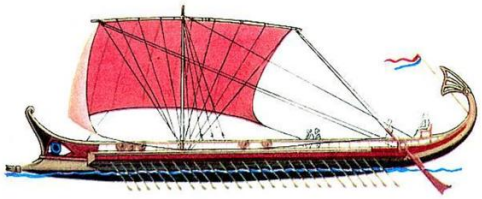


Navigare necesse est

Maritime Law Association of Australia and New Zealand
46th National Conference
SEA CHANGE - NAVIGATING THE FUTURE

Tomasz (Tomek) M. Glowacki
September 11-13, 2019

"Navigare necesse est, vivere non est necesse"
Sailing is necessary, live is not necessary
In our time we should shout:
"Sailing is necessary because our life depends on it".

Cause & Effect

Cause and effect is a relationship between events or things, where one is the result of the other or others. This is a combination of action and reaction.

When food was in short supply in Rome (in 56 Before Christ), Pompeius sailed to Africa to bring food. When the ships were laden with grain, a storm stopped them from leaving the harbour. Sailors were afraid to sail on stormy waters. Then Pompeius first hoisted the sails, weigh the anchor and shouted:

***"Navigare necesse est, vivere non est necesse"* – "Sailing is necessary, live is not".**

In our time we should shout: "Sailing is necessary because our lives depend on it".

The relation of cause & effect took on a new meaning with the discovery of Edward Lorenz

The missing of last three digits
0.506**127** is not trivial.

Cause and Effect

0.506127 versus 0.506

"The butterfly effect"

The unexpected result led Lorenz to a powerful insight about the way nature works: small changes can have large consequences. The idea came to be known as the "butterfly effect" after Lorenz suggested that the flap of a butterfly's wings might ultimately cause a tornado.

If the flap of a butterfly's wings can be instrumental in generating a tornado that would not otherwise have happened, it can equally well be preventing a tornado – said Edward Lorenz

He came up with this quote when testing a weather computer model which one day he decided to take a short cut in order to re-examine one particular stimulation. Instead of running the whole sequence from the beginning (computer a lot slower then), he began halfway through. Then he went off to grab a cup of coffee. When he returned, he saw the new print-out, he was astonished: it diverged so wildly from its predecessor. After weeks of analysis, he found the culprit. It wasn't in the code or the machine; it was in the data he entered. He assumed that the difference between 0.506127 and 0,506 would be inconsequential.

The "butterfly effect" phrase gained a powerful meaning on 17 December 2010 in the small Tunisian town of Sidi Bouzid.

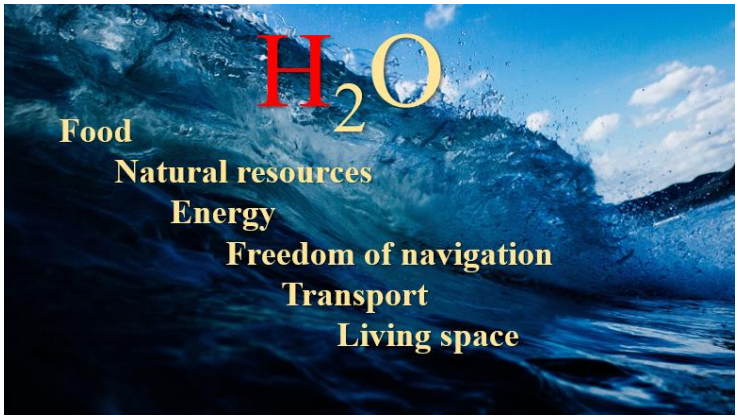
The "butterfly effect" phrase gained a powerful meaning on 17 December 2010 in the small Tunisian town.

The world has become less predictable. Events are developing in a speed of light and the Marine Industry, is not immune to it.

