

StormGeo

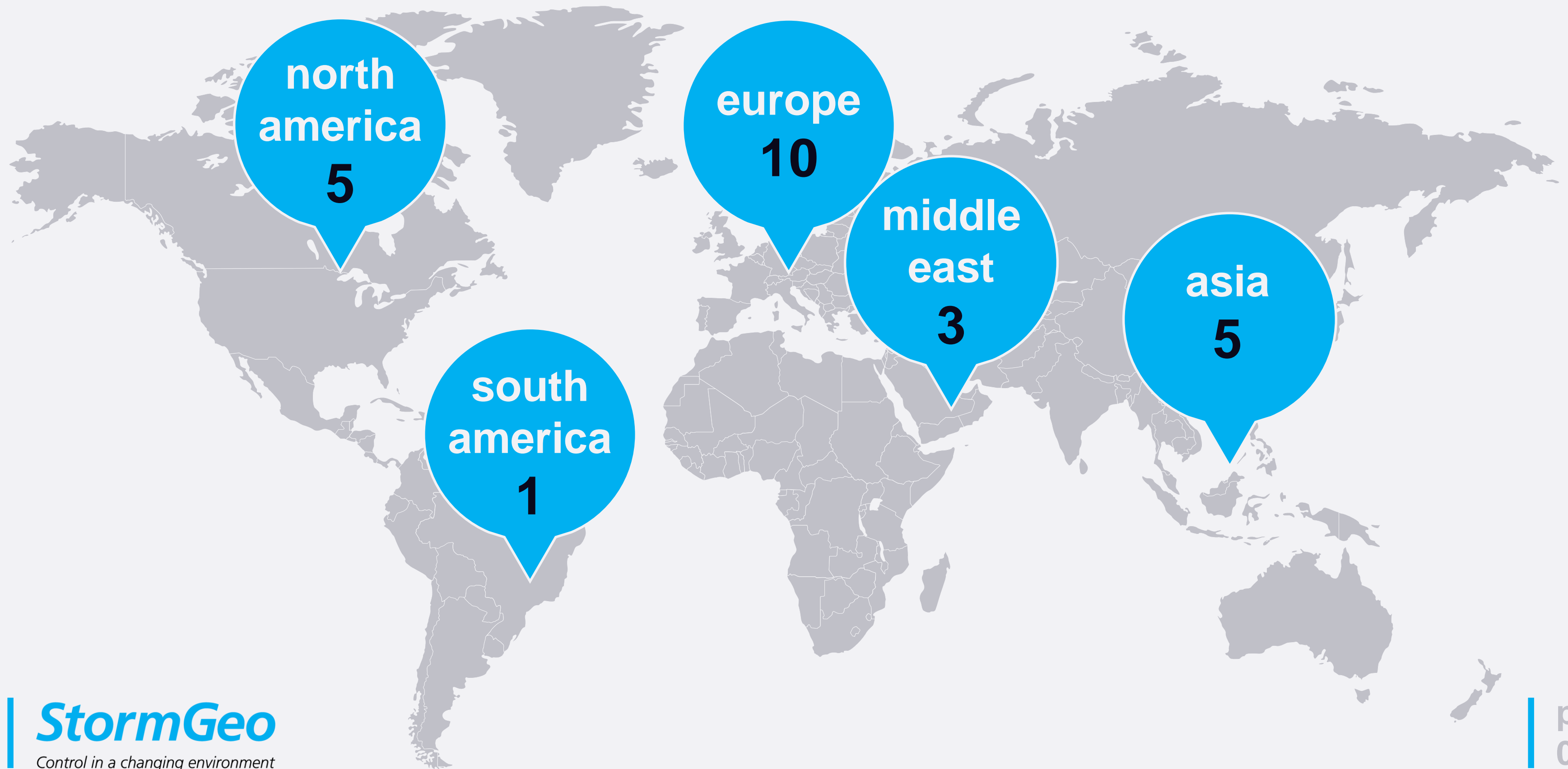
Control in a changing environment

StormGeo is the global provider of advanced analytics and meteorological services delivering decision support for weather sensitive operations.

agenda

- Part 1** Who are we? What do we do?
- Part 2** Tropical expertise
- Part 3** Delivery platforms
- Part 4** Arctic Competence

where we are established global presence





More than 55,000
safe weather routing voyages &
voyage performance analysis per year



2,500
vessels with continuous reports for technical
performance (DRS 2)



5,800
vessels with installed software for
voyage optimization (BVS/Seaware)



8,900
vessels supported in total



24%
overall market share (core market 32,000 vessels).
41% market share among ships using weather
services.



Big Data
all historical voyage data stored (best practice
analysis)



Shipping



1,380
offshore installations/vessels (locations) served every
day



87,000
forecasts (customer specific) issued every month



300
customers



45%
market share (core services) in the 3 main basins
(North Europe, Gulf of Mexico, Persian Gulf)



20%
market share worldwide (incl main basins)



Arctic
the leading service provider



Offshore



8,000
point forecasts (customer specific issued every month
– in offshore wind



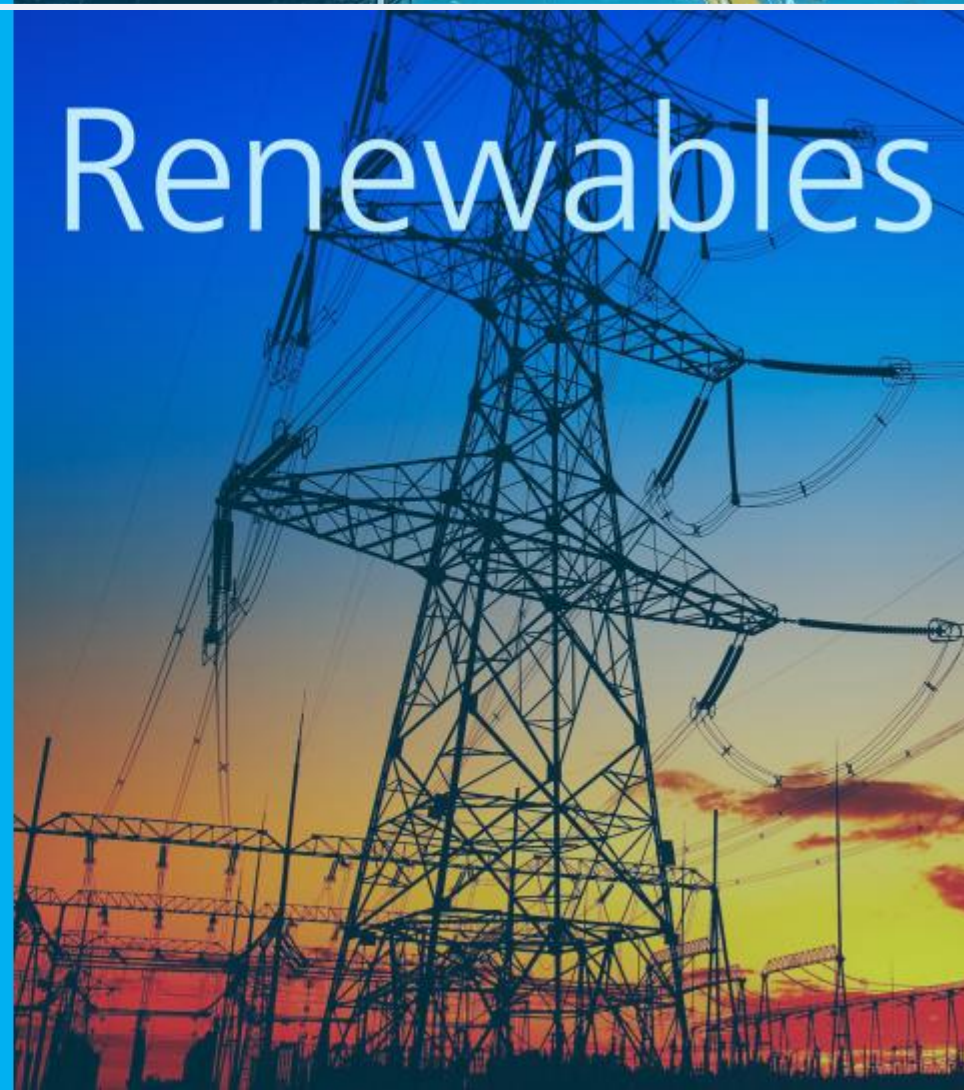
30%
market share in offshore wind worldwide
(Germany 80%, UK 25%)



246
customers in wind, utilities, trading and hydro



7%
market share electric utilities/grid watch in the U.S.
growing rapidly



Renewables



10,800
U.S. onshore locations served every day of which 623
with manual enhancements



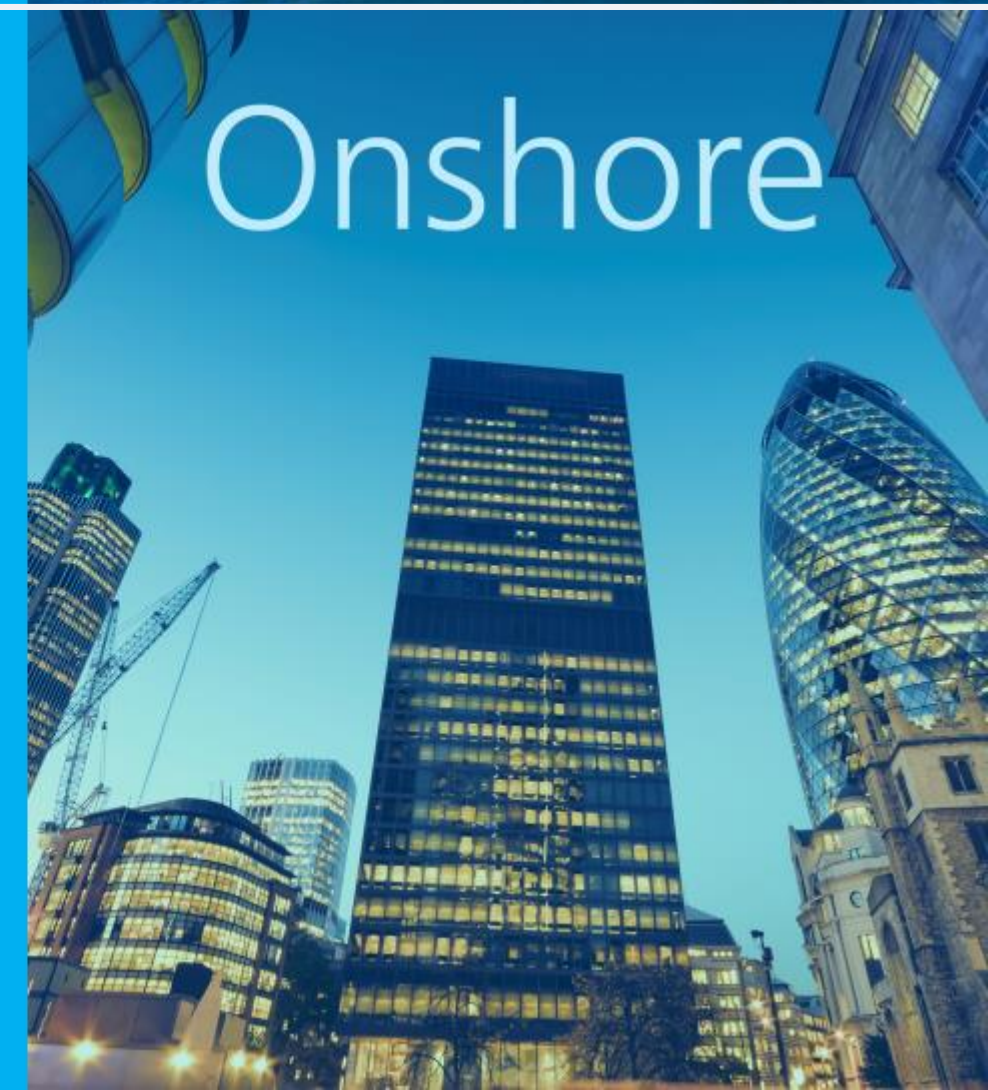
240
customers



Business continuity
solutions used by a wide range of industries
(petrochemicals, oil&gas, healthcare, banks,
retail, insurance, energy, manufacturing, etc.)



Global Hurricane Center
customers served by our global hurricane and
typhoon center in Houston (incl Offshore)



Onshore

infrastructure and security



- Isolated customer environments**
-virtual machines & containers
- Monitoring and logging infrastructure**
-redundant logging of all network events, hardware and software events
- Scanning of infrastructure and software**
-external network scanning all edge components
- Secured data transmission**
-IPSEC VPN with SHA256 / AES256
- StormGeo Hybrid Cloud Services**
- Secured storage**
-encrypted and backup of all essential data (IBM TSM TS3310)
- Authentication and Authorization**
-active directory monitored by Netwrix

FINANCIAL AND ENTERPRISE-GRADE COMPLIANCE



ISO 27001 Compliance

KEY CUSTOMERS



StormGeo

Control in a changing environment

timeline

our history



1996-1997

the start

AWT founded in Silicon Valley California

Storm Weather Center founded in Bergen by Siri Kalvig and TV2

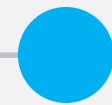
1998

renewables

StormGeo creates its first weather service for the hydroelectric power industry

timeline our history

2001



bvs

First version of the AWT onboard weather routing software launched

2002-2006



awt expands

AWT opens offices worldwide:

- New York
- Aberdeen-Europe
- Hong Kong
- Shanghai

2005



offshore

StormGeo starts deliveries to the offshore industry by winning contract with Statoil

timeline

our history

2009-2010



new offices

StormGeo acquires the Swedish company Seaware AB, a leader in onboard ship routing services.

StormGeo opens offices in Denmark, Sweden, UK and US.

AWT opens offices in London, Singapore and Japan

2011



new shareholder

Reiten & Co Capital Partners VII L.P. private equity fund buys 67.7% of StormGeo with sights on continued growth and Globalization.

StormGeo acquires Dubai-based weather forecasting company Met Consultancy FZ LLC.

2012



expansion

DNV GL (Det Norske Veritas) invests in StormGeo and becomes second largest owner (22.7%) retaining 51%.

StormGeo acquires Houston based Impactweather and opens office in Germany, Rio and US.

timeline our history

2013



aviation forecast

StormGeo opens office in Singapore and Korea.

StormGeo becomes the only private weather company to be certified by the civil aviation authorities for the provision of official aviation forecast under the Single European Skyregime.

2014



awt and eqt

StormGeo acquires Silicon Valley-based Applied Weather Technology, Inc. (AWT), a leader in weather and route forecasting for the shipping industry.

