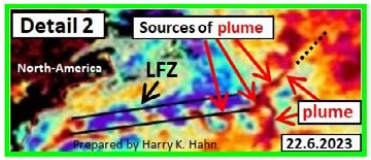
Increased aperiodic hydrothermal-activity in defined submarine areas (volcanic areas and tectonic fractures) at a global scale

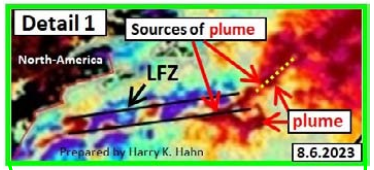
→ **Please also read Part 2, Part 3 & Part 4 (or here: P2, P3 & P4)** / → Weblink to **extended version** of Part 1 of my Climate-Hypothesis : **Part-1e** (with Chapter **C4**)

by **Harry K. Hahn** / Germany - **15.7.2023** -

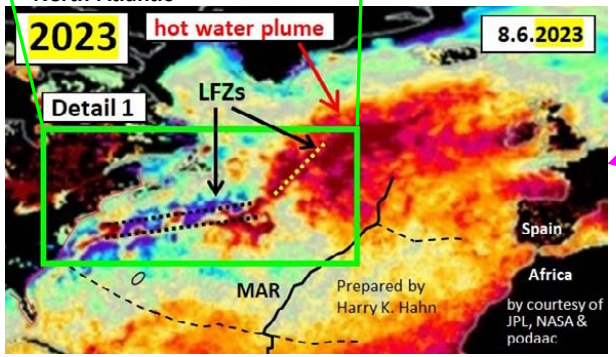
Abstract :

My study provides evidence of the real sources of the **SST-anomalies** which lead to the development of **El Ninos** : **These are hydrothermal-sources, which are located in the Kermadec-Tonga-Arc (e.g. in the Monowai- & Macauley-Volcanic-areas), New-Hebredes-Trench-area, Nankai-Trough- & Philippine-Plate-area, Salado-Fracture-Zone, Falkland-Agulhas-Fracture-Zone, South-West-Indian-Ridge-area, Mid-Atlantic-Ridge, LFZ, Kane-Fracture-Zone & in the Pacific-Plate east of Japan, to name the important locations.**
The cause of El Nino-events is hydrothermal-water that rises from submarine-volcanic-areas & -tectonic-fractures to the surface ! On the ocean surface this hydrothermal-water appears in the form of growing plumes or-blobs (sea-surface-temperature (SST)-anomalies), which then get distributed by the main ocean-currents and by surface-currents.
With the **NASA Worldview tool** an analysis of the sea-surface-temperature (SST)-anomalies was done for the time-period Oct. 2021 to June 2023, and for the time-periods in which the strong El Ninos from 1997/98 & 2014-16 developed. Five areas (1 – 5) on the ocean-floor were found where large amounts of hydrothermal-water was rising from specific areas on the ocean-floor to the surface at irregular intervals during the mentioned time-periods! Note: The irregular hydrothermal-activity in these five areas is a global phenomenon !!
The hydrothermal-activity comes and goes in a "wave-like-pattern", which often causes activity in 3 to 5 areas, which are thousands of km apart, at nearly the same time !!
As an example I want to mention the period 9.12.2013 to 21.12.2013 (12 days) in which the hydrothermal-activity reached a maximum level in at least four of the five areas (1-5) in this very short time-period ! Note: These areas are located in the northern- & southern-Hemisphere. And the hydrothermal-activity, which starts at nearly the same time and reaches a maximum activity at nearly the same time, comes in a "wave-like-pattern" and it seems to move from west to east over the globe. Changes in Earth's Magnetic Field seem to be the main cause of this increased Hydrothermal-& Volcanic-Activity ! These changes (e.g. geomagnetic jerks) in Earth's Magnetic-Field can be caused either by internal processes which take place near the Core-Mantle-Boundary (CMB), or they can be caused by external events, which are strong geomagnetic-storms caused by solar wind (space-weather). First the geomagnetic-changes (e.g. geomagnetic-jerks) seem to increase seismicity in High-Geothermal-Flux-(HGF)-areas, then with a certain delay hydrothermal-activity, especially along tectonic-fractures, is increasing, which then rises the SST and the Ocean-Heat-Content, and finally causes the El-Ninos.
The key to find the hydrothermal- or volcanic-sources, which cause the strong temperature-anomalies, is the precise observation of the development of every major anomaly in an animation, from the early beginning of the SST-anomaly, when the first small warm-water-blob appears on the surface !
Please also read **Part 2** & **Part 3** of my hypothesis which explain the probable causes of the described "global-hydrothermal-activity" in more detail !

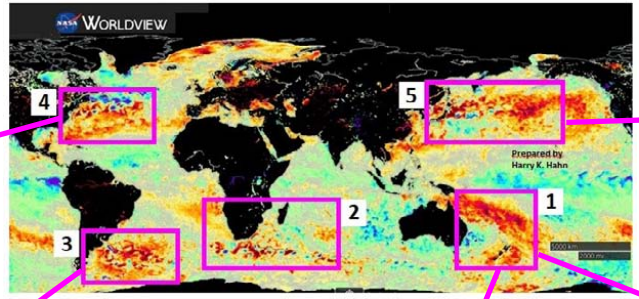




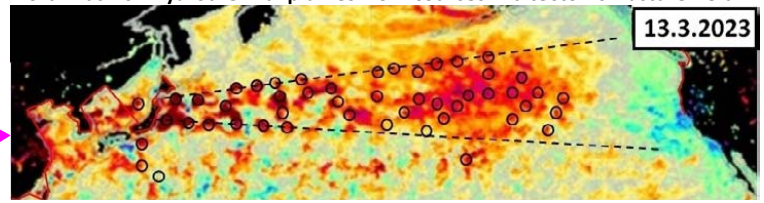
North Atlantic



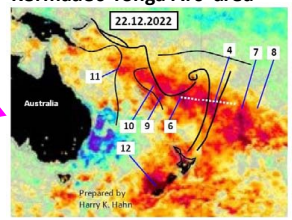
24-11-2022 : the Hydrothermal-source-areas of strong SST-anomalies

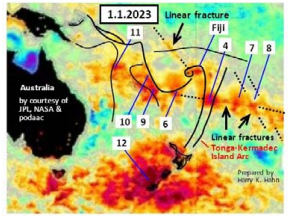


North Pacific : hydrothermal-plumes from sources in a tectonic-fracture-field

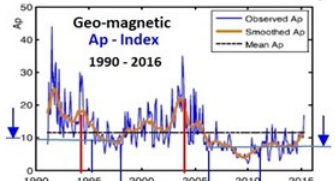


Kermadec-Tonga-Arc area

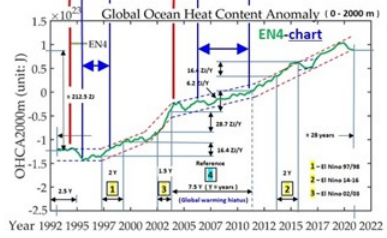




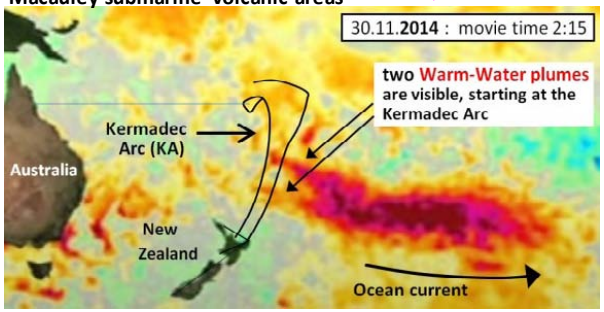
Correlation of the OHC with the geomagnetic Ap-Index



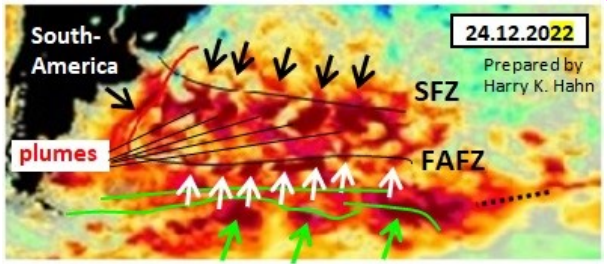
Note the correlation between sections of ≤ 10 in the Ap-chart and the Lows (or stagnation periods) in the OHC-chart ! Also note the peaks ! (→see chart)



Hydrothermal-plume from the Monowai- & Macauley-submarine volcanic-areas



South Atlantic : hydrothermal-plumes from the SFZ & FAFZ



Introduction :

The **Sea-Surface-Temperature-map** shows the **Absolute Temperatures of the ocean-surface** at a certain point of time.
It doesn't give us any information where the warm water is coming from, which is slowly heating our oceans and causes climate-change.
(→ see the 2. map below)

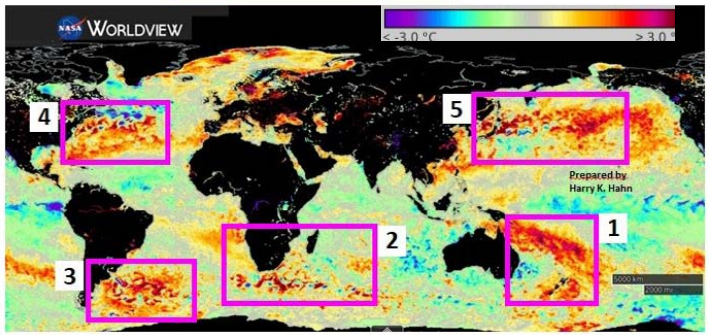
But to find out where the warm water is coming from, that is causing the El-Nino-events, which happen at irregular intervals of **2 to 7 years** and which are mainly responsible for the heating of the ocean water, **we must find the sources of the unusual temperature-anomalies** !!

That's what I did with this study here !
→ A **temperature anomaly** is a deviation of the surface-temperature in a certain area, in reference to the average of temperatures that were measured in this area over a long reference period (≥ 30 years)

The key to find the hydrothermal- or volcanic-sources, which cause the strong temperature-anomalies, is the precise observation of the development of an anomaly in an animation from the early beginning when the first small warm water blob appears on the surface !
→ See examples in Appendix 1.1 → How to use & see the animations

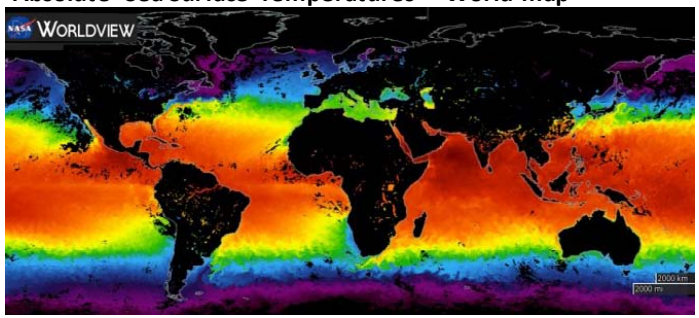
Temperature Anomalies

24-11-2022 : the Hydrothermal-source-areas of strong SST-anomalies



Absolute Temperatures (→ for comparison)

Absolute Sea Surface Temperatures – World map



Contents :

Hard evidence to proof the theory :

Here I present a first hard evidence which confirms my theory that large "warm-water blobs" (Sea-Surface Temperature-anomalies) are caused by submarine volcanism and/or hydrothermal activity !

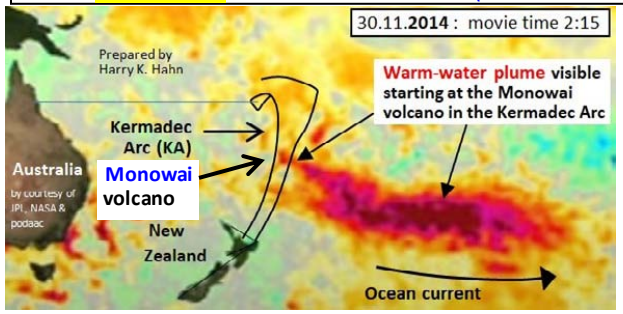
During the 2014-16 El Nino a strong SST-anomaly, a clearly visible **>2000 km** long "warm-water plume", was developing east of the Kermadec Arc in the time from **24.11.-30.11.2014**.

It was caused mainly by an eruption of the Monowai-volcano ! The "start-point" of the "warm-water plume" is clearly visible. It is precisely located at the position of the **submarine Monowai-volcano**.

The reason why the "start-point" of this gigantic warm-water plume is very good visible, is the fact, that **the top of the Monowai-volcano is located only 130 m below the ocean-surface !**

The Macauley-area probably also contributed to this SST-anomaly.

→ see **NASA-video**: **El Nino Watch 2015** (video from Nov. 29 – 2015)



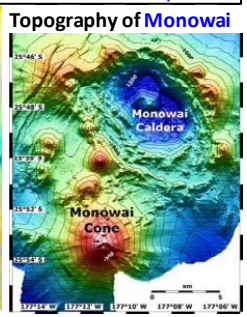
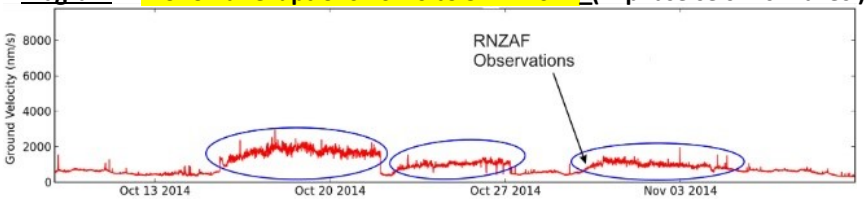


Diagram : Monowai eruptions 16-10 to 5-11-2014 (T-phase seismic waves)



Observation of plume-source by RNZAF-airplane 31-10-2014

The eruption of the Monowai-volcano which has caused the large warm-water plume (SST-anomaly) had a duration of ≈ 20 days, and it was detected by measuring T-phase seismic waves. Additionally a plane of the New-Zealand Airforce (RNZAF) could make a photo of the plume-source on the ocean surface, on 31-10-2014. (→ see left image)

Infos of the Smithsonian-Institute: → **Weblink**

Note: The **heat-energy** released by the plume **was ≈ 0.3 ZJ** ($3x10^{20}$ J)
Estimation: area of plume ≈1350000 km^2 (≈5x NZ-area), thickness of warm-water layer ≈ 20 m, ΔT=2,5°K → **Q ≈ 0.3 ZJ** (3×10^{20} J) !!!

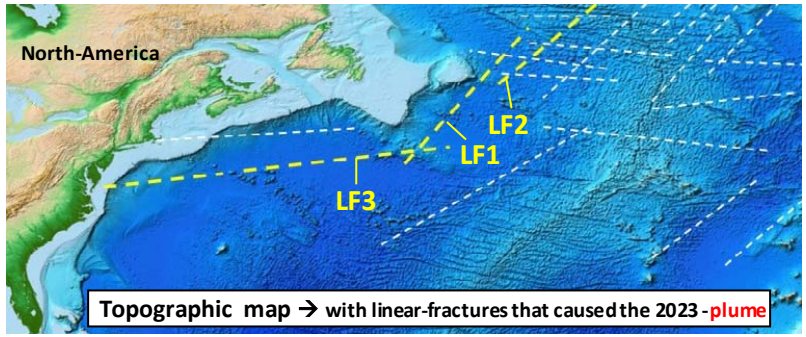
Overview : (Addition 1)

Page added on 11.12.2023

To the 2023 Atlantic-Plume :

The large "warm-water plume" that developed in May/June 2023 in the North Atlantic Ocean is the result of hydrothermal water that was ejected from fractures in the ocean floor.

As decribed in my study the most "warm-water plumes" develop along already well known **tectonic-fracture-zones** or along yet unknown nearly linear-fractures on the ocean floor.