Tunisian fruit vendor Tarek al-Tayeb Mohamed Bouazizi in protest of treatment him by local authorities, douses himself with gasoline and self-immolates, events spiralled out of control at breakneck speed: a crowd protested his death, and his cousin records the scene on his iphone. Video appear on YouTube within two days, along with a picture of Tarek, aflame and dying. More protests erupt. Videos of those protests wind up on Facebook. Not only Al-Jazeera, but the New York Times and the Guardian make trips to the small town of Sidi Bouzid. Within three months, the thirty-year reign of Hosni Mubarak is brought to an end. Some 1400 miles away in Cairo, Muammad Gaddafi starts losing control of Libya after decades in power, and Syria begins its descent into intractable civil war. He triggered a revolution in Tunisia and the Arab Spring in the wider region.

The world has in many respects become much faster and less predictable.

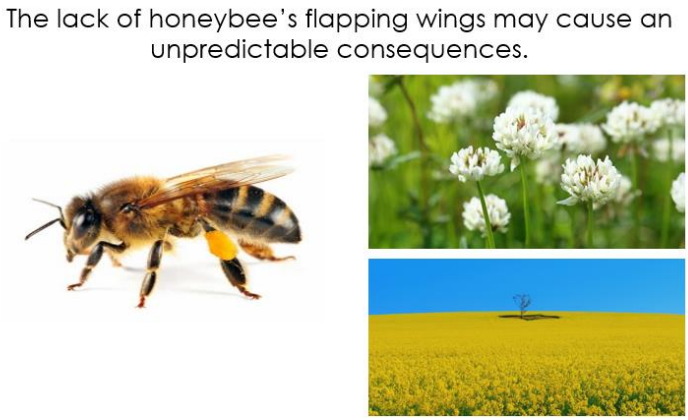
As befits the Maritime Association, I will address several topics closely related to water where the cause & Effect relation is commonplace.



Modern societies in order to survive need a few very fundamental things: **food, natural resources, energy, freedom of navigation, transport and living space.** The threat of removing one link from this chain will push humans to develop new methods of producing food, energy and exploring for natural resources even by using military power. Oceans will play an even bigger role in our lives. The growing number of people on the Earth, diminishing arable land, climate change and the problem with pollination will create a need for new sources of food. Oceans are enormous "cultivated area" and ready to be "ploughed". There is no more energy stored in anywhere than in oceans. Oceans are the lifeblood of our planet. And, …

"We have only explored less than five per cent (5%) of the them".

FOOD



The lack of honeybee's flapping wings may cause an unpredictable consequence.

Honeybees not only produce honey but approximately 80% of our food depends on bees' pollination. Today the varroa mite and monoculture are mainly responsible for the collapse and death of bees around the world. State lawmakers in Minnesota approved a program that would set aside 900,000 dollars annually to pay homeowners who replace traditional lawns with bee-friendly wild-flowers. If the population of bees decline even further, there will be bigger demand for food from the sea. So, the oceans will become an "arable sea" or "cultivated oceans".

Food - Offshore aquaculture

Traditional fish farm near island Corfu - in Greece

Here is sample of a Snapper farm giant Deep-Sea pods off Puerto Rico

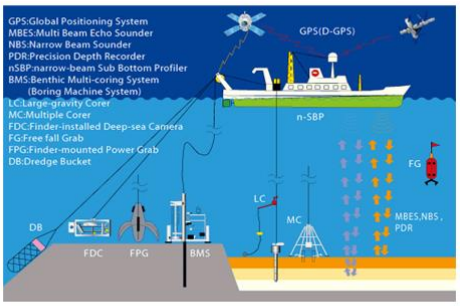
Shallow water cultivation will be replaced by deep water farms. There will be a bigger requirement for exchange of food between the countries causing the demand for more overseas transport.

Offshore aquaculture is farming where fish farms are moved some distance offshore. The farms are positioned in deeper and less sheltered waters, where ocean currents are stronger.

NATURAL RESOURCES

Natural Resources - Deep ocean exploration

James Cameron Deepsea Challenger



Instruments for Navigation, Exploration and Geological Sampling

1. Coordinated technical effort and political diplomacy will be required for all kind of bottom dredging, drilling and ocean exploration. Deep ocean exploration is accompanied by various activities. Constant research for resources relates to “littering” of oceans. They create an obstruction for navigation.

Natural Resources – Fresh water, salt and crude oil

Freshwater Plant

Dominion Salt near Blenheim

2. Freshwater, salt and crude oil are the most precious resources humans need. Now also hydrogen as a source of energy begins to play its role. With 2.5% of fresh water available in lakes, rivers, underground and glaciers, some countries will **seriously** look at building desalination plants.

ENERGY

Energy

Vertical movement - Wave Energy

Horizontal movement - Current Energy

hydrogen as a source of energy begins to play its role

Energy from ocean could come from: horizontal movement of water like “tides” or from vertical movement of water like waves.

But now the Hydrogen is starting to play a stronger role. Hydrogen is one of the elements of water (H_2O) and has one of the highest energy density values per mass and it is highly flammable.

FREEDOM OF NAVIGATION

Freedom of Navigation

Is anybody trying to change this status quo?

British naval fleet was the main force for maintaining Freedom of Navigation from the time of Horatio Nelson till the second world war. After that time, until now the American's fleet has assumed this responsibility.

Is anybody trying to change this status quo?

The National People's Congress of China passed the law which says:

"it is the military's duty to defend overseas interests through military action if necessary".

……
……..

Listen to what Napoleon Bonaparte said at the turn of the 18th and 19th century (1769 – 1821)

"Let China sleep, for when she awakes the world will tremble" –

Let's see what is happening in defence area …

Wave-piercing hulls or SWATH

In defence technology, we will see more of drones and smaller crafts, very fast but with much lower G-forces (acceleration) as traditional boats. Their shape will be based on either wave-piercing hulls or SWATH (Small Water Area Twin Hull) or cross between both. And, they will be stealth.

Freedom of Navigation

Sweden has a sub that's so deadly, the US navy hired it to play "Bad Guy"

New Germany's Stealth Submarines powered by Hydrogen could Take on Any Navy

Sweden has a submarine that is so deadly, the US navy hired it to play a Bad Guy. The secret of the new generation of German submarines is the use of hydrogen fuel cells for power.

The Offshore Patrol Vessels

The Offshore Patrol Vessels market is the fastest-growing segment of the naval market. This is a defensive strategy for the protection of countries' own Maritime Limits & Boundaries.

Such as 12 Nm, 24 Nm and 200 Nm zones.

Locust swarm strategy in modern warfare

There are several things that an aircraft carrier fears. One of them is a massive swarm of tiny boats, each of them carrying outsized armaments.

Iran navy will use 10,000-speed boats doing 80-85 knots armed with the Chinese made C-704 anti-ship missiles.

TRANSPORT

The 16 biggest ships produce more pollution than all the cars in the World!!!

Wärtsilä-Sulzer RTA96-C

Such information must have triggered a reaction, so MARPOL has established the emission control areas and restricted of emission by using onboard fuel oil with a sulphur content of no more than 0.10% [m/m] (0.1% * 10000 = 1000 ppm)

What sort of engines are we talking about?

Configuration:	Turbocharged two-stroke, often double acting, 6 to 14 cylinders
Piston diameter:	960 mm (38 in)
Stroke:	2,500 mm (8.2 ft)
Displacement:	1810 litres (110450 CI) per cylinder
Engine speed (only):	22–120 RPM

These types of engines use a Heavy Fuel Oil (HFO), which must be heated up and centrifuged before injected into cylinders. These engines are powerful but, not very efficient.

Note: They Pollute: sulphur oxides (SOx) and nitrous oxides (NOx)

New Sailing systems

Shipping companies will be looking for wind supporting systems to power their vessels and in recent years has been a rapid development of hydrogen technology.

With the wind supported vessels, new issues may appear regarding the Right of Way. Will such a vessel be treated as a “sailing vessel” or “power-driven vessel”? Or will the proportion between the drives decide? This need to be addressed.

Unmanned ship

80 m LOA Yara Birkeland”

Submarine hunting drone

Sea drone

Unmanned ships - This could prove a significant leap forward. “Yara Birkeland” is the 80 m long all-electric, Norwegian autonomous container ship.

Delivery planned for the first quarter of 2020.

Northern Passage & climate change

Northern Passage & climate change

Future Arctic Shipping

The average January ice extent for 1979 to 2014 shows a decline of 3.2% per decade.

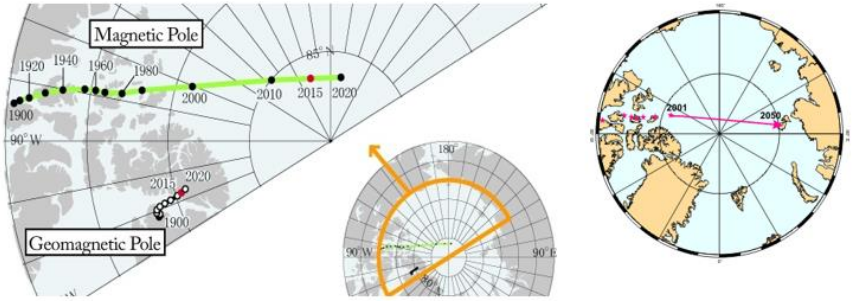
The Arctic climate has changed significantly. There are periods of time in late summer when the Northwest Passage is wholly or largely ice-free.

Opening the Northwest Passage to regular commercial ocean traffic would have worldwide economic significance. But competitive developments, governmental policies, and many complex economic and legal issues are likely to determine how soon, and how much, this route would be used.

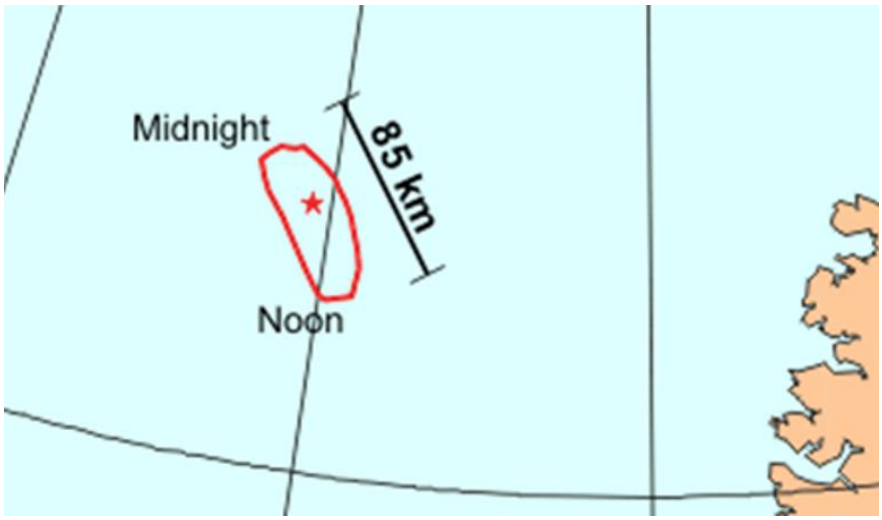
So, what causes the warming of arctic waters?

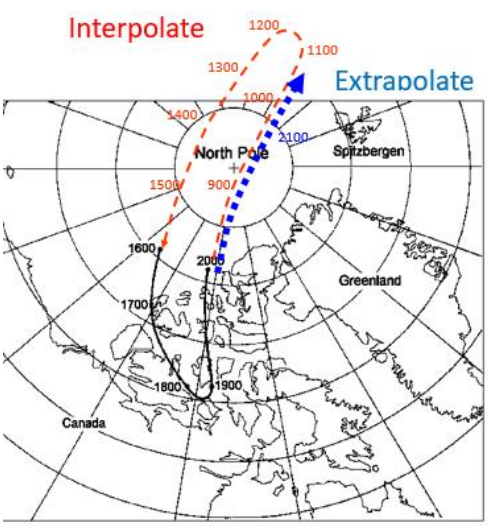
The Magnetic field is created by its moving, molten (hot) iron. Since its first formal discovery in 1831, the North Magnetic Pole has travelled over 2,000 km. This movement has been quite slow, around 9km a year. But since the turn of the century, this speed has increased to 50 km/year. It has been even noticed a jump of 80 km/day.

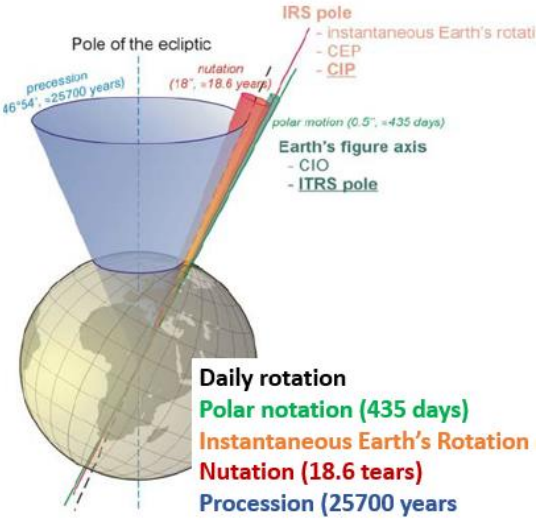
Movement of North Magnetic Pole.



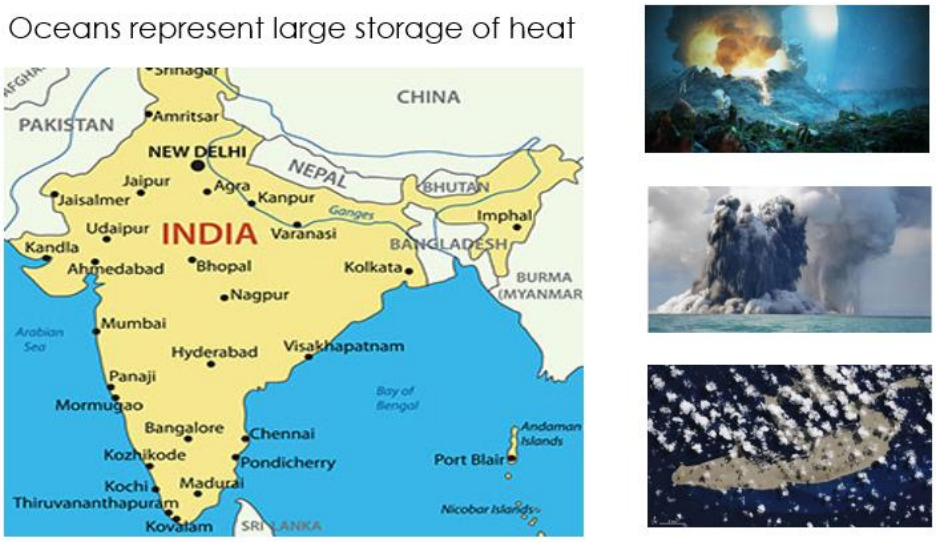
North Magnetic Pole is rapidly migrating toward Geographic North Pole.
Forcing all publishers of nautical charts to update the angle of declination.







Oceans represent large storage of heat



Oceans represent large storage of heat due to the high specific heat capacity of water which is higher than any other common substance. To raise one cubic meter of water by 1 degree of C, we need heat included in approximately 3500 cubic meters of air heated by 1 degree of C. **If!** an underwater volcano rises temperature of one cubic kilometre of ocean water by one degree from 20 to 21 degrees C, this heat can warm up a layer of air 1 metre thick of area which could cover the country of India.

There are approximately 5000 underwater volcanos

This picture shows a “raft” of volcanic rocks (pumice) stretching over 150 sq km (12km x 12km) created in July/August by an underwater volcano.

After all, CO2 and glasshouse effect may not be the culprits of "Climate Change".

So, as a matter of interest How much heat we (humans) produce?

Total human energy consumption per day is 18.3 TWs.

This number does not tell much until we compare it with something tangible, for instance, a nuclear bomb as dropped on Hiroshima. This equates to over 20 thousand of “Little Boys” bombs dropped - on - Earth - every – day.

Alternative transport

Alternative, transport companies are emerging. They are run by enthusiasts with small profit but a great lifestyle. Arjen, Andreas and Jorne decided to create the world's first modern transport company "free from emissions" – “Fairtransport”. The main purpose of "Fairtransport" is to move cargo by ships free of emissions, with special emphasis on the transport of products that are traditional or traditionally manufactured - such as olive oil, wine and rum.

There are currently over 30 projects of this kind around the world

GPS Jamming and Spoofing

GPS Jamming and Spoofing Reported at Port of Shanghai

13 August 2019. Reports have been filtering through the maritime community about a strange reading of the Automatic Identification System (AIS) and GPS at the Port of Shanghai. The incident reported appears to be part of an on-going problem in Shanghai. This scenario was first documented by the General Lighthouse Authorities of the United Kingdom and Ireland in 2009 and 2010. By studying AIS transmissions in the Black Sea and other Russian waters, it has been identified this year almost 10,000 of such incidents.

Eco-Ports

Eco-Port
Kaohsiung - Taiwan

Port of Kaohsiung: First Eco-Port in the Asia-Pacific.
November 14, 2014

Eco-Ports is the initiative of several proactive European ports in 1997.

Eco-Ports provides two tools to its members:

- Self-Diagnostic method (SDM) and
- Port Environmental Review System (PERS)

It is another step toward cleaner environment.

LIVING SPACE

Erosion

America's vanishing coastline. We can hear a lot of laments, that climate change causes oceans taking over the land.

Living space is shrinking

America's Vanishing Coastline

The Church in Trzęsacz - Poland

1870, the church inside

Current state

The Church in Trzęsacz, in Poland, was built in the late 14th or early 15th century. At that time, it was located almost two kilometres from the Baltic sea. Year by year, water would come closer;

In 1750 the sea was as close as 58 meters. The last service took place in 1874.

We need to accept the fact that "the process of erosion was, is and will continue throughout the World, wherever the sea meets the land".

Living on the water

Living on the water has already solid place in urban architecture. However, with a still-growing population, a new, bold and extravagant solutions will be developed.

The Palm Islands in UAE

Artificial island – South China

Reclamation of land isn't new. Countries like Holland using it to perfection. But we are seeing a new trend emerging. To expand territorial waters countries may follow Chinese idea and build artificial islands well off the main coastline.

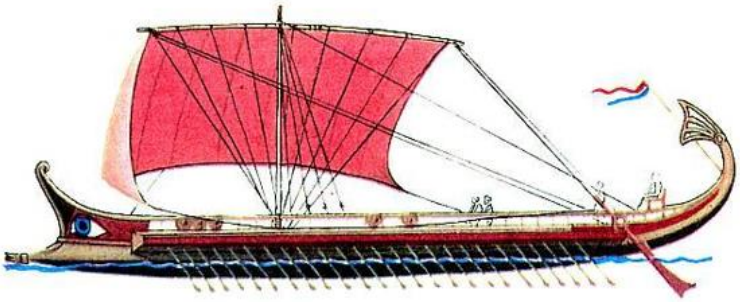
Floating School

Floating School in Nigeria designed by architect Kunle Adeyemi

And, while some will build more and more extravagant structures, others will try to survive and be proud of a new school on the water like in Makoko – city built on stilts, Nigeria oldest slum at the edge of the lagoon.

Back to basics

Maybe, after exploring all kind of profligacy and debauchery people will be looking for something different: simple, slow-moving, easy to build, down to earth (or rather down to the water) and close to nature structures.



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