EQT private equity fund becomes StormGeo's majority shareholder (57.5%) and DNV GL increases its stake to 27%

2015



FleetDSS

StormGeo and AWT launches new versions of its Fleet decision support systems.

timeline our history

future is
promising

2016



nena

StormGeo acquires Oslo-based Nena AS, a leading analysis house delivering energy insights to major utilities and trading companies

2017



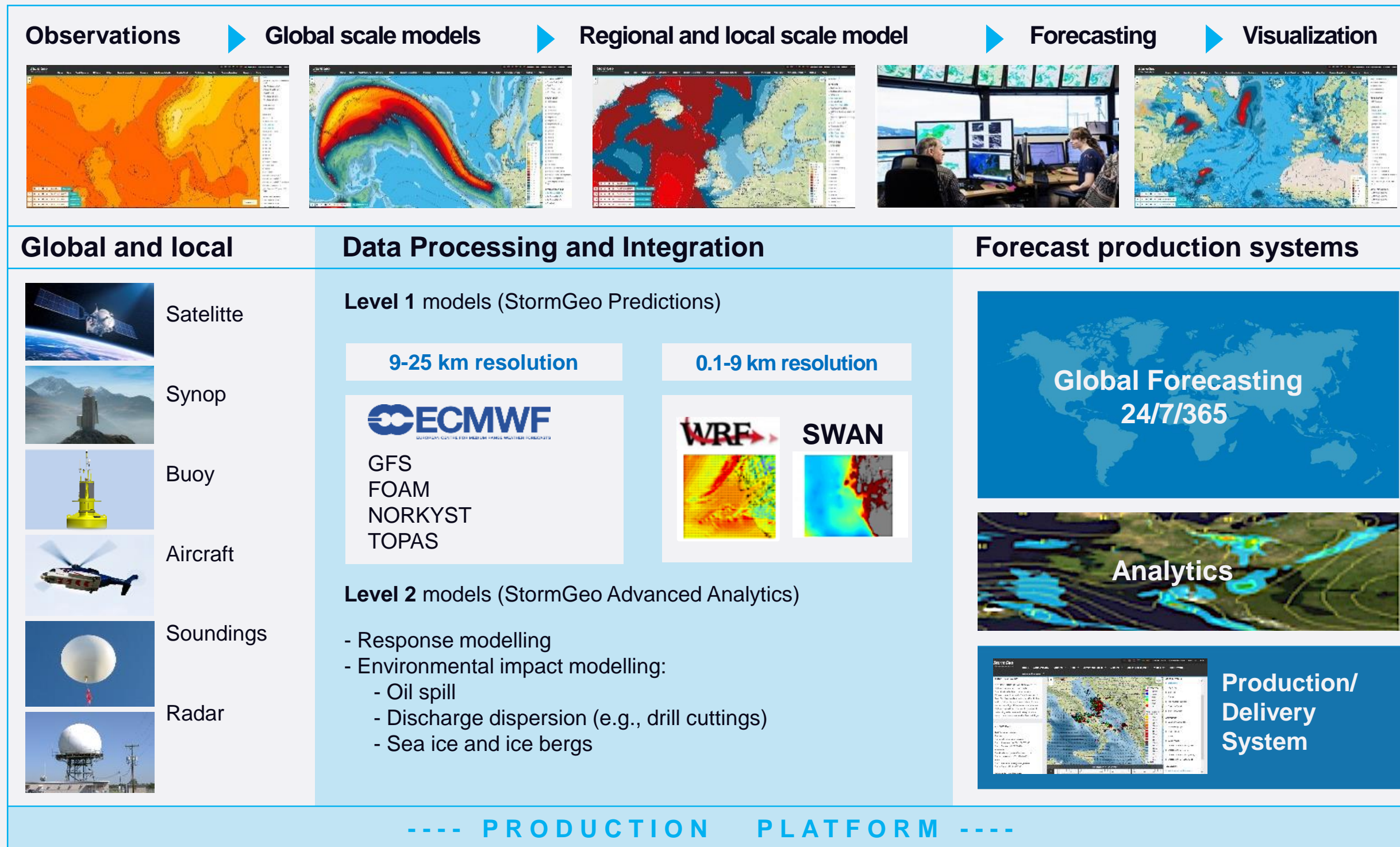
awt= stormgeo

AWT has changed its name to StormGeo. Our shipping division is now organized in special teams pr vessel type and service thousands of voyages every month



Tropical expertise

How do we do it global data platform



Third-party data

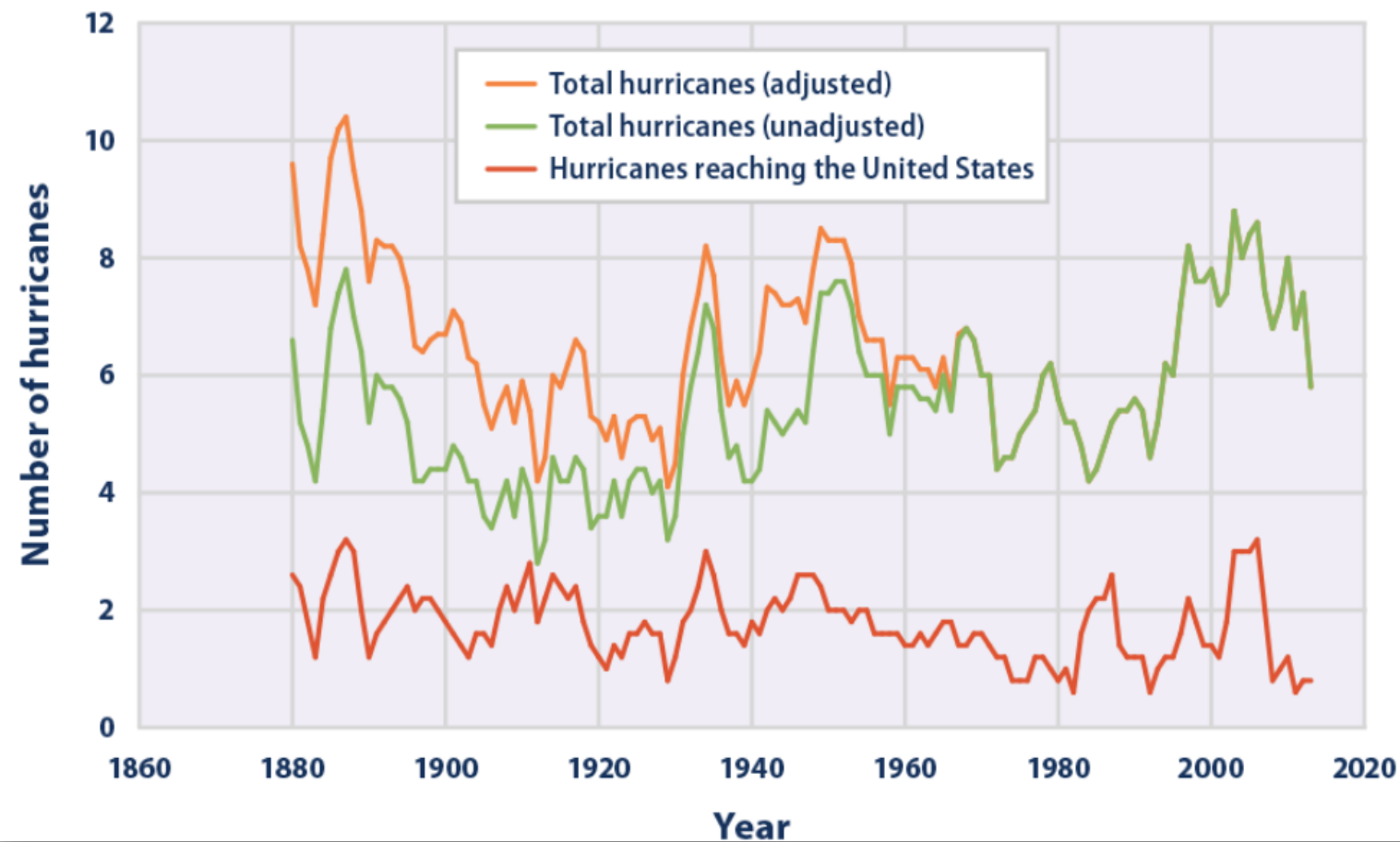
Products

- SHIPPING
- ONSHORE
- RENEWABLES
- MEDIA
- AVIATION
- OFFSHORE

Analytics

Climate Change Indicators: Tropical Cyclone Activity

Figure 1. Number of Hurricanes in the North Atlantic, 1878–2015



Tropical Cyclone Activity

Since 1878, about six to seven hurricanes have formed in the North Atlantic every year. Roughly two per year make landfall in the United States. The total number of hurricanes (particularly after being adjusted for improvements in observation methods) and the number reaching the United States do not indicate a clear overall trend since 1878.

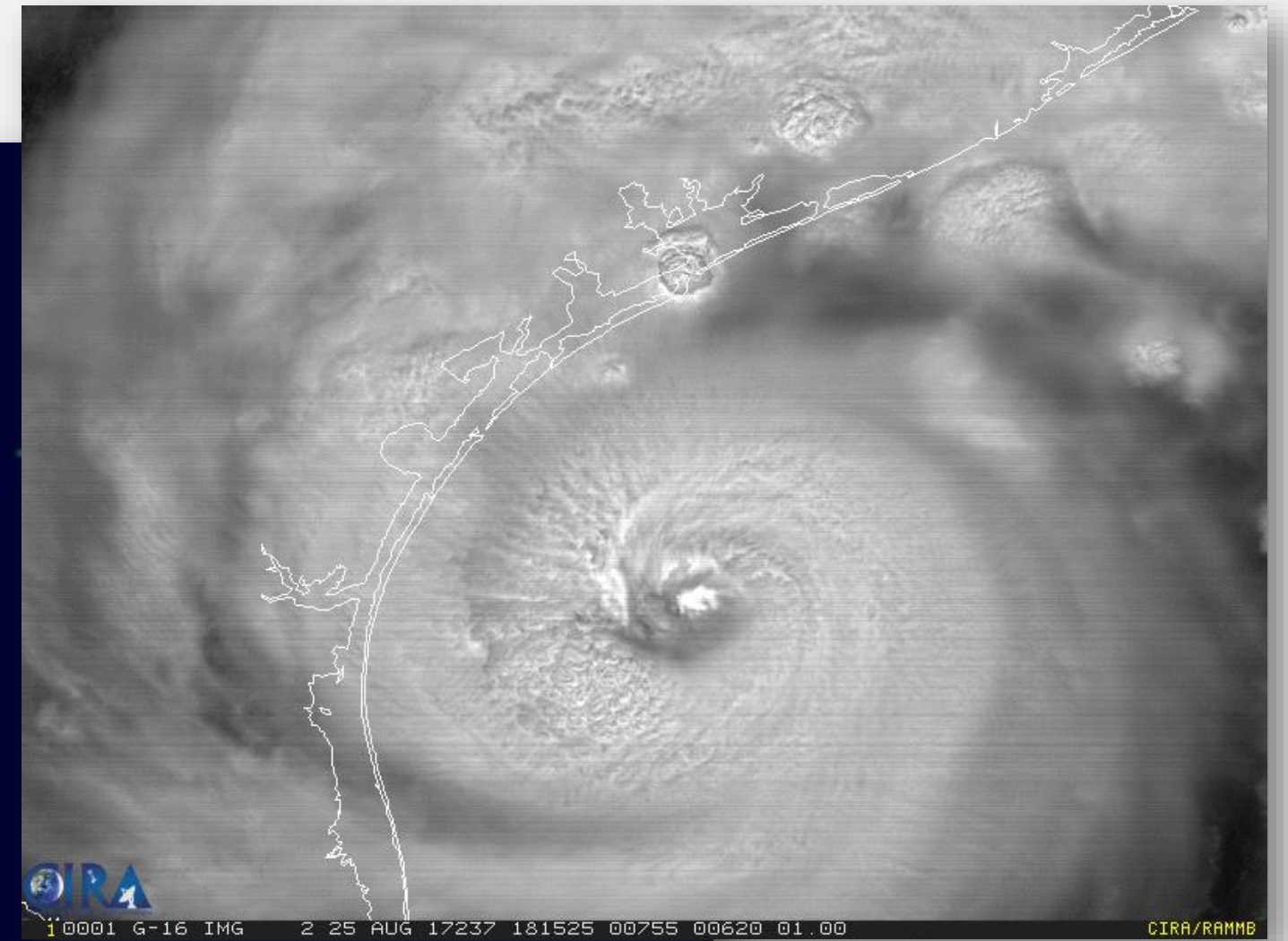
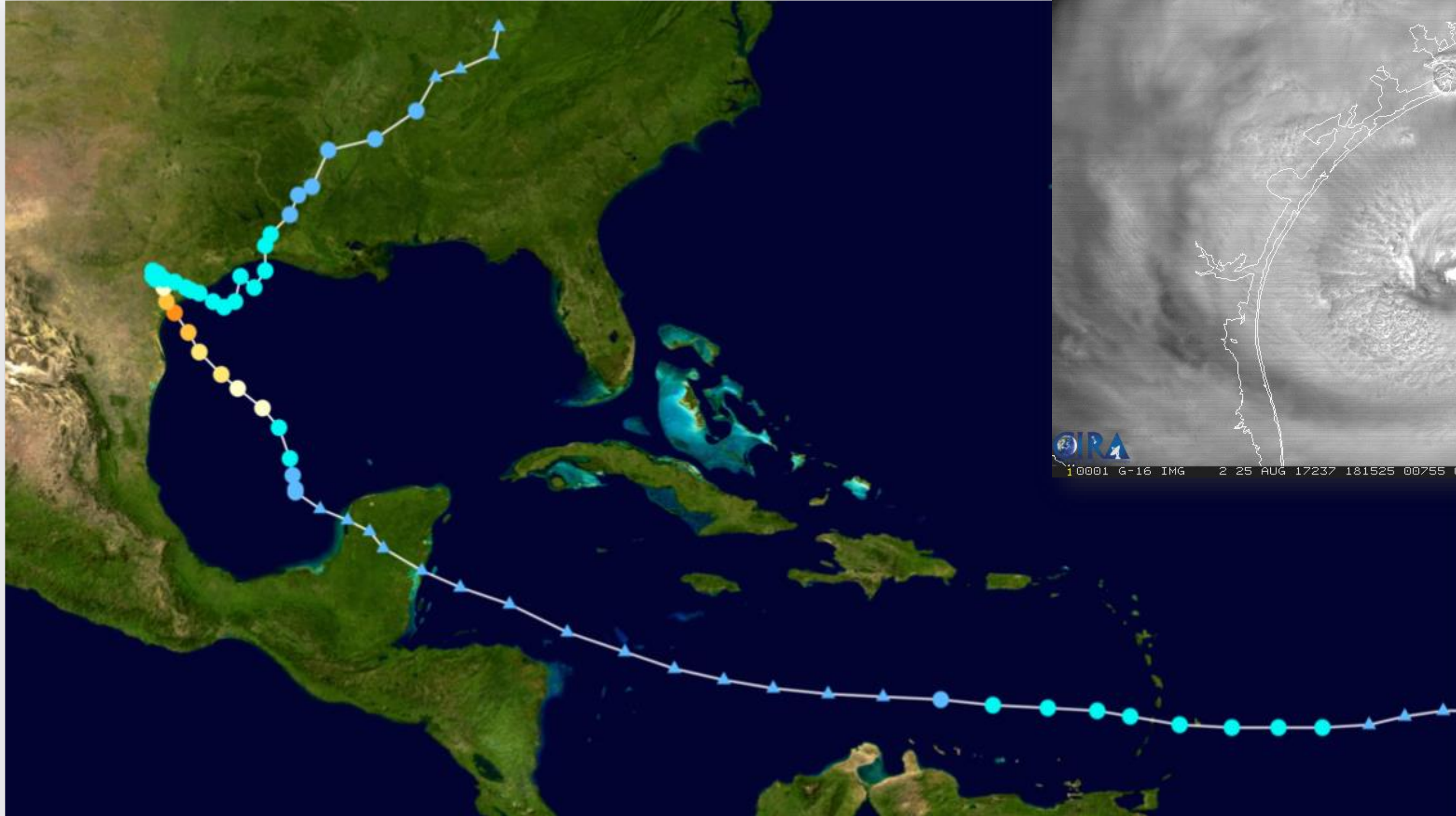
This indicator examines the frequency, intensity, and duration of hurricanes and other tropical storms in the Atlantic Ocean, Caribbean, and Gulf of Mexico.

According to the total annual ACE Index, cyclone intensity has risen noticeably over the past 20 years, and six of the 10 most active years since 1950 have occurred since the.

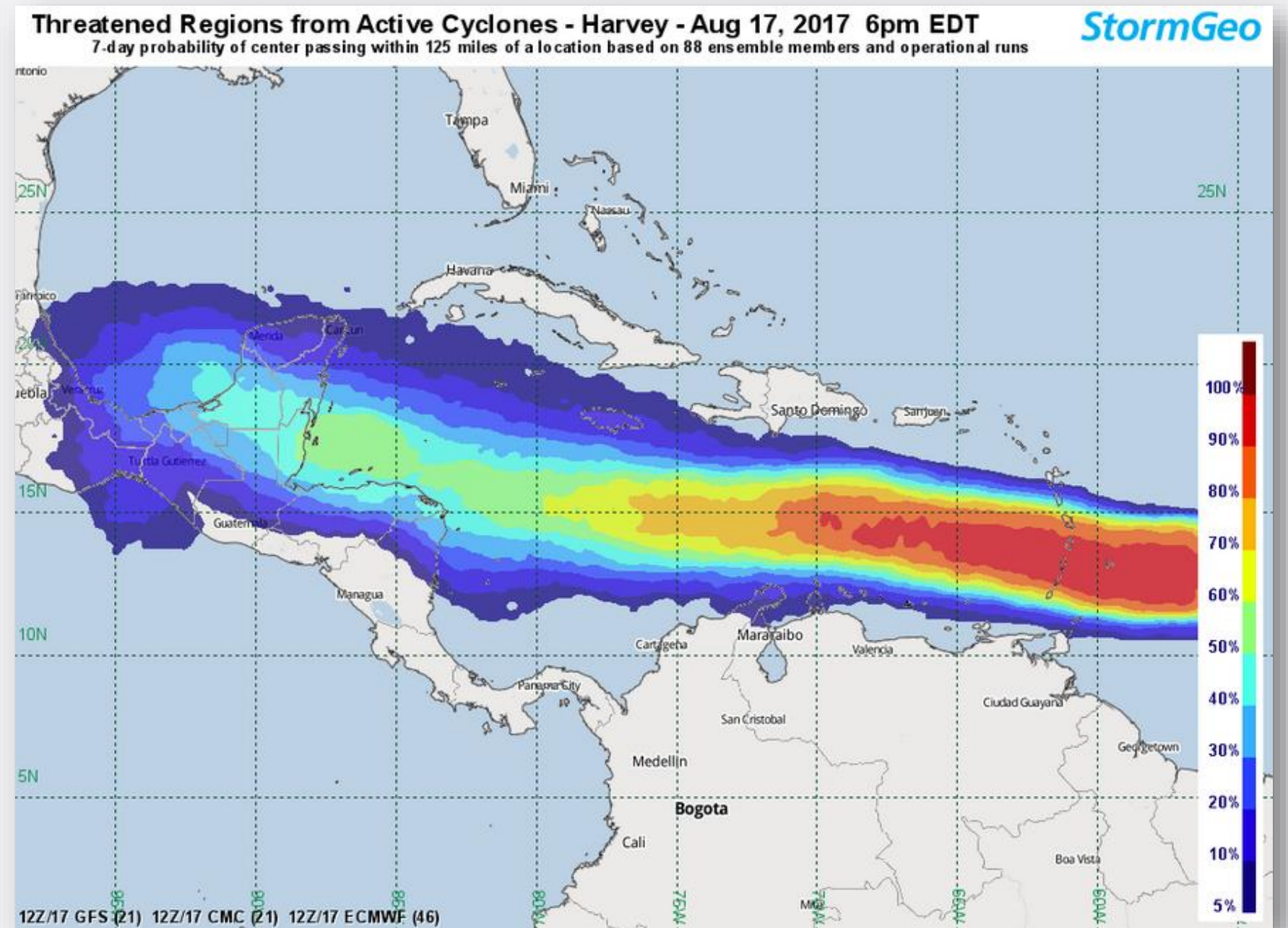
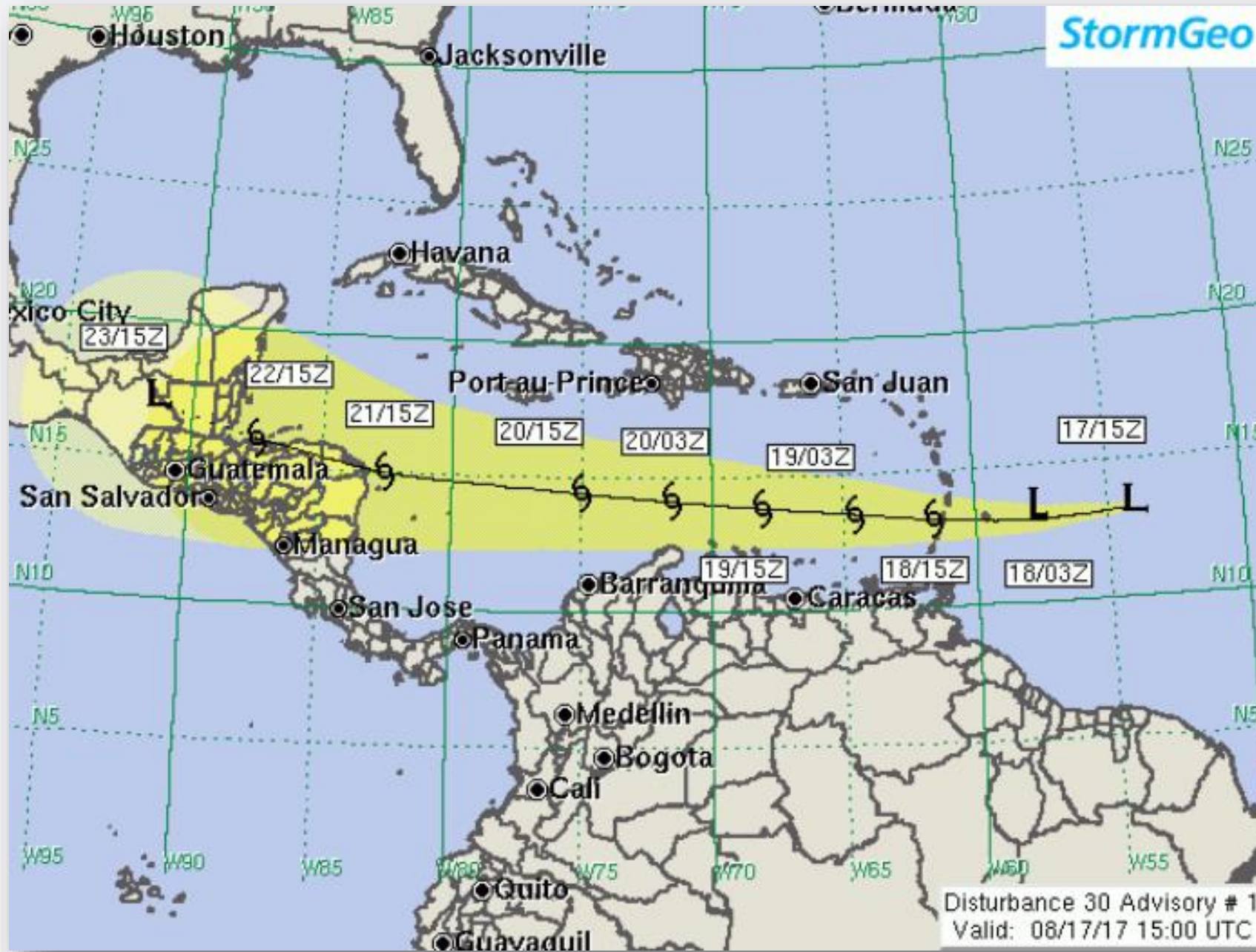
Relatively high levels of cyclone activity were also seen during the 1950s and 1960s.

Despite the apparent increases in tropical cyclone activity in recent years, changes in observation methods over time make it difficult to know whether tropical storm activity has actually shown an increase over time.

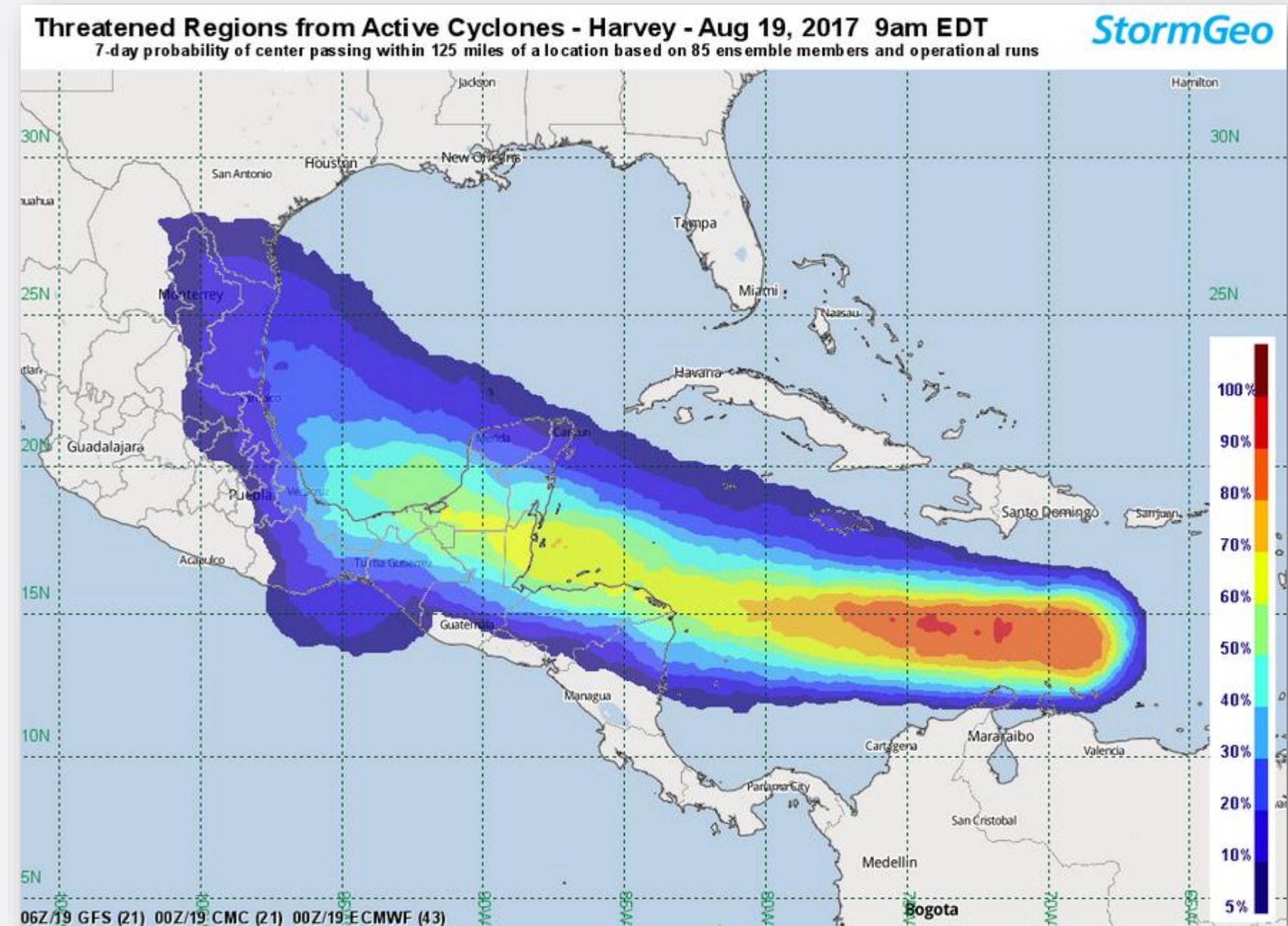
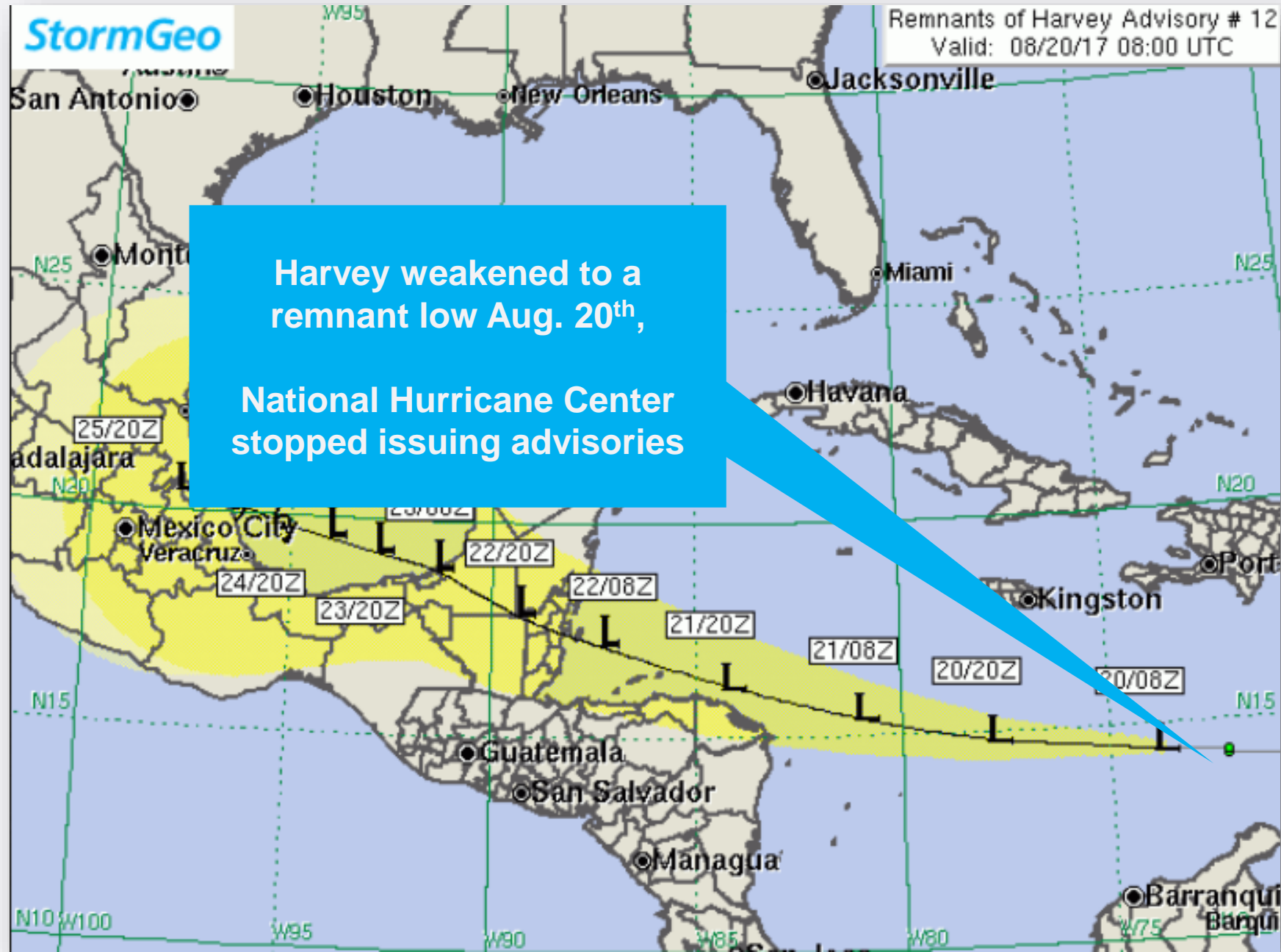
Hurricane Harvey



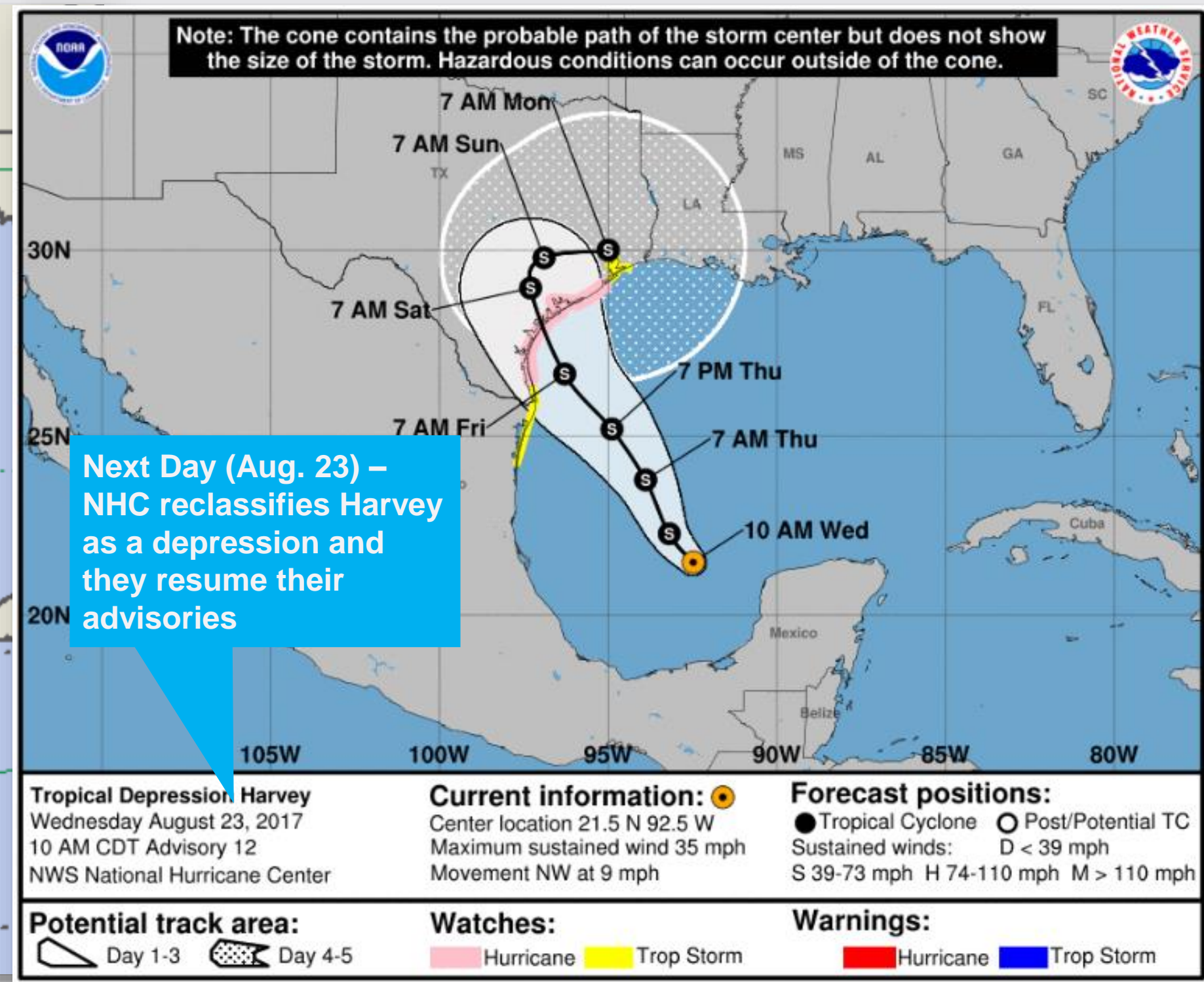
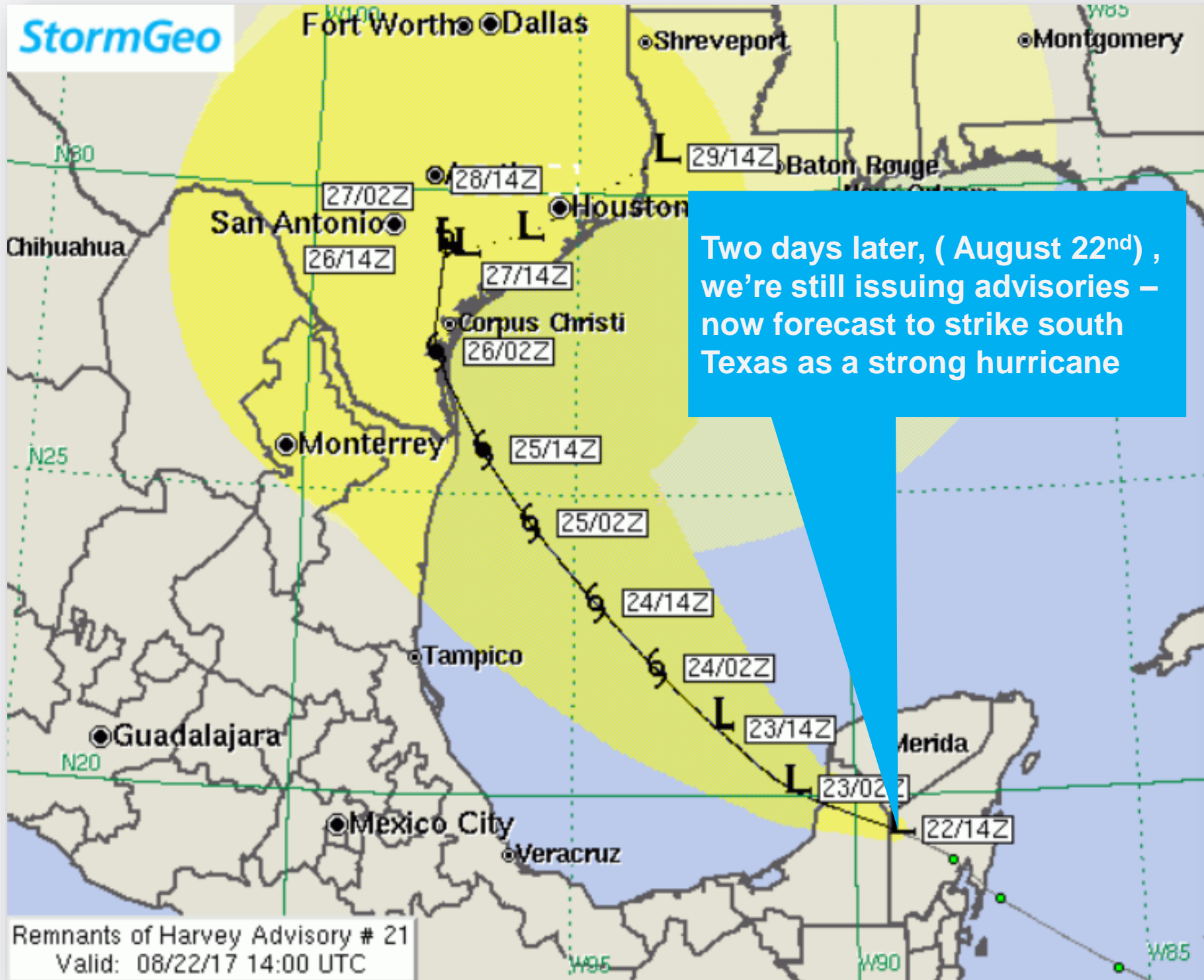
Hurricane Harvey



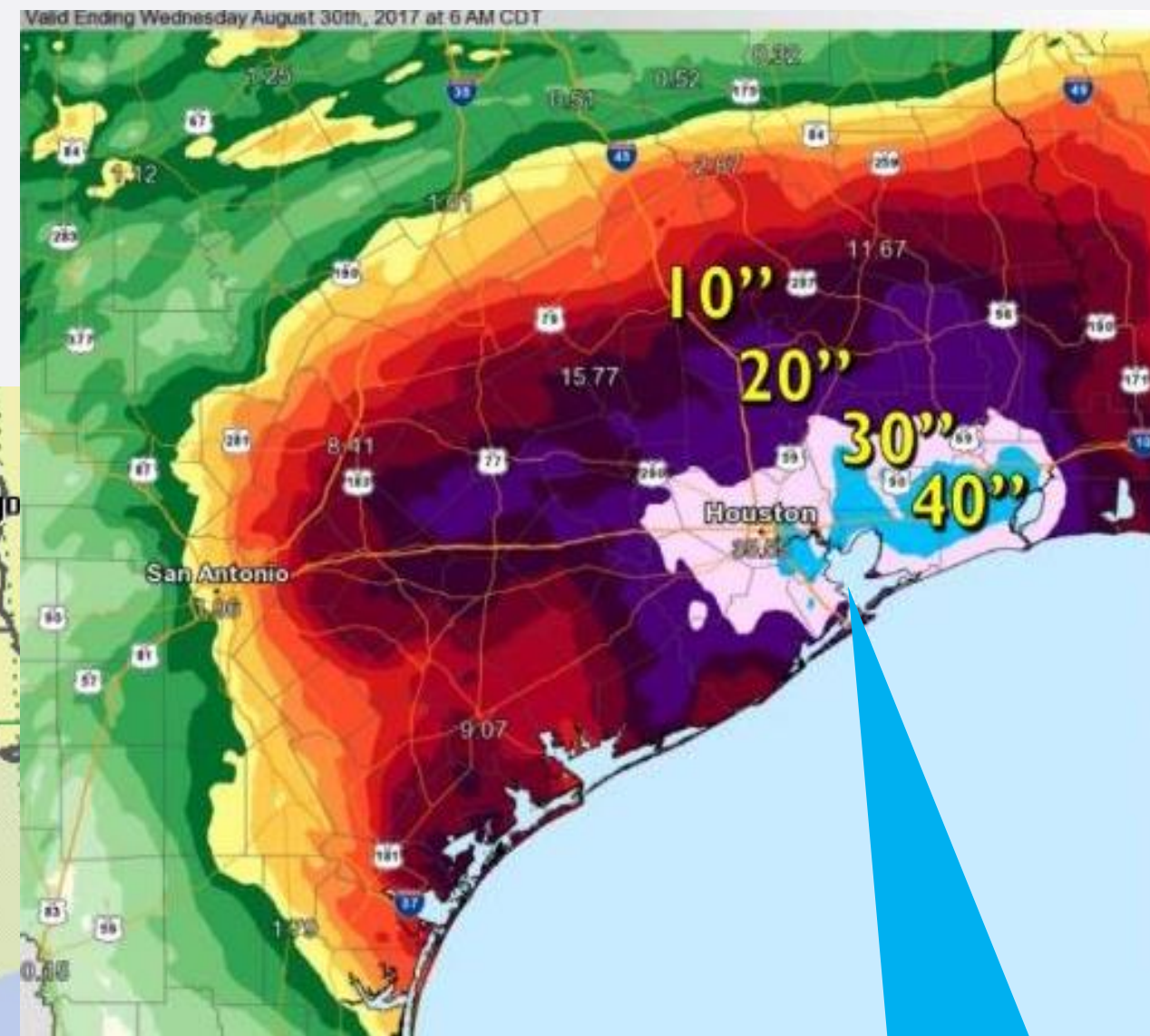
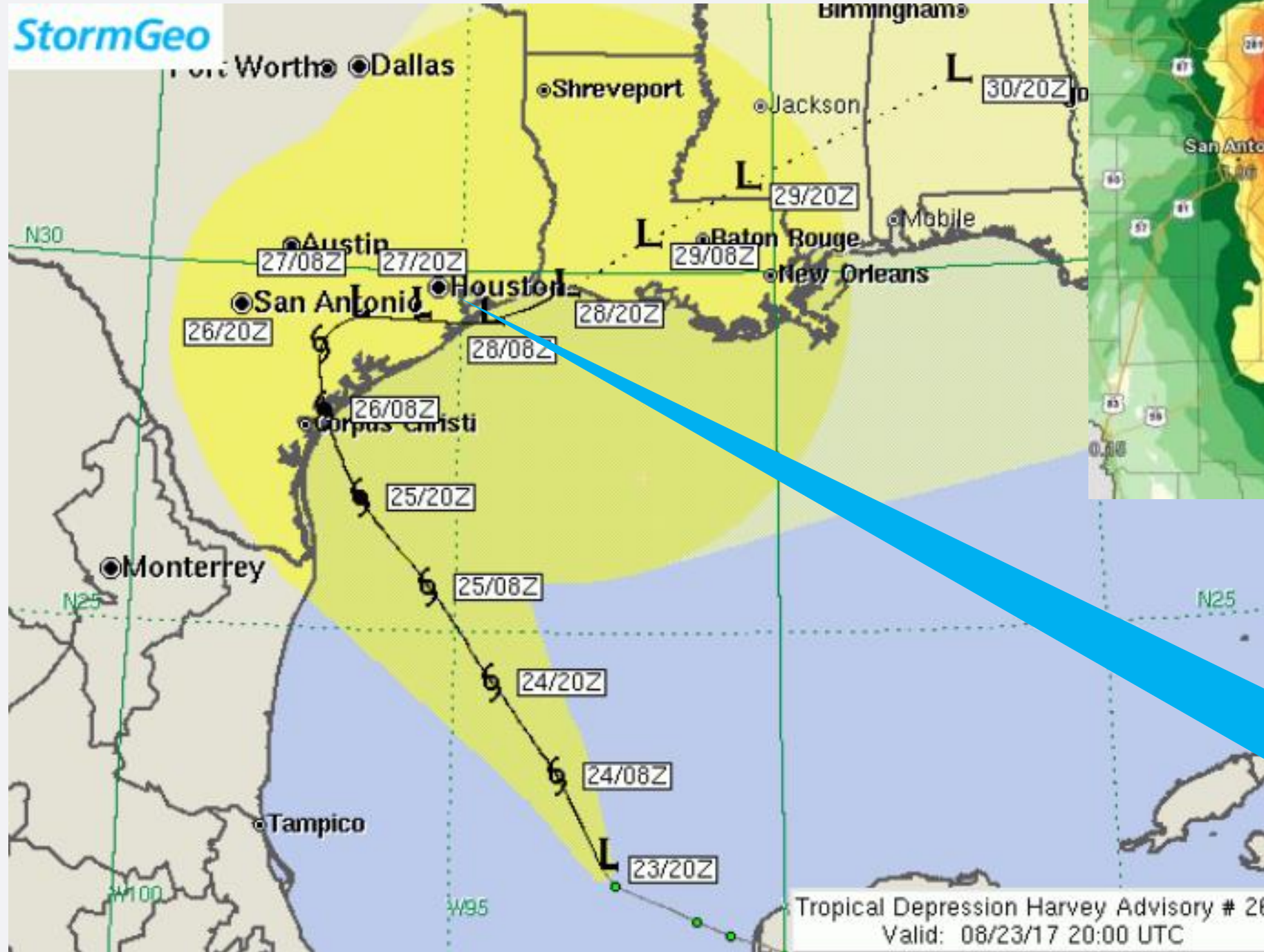
Hurricane Harvey



Hurricane Harvey



Hurricane Harvey



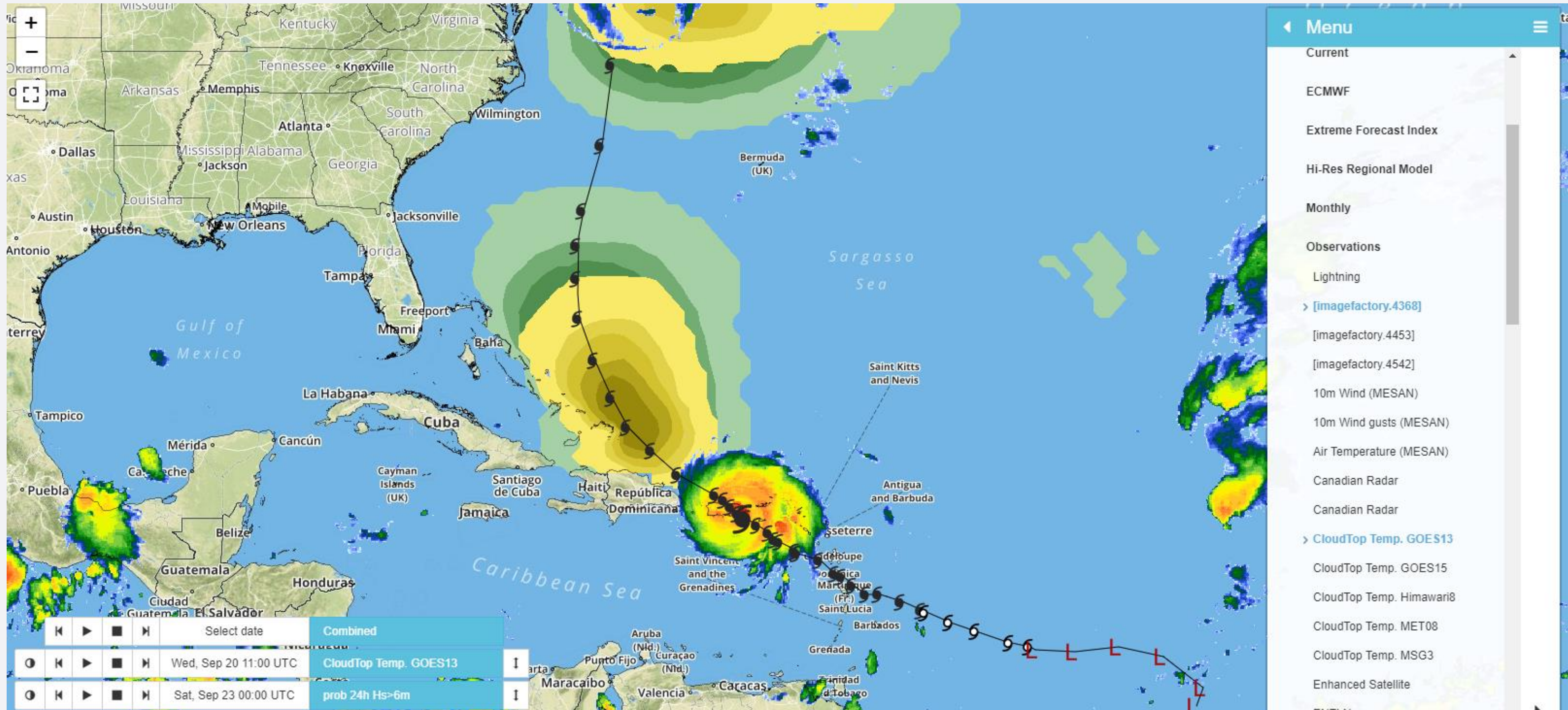
5 Day Point Rainfall Amounts in Inches

- Harvey continued to produce record breaking **rainfall totals** of **45 to over 50 inches**... with continued rainfall
- **Cedar Bayou - 51.88**
- **Berry Bayou - 44.88**
- **League City - 49.84**
- **Mary's Creek - 49.80**
- **Goose Creek - 44.08**
- **Greens Bayou - 41.36**
- **Buffalo Bayou - 35.60**
- **Addicks Dam - 33.44**

The Port of Houston was closed for approx. 1 week (Aug 25th - Sept. 1st)

Hurricane Maria

Wave height probability



The configurable weather portal

StormGeo NEWS AND NEW PRODUCTS GLOSSARY LOGOUT

Home Asset Overview Offshore Adhoc Satellite and charts Short routing Daily video Breifing

SYNOPTIC SITUATION

SYNOPTIC SITUATION NORTH SEA MONDAY 18 UTC

A deep storm Low close to northern Scotland moves quickly east with gales or severe gales overnight, locally storm force at times. The very unsettled conditions remain Tuesday as high seas slowly reduce, winds veering N'ly. A brief ridge crosses area Wednesday with a slight decrease in winds but further fronts cross the Uk and North Sea with winds SW'ly fresh to strong into Friday, as a Low remains to the north.

24/7 CONTACT

24/7 forecaster support:
E-mail: offshore@stormgeo.com
Phone (Aberdeen) +44 (0) 1224 76659
Phone (Bergen): +47 5570 6174

Your account manager:
Anna Hilden
Email: anna.hilden@stormgeo.com
Phone +45 3035 8856

Locations

- Onshore
- Offshore
- Adhoc

Lightning (Euclid) (min)

- 120-100
- 100-80
- 80-60
- 60-40
- 40-20
- 20-

Lightning (Euclid)

- > Lightning (Euclid)
- > Satellite Europe
- > Radar

OFFSHORE

- > Wind and Wave(Hs)
- > Wave Height (Hs)
- > Peak Period
- > Swell
- > Wind Waves

STANDARD

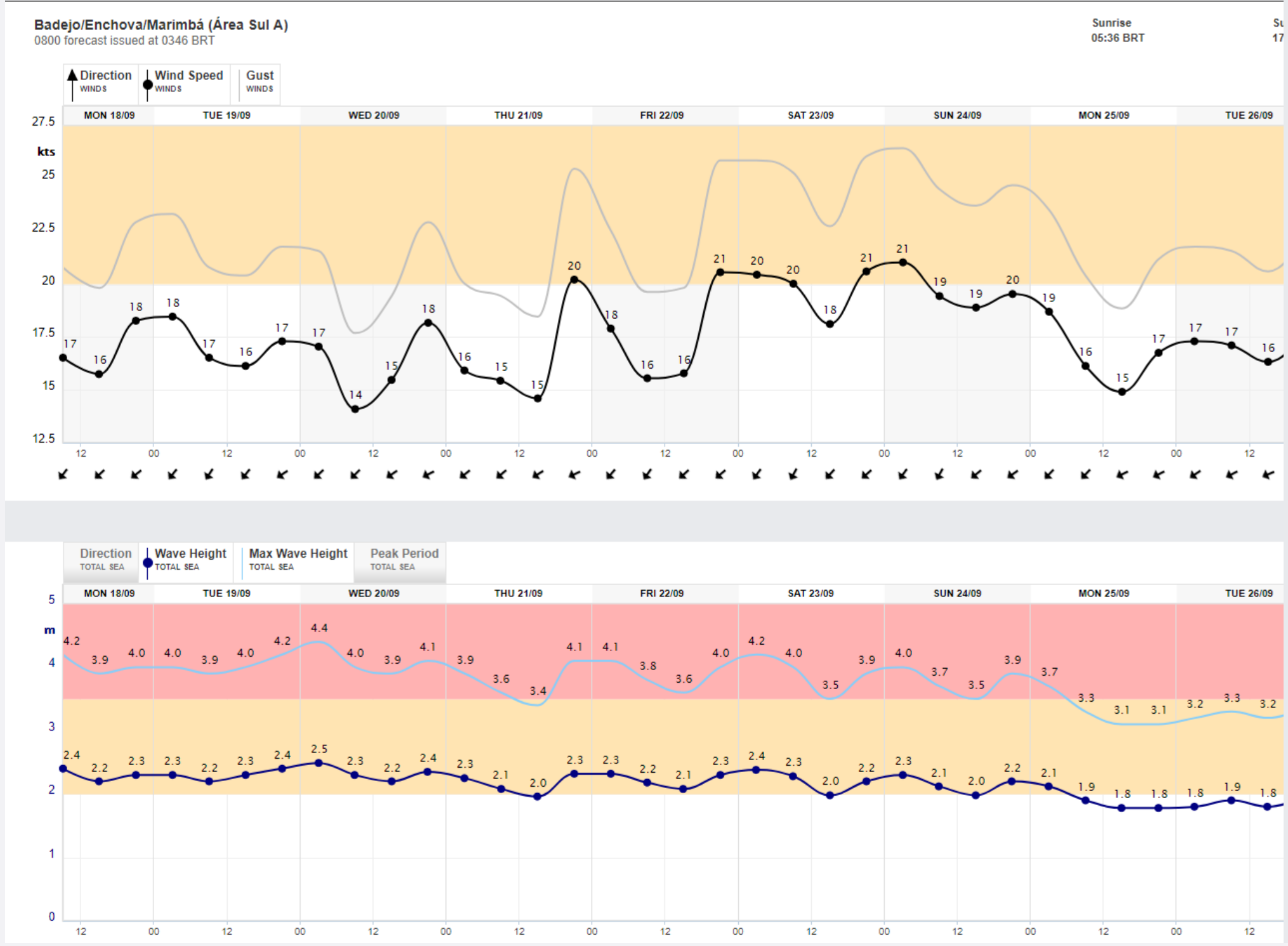
- > Wind speed and pressure
- > Pressure
- > Precipitation (3hrs)
- > Thunder Index

7/1 11:15

Tue Wed Thu Fri Sat Sun Mon Tue Wed

The configurable weather portal

...Weather against thresholds



StormGeo
Offshore Weather Service

Home Heli MetOps Heli MetPlan Offshore Adhoc Satellite and charts

Buzzard FPS point Custom Thresholds

Buzzard FPS point: Tabular forecast

UTC	CONF	Dir	WINDS				Hs
			Ws10	Wg10	Ws50	Ws100	
Date Time	Conf	(°)	(kts)	(kts)	(kts)	(kts)	(m)
			>25				>3.5
THU							
29/01 19	●	WNW	19	24	24	26	2.3
29/01 20	●	WNW	20	25	25	27	2.4
29/01 21	●	WNW	21	26	26	28	2.5
29/01 22	●	W	22	27	27	29	2.7
29/01 23	●	W	22	28	27	30	3
FRI							
30/01 00	●	WSW	23	28	28	30	3.2
30/01 01	●	W	23	29	29	31	3.4
30/01 02	●	WNW	24	30	30	32	3.6
30/01 03	●	NW	24	31	30	33	3.8
30/01 04	●	NW	25	31	31	34	3.7
30/01 05	●	NW	26	32	32	34	3.6
30/01 06	●	NW	27	33	33	36	3.5
30/01 07	●	NW	26	33	32	35	3.6
30/01 08	●	NW	25	31	31	34	3.8
30/01 09	●	NW	25	31	31	33	3.9
30/01 10	●	NW	24	30	30	32	4.1
30/01 11	●	WNW	24	30	29	32	4.2
30/01 12	●	WNW	23	29	29	31	4.4

The configurable weather portal

Asset overviews

StormGeo

Home Asset Overview Offshore Adhoc Satellite and charts Short routing Daily video Breifing

WEATHER RISK ASSESSMENT

Locations		Mon	Tue				Wed				Thu				Fri				Sat			
		18:00-00:00	00:00-06:00	06:00-12:00	12:00-18:00	18:00-00:00	00:00-06:00	06:00-12:00	12:00-18:00	18:00-00:00	00:00-06:00	06:00-12:00	12:00-18:00	18:00-00:00	00:00-06:00	06:00-12:00	12:00-18:00	18:00-00:00	00:00-06:00	06:00-12:00	12:00-18:00	
BALTIC SEA SITE	Jacking up operations	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green
	Lifting operations	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Red	Yellow	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green
CUXHAVEN	Jacking up operations	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green
	Lifting operations	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
KIEL	Jacking up operations	Green	Green	Green	Yellow	Yellow	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	Lifting operations	Yellow	Yellow	Yellow	Red	Red	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
SOUTHERN NORTH SEA SITE	Jacking up operations	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	Lifting operations	Red	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Green	Green	Green	Green	Green	Yellow	Red	Red	Red	Red	Red


THRESHOLD DESCRIPTION

Jacking up operations	Yellow	Significant wave height ≥ 1.3 m	Red	Significant wave height ≥ 1.5 m
Lifting operations	Yellow	Wind speed 10m ≥ 10 m/s	Red	Wind speed 10m ≥ 12 m/s

The configurable weather portal

Alert services

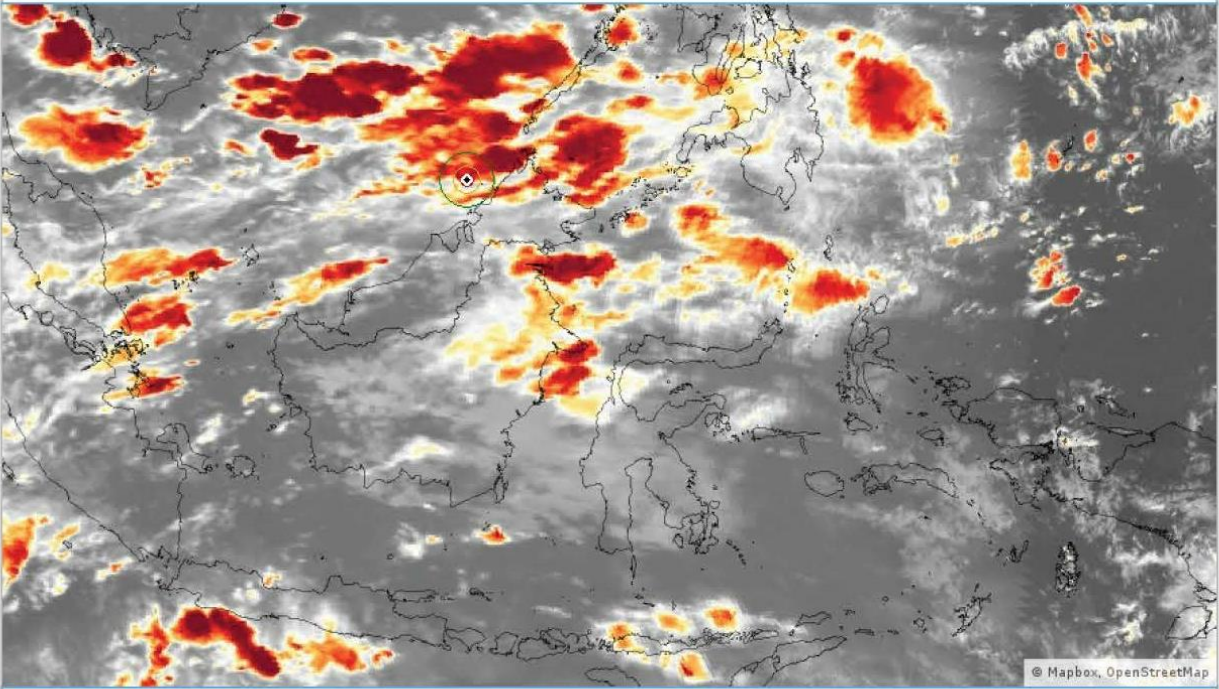
StormGeo Phone (NO) +47 55 70 61 74 offshore@stormgeo.com
Phone (UK) +44 (0) 1224 766590 offshore@stormgeo.com
Phone (US) 1-877-792-3225 offshore.houston@stormgeo.com
Phone (UAE) +9714 3678257 forecaster.dubai@stormgeo.com

Malikai Area Forecast Lat Lon Lovelyn.Fonseca
Issued at: 19 Sep 2016 11:42 MYT 6.35 115.1 Dubai, UAE 

Valid from 19 Sep 2016 12:00 MYT **Valid until** 19 Sep 2016 17:00 MYT **Condition Red - Squalls**

STATUS Squalls are likely at your location over the next 1-3 hours. **EXPECTED WEATHER**

LIGHTNING FREQUENCY	Occasional to Frequent
WIND GUST	40 kts
SEAS	0.9 m above forecasted

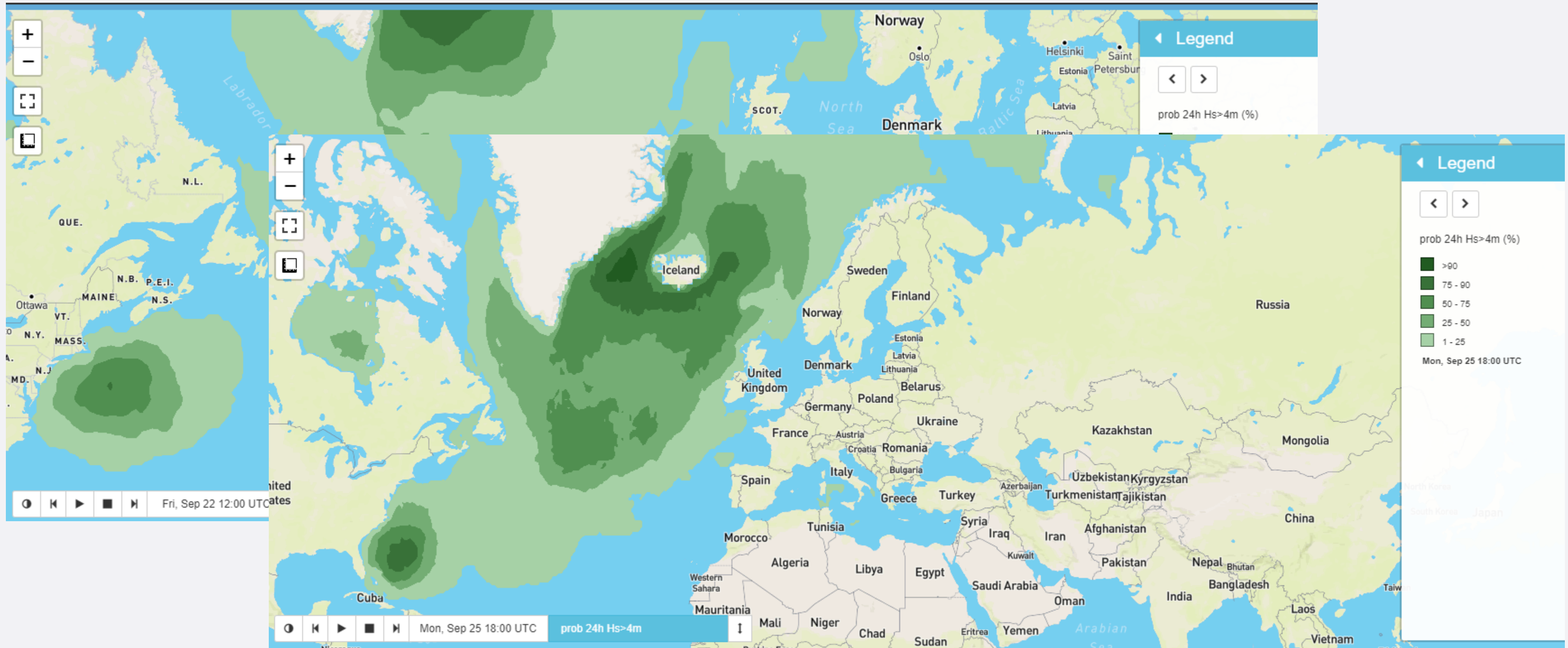


Range rings — 25 km — 50 km — 100 km

- Squall alerts
- Lightning Proximity
- Heavy rainfall
- Temperature
- ++

The configurable weather portal

probabilities of high waves



Shipping

three main segments



StormGeo

Control in a changing environment

on-board services

8
Dual Speed Optimization
Maximizes cost savings by adjusting speeds when sailing in ECA areas

7
Ship Specific Consumption Curves
Statistical consumption curve modeling

6
Tropical Storm Data
Automatic updates based on real-time latest available forecasts

5
System Compatibility
ECDIS systems and passage planning tools

File Edit View Data Setup Help

Pressure 500mb Wind Sig Wv Seas Swell Current SST Vis Vsl Icing Precip Clouds Air Temp Humidity Rogue W

22°45'N 088°45'W Base:2009/10/08 12:00 2016/05/25 05:21

Resonance synchronous roll threshold, roll period/GM not defined.
Tracks: IDTRK-SGSIN_RL / PACTB-COPBO_RL / AEKLF-REPDG_RL / CNSHA-PHMNL_RL / PACTB-COSMR_RL / USCHS-BEANR_RL

Geographical
 User NoGo
 Universal NoGo
 Traffic Separation
 Port Locations
 Capes and Straits
 Time Zones
 Load Lines
 Pirate Attacks
 War Risk
 ECA
 DropPt Locations

Weather
 Port Vicinity Fcsts Imagery
 Bulletins
 Low Track
 Zoom to Wx After Download

Track
 Point Symbol Size
 Dep/Arr
 Waypoints
 Reported
 Computed
 Lat/Lon Format
 On Track Features
 Wind Barb
 Swell Arrow
 Ship
 Distance Indicator
 Grid Darkness

Map and tracks are not to be used for navigation

Ship	Position	Time	Nv	Sc	wxF	hrs	ToGo	Wind	Sig Wv	Sw
*	32°40'N 079°43'W	2016/05/25 05:25	RL	106	20.0	-0.10	192.4			
	32°38'N 079°36'W	2016/05/25 05:44	RL	62	20.0	-0.21	192.1			
	33°17'N 078°10'W	2016/05/25 09:51	RL	55	20.0	-1.40	188.0			
	33°40'N 077°30'W	2016/05/25 12:00	RL	55	20.0	-0.56	185.9			
	34°45'N 075°40'W	2016/05/25 17:38	RL	51	20.0	-1.74	180.2			
	35°41'N 074°15'W	2016/05/25 22:14	RL	54	20.0	-2.11	175.6			
	36°16'N 073°14'W	2016/05/26 01:19	RL	61	20.0	-1.75	172.5			
	38°02'N 069°16'W	2016/05/26 12:00	RL	61	20.0	-1.03	161.9			

GPS positions sent to shore
Real-time data for onshore fleet management

StormGeo

Control in a changing environment

shore-to-ship services routing staff available 24/7



Each year, we route 60,000 voyages to 4,000 ports of call to more than 150 countries around the world.

Team-based

- Tanker, Dry Bulk, Container, Ro-Ro that suit needs of different marine segments

Routing staff

- Understand unique operational requirements of tankers both at sea & in port
- End of Voyage analysts well versed in the compl.

Getting you there safely and efficiently

StormGeo has made a business of making world trade more efficient with innovating ship routing services through our own AWT Routing®. We understand the challenges faced by vessel operators:

- How to sail the optimal route with minimal cost?
- Which route will minimize risk for damage to vessel and cargo?
- How to arrive at a fixed time or achieving the required ETA?

The ship route planner takes into account weather patterns, forecasts, currents and numerous other operational and environmental factors. All this data comes together to provide captains and fleet managers speed-setting guidance along an optimum route in order to safely and efficiently achieve a desired ETA.



performance, analytics, tracking



Performance Report

- On the fly for selected time period,
- Provides an all weather or good weather analysis for at sea and in port
- Customize benchmark terms (CP)

Daily Performance

- Daily speeds, weather, consumptions, etc.
- Data can be customized and is exportable
- Performance summary in good/bad weather



Event Track

- Track created when COSP report received
- Compare how your vessels performance changes over time or varies from ship to ship
- Compare your fleet to others
- Be proactive to speed & consumption claims
- Be proactive to managing fuel consumption on current voyages
- Be proactive to managing weather risks on current voyages

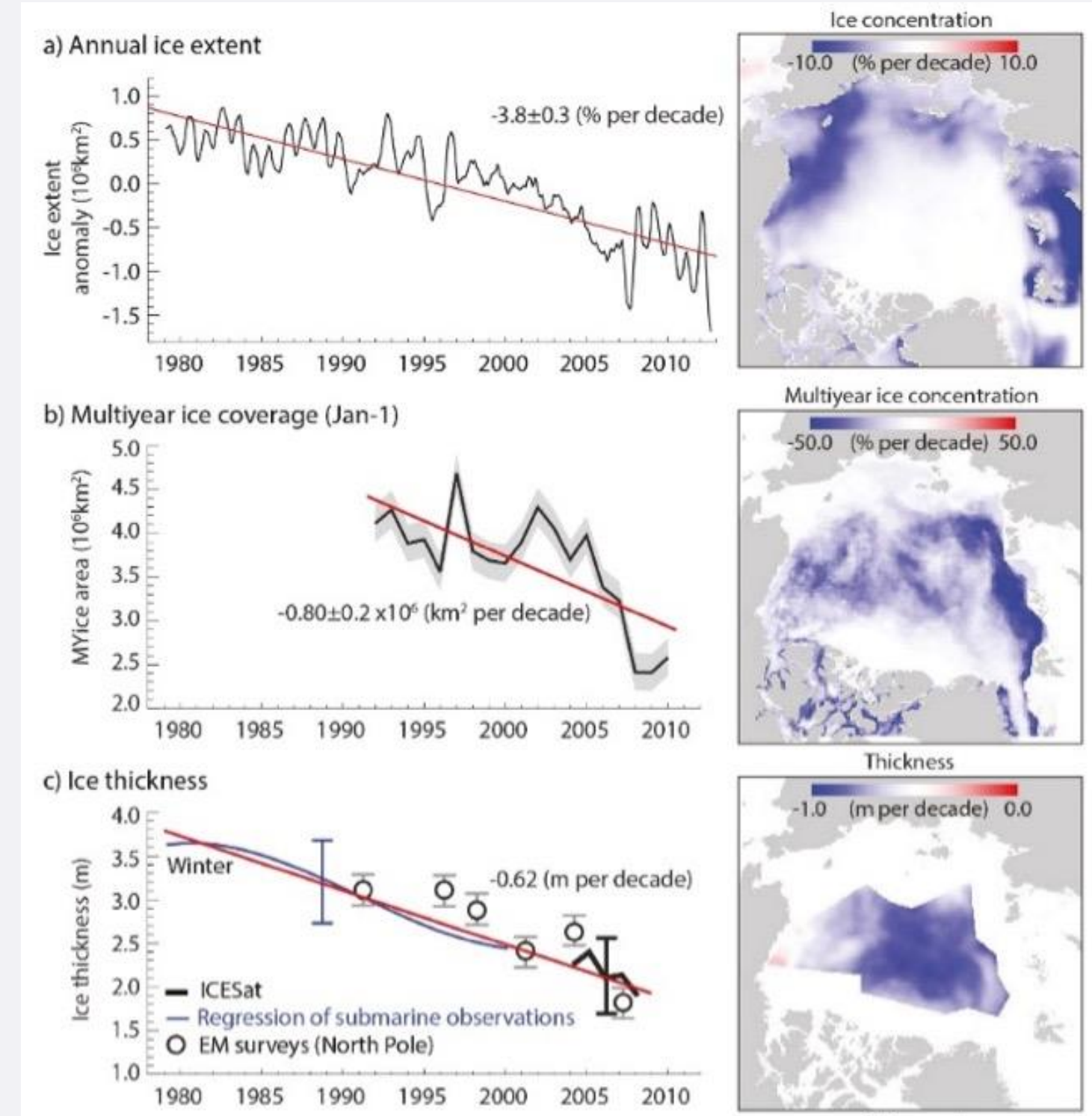
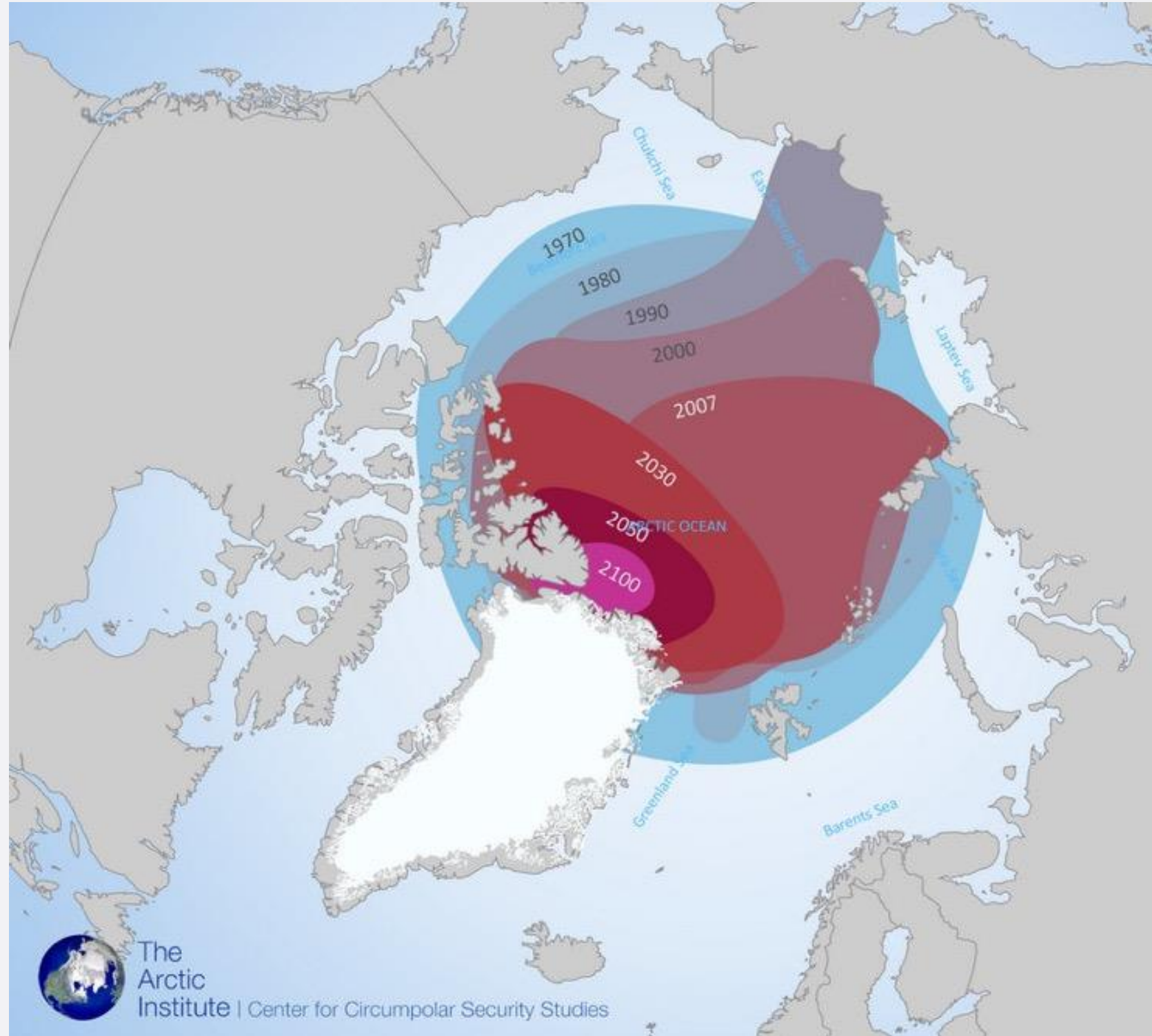




arctic competence -



Climate change effect on ice



Planning phase

seasonal predictions

2.2 North Bering Sea Region

OSI SAF sea-ice area over the North Bering Sea

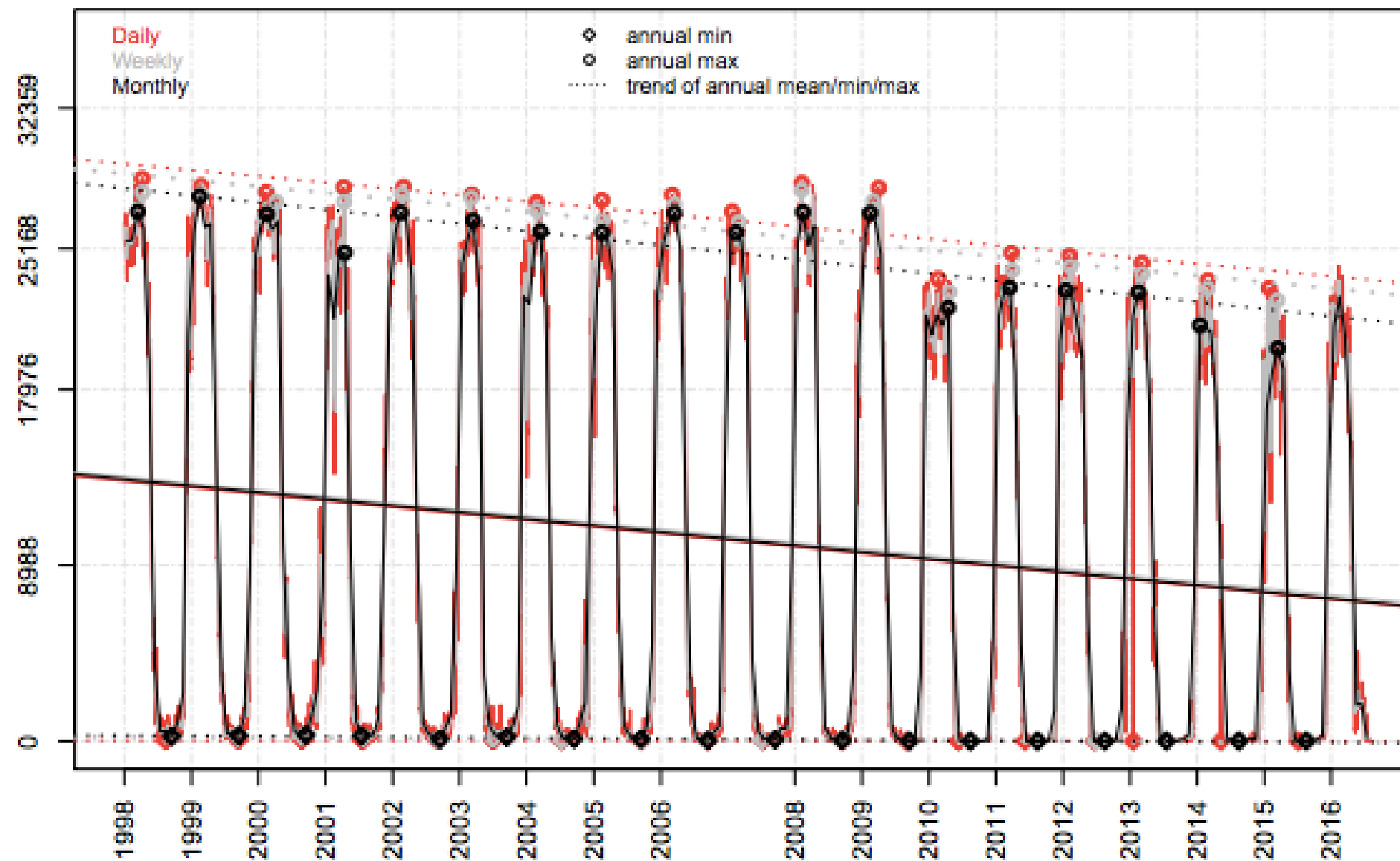


Figure 13: Sea ice area time-series shown on daily, weekly and monthly averaging time. Trend of annual mean, annual minimum, and annual maximum are also shown.

Planning phase probability of ice scenarios

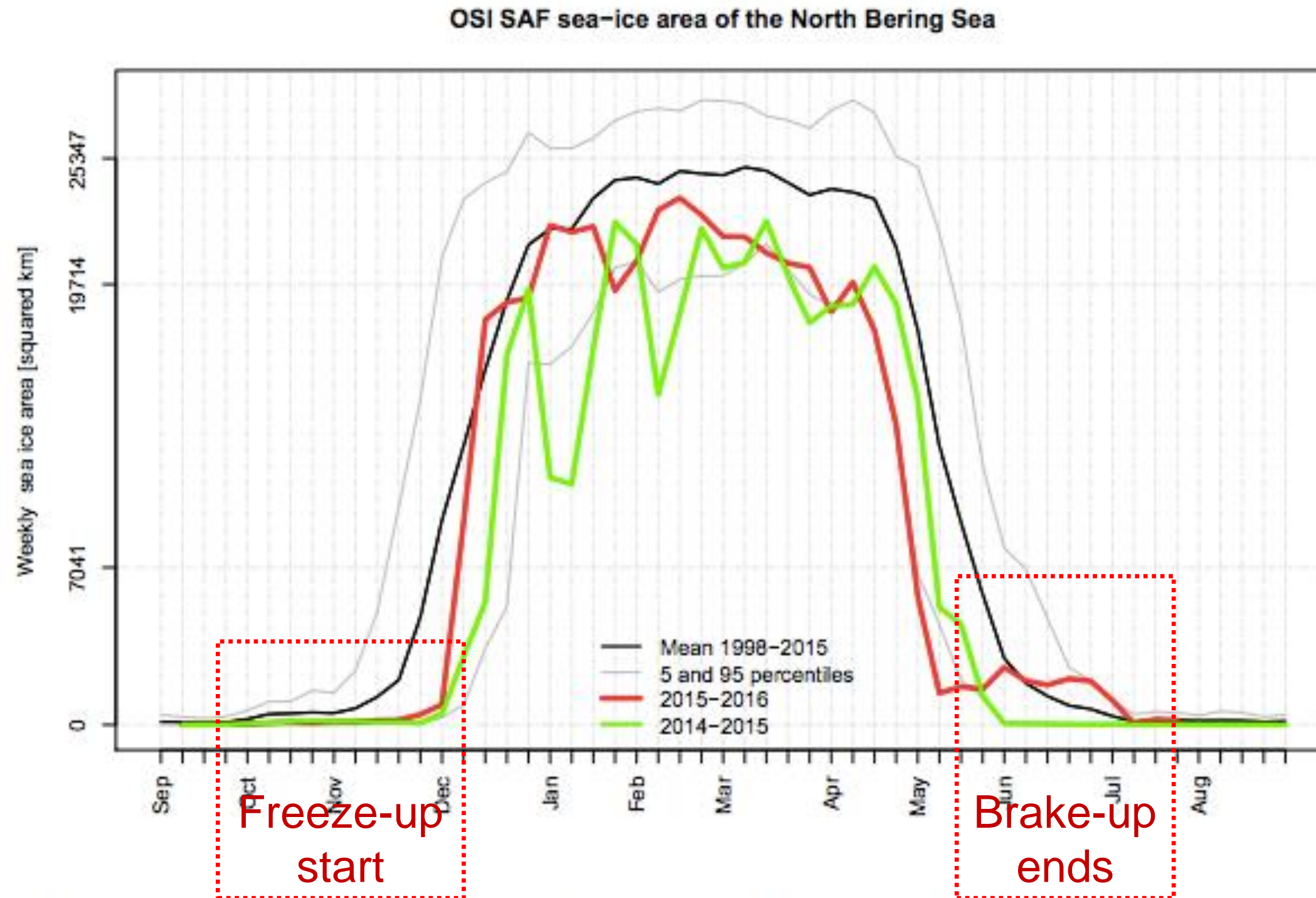
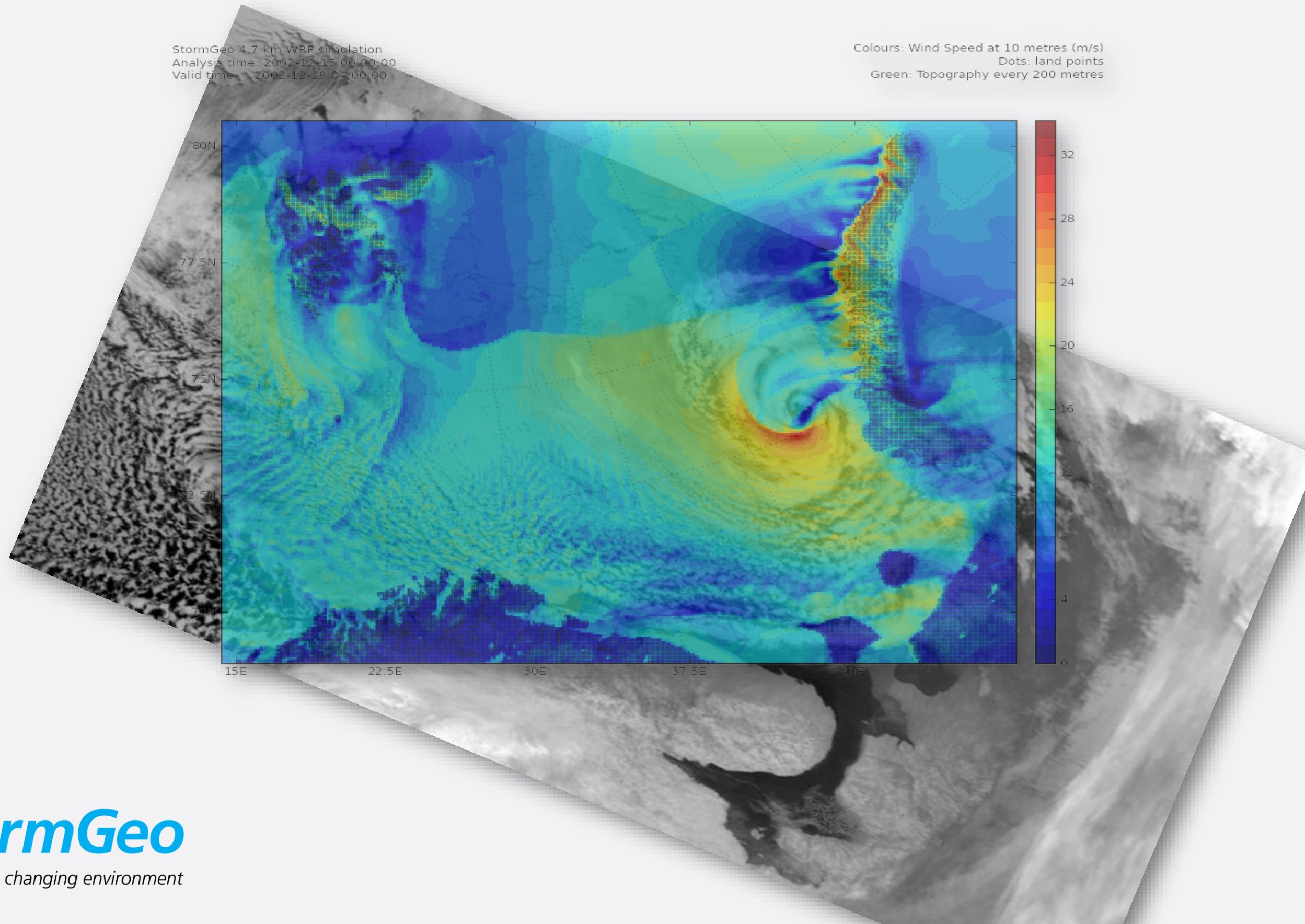


Figure 14: Weekly averaged sea ice area mean, 5 and 95-percentiles over the given period of observations. If the current season started, it is shown in red.

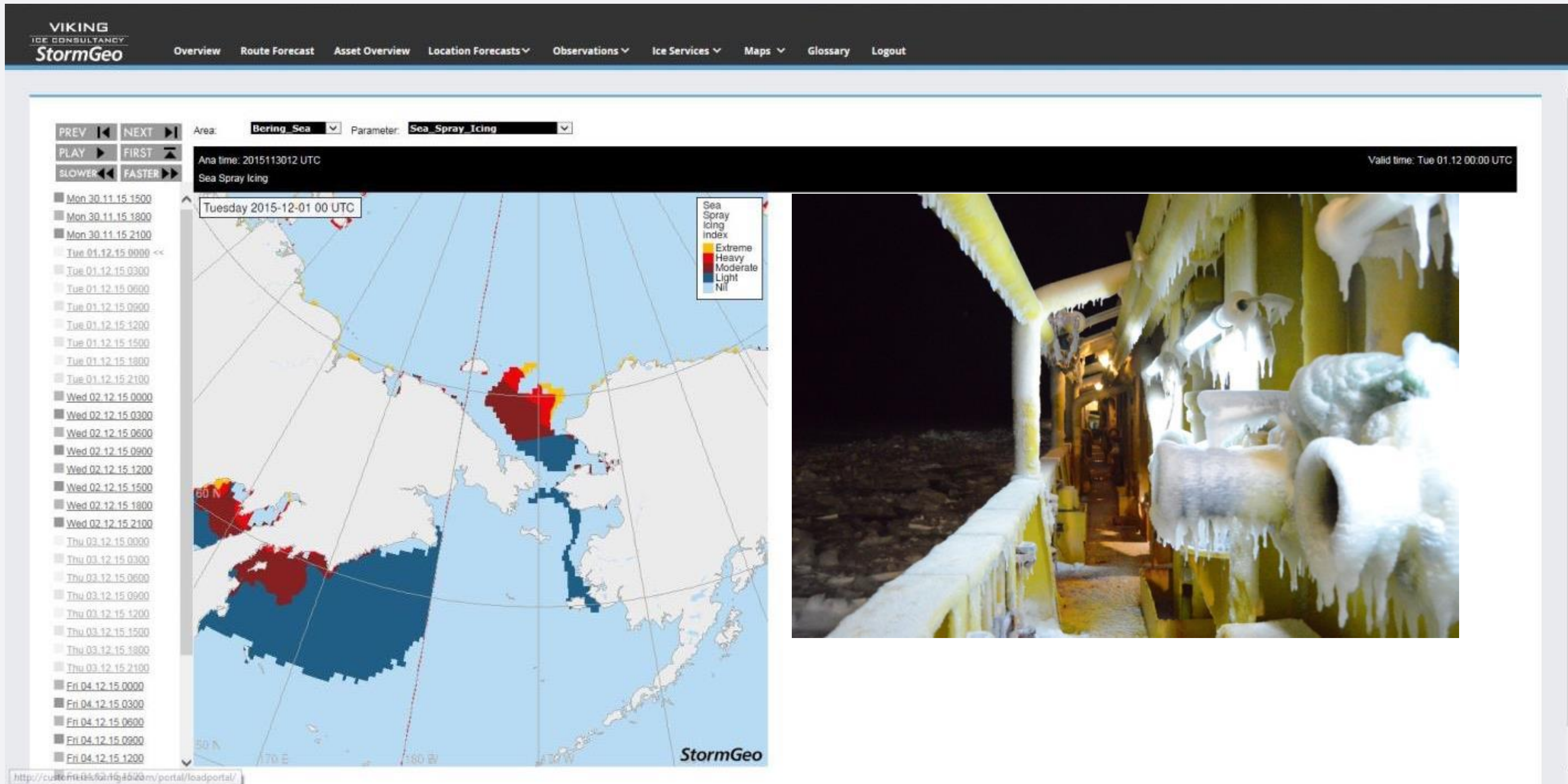
Arctic Weather Challenges

polar lows



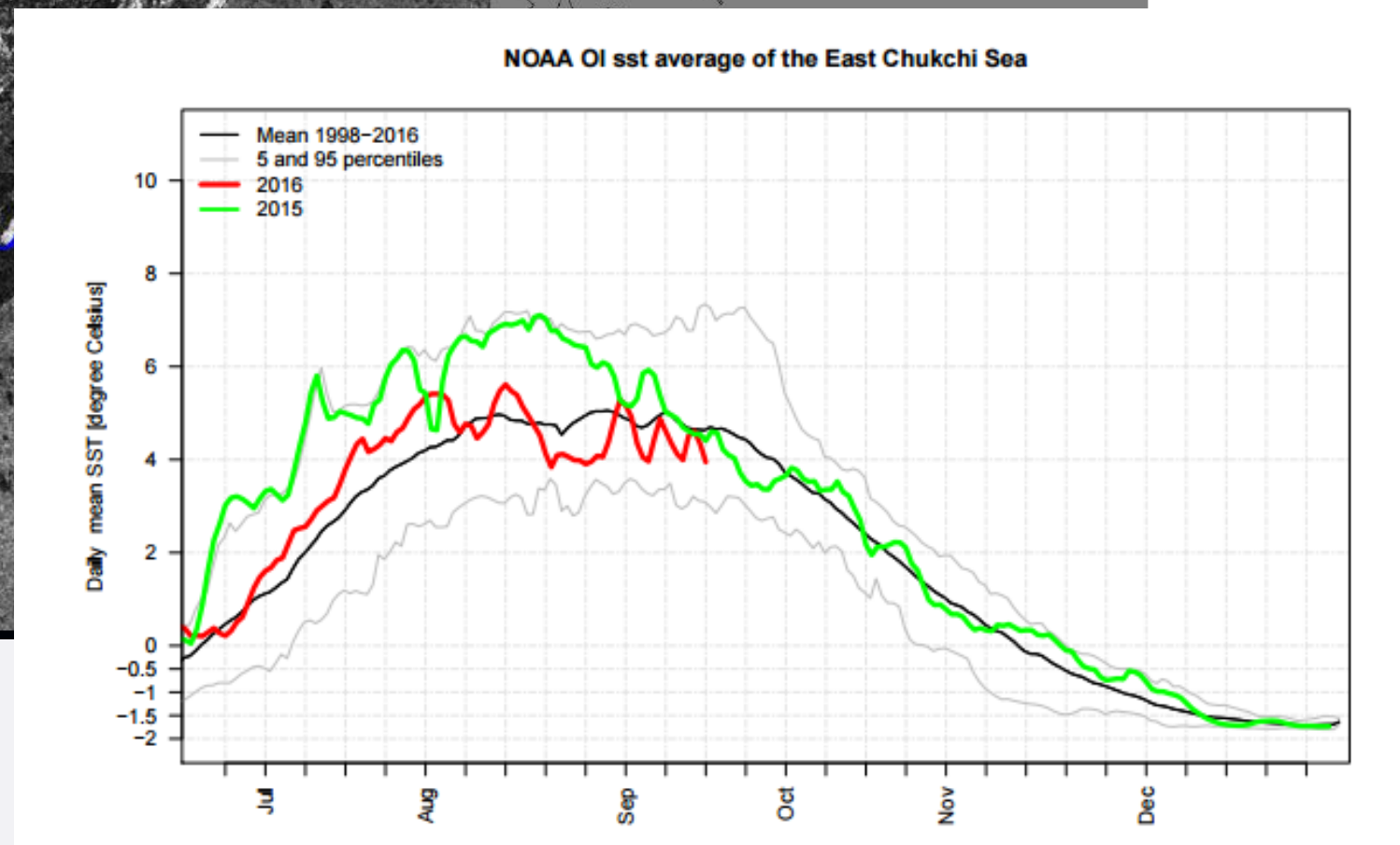
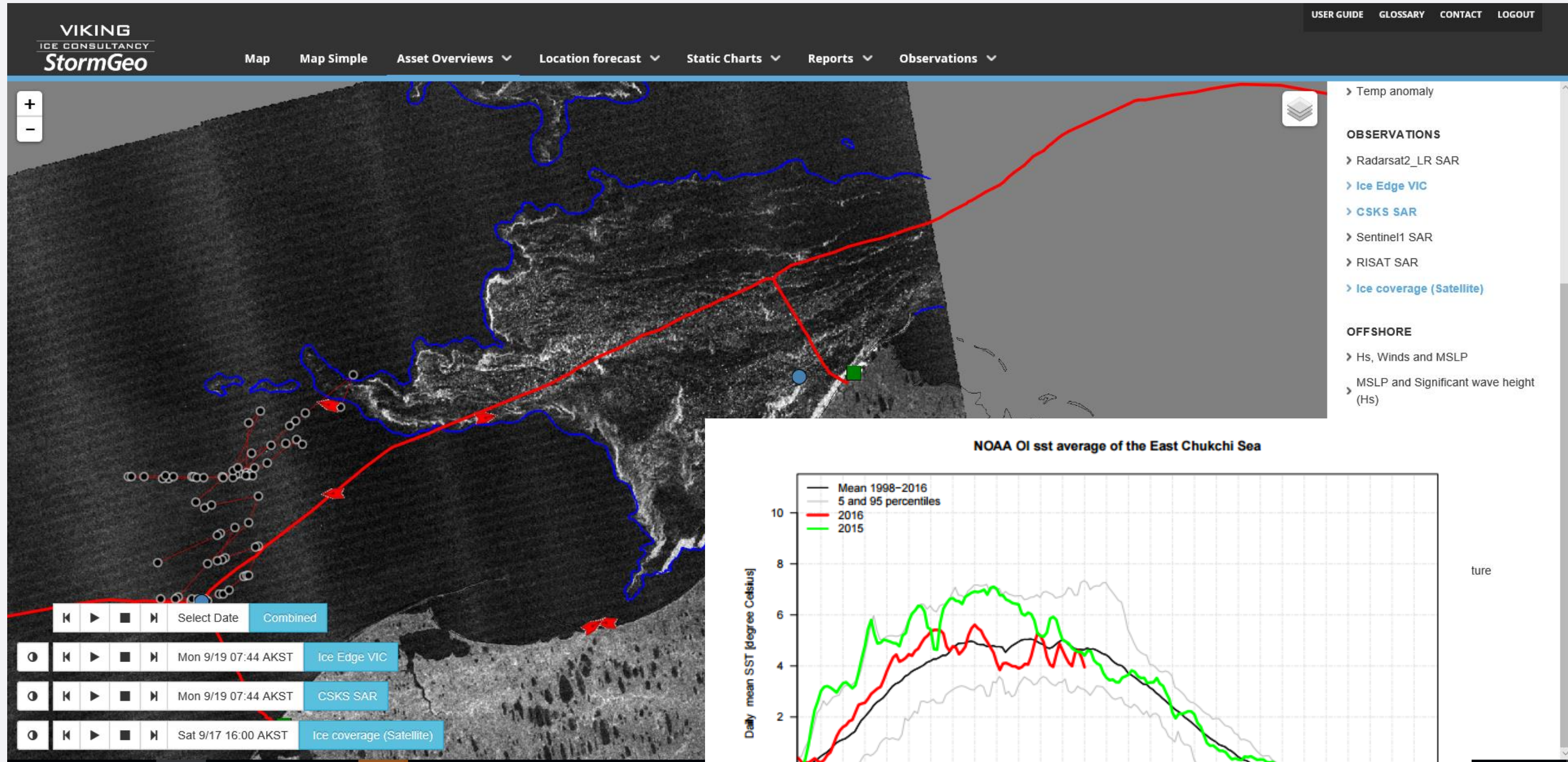
Arctic Weather Challenges

sea spray icing

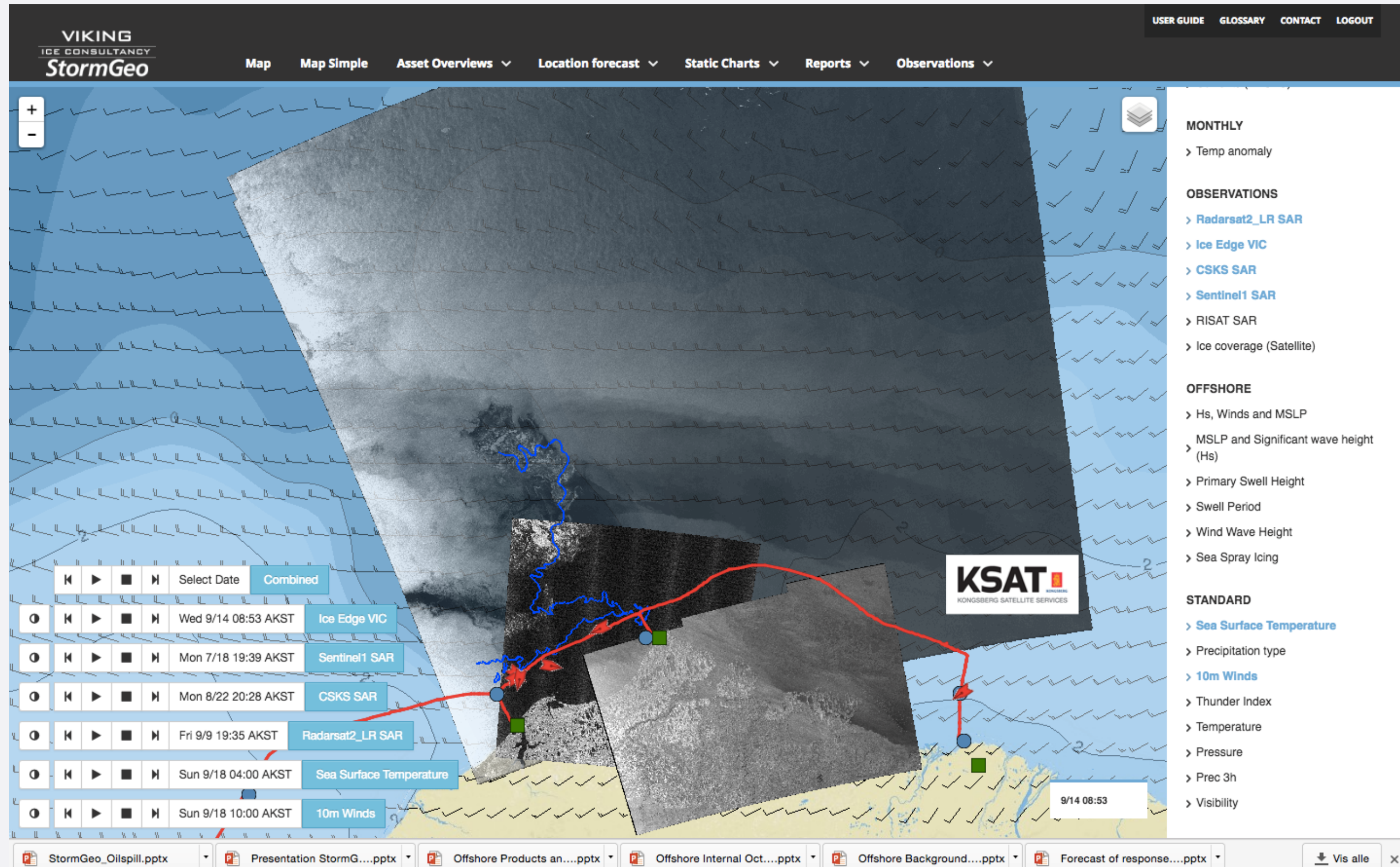


The configurable weather portal

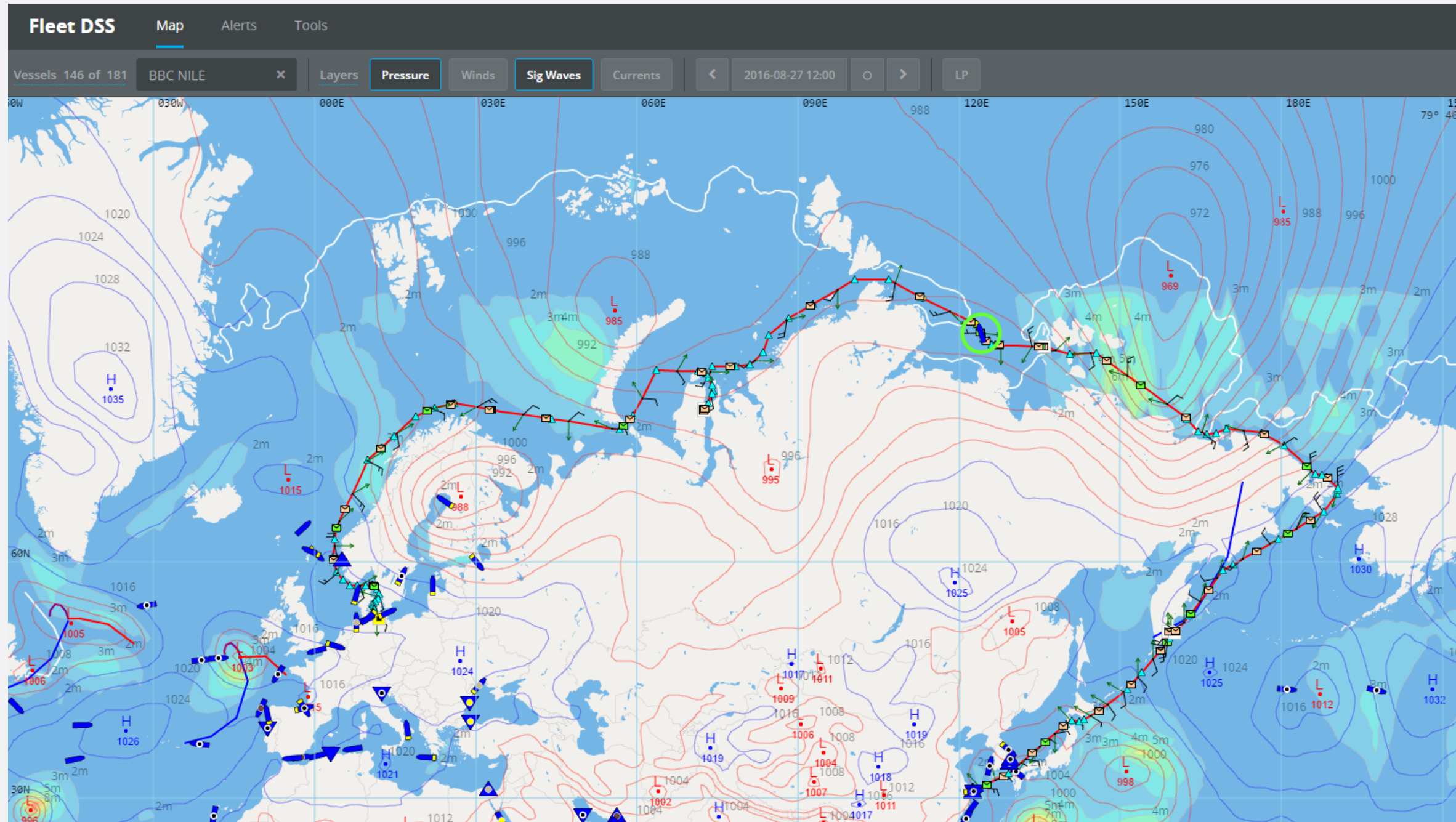
Ice management



Ice management in Alaska common operating picture display



Arctic weather and ice support weather routing



- Portal for office use
- Route advisory/
weather data sent to
vessel
- Weather along route
based on ice pilot
choice of route

on-board services



Optimization on-the-go

On-Board Service (BVS™) 8 was designed with Captains in mind. Our newest features help put voyage planning right in the hands of the captain and helps him plan and determine the safest, most fuel-efficient route. With BVS you know you can optimize your voyage based on specific weather constraints and then seamlessly display the track in e-Navigator or Chartco's Passage Manager™. And it can be passed to your onboard ECDIS system to confirm navigational safety. Via broadband, email or KVH IP-MobileCast, BVS delivers the latest weather and ocean data on-the-go.

Seakeeping The BVS Seakeeping module uses weather forecasts and ship design to predict a vessel's seakeeping characteristics, allowing for more comprehensive route planning and voyage optimization. With the option of motion sensor and anemometer integration estimates can be made of the real-time sea state surrounding the vessel for immediate tactical decisions.

Position Polling/Track Transfer When connected to the ship's GPS, BVS 8 conducts position polling at defined intervals. This provides optimal shore-based decision support. The ship's track can be forwarded from BVS by the master for shore-based display in Fleet DSS.

Weather and Ocean Current Based Route Optimization BVS 8 provides the most recent weather and ocean data to the ship by broadband or email communications in a highly compressed format to minimize communication costs. This data is then used to generate color-enhanced maps and graphics that allow the ship's captain to easily view and interpret potential problem areas in advance. Calculate Least Time, Fuel or Cost by using your on-board computer together with BVS 8



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