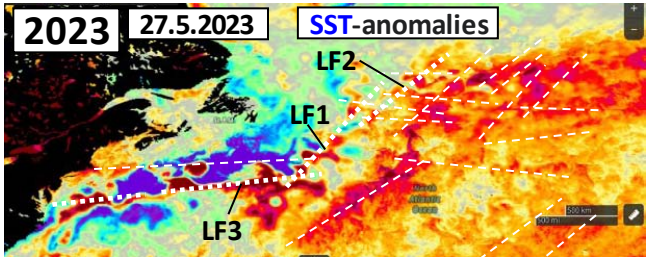


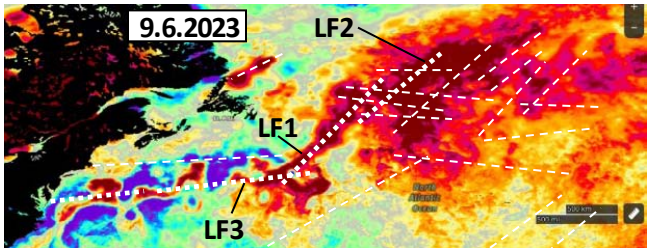
The gigantic "warm-water plume" in the Atlantic is also the result of hydrothermal water which was released by such fractures on the ocean floor

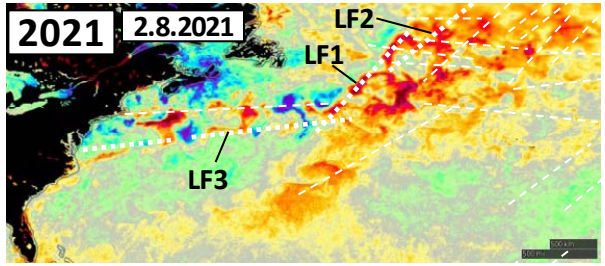
First it looked like as if this **plume** was coming only from one fracture (or source) → see 2. SST-Image

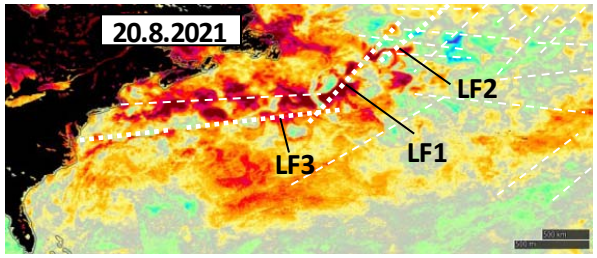
But a new analysis of the SST-anomalies shows that the hydrothermal water forming the plume was actually coming from different fractures. →

There seem to be three linear fractures (**LF1** - **LF3**) which contributed most of the hydrothermal water to the plume. But **a precise analysis of the animations, which shows the development of the plume**, indicates that there are more fractures that also contributed certain amounts of hydrothermal water to the plume ! With **NASA Worldview** I have analysed the two periods **13.5.2023-22.6.2023** and **2.8.-20.8.2021.** (see **Appendix 1**: → How to do this)









As described in **Part 2** & **3** of my study, changes in Earth's magnetic field seem to be responsible for the increased hydrothermal-activity along these fractures

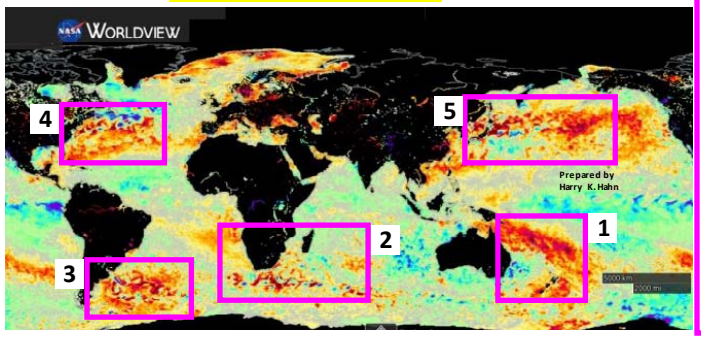
The **linear fractures** indicated by the SST-anomalies that form along these invisible linear fractures, must exist in the oceanic-crust for millions of years, as the linear Kelvin Seamount and linear-seamounts in the Pacific-Plate indicate. (→ read **Study** on **page 35** (29))

Note: The **heat-energy** released by this plume **was in the range of ≈ 1 ZJ** ($1x10^{21}$ J) !! (see also **page 10**)
Estimation: area of the plume ≈4550000 km^2 (this corresponds to ≈ 9x land-area of Spain), assumed thickness of the warm-water layer ≈ 20 m, ΔT of anomaly =2,5°K → **Q ≈ 1 ZJ** (1×10^{21} J) !!!

Overview : In 5 defined areas large amounts of hydrothermal-water rise to the ocean-surface at irregular intervals !

With the NASA Worldview tool an analysis of the sea-surface-temperature (SST)-anomalies was done, for the time-period Oct. 2021 to June 2023. → Five areas (1 – 5) on the ocean-floor were found where large amounts of hydrothermal -(hot)-water rises from the ocean-floor to the surface at irregular intervals !

24-11-2022 : the Hydrothermal-source-areas of strong SST-anomalies

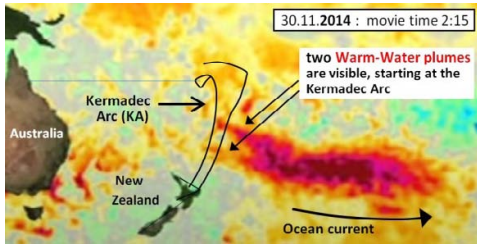


Note : The hydrothermal-water that rises to the surface and causes strong & large SST-anomalies in these 5 areas is the main cause (or even the exclusive cause !) of the global El Nino-events !!

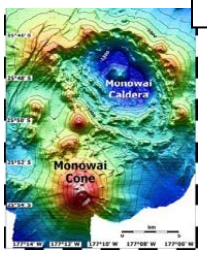
Note : The irregular hydrothermal-activity in the 5 marked areas is a global phenomenon !! The activity comes and goes in "waves", which often cause activity in ≥ 4 areas at the same time !!, with durations of a few days or weeks. The cause for it seem to be geomagnetic jerks ! → Chapter 4

1 SW-Pacific : the Kermadec-Tonga Arc area is a main source of hydrothermal-activity

2014 : Large SST-anomaly caused by Volcanism



Monowai Volcano

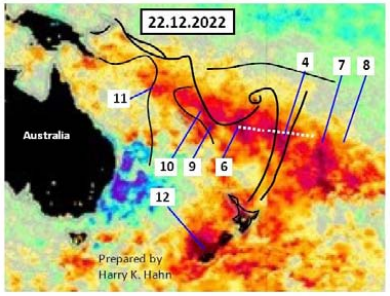


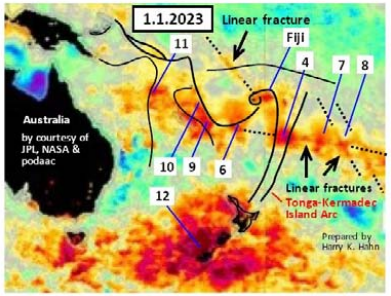
By analysing the sea-surface-temperature (SST)-anomaly map of the SW-Pacific area on selected dates, it becomes clear that the SST-anomalies (the strong positive anomalies (red=warmest)) are purely the result of hydrothermal- and volcanic-activity in the Kermadec-Arc- & New-Hebrides-Trench areas & South-Rennell-Trough area !! (→ see images on the left !)

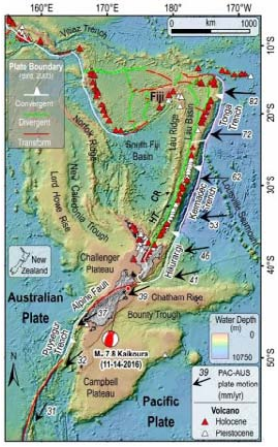
The SST-anomalies can clearly be traced to very active submarine-volcanic-regions like the Monowai- & Macauley- Volcanic-areas and to a number of tectonic-fractures & -trenches !

The SST- anomaly from 30.11.2014 for example, shows a very large warm-water plume that was caused by two submarine-volcanic-areas, the Monowai- & Macauley- Volcanic-areas !

2022/23 Submarine Volcanic activity in the : Kermadec-Tonga Arc





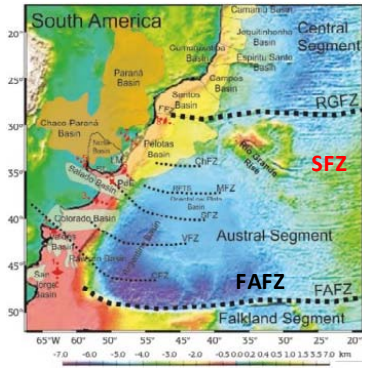


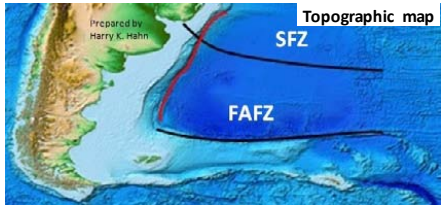
1 - Maccauley volcano area
2 - Maccauley-fracture (near CR)
3 - Maccauley-fracture (west)
4 - Monowai-volcano area
5 - Monowai-fracture (near LR)
6 - Monowai-fracture (west, near HR)
7 - Monowai-fracture (east, Pos.1)
8 - Monowai-fracture (east, Pos.2)
9 - New Hebrides Trench (Pos. 1)
10 - New Hebrides Trench (Pos. 2)
11 - South Rennell Trough
12 - Puysegur Trench (NZ-Alpine Fault)

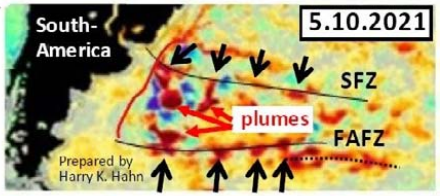
3 South Atlantic : Tectonic Fracture Zones are the source of strong hydrothermal activity in the Argentina-Basin

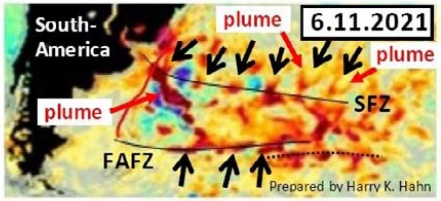
By analysing the development of the strong SST-anomalies which were visible east of Argentinia in 2021/22 and in 2013-15, I found clear evidence for ≥10 stationary hydrothermal-sources (-vents) which are located along the Salado-FZ (SFZ), and located along the Falkland-Agulhas-Fracture-Zone (FAFZ) ! The SST-anomalies did develop precisely along the mentioned tectonic fracture zones !

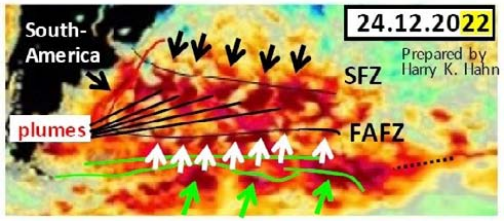
Topographical map of SE-South-America overlain by basins & structural elements









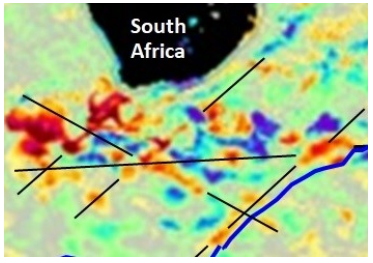


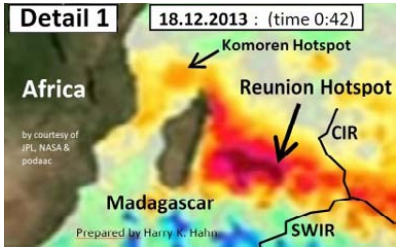
At certain dates the positions of the hydrothermal vents and the linear tectonic fractures are easy noticeable, because the warm water plumes that were coming from the vents, clearly indicate these tectonic-fractures on the map !

Other hydroth. sources in the area seem to be located near the Rio-Grande Rise and near the continental shelf

2 Southern- & Indian Ocean: Along tectonic fractures hydrothermal-activity is visible

Other strong hydrothermal-sources are located along mostly Linear-Tectonic-Fractures south-west to south-east of South -Africa. Note the precisely linear SST-Anomalies that are visible on the map ! (indicating fractures). Other big hydrothermal-vents are located near the Reunion-Hotspot and the SWIR

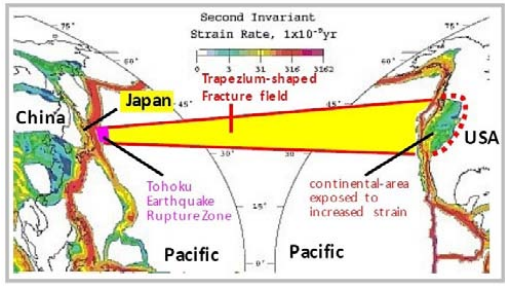




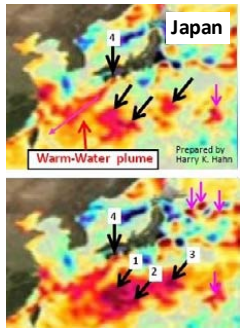
5 North Pacific : Hydrothermal-sources in a trapezoid-shaped fracture-field cause strong SST-Anomalies

This trapezoid-shaped fracture-field with many dozens of aperiodic-active strong hydrothermal-sources has a defined Northern- & Southern-borderline. The SST-anomalies can be traced to hydrothermal-vents located along linear fractures within this trapezoid-shaped fracture-field. The fracture-field has a relatively clear defined northern- & southern border. The western.border of the fracture-field is the Japan Trench (→Tohoku-area). And its eastern-border is defined by an area in East-USA that is exposed to a high tectonic strain-rate. The whole trapezoid area seems to be exposed to high strain.

Trapezoid-shaped frature-field between Japan & USA

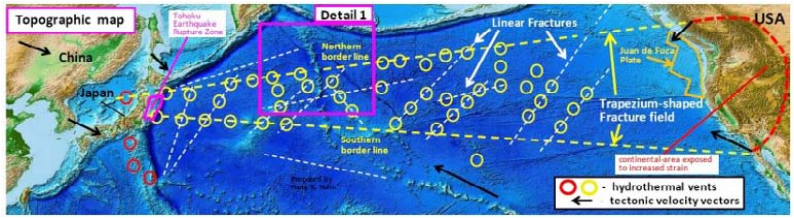


Beside the described trapezoid-shaped source-area, **there is another source-area of hydrothermal vents which causes strong SST-anomalies in the North-Pacific.** (→see image on the right)

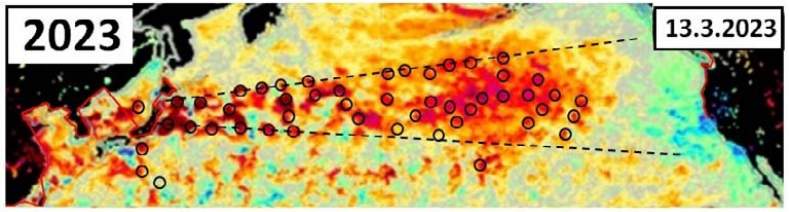


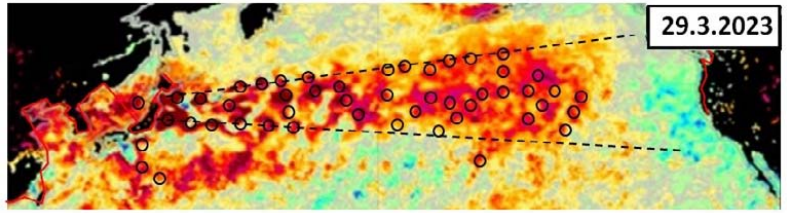
This other source-area is located south of Japan and consists of the Shikoku Basin, the North Kyushu-Palau-Ridge (KPR) and the Nankai-Trough. During the 2014-16 El Nino warm water plumes were coming from 4 sources in these areas, as the SST-anomalies clearly show ! →

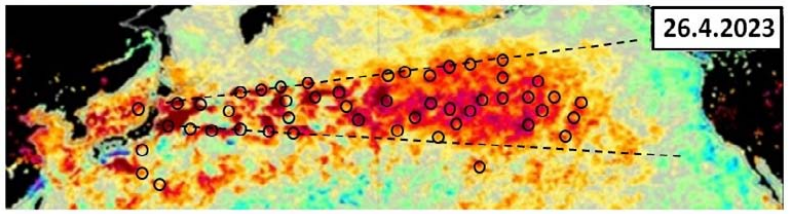
Trapezoid-shaped frature-field with hydrothermal-sources and fractures indicated



2023 : SST-anomalies in the N-Pacific with the hydrothermal sources indicated







4 North Atlantic : Hydrothermal activity on different fractures caused a big SST-anomaly

In May/June 2023 a very large sea surface temperature (SST)-anomaly developed in the North Atlantic Ocean.

This strong SST-Anomaly, which had a shape indicating a warm-water plume, was caused by hydrothermal vents located on different fractures ~750 km south & east of Cape Race (Newfoundland). → see image on the right !

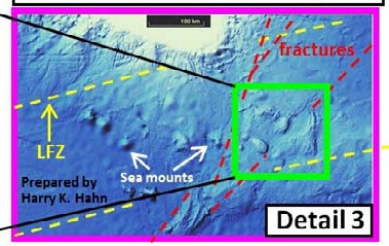
The large warm water plume that was caused by this hydrothermal sources had the size of Western Europe ! This plume injected **≈ 1 ZJ heat energy** into the Ocean !

The hydrothermal-sources are located along different linear fractures on the ocean floor that were active simultaneously. There seem to be three **linear fractures (LF1 - LF3)** which contributed most of the hydrothermal water to the plume. However a precise analysis of the animations, which shows the development of the plume over time, indicates that there are many more linear fractures that also contributed certain amounts of hydrothermal water to this enormous plume !

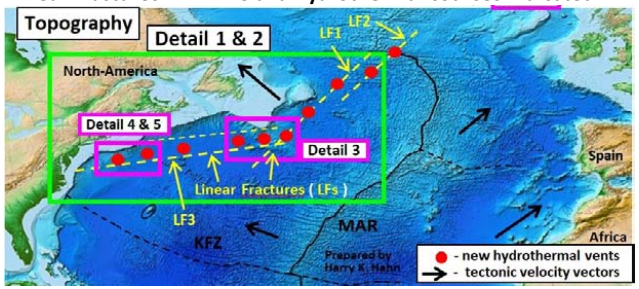
Other hydrothermal-vents which also produced warm water plumes, are located along the Mid-Atlantic-Ridge. But these other hydrothermal-sources (-vents) produced smaller plumes than the gigantic **2023**-plume. I describe these other hydrothermal-sources, that caused SST-anomalies during the **1997/98 & 2014-16 El Ninos**, in **Chapter C3** of this study.

Source-area of the Warm water Plume

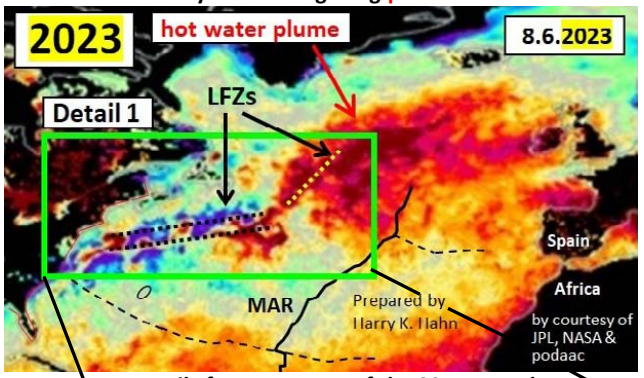
Source-area of big hot-water plume



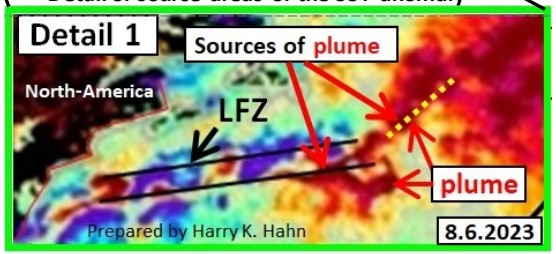
Linear Fractures LF1 – LF3 and hydrothermal sources indicated

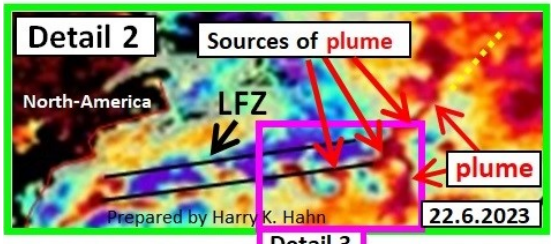


2023 : SST-anomaly is indicating a big plume & the source areas



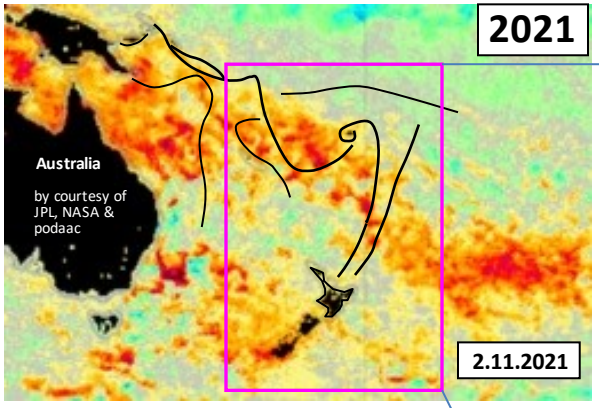
Detail of source-areas of the SST-anomaly

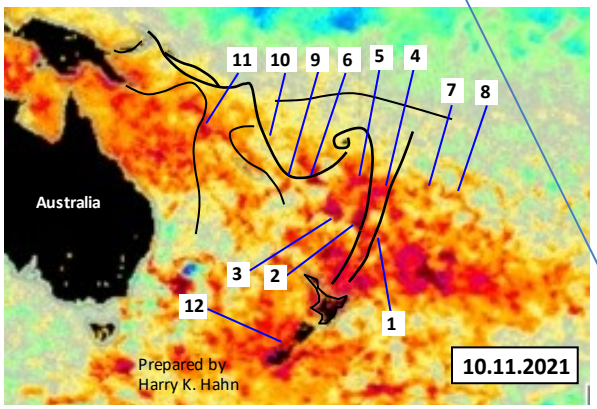




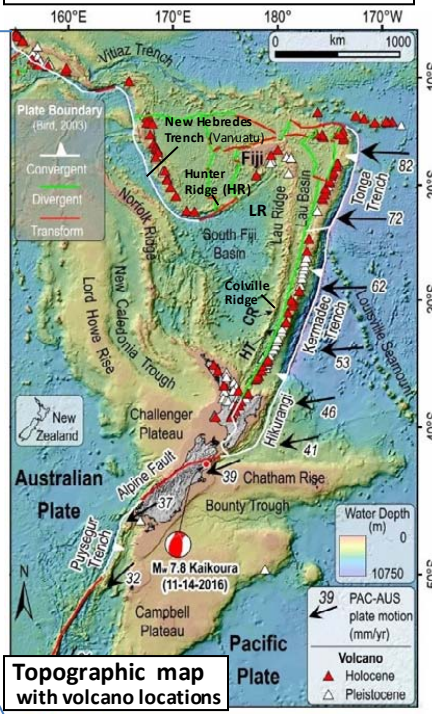
C1 2021-23 : Strong SST-anomalies caused by hydrothermal-activity in the Kermadec-Arc- & New-Hebredes-Trench-areas

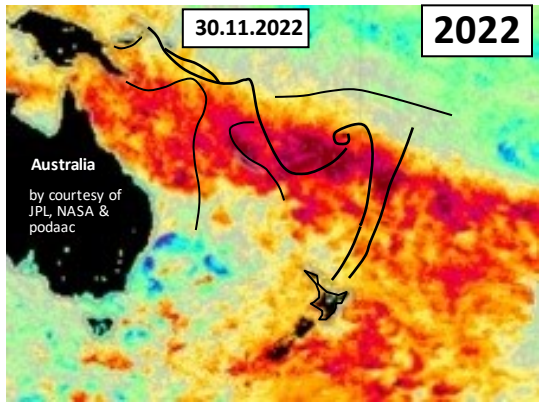
An analysis of Sea-Surface Temperature (SST)-anomalies in the SW-Pacific-region from Nov. 2021 & Nov./Dec. 2022 with the help of the NASA-Worldview tool was done. This analysis provides clear evidence, that the largescale SST-anomalies visible on the SST-(L4,MUR)-anomaly-map have nothing to do with Global Warming caused by CO2 ! It clearly visible on the SST-maps of different dates, **that the SST-anomalies are purely the result of hydrothermal- & volcanic-activity in the Kermadec-Arc- & New-Hebrides-Trench regions !!** (see images !) **The SST-anomalies can clearly be traced to active submarine-volcanic-regions like the Monowai- & Macauley- volcanos and tectonic-fractures !**

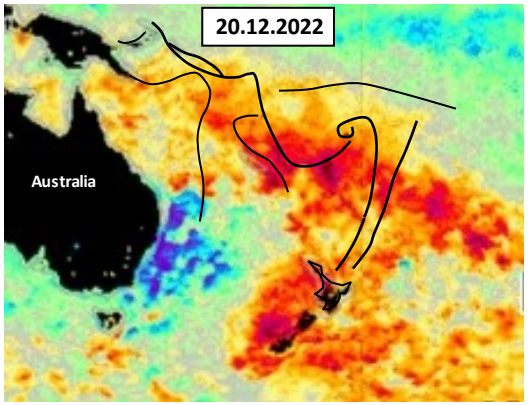


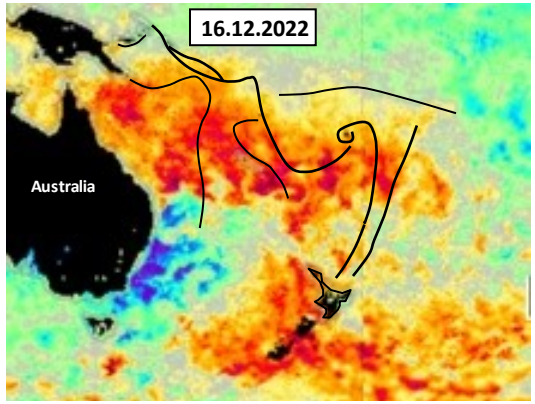


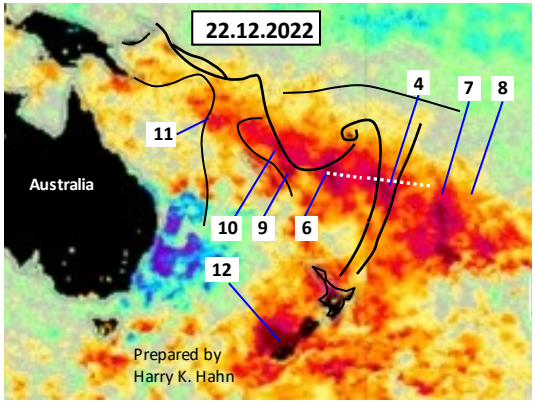
Kermadec-Tonga (volcanic) Island Arc





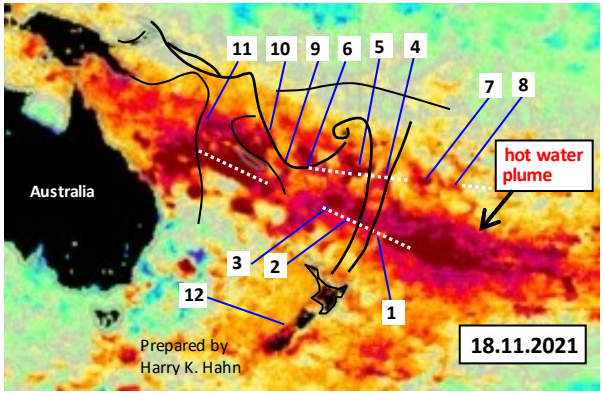


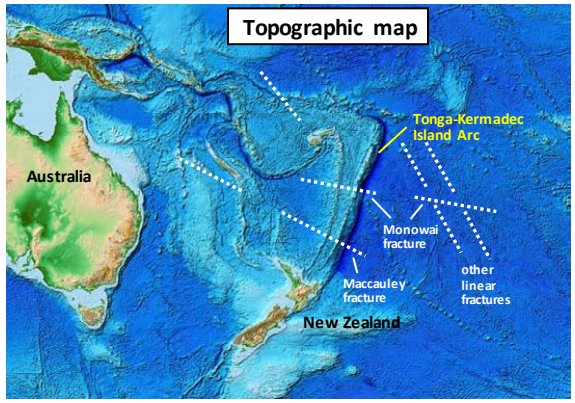


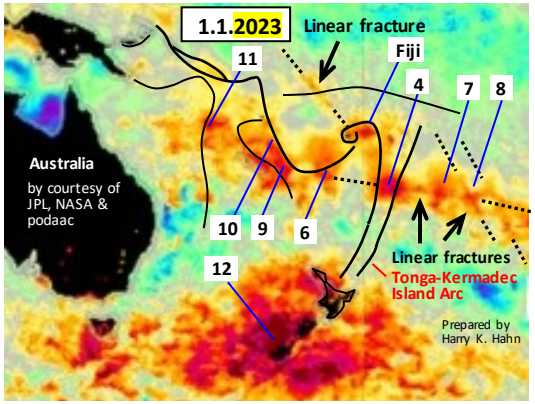


The hydrothermal vents which cause the SST-anomalies (warm-water plumes) are located in these submarine/volcanic areas:

1 - Maccauley volcano area
2 - Maccauley-fracture (near CR)
3 - Maccauley-fracture (west)
4 - Monowai volcano area
5 - Monowai-fracture (near LR)
6 - Monowai-fracture (west,near HR)
7 - Monowai-fracture (east, Pos.1)
8 - Monowai-fracture (east, Pos.2)
9 - New Hebrides Trench (Pos. 1)
10 - New Hebrides Trench (Pos. 2)
11 - South Rennell Trough
12 - Puysegur Trench (NZ-Alpine Fault)



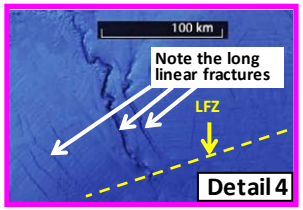


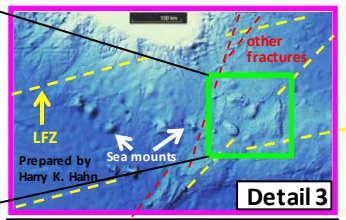


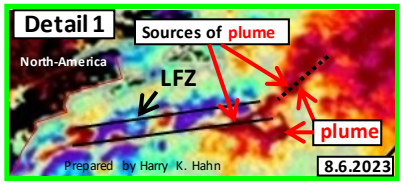
2021-23 : The extreme SST-anomaly in the Atlantic in 2023 was caused by hydrothermal-water coming from different Linear Fractures

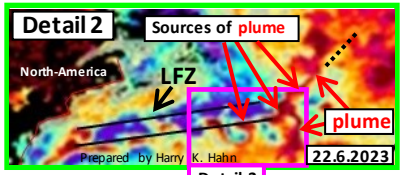
The large 2023-SST-anomaly in the Atlantic can be traced to hydrothermal-vents that are located ~750km south & east of Cape Race along different Linear Fratures

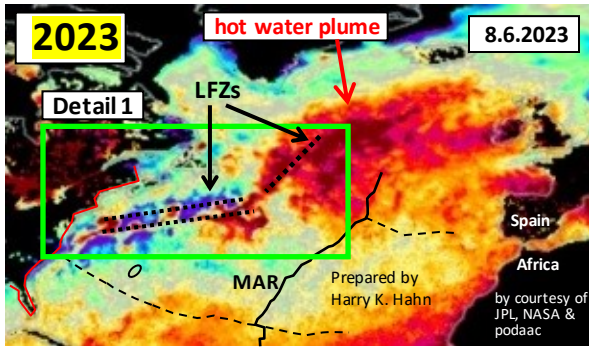
The sources of the hydrothermal-water that caused the extreme **2023**-warm-water-plume are **Linear Fratures** (**LF**s) which are located ~750 km south and east of Cape Race (New-foundland). These Linear Fractures exist for millions of years as the linear-Kelvin Seamount indicates, which is located on **LF3**. Other sources are located on the Mid-Atlantic-Ridge.

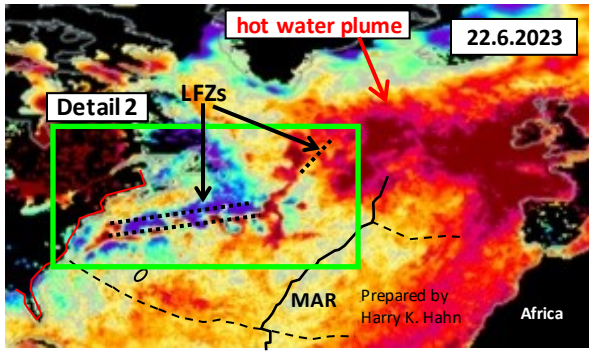


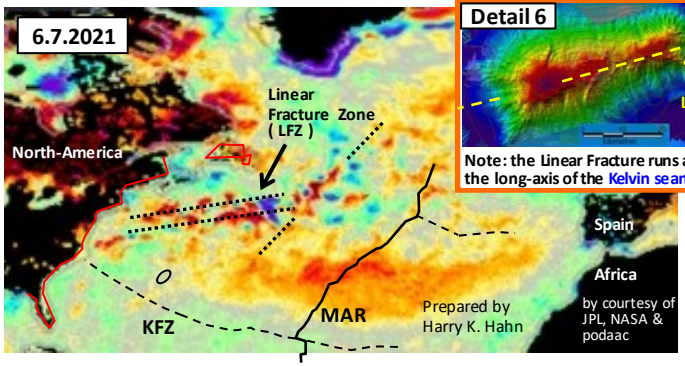




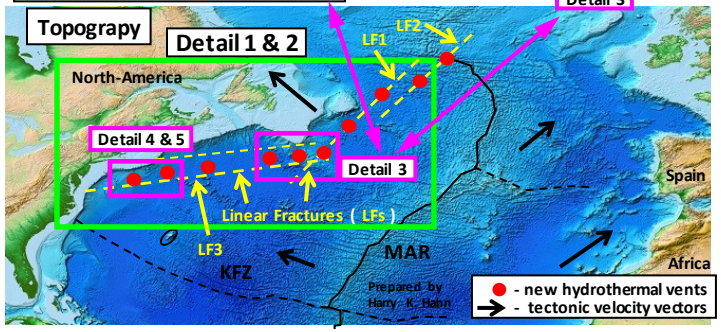


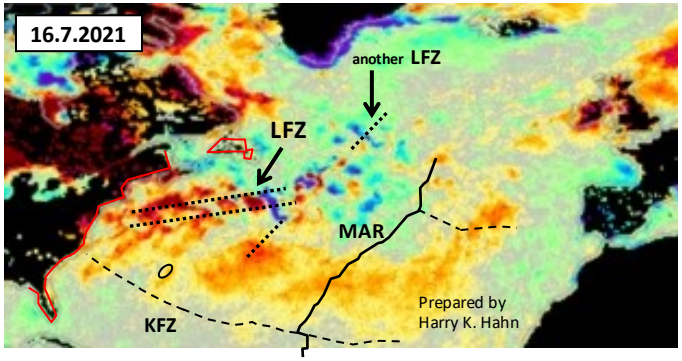


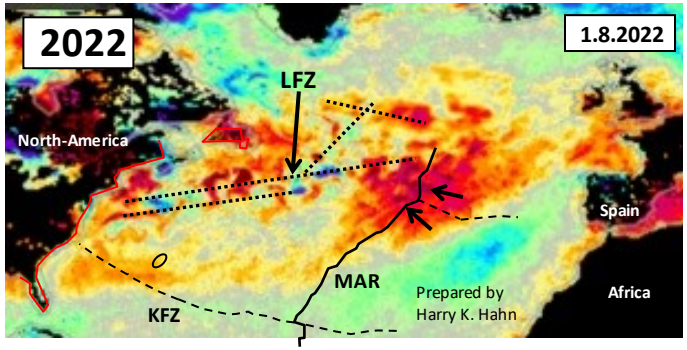


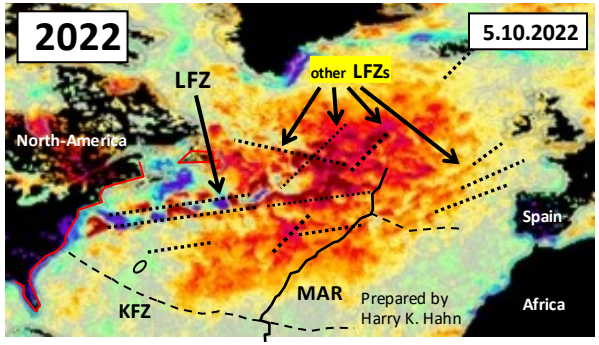


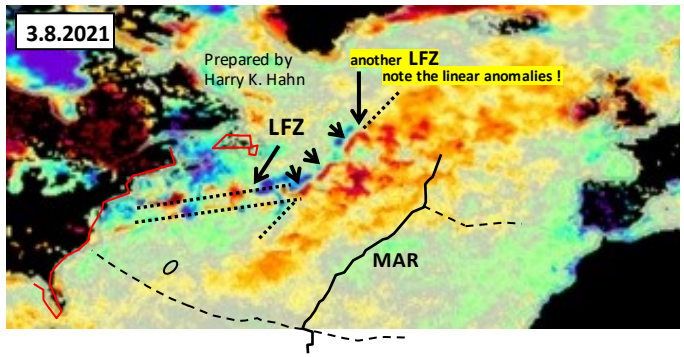
Source-area of big hot-water plume

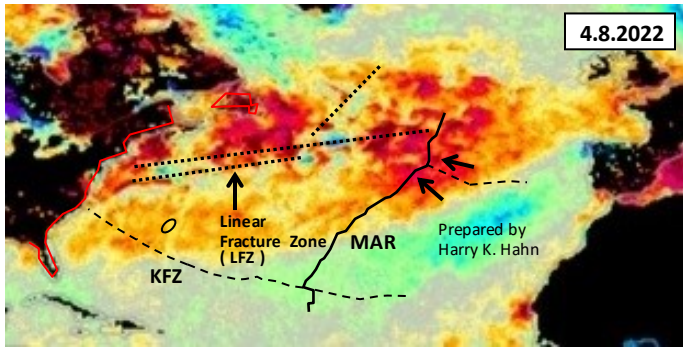


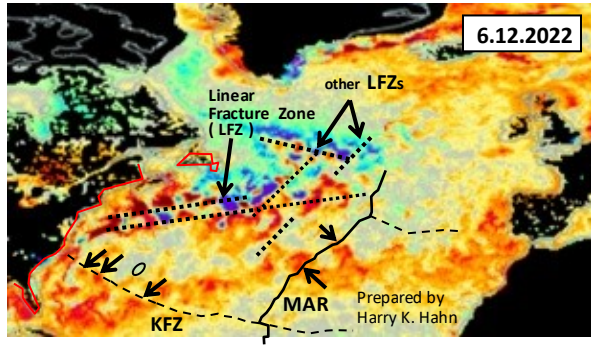








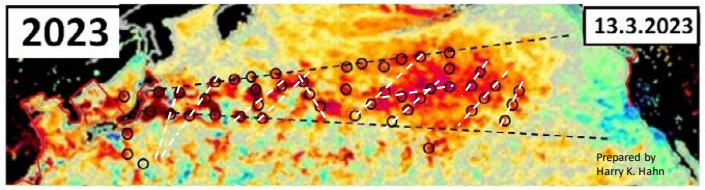


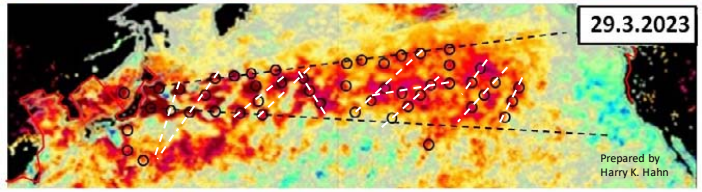


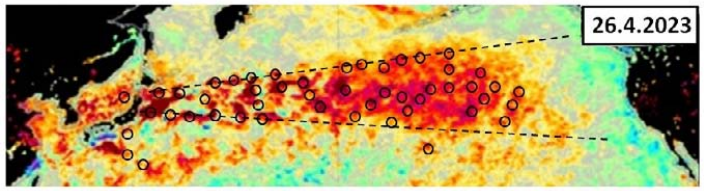
2021-23 : Hydrothermal-sources in a trapezoid-shaped fracture-field on the North-Pacific ocean-floor caused strong SST-Anomalies

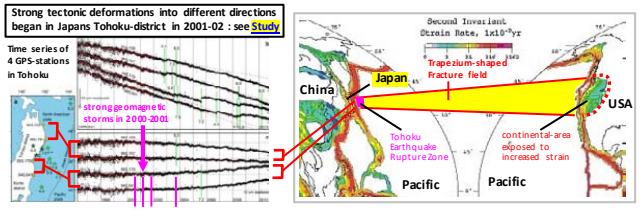
Strong SST-anomalies in the North-Pacific can be precisely traced to a trapezoid-shaped fracture-field located between the Japan-Trench & the East-coast of USA

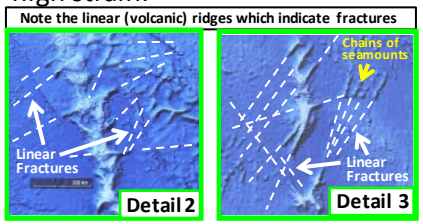
The trapezoid-shaped fracture-field with many dozens of aperiodic-active strong hydrothermal-sources has a clear defined Northern- and Southern-borderline. Its left border is the Japan Trench and its right border is an area in East-USA exposed to high strain.

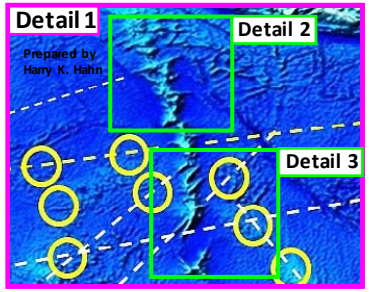


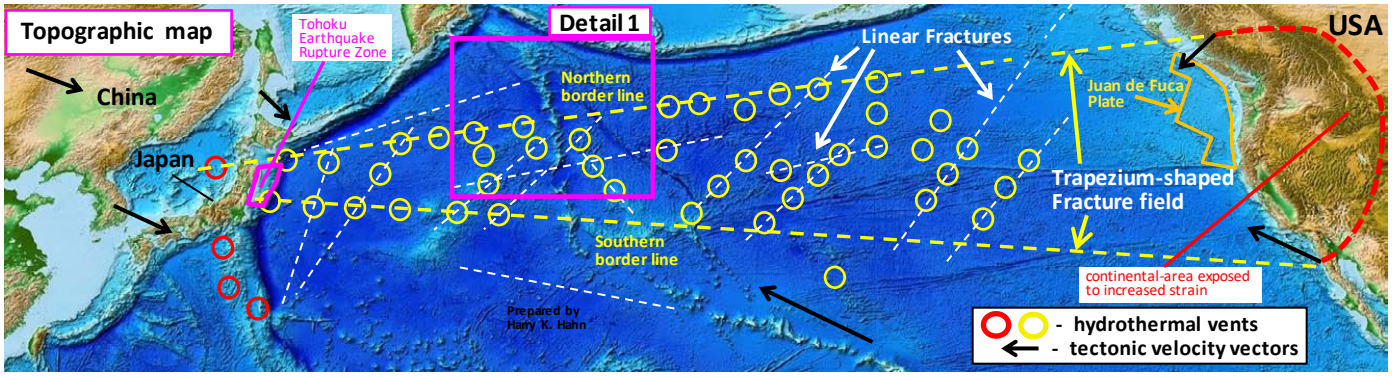


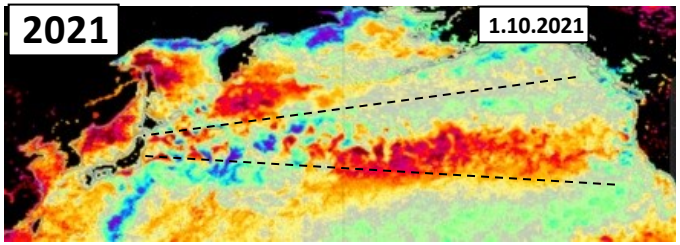


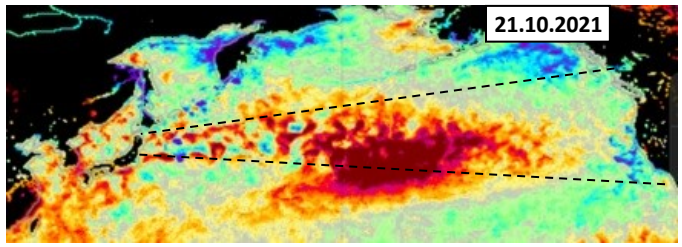


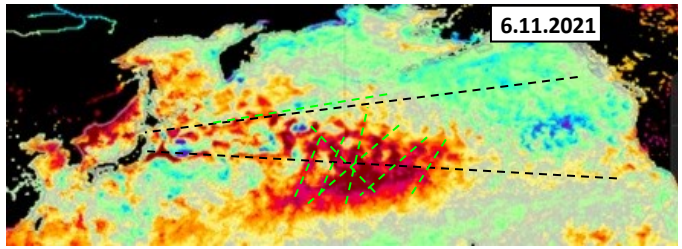


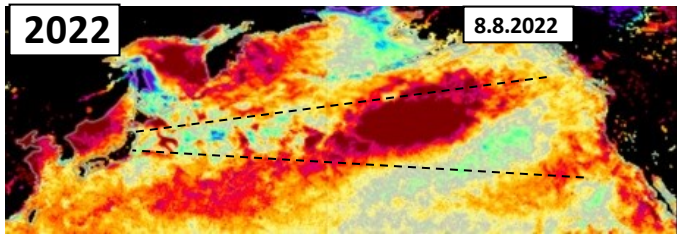


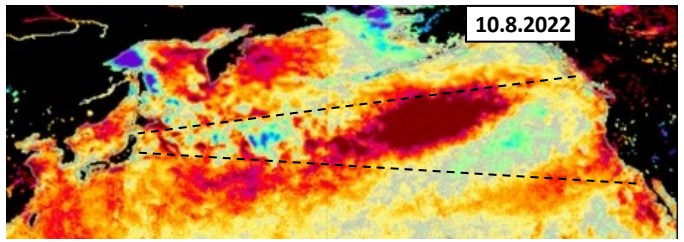


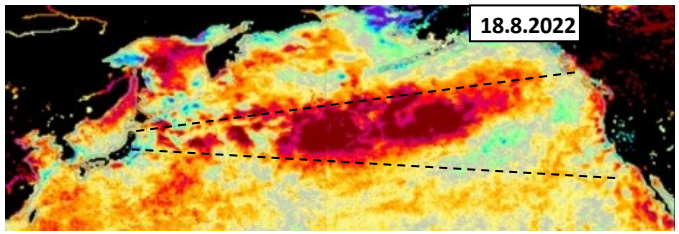


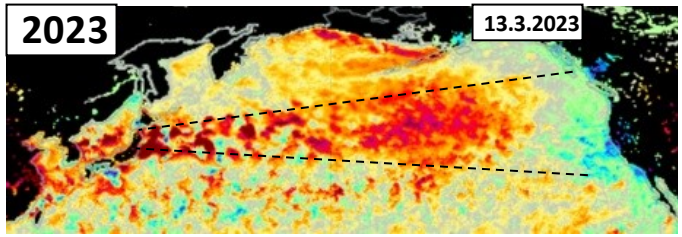


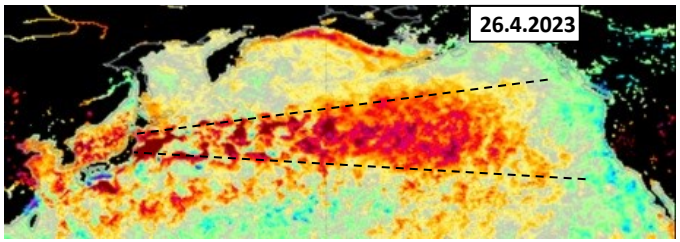


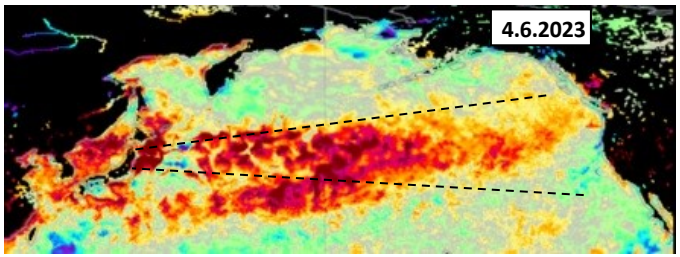






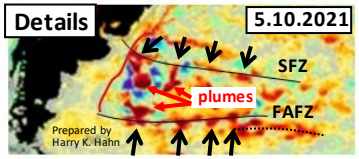




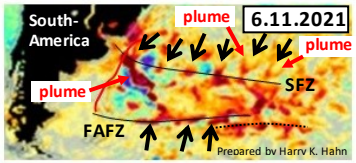


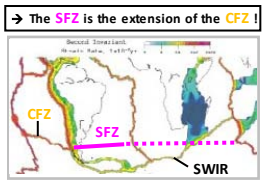
2021-23: Hydrothermal-sources along tectonic fractures in the South-Atlantic caused strong SST-anomalies

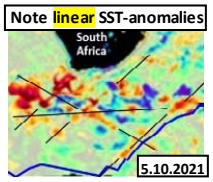
Strong SST-anomalies can be traced to the Falkland-Augulhas-(FAFZ) & Salado-Fracture-Zone (SFZ) and to other linear fractures.



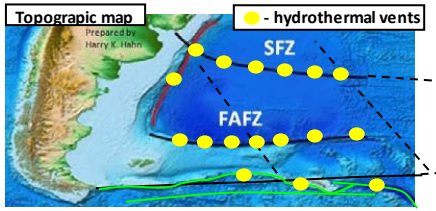
It is clearly visible that hydrothermal-sources are located east of **Argentinia** along the Salado-FZ (SFZ) , which seems to be the extension of the Chile-FZ (CFZ) through the South-American Continent , and along the FAFZ !

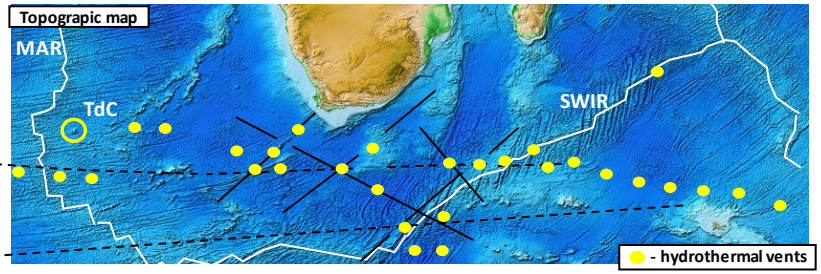


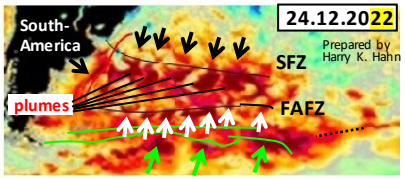


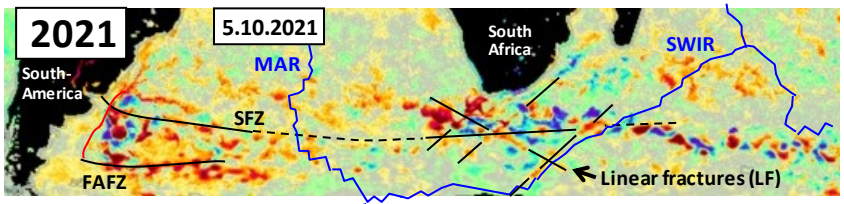


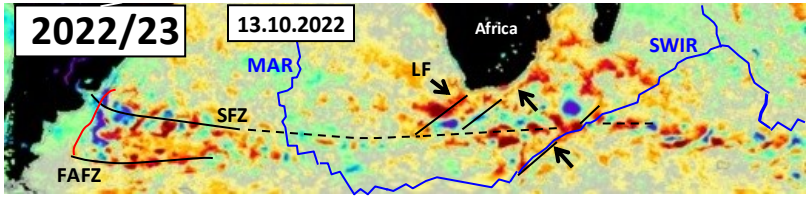
Other strong hydrothermal-sources are located on a **Linear Fracture** south of South-Africa, which seems to be the extension of the SFZ , and they are located on **other Linear Fractures** south of South-Africa

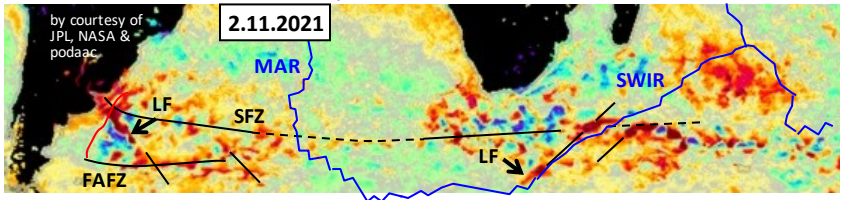


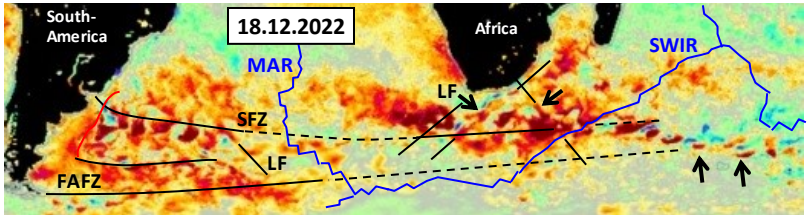


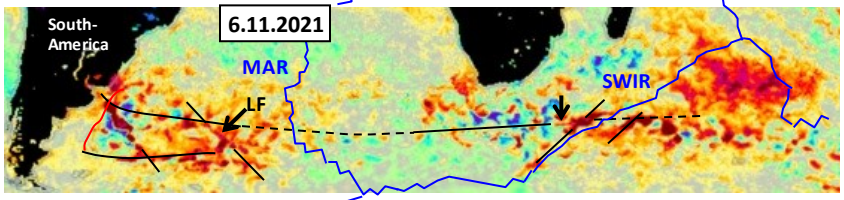


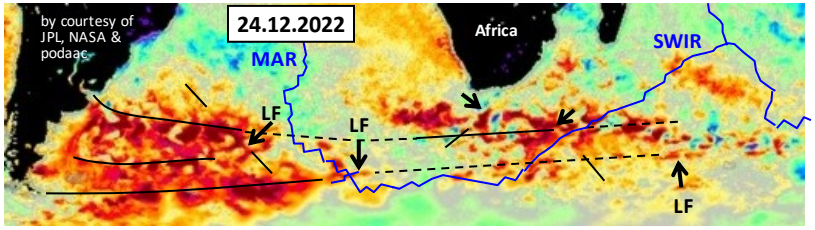


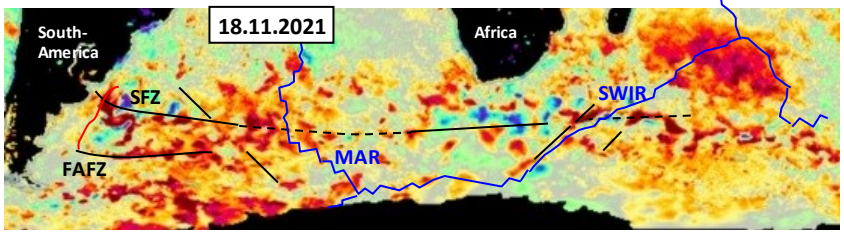


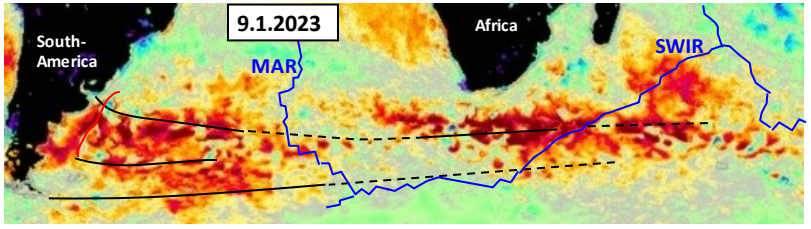






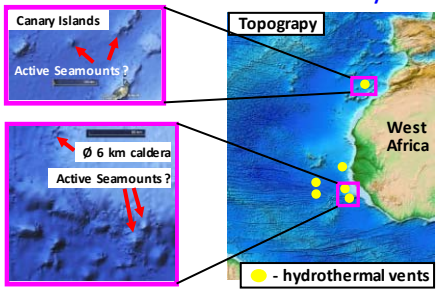


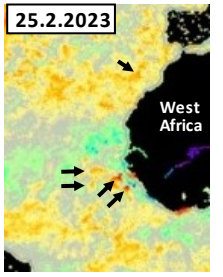


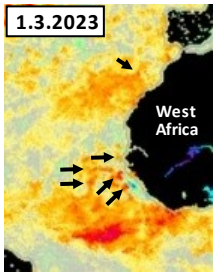


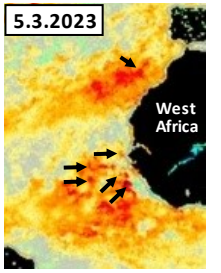
2023 : ≥5 Hydrothermal-sources near West-Africa & in the Canarys

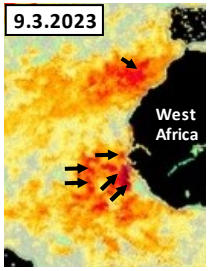
Two big SST-anomalies can be traced to a submarine caldera Ø6km ~250km SSW of Cape Skirring and to a another **submarine volcano** ~350km south of Cape Skirring, which is located in the mid between **Dakar** & **Monrovia**.
There are 3 other sources in this area
Another source is located ~100 km north of Lanzarote in the Canarys.

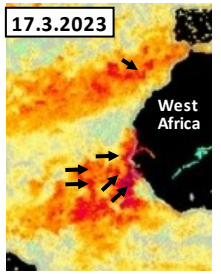


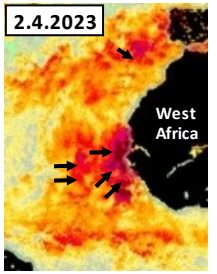










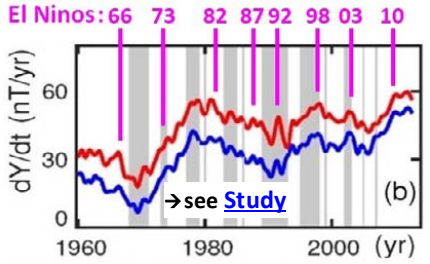


C2 To the probable causes of increased global hydrothermal activity, which leads to El Nino events

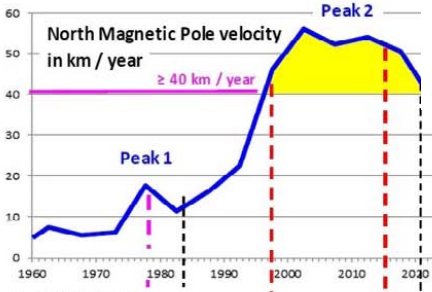
→ Changes in Earth's Magnetic Field seem to be the main cause of increased Hydrothermal-& Volcanic-Activity on Earth !

These changes (e.g. geomagnetic jerks) in Earth's Magnetic-Field can be caused either by internal processes which take place near the Core-Mantle-Boundary (CMB), or they can be caused by external events, which are strong geo-magnetic-storms caused by solar wind (space-weather). The maximum impact of the external events (geo-magnetic storms) seems to be around +/-20%, and the impact of internal-effects seems to be around +/-30% (→charts on the left). As internal effect the fast North-Magnetic Pole Shift must be mentioned, which showed a very high acceleration between 1993 and 2002.

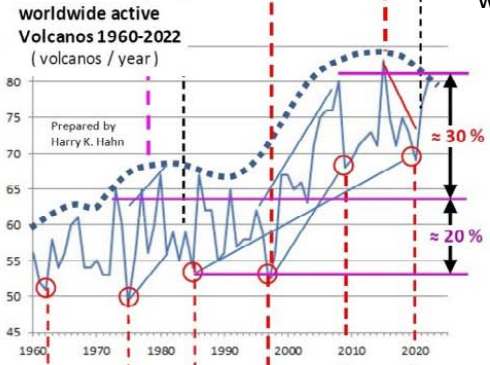
1.derivative of Geomagnetic-Y-component

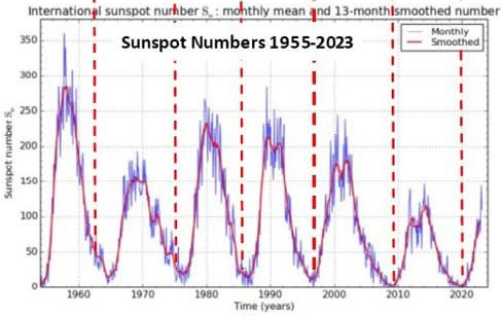


Increased changes in Earth's magnetic field caused by internal-processes (→indicated by the 1.derivative of the Y-component) cause increased seismicity (earthquakes) which then lead to increased volcanism & hydrothermal-activity. Geomagnetic storms caused mainly during solar-cycle-maximas increase this correlation. → **Read Part 2 of my study**



The comparison of the 3 charts on the left indicates that volcanic activity is influenced by shortterm geo-magnetic effects, caused by the sunspot cycles (=space weather) and by a longterm geo-magnetic effect, the NMPV. The chart of the Worldwide Active Volcanos per Year clearly follows a very similar trend as the chart of the North Magnetic Pole Velocity (NMPV). This trend is only interrupted by drops (lows) caused by sunspot cycle minimas.

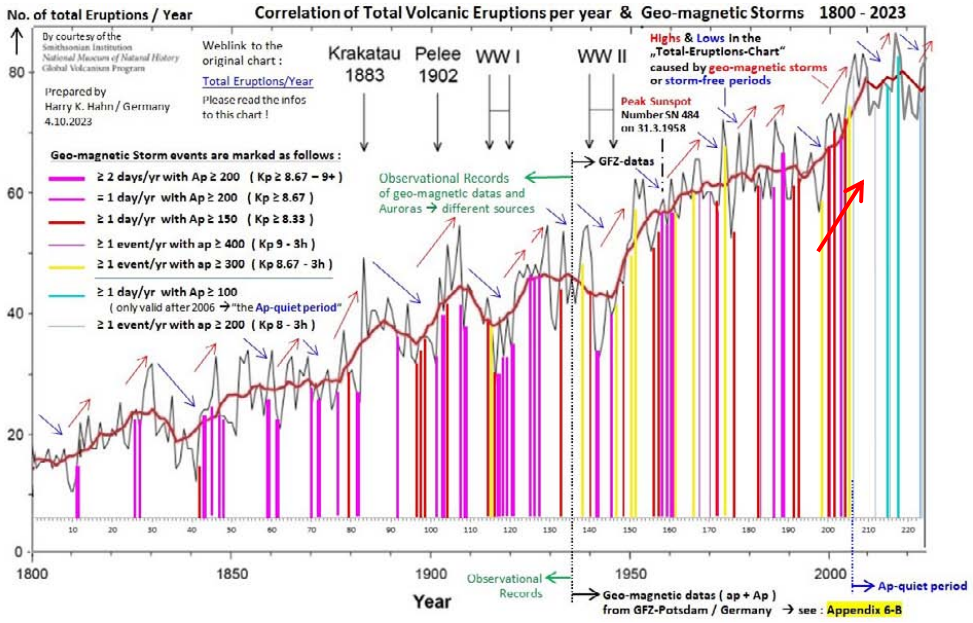




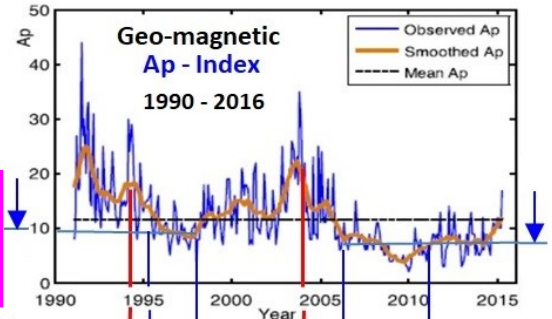
Correlation of "Total Volcanic Eruptions" with "strong Geomagnetic storm-periods" :

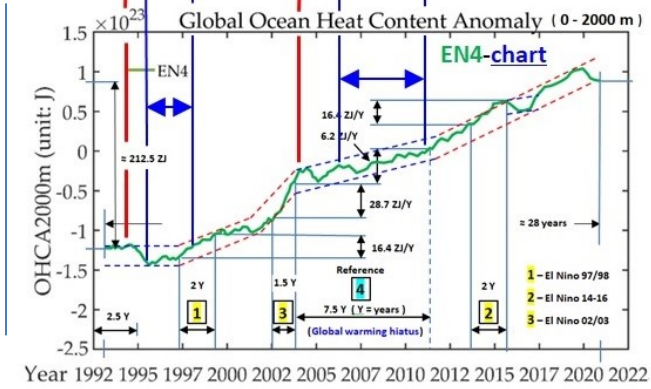
Shortly after the occurence of a strong **Geomagnetic-storm**-(**period**), or with a delay of up to 1-2 years, there is a sharp increase in the number of **Total-Volcanic Eruptions** visible in the chart ! (Highs, indicated by red arrows). And lows in the chart correlate with phases where no or very less geo-magnetic storms occured (→ the blue arrows)

Correlation of -Total Volcanic Eruptions- with -strong Geomagnetic storm-periods- between 1800 and 2023. → Eruptions rise sharply 1-2 yr after geomagnetic storms



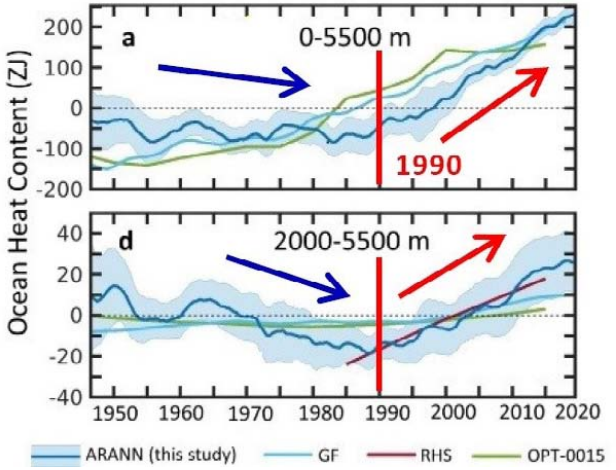
Note the correlation between sections of ≤ 10 in the Ap-chart and Lows (or stagnation) in the OHC-chart ! Also note the peaks ! (→see chart)





The Ocean Heat Content in the depth-range 2000-5500 m did not increase in the time-period ~1950 to 1990 !! (→ see chart below). **Note : The OHC actually dropped in that time-period in the depth-range 2000 - 5500 m !!**

But after 1995 it increased rapidly !!!



The Ocean Heat Content-Chart provides proof that hydrothermal-sources contribute at least ≈40 % heat to the Oceans !

The **ocean heat content** (OHC) is the energy absorbed and stored by the world's oceans. The **current hypothesis** says that the main driver of the OHC-increase most likely is "**Anthropogenic (human) forcing via rising Greenhouse Gas Emissions**". **But a look at the diagram of the „Global Ocean Heat Content Anomalies" clearly indicates that the current official hypothesis is incorrect and incomplete ! And therefore the current "Climate-Change Models" are incorrect too ! There are clearly time-periods (EL Nino events) visible in the chart where the ocean heat-content (and the sea-level !) rises much faster than in other (cooler) periods, by a factor of 2.6 to 4.6 !! This fact can't be explained by the greenhouse-theory alone !! This big difference in heat-input can only be explained by another additional powerful heat-source beside the sun that contributes heat !!!**

This other heat-source are hydrothermal-vents & submarine-volcanism on the ocean-floors !!

I have marked four time-periods on the OHC - Chart on the right :

1 - El Nino 1997/98 (a 2-year period was selected)
→ Heat input in this time ≈ **16.4 ZJ / Year**

2 - El Nino 2014-16 (a 2-year period was selected)
→ Heat input in this time ≈ **16.4 ZJ / Year**

3 - El Nino 2002/03 (a 1.5-year period was selected)
→ Heat input in this time ≈ **28.7 ZJ / Year**

For comparison I have picked out a time-period with a low OHC-increase :

4 - Reference (for comparison a **cool** 7.5 year period)
→ Heat input in this time ≈ **6,2 ZJ / Year**

(**Note** : **1 ZJ/Y = 1 x 10^{21} Joule / year**)

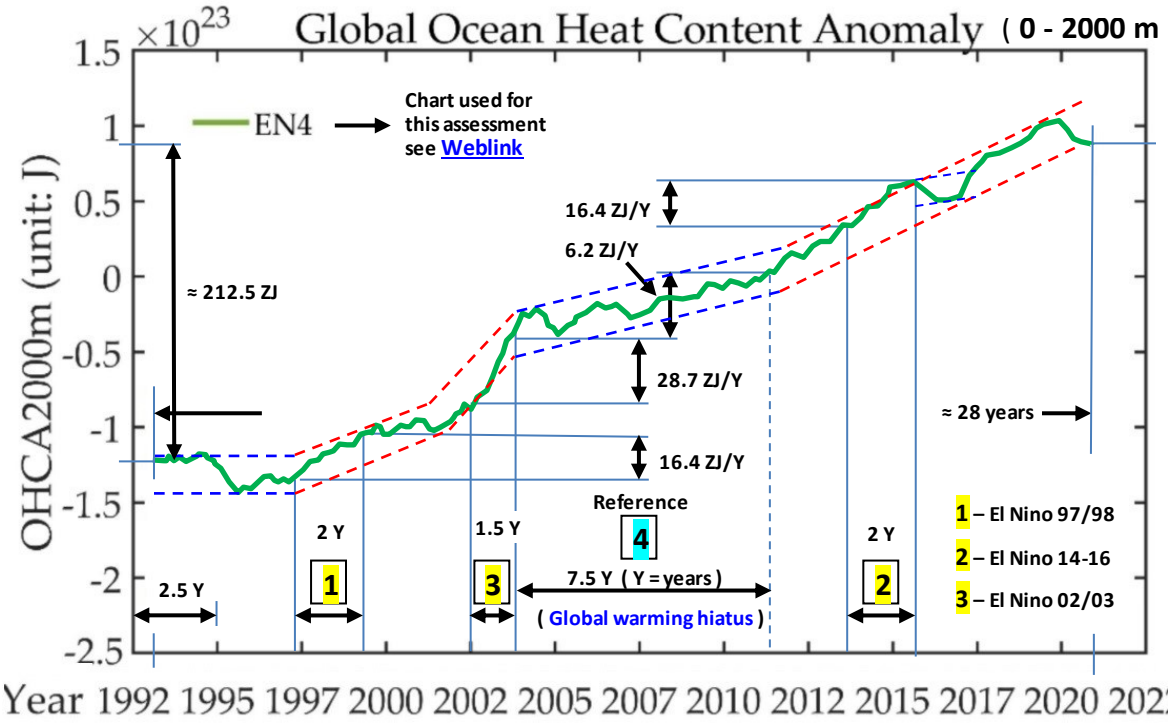
To put the numbers in perspective :
The El Nino events 97/98 & 14-16 added 10.2 ZJ/Y more heat to the world's oceans than the (cooler) years : 2004 - 2011 (→ **16.4 - 6.2 = 10.2 ZJ**)
The El Nino 2002/03 even added 22.5 ZJ/Y more heat !

For comparison : **10.7 ZJ** is the energy which the Earth's surface receives from the sun in one day !
The whole global economy uses **0.58 ZJ/Y**

How much hot magma (lava) could add 10.2 ZJ heat to the oceans ? :

Answer : approx. 6375 km^3 of hot magma (basalt) which cools down from 1300°K to 27°C (→ΔT=1000°K) This volume of 6375 km^3 corresponds to (is equal to) a cube of magma with the edge-length of ≈ 18.5 km

This is a very realistic scenario !!

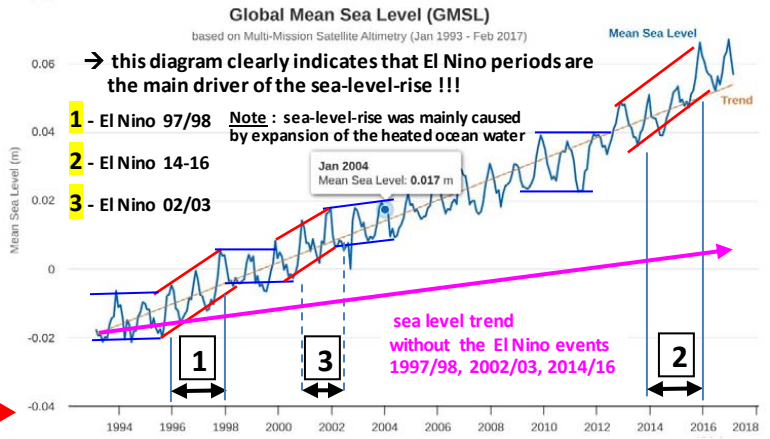


The analysis-result :
During the 5.5 El Nino years (1-3) ≈ 108,7 ZJ heat were added. In the rest 22.5 years of the **≈ 28 year** long OHC-chart , ≈ 103.8 ZJ heat were added. This corresponds to only ≈4.61 ZJ per year
If I use this 4.61 ZJ as average added per year without EL Ninos (1-3) which is ≈129 ZJ for 28 years. Then the greenhouse-warming adds129/212.5≈60.7%
And EL Ninos added ≥ 39.3% to the OHC.
(103.8+108.7=212.5 ZJ)

Note : For my assessment I have used the well established OHC - **EN4-Chart** (0 – 2000 m)
(→ **see Info in Appendix 3**)

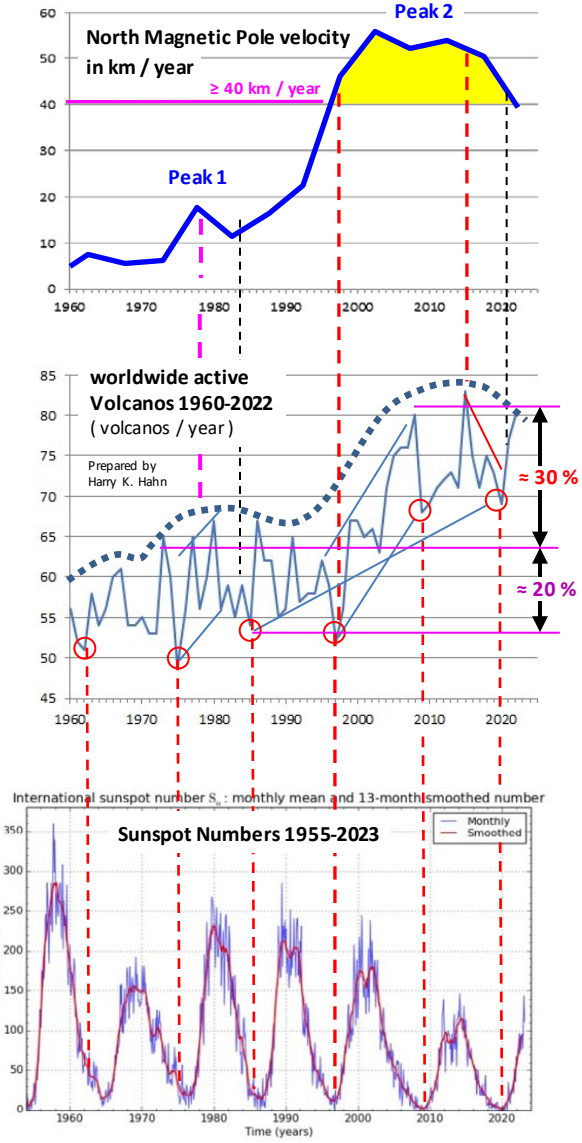
Note : the **EN4 - Chart** (0-2000m) used in the diagram above, was extracted from a study which aimed to reconstruct a new long-time OHC–dataset to better understand climate-events.
→ **weblink to this study : LSTM-method Study**

The **Global Mean Sea Level** (**GMSL**) diagram on the right **also clearly indicates** that the **El Nino periods are the main driver of the sea-level-rise !!!**



Volcanism is correlated to geo-magnetism, HGFA-seismicity, solar-cycles & global warming

A comparison of the 3 charts below indicates that **volcanic activity is influenced by shortterm geo-magnetic effects, caused by the sunspot cycle (=space weather) and by a longterm geo-magnetic effect, the MPV.**
The chart of the **Worldwide Active Volcanos per Year** clearly follows a very **similar trend as** the chart of the **North Magnetic Pole Velocity (N-MPV)** if we consider a smoothed chart of the **Active Volcanos/Year** (dotted line)
When the **MPV** reached the wide **Peak 2 with ≥ 40 km/year** we can see a **sharp rise & elevation of the volcanic activity**. If we look at the chart of the **worldwide active volcanos per year** we clearly see **sharp rises of activity in the years 1997-99, 2003-07, 2014-15 & 2020-22 interrupted by two drops caused by sunspot cycle minimas**
Note that we had **El Ninos events** with inreased **Sea Surface-temperatures** in the years **97/98, 2003-05, 2007 2014-16** and a **new El Nino** episode just started in ≈**2022**. The impact of the high MPV on Volcanism is **≈30%** and that of solarcycles **≈20%**



Further some studies show a clear **correlation of seismic activity in High-geothermal-flux-areas (HGFA) and the Global Warming** of the last few decades (see : Study & Study-update) → see charts → **HGF-areas** are all mid-ocean-ridge-areas and geothermically active areas. It is important to note that there is a **delay of around 2 years between the seismic activity and the reaction of the global climate-system**. (see charts on the right).

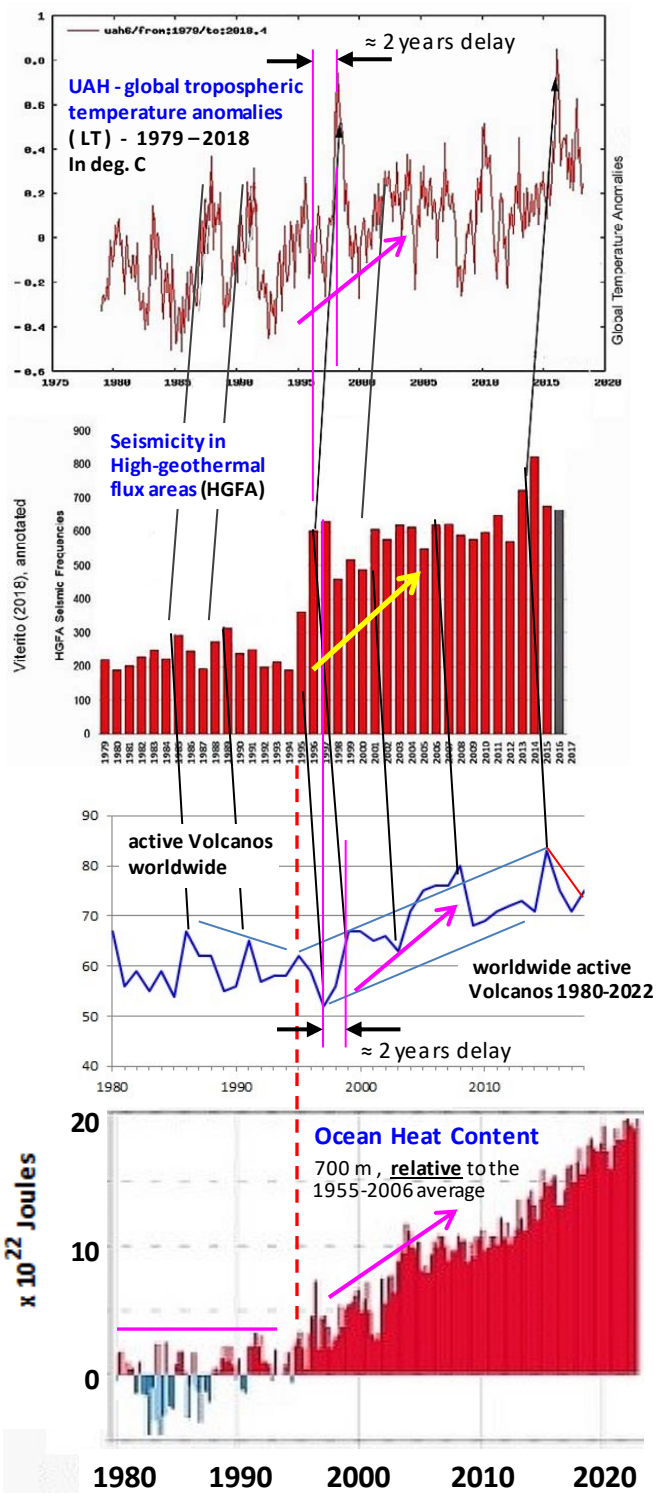
There is also a **delay of ≈ 2 years** noticeable **between the seismic-activity in the HGF-areas and the global volcanism** (in the chart represented by **active volcanos per year**) → see charts on the right. This delay can be explained by the time needed for magma and/or hydrothermal fluids to rise from Earth's mantle and Earth's crust to the surface, after new fractures have opened up in Earth's crust, caused by increased seismicity resulting from the mentioned geo-magnetic effects. (magnetic pole-speed & geomagnetic storms)

Further it's important to note that **the distinct jump in seismic activity** to a higher level **in the HGF-areas**, which we see in the chart **in the years 1995-1997, was followed by a strong increase in the growing-rate of the Ocean Heat Content since around 1996** and followed by a strong peak in global tropospheric-temperature-anomalies (→ see charts on the right).

Here are weblinks to infos & studies that also indicate such correlations:

1.) - **Correlation between solar activity and large earthquakes worldwide**
2.) - **A solar-terrestrial effect influences volcanism & global seismic activity**
3.) - **Correlation of geomagnetic anomalies with earthquakes & solar storms**
4.) - **Volcanic eruptions are correlated with Solar Activity**
5.) - **Links of Volcanic Eruptions to Solar Activity and Solar Magnetic Field**

More weblinks to similar studies under References (see last pages)



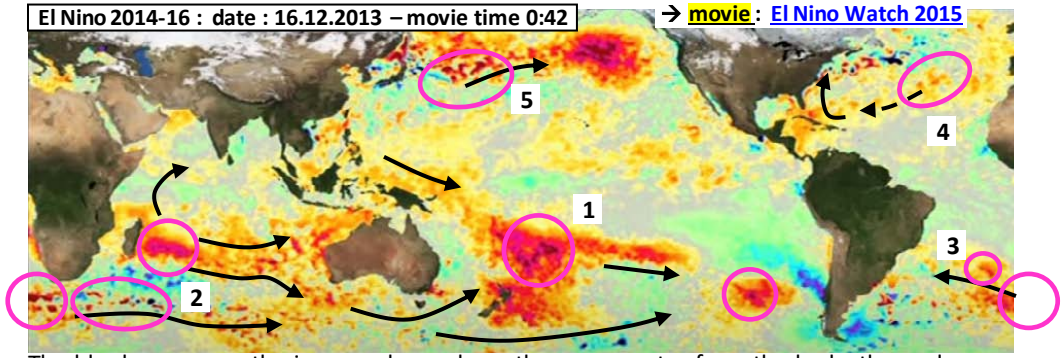
C3 El Nino 2013-15: Analysis of the Migration-paths of hydrothermal-water from the source areas 1 to 5 that was causing the El Nino

Mid of December 2013 (& in 2014 again) hydrothermal-sources located in the source-areas **1 – 5** , near hotspot-areas or mid-ocean-ridges in the Southern- & Northern-hemisphere, became active nearly simultanously !! and ejected a lot of warm water into the oceans, as the sea-surface temperature anomalies indicate. The best examples are the Monowai- & Macauley- submarine-volcanos in the Kermadec Arc ! After this „global hydrothermal-event(s)“ ocean- and wind-currents distributed & transported the warm water mainly eastward. Most of the warm water finally accumulated in the Pacific off the W-coast of South- & North-America

This image shows a crucial scene at the beginning of the El Nino event where we can see the hydrothermal-source areas (pink circles) which are nearly all active at the same time.

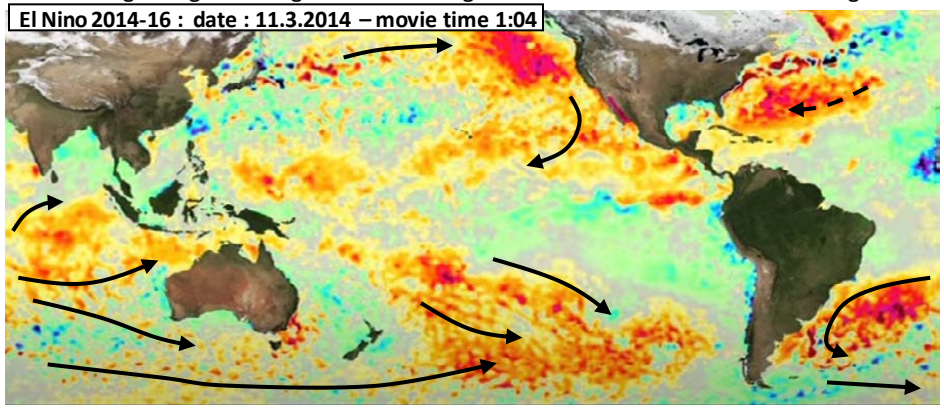
El Nino 2014-16 : date : 16.12.2013 – movie time 0:42

→ movie : El Nino Watch 2015



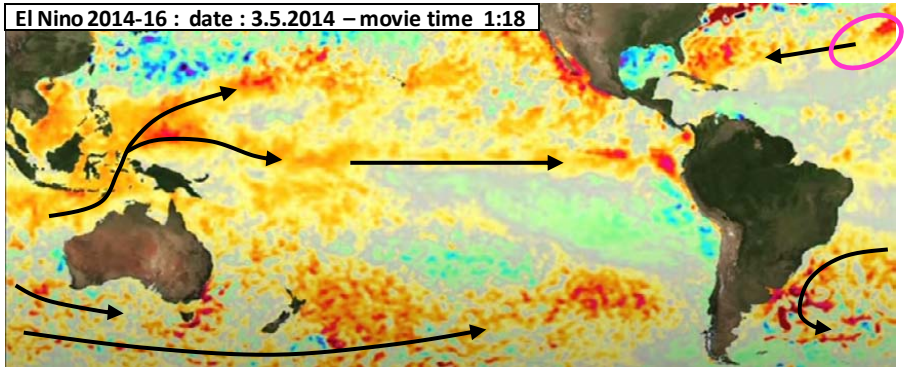
The black arrows on the images show where the warm water from the hydrothermal source areas is migrating to. A large share of it migrates eastward and is accumulating in the Pacific.

El Nino 2014-16 : date : 11.3.2014 – movie time 1:04



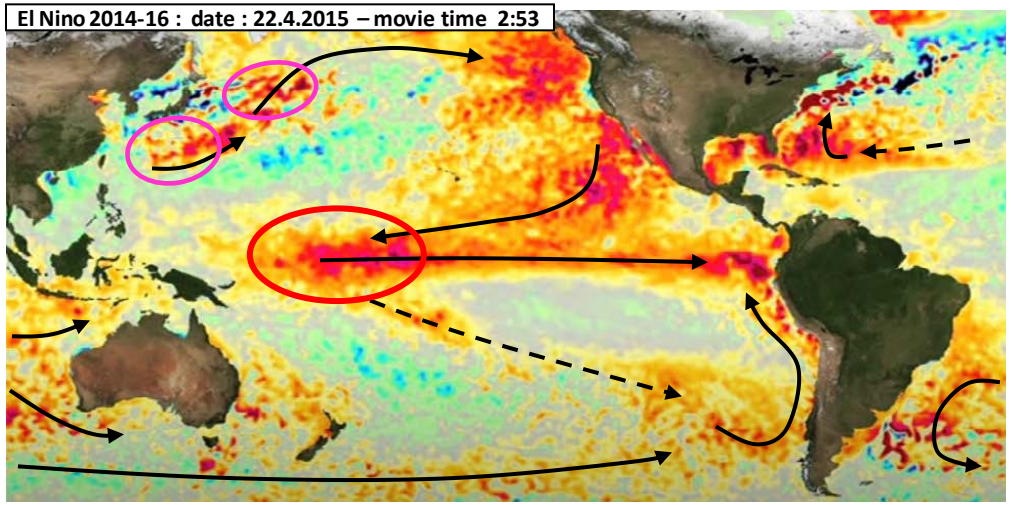
In the time period **25.4. to 10.5**. a considerable amount of warm water moved between Indonesia and New-Guinea, from the Indian Ocean to the Pacific

El Nino 2014-16 : date : 3.5.2014 – movie time 1:18



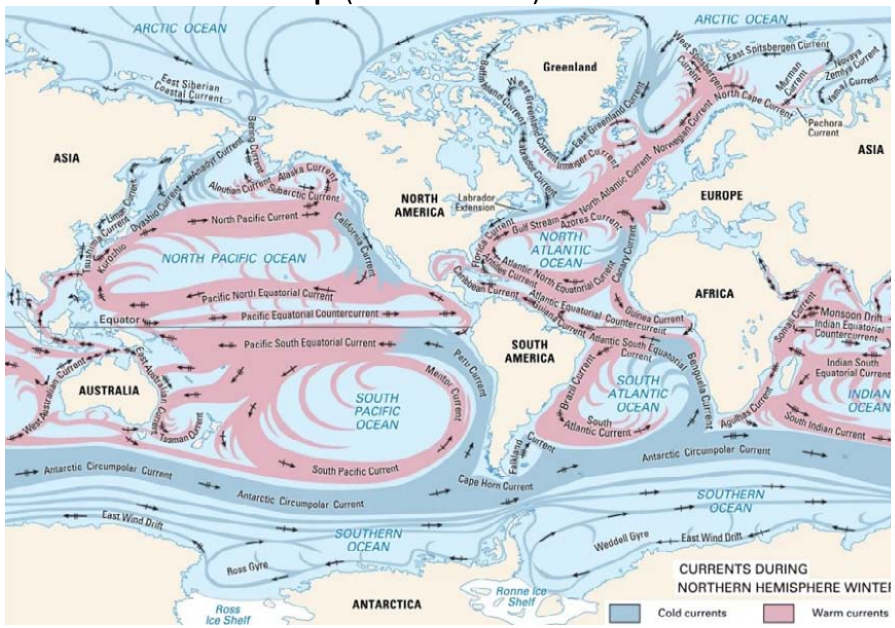
In is image the El Nino event is in full swing. A large amount of warm-water accumulate in the equatorial West-Pacific (red ellipse) and westerly wind bursts transport it to South-America

El Nino 2014-16 : date : 22.4.2015 – movie time 2:53



Note : In the area indicated by the red ellipse warm water accumulates and then gets pushed towards east by westerly wind bursts & cyclone-activity

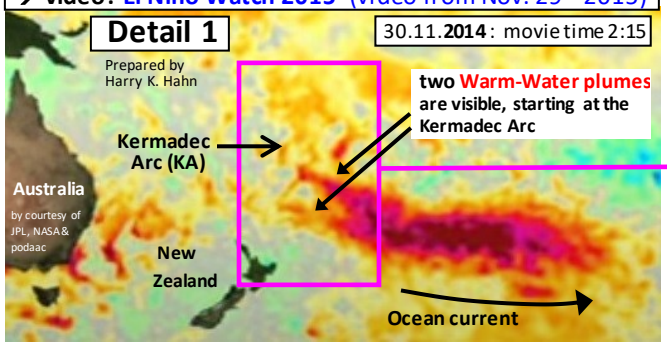
Ocean Currents worldmap (for Reference)



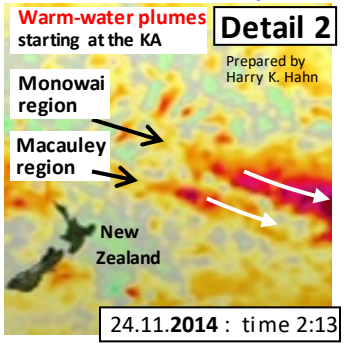
2014 : Two big warm-water plumes caused by the Monowai- & Macauley- Volcanos in the Kermadec-Arc caused large SST-anomalies

The animation of the Sea-Surface Temperature (SST)-anomalies of the 2014-16 El Nino provides evidence for the real cause of strong SST-anomalies (warm-water Blobs) !
In the animation it is clearly visible that the cause of the strong anomaly that developed in the time 24.11.-30.11.2014 was submarine volcanism and/or hydrothermal activity !!
The image sequence from 24.11.-30.11.2014 shows **two warm-water plumes** which **were caused by the Monowai- & Macauley - submarine volcanos** in the Kermadec Arc (KA) !

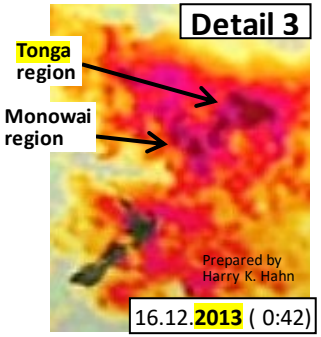
→ **video: El Nino Watch 2015** (video from Nov. 29 - 2015)

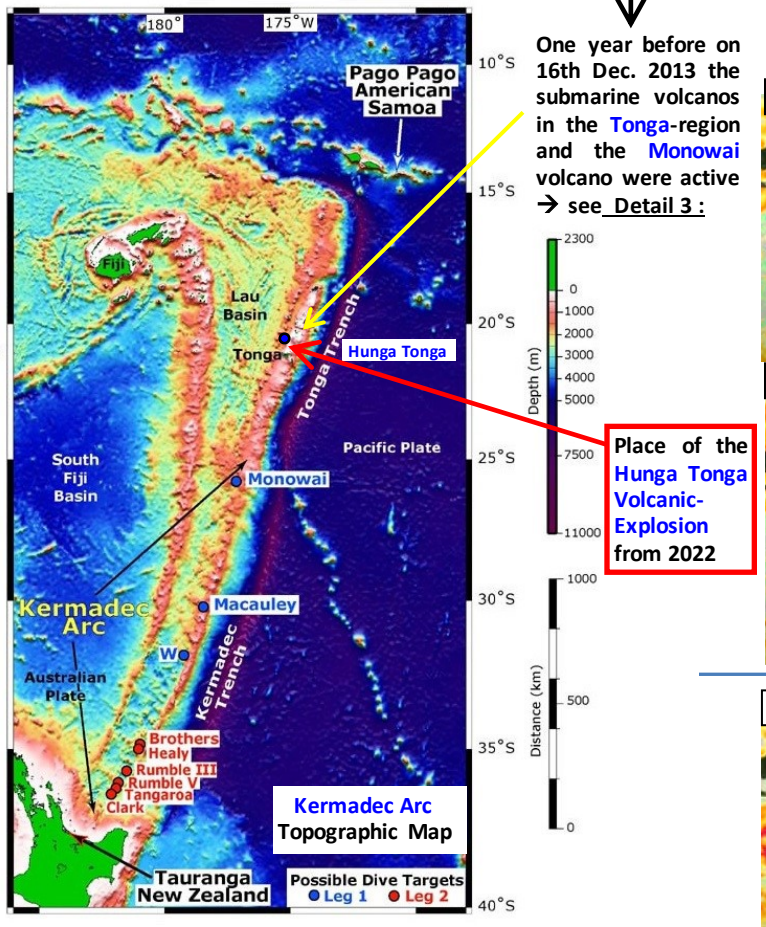


Detail 2 : shows two hydrothermal sources in the Kermadec Arc (KA) Probably located in the regions of the Monowai- & Macauley volcano



Detail 3 : shows a different activity phase of the volcanos of the KA, in which volcanos in the Tonga-region & the Monowai volcano were active



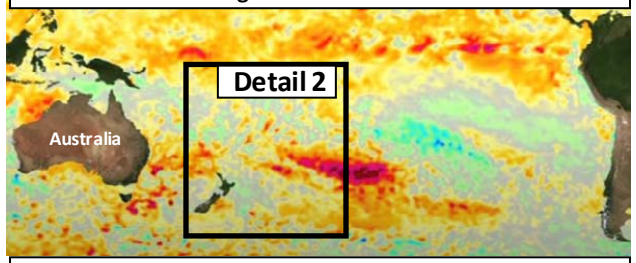


One year before on 16th Dec. 2013 the submarine volcanos in the Tonga-region and the Monowai volcano were active → see Detail 3 :

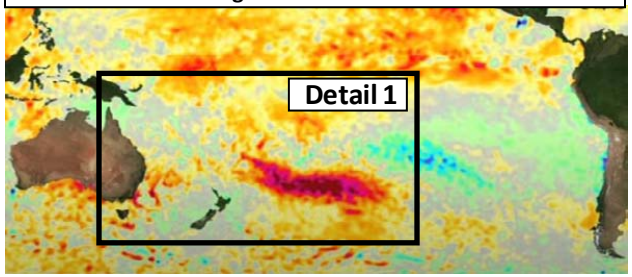
Place of the Hunga Tonga Volcanic-Explosion from 2022

The following images show strong SST-Anomalies, which have their origin at submarine volcanic locations in the Kermadec Arc
→ **video: El Nino Watch 2015** (video from Nov. 29 - 2015)

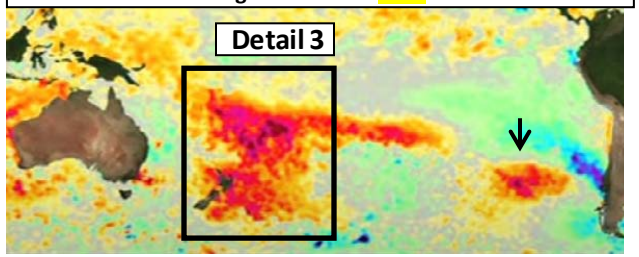
El Nino 2014-16 : image from 24.11.2014 – movie time 2:13



El Nino 2014-16 : image from 30.11.2014 – movie time 2:15

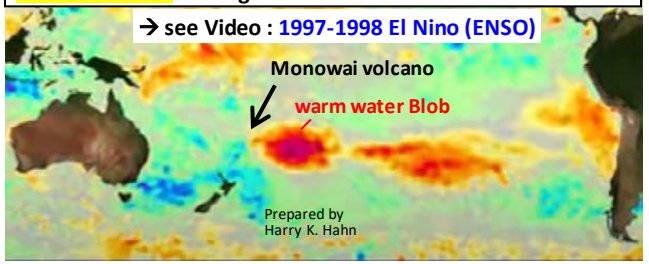


El Nino 2014-16 : image from 16.12.2013 – movie time 0:42

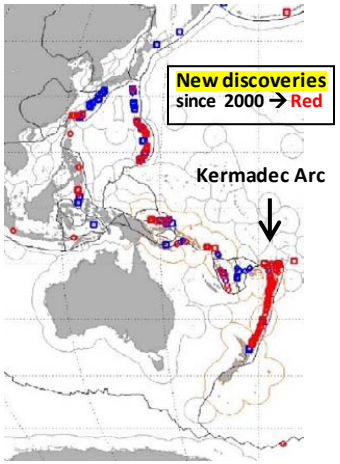


Hydrothermal activity of the Monowai-volcano in Feb. 1997

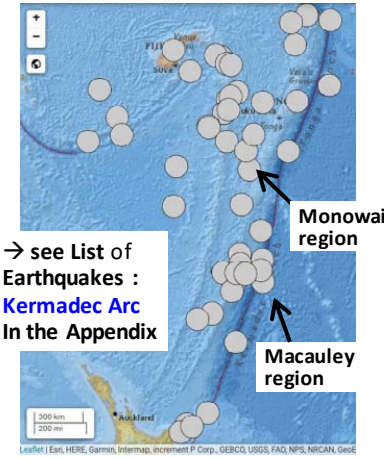
El Nino 1997-98 : image from 9.2.1997 – movie time 0:24
→ see Video : 1997-1998 El Nino (ENSO)



Submarine hydrothermal venting (volcanism) locations_West-Pacific

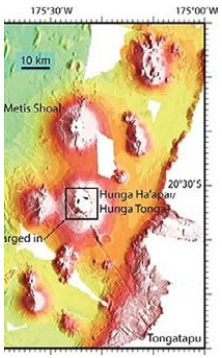


Earthquakes > 7.0 mb in the time 1990-2023.06 in the Kermadec Arc

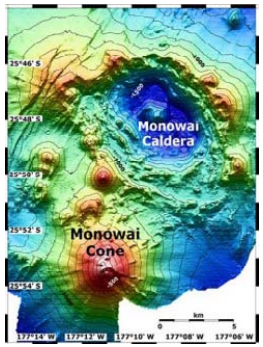


→ see List of Earthquakes : Kermadec Arc In the Appendix

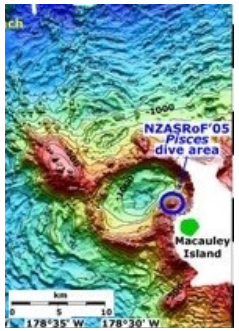
Hunga Tonga volcano



Monowai volcano



Macauley volcano

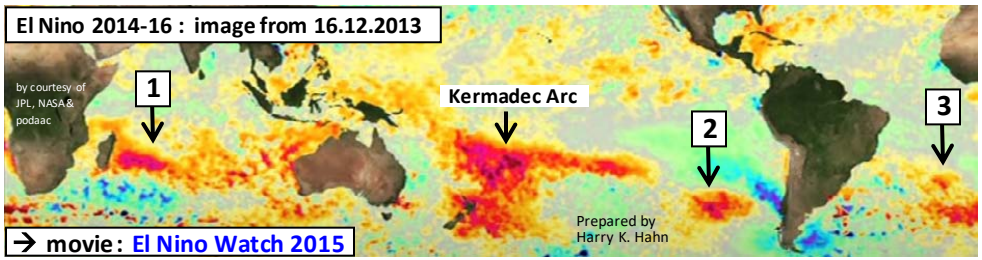


2013 : Large SST-anomalies caused by hydrothermal-sources on 4 very different places at the same time indicate a global phenomenon

The image sequence below shows the early beginning of the 2014-16 El Nino. The warm water which caused the strong El Nino-event at the Pacific-equatorial-region in **2015** already started to accumulate on the surface of the worlds oceans in December 2013 ! **December 2013** is a crucial point in time in order to understand **the real cause of El Ninos**, because this time allowed to notice **the real sources** of the warm water that later caused the El Nino SST-anomalies. On the images I marked **4 positions** where Warm-water Blobs developed on the surface **at the same time**, which were feed by submarine volcanism and/or hydrothermal-sources ! For the **Kermadec-Arc-region** I already described the probable hydrothermal sources (→ see previous page). For the other 3 locations marked on the SST-anomaly-map (1-3) I describe the probable hydrothermal-sources below.

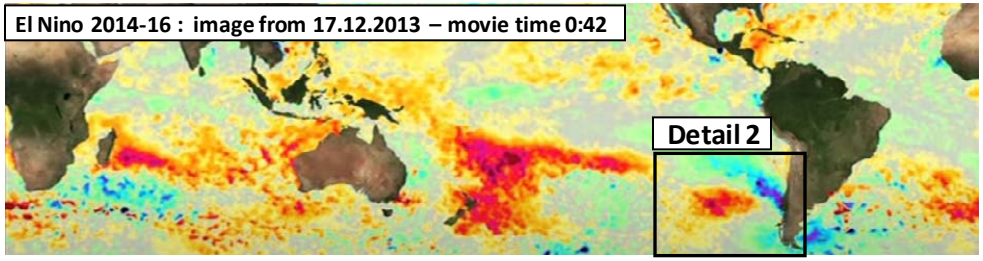
Note : **Important is the fact that on all 4 positions the volcanic &/or hydrothermal-activity started & increased nearly at the same time ! This indicates a global phenomenon !**

El Nino 2014-16 : image from 16.12.2013

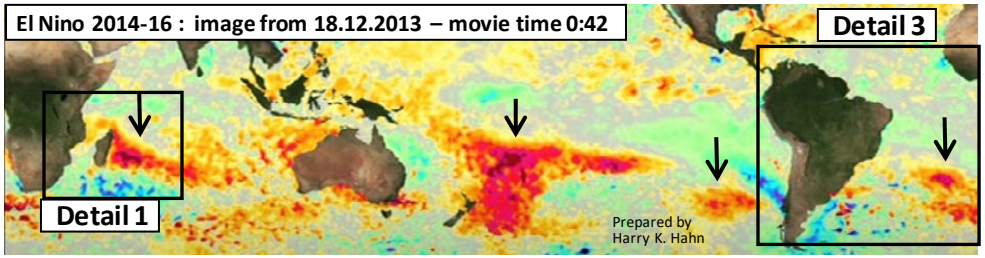


→ movie : El Nino Watch 2015

El Nino 2014-16 : image from 17.12.2013 – movie time 0:42

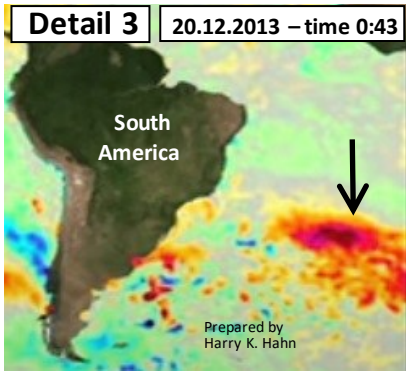


El Nino 2014-16 : image from 18.12.2013 – movie time 0:42



Description of the hydrothermal source visible in Detail 3 → see next pages !

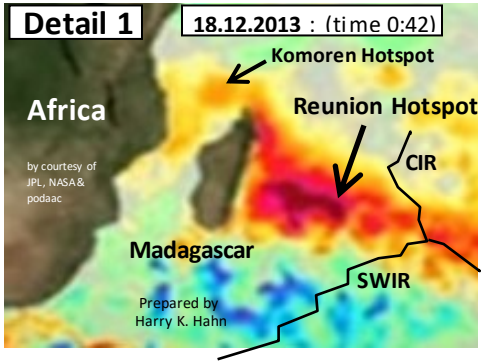
Detail 3 **20.12.2013 – time 0:43**



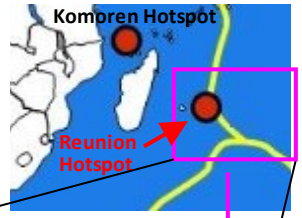
SST-anomaly caused by the Reunion -hotspot :

The SST-anomaly that developed east of Madagascar came from hydrothermal-sources in the Reunion-area (e.g. **Piton de Fournaise, Rodrigues-Ridge, CIR** etc.)

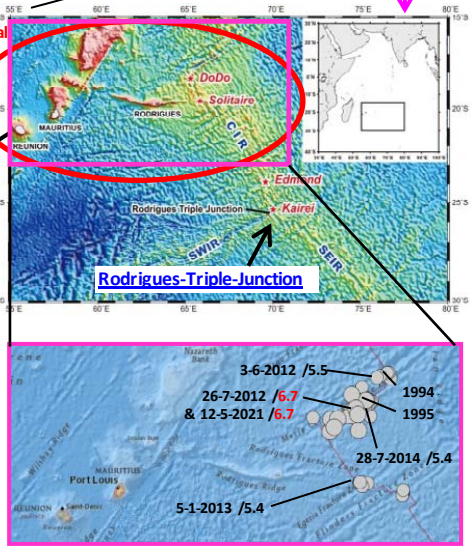
Detail 1 **18.12.2013 : (time 0:42)**



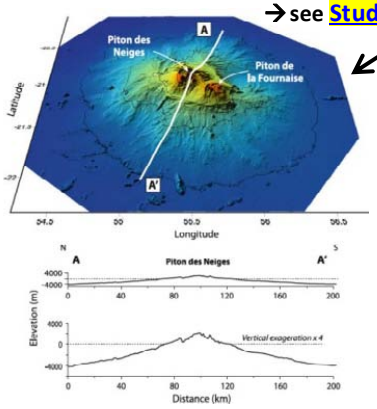
The map below shows the **Reunion hotspot area** and the 4 hydrothermal- fields **DoDo, Solitaire, Edmond** & **Kairei**" and the **Rodrigues-Ridge**, → the **probable** hydrothermal source-area → see Study2



probable hydrothermal source-area



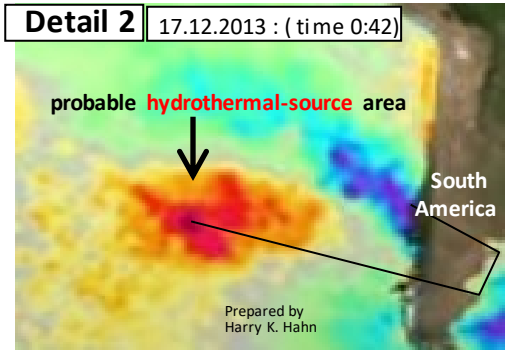
Piton de la Fournaise is a large and very active shield-volcano – **Base Ø 200 km** !! → see Study



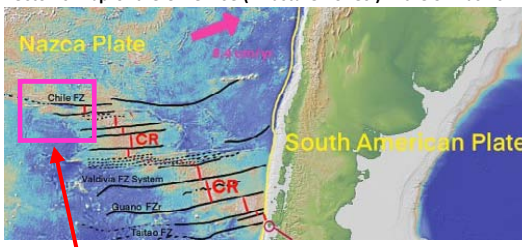
SST-anomaly developed near the Chile Rise :

This SST-anomaly (warm-water Blob) developed at or near the Chile Fracture Zone, which is located at the southern boundary of the Nazca Plate. It belongs to the Chile Rise, an earthquake-rich fracture zone.

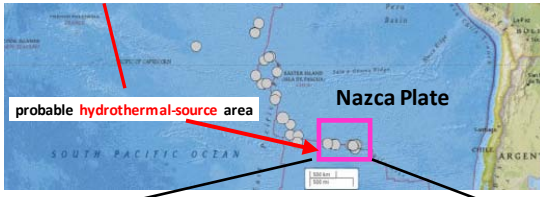
Detail 2 **17.12.2013 : (time 0:42)**



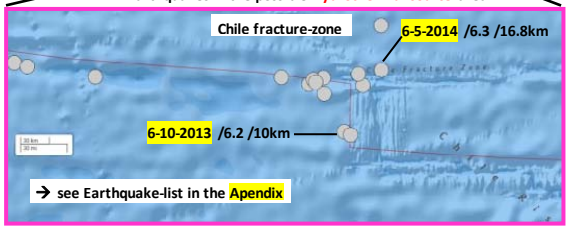
Tectonic Map of the Chile Rise (-fracture zones) in the SE-Pacific



Earthquakes ≥ 6.0 near the probable hydrothermal-source area – 1990 to 2023.06



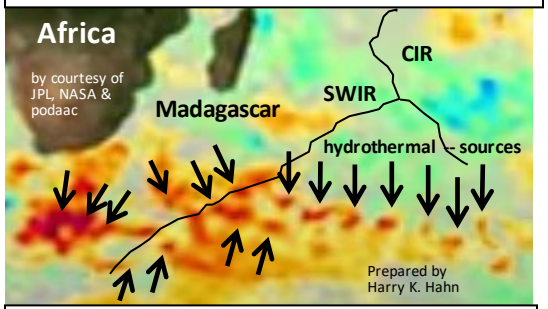
Earthquakes in the possible hydrothermal-source area



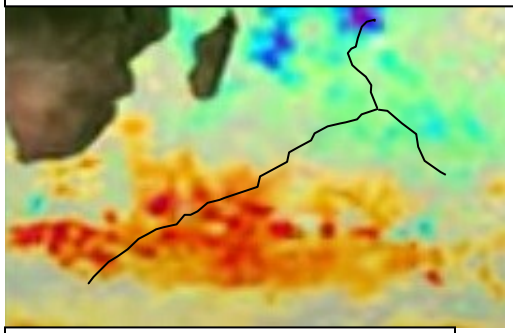
1997 : Hydrothermal-sources near the SWIR & hotspots, caused SST-anomalies

→ Weblink to SST-animation : "1997-1998 El Nino..."

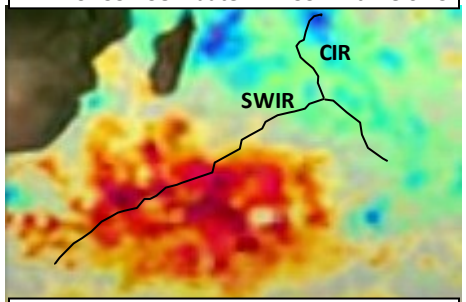
El Nino 1997-98 : date 7.1.1997 - movie time 0:19



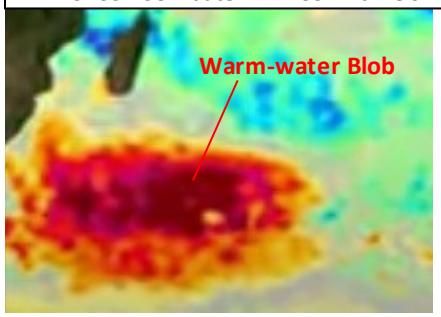
El Nino 1997-98 : date 28.1.1997 - movie time 0:22

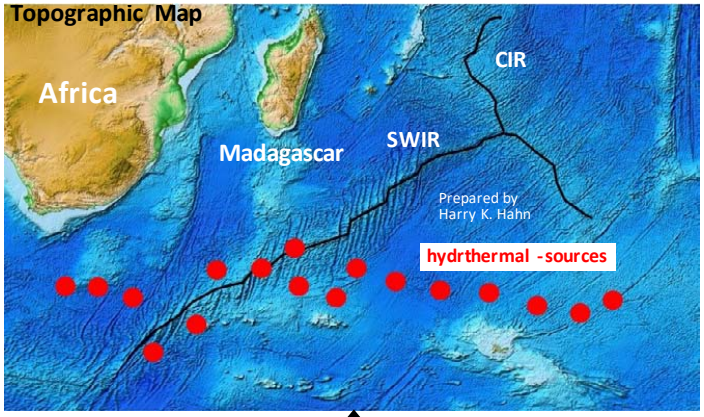


El Nino 1997-98 : date 2.2.1997 - time 0:23

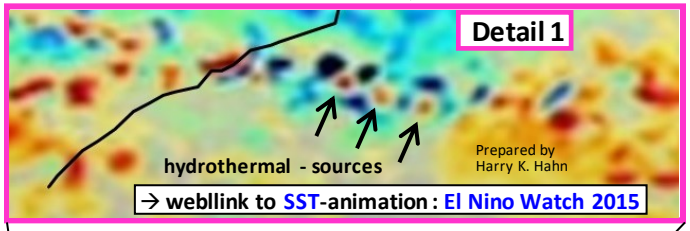


El Nino 1997-98 : date 12.2.1997 - time 0:24

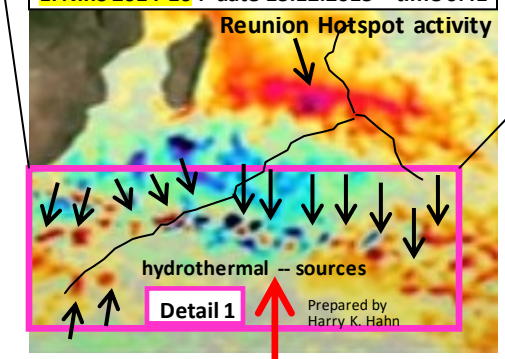




Note : the same pattern !



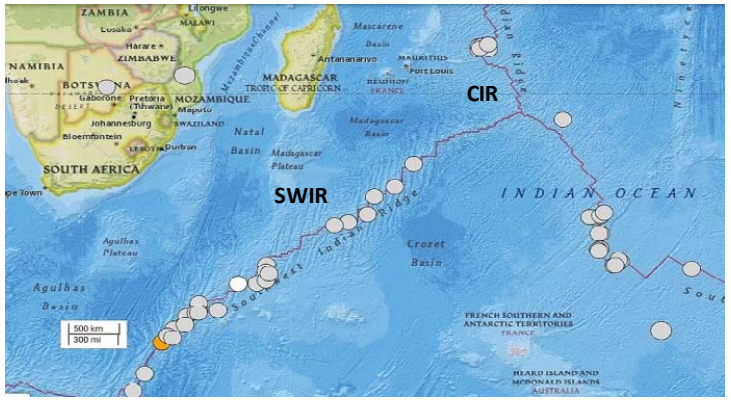
El Nino 2014-16 : date 13.12.2013 - time 0:41



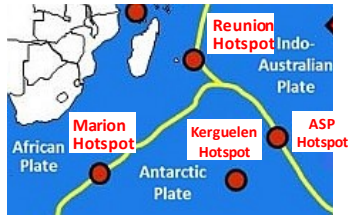
Note : At the start of the 2014-16 El Nino event the same pattern of Warm-water Blobs is visible as during the 1997-98 event ! The small red blobs indicate considerable less intensity of the hydro-thermal sources if compared with the 97/98 El Nino. Some sources are inactive. The deep blue blobs probable represent lateral up-welling cold-water.

The large Warm-water Blob that developed south of Madagascar in Jan. & Feb. 1997 during the 1997-98 El Nino was caused by many hydrothermal-/volcanic-sources (≥ 16) on the ocean-floor which are located close to the following hotspots : Marion-, Del Cano-Rise-, Crozