA	
Long Range	<10 MHz	4	6	4	4	2	2	1		13		2		2		3		41
Standard range	10-16 MHz		2	2	5	8		7						13				37
	24-26 MHz					8	16	13		4								41
High resolution	>30 MHz		2			2	1	4										9
Total		14		15		39		25		15		2		15		3		128

Note: CL and PL denote antenna types of crossed-loop and phased-array.


Global Inventory
349
381
Australia
Azerbaijan
Bahamas
Brazil
Canada
Chile
China
Croatia
Egypt
France
Germany
Greece
Honduras
India
Indonesia
Ireland
Israel
Italy
Japan
Jordan
Korea
Malta
Mexico
Norway
Oman
Portugal
Russia
Spain
Taiwan
Thailand
UAE
United Kingdom
United States
Vietnam
1
10
100
1000

Other Sensors



Satellites 10

HF Radar 500

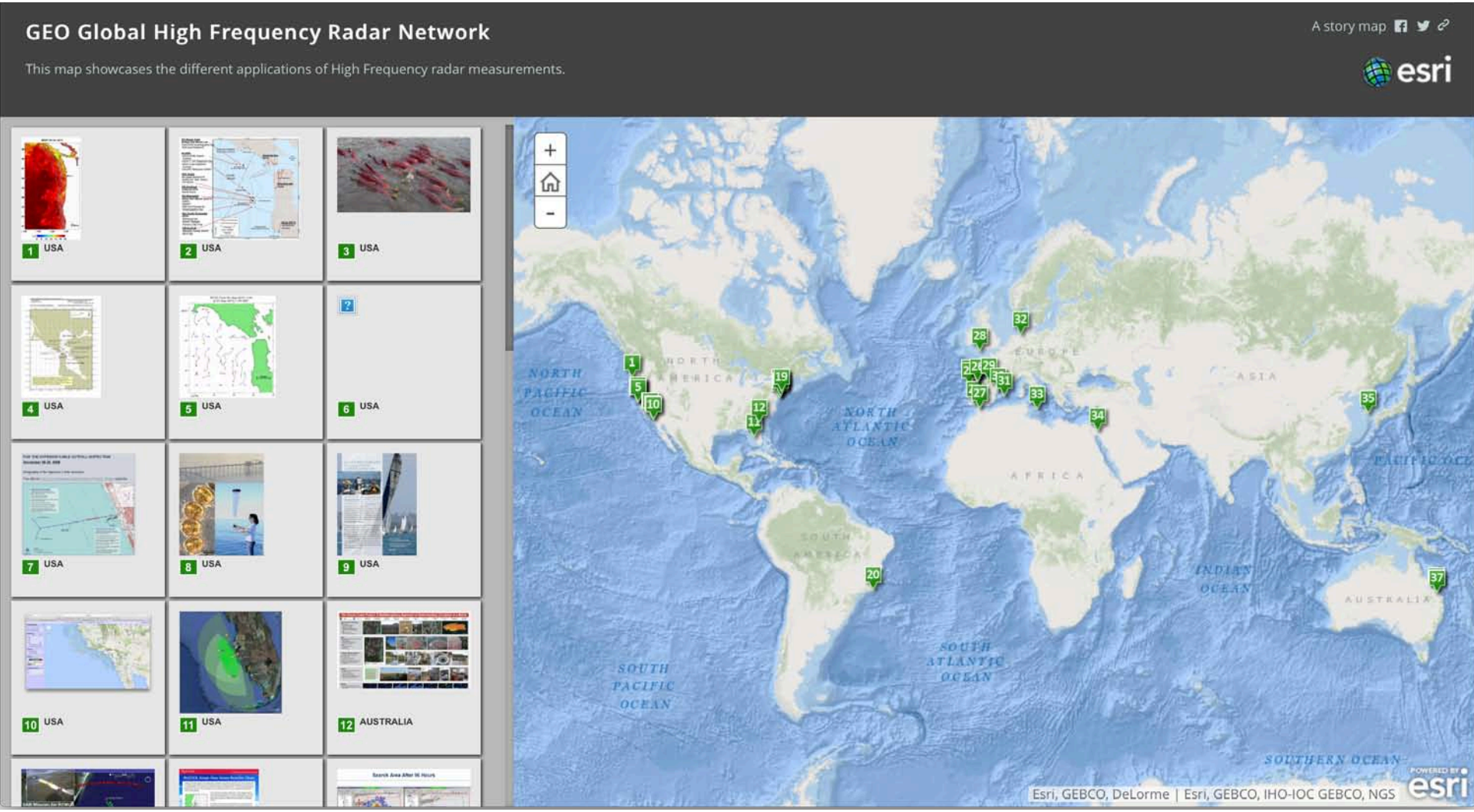
ADCP
50,000

Argo Float
6,000

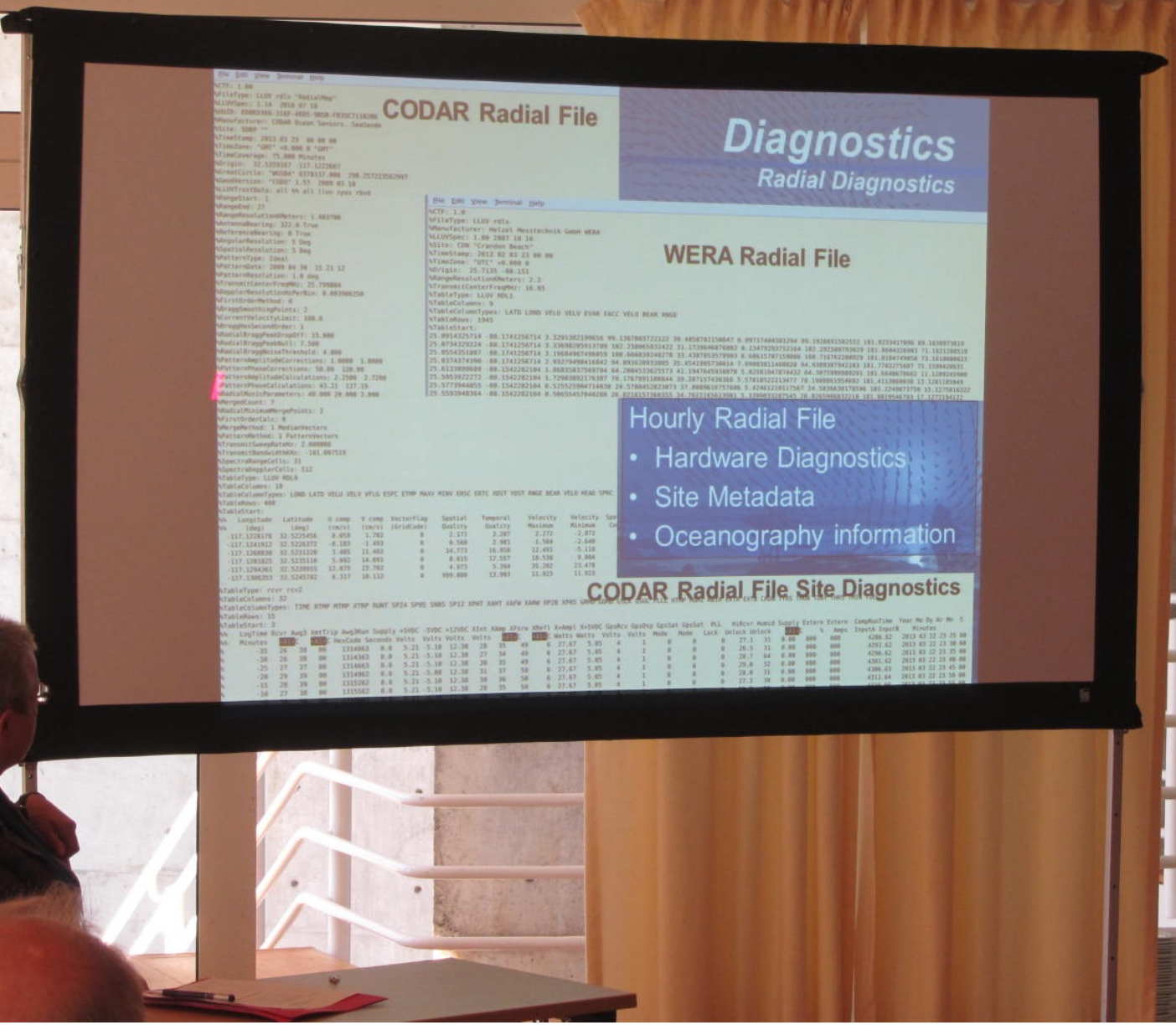
London 2012

- Imagine Global Current Maps
- Inventory of the radars
- Inventory of the applications

Application Success Stories

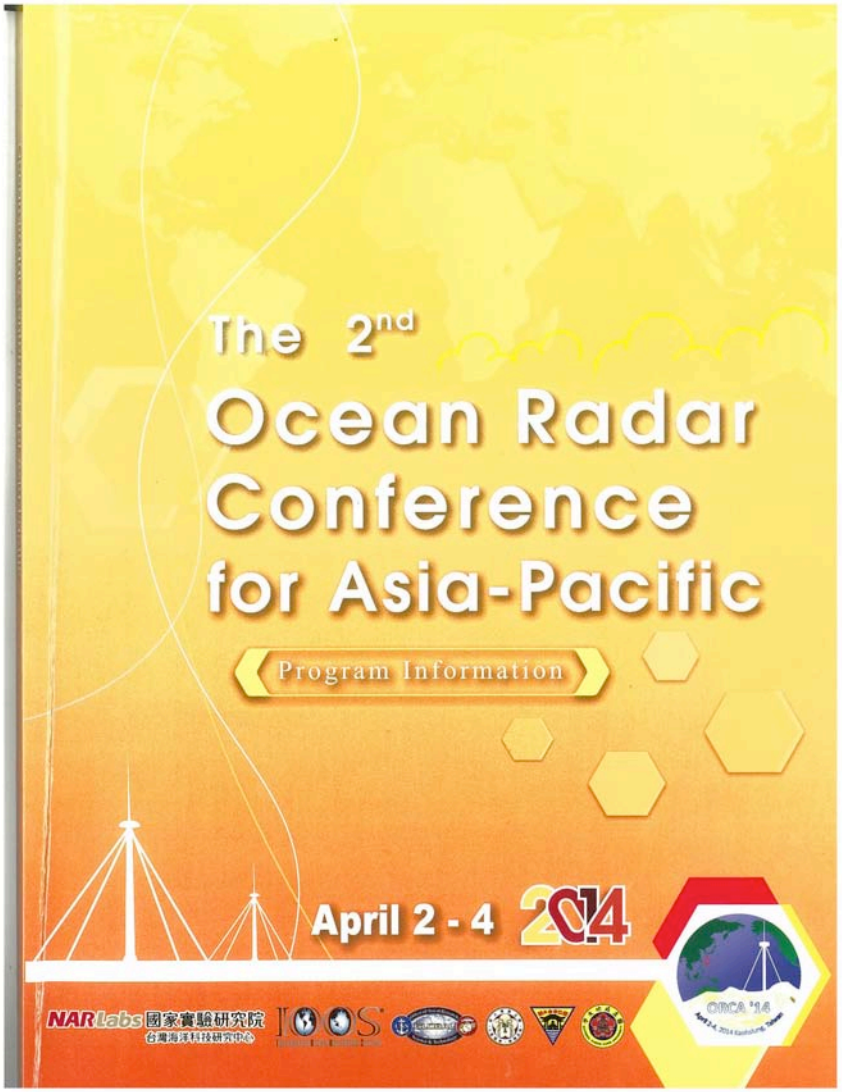


Bergen 2013


CODAR Radial File
Diagnostics
Radial Diagnostics
WERA Radial File
Hourly Radial File
• Hardware Diagnostics
• Site Metadata
• Oceanography information
CODAR Radial File Site Diagnostics

Taiwan 2014


April 2-4 2014, Kaohsiung, Taiwan
The 2nd Ocean Radar Conference for
Asia Pacific (ORCA)
ORCA '14
NARLabs
IOOS



Thursday, April 3

Special session : Group on Earth Observation (GEO) Global High Frequency (HF) Radar Network Host: Dr. Jack Harlan (NOAA IOOS) Location : Exhibition Hall a		
Time	Title	Speaker
14:30-14:45	Short Introduction to GEO HF Radar effort	Jack Harlar
14:45-15:00	Description of US IOOS HF Radar Network and Applications	Lisa Hazar Hugh Roar
15:00-15:15	Description of Australia Coastal Ocean Radar Network	Lucy Wyat
15:15-15:30	Description of Taiwan Ocean Radar Observing System	Jian-Wu L
15:30-15:45	Development of Coastal Radar System and Applications in Thailand	Siriluk Prukpitiku
15:45-16:00	*Coffee break*	
16:00-17:30	Discussion Session Topics A. Discussion of existing and potential GEO collaborations in Asia B. Data management and quality control C. Applications of HF radar data to coastal issues	Jack Harlar

Google books Ngram Viewer

Graph these comma-separated phrases: radar case-insensitive

between 1900 and 2000 from the corpus English with smoothing of 3 . Search lots of books

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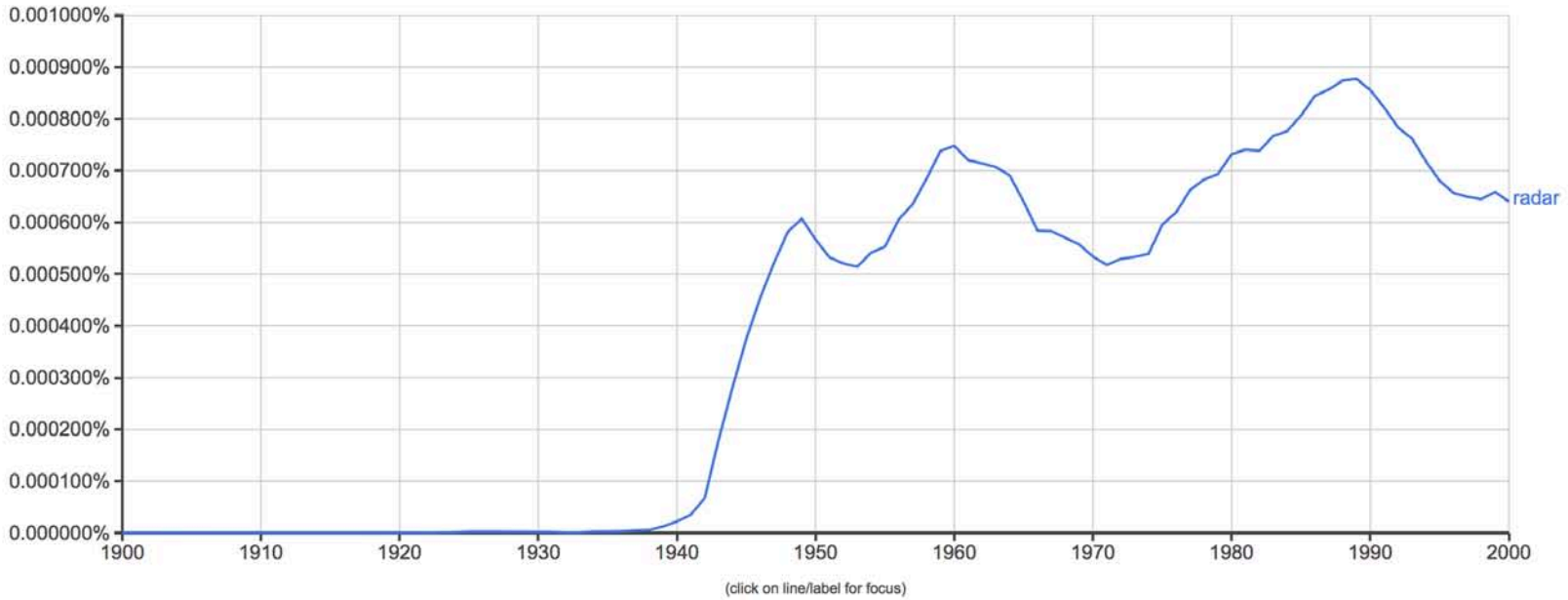

(click on line/label for focus)

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Google books Ngram Viewer

Graph these comma-separated phrases: hf radar case-insensitive

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Ngrams not found: hf radar

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Run your own experiment! Raw data is available for download here.

High-Frequency Radar Observations of Ocean Surface Currents

Jeffrey D. Paduan[1] and Libe Washburn[2]

[1]Department of Oceanography, Naval Postgraduate School, Monterey, California 93943; email: paduan@nps.edu

[2]Department of Geography and Earth Research Institute, University of California, Santa Barbara, California 93106; email: washburn@eri.ucsb.edu

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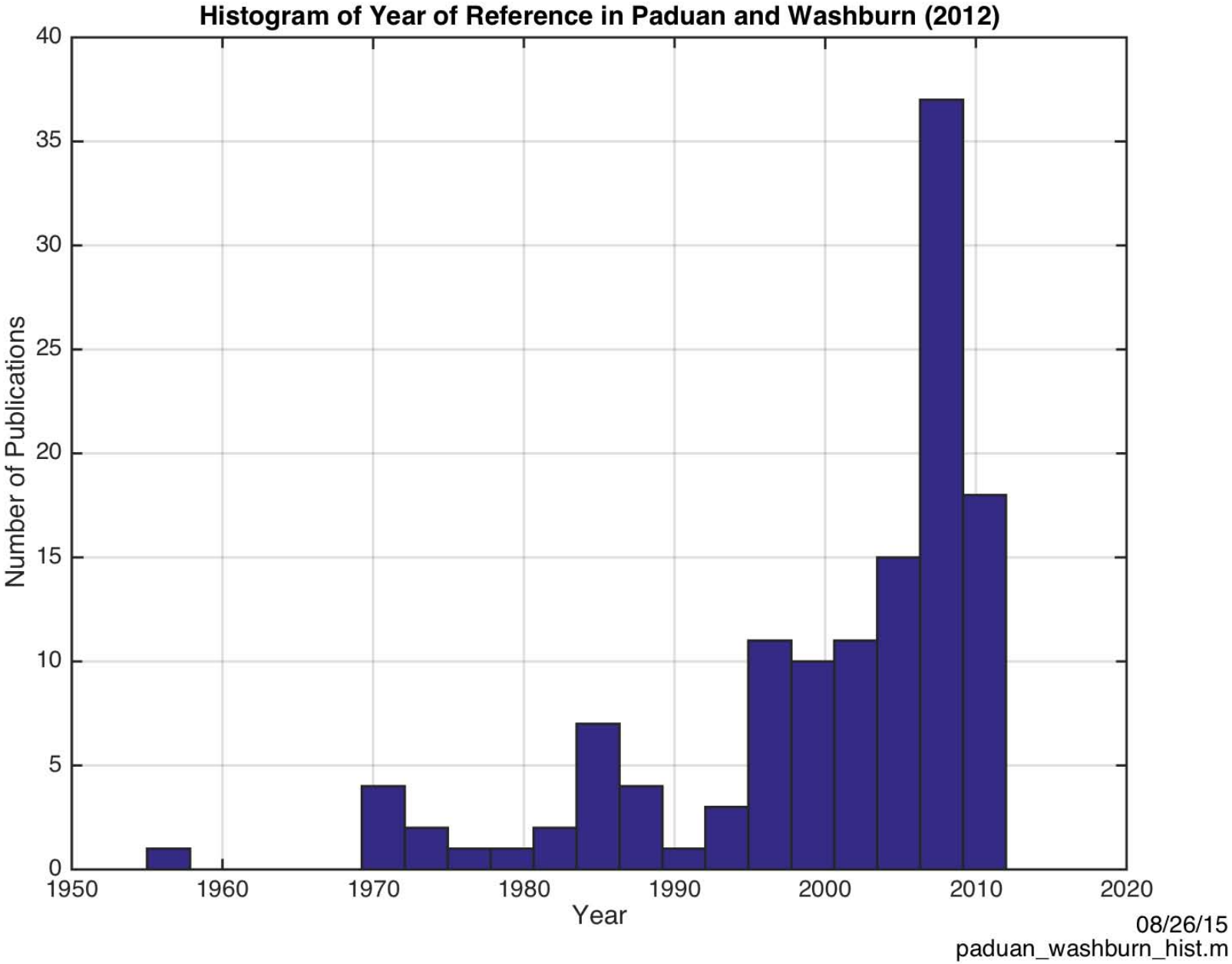
This article's doi: 10.1146/annurev-marine-121211-172315

Keywords

HF radar, ocean remote sensing, search and rescue, sea echo

Abstract

This article reviews the discovery, development, and use of high-frequency (HF) radio wave backscatter in oceanography. HF radars, as the instruments are commonly called, remotely measure ocean surface currents by exploiting a Bragg resonant backscatter phenomenon. Electromagnetic waves in the HF band (3–30 MHz) have wavelengths that are commensurate with wind-driven gravity waves on the ocean surface; the ocean waves whose wavelengths are exactly half as long as those of the broadcast radio waves are responsible for the resonant backscatter. Networks of HF radar systems are capable of mapping surface currents hourly out to ranges approaching 200 km with a horizontal resolution of a few kilometers. Such information has many uses, including search and rescue support and oil-spill mitigation in real time and larval population connectivity assessment when viewed over many years. Today, HF radar networks form the backbone of many ocean observing systems, and the data are assimilated into ocean circulation models.


Histogram of Year of Reference in Paduan and Washburn (2012)
Number of Publications
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2020
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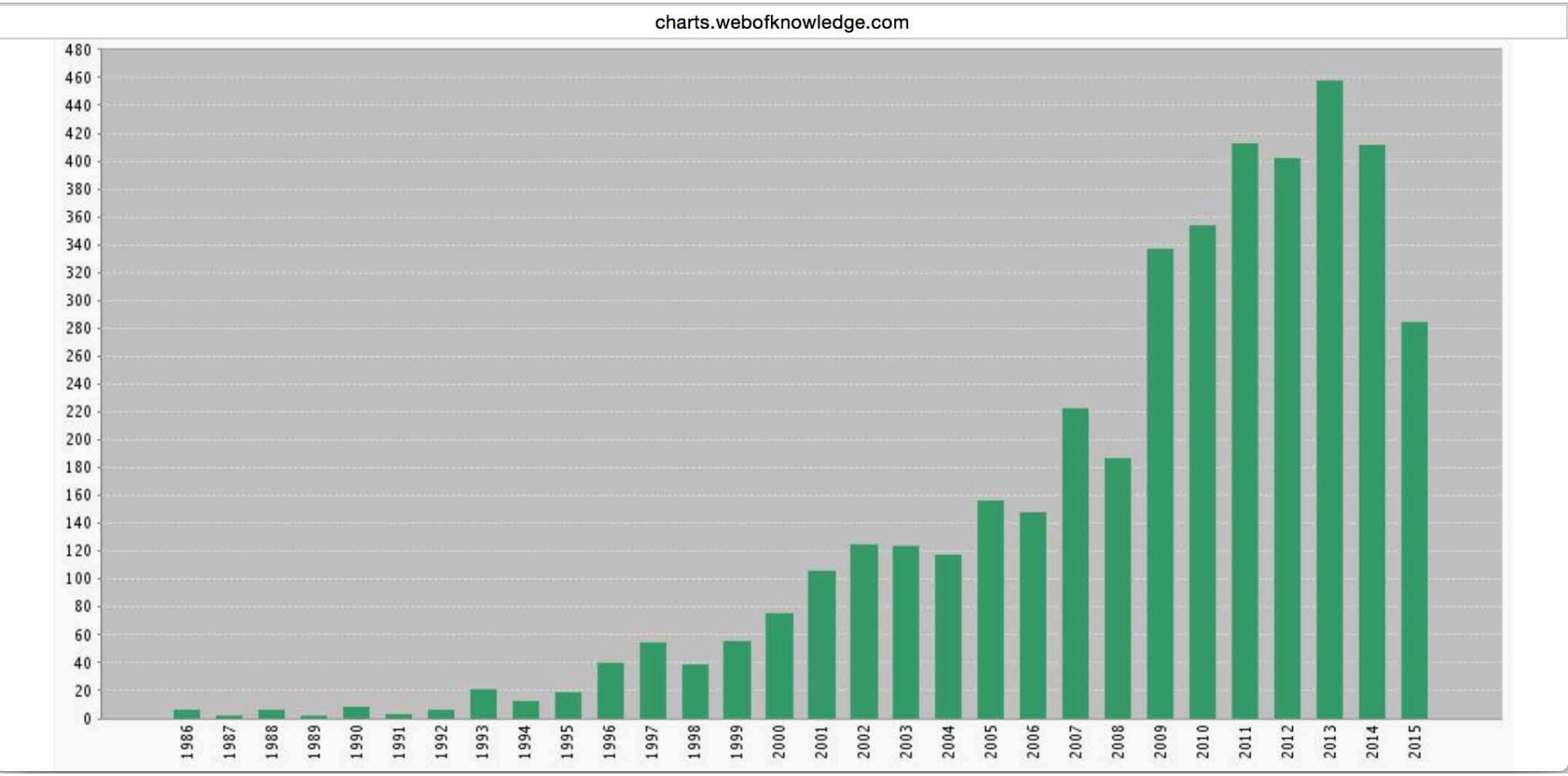
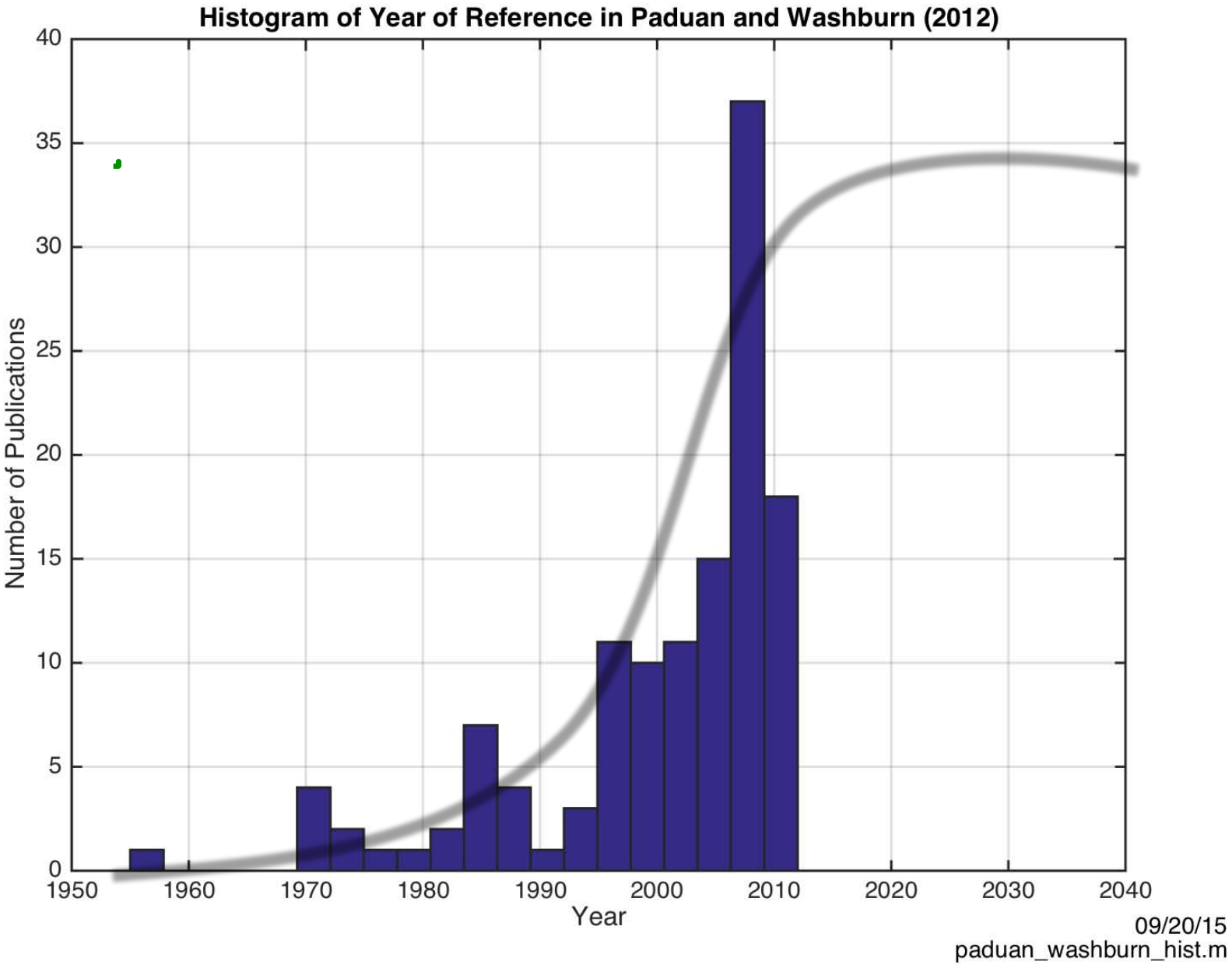
Method #2

- Web of Science
- Search HF Radar
- Refine by Oceanography
- Create Citation Report

Citations in Each Year – HF Radar Oceanography

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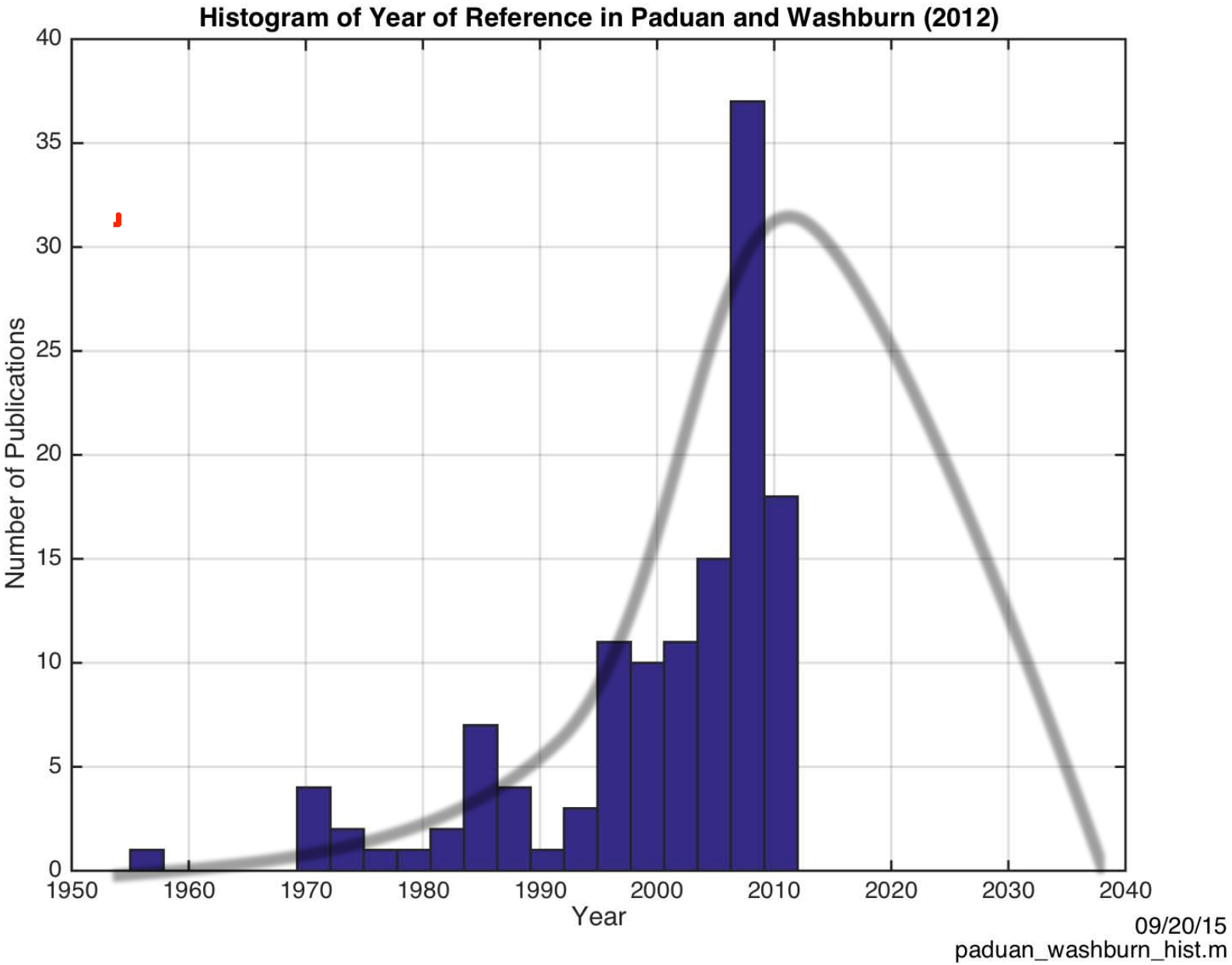
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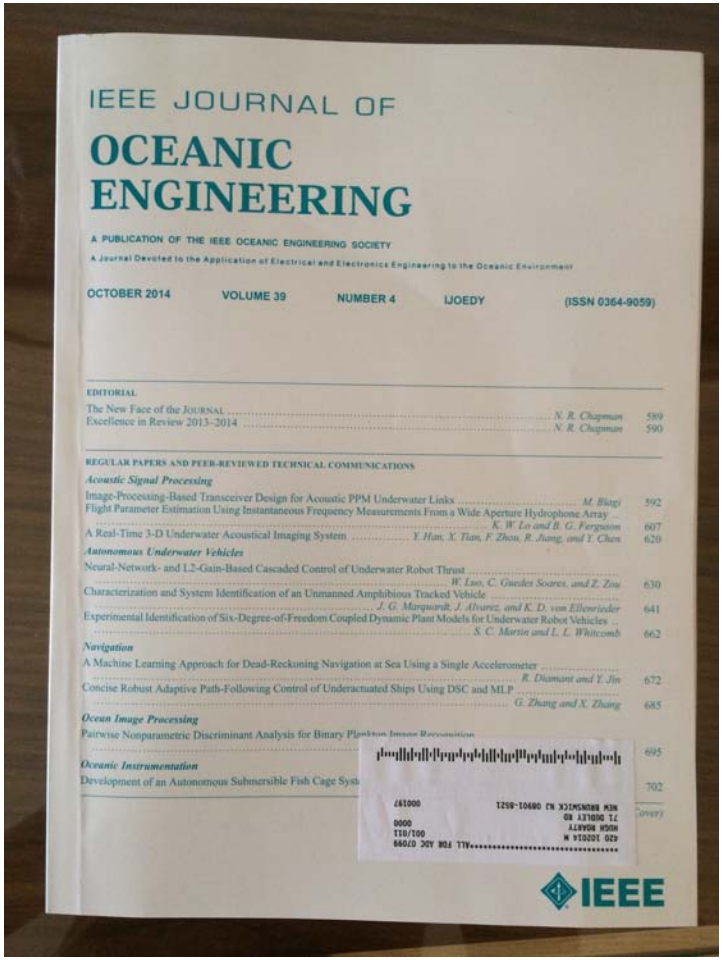
MTS
marine technology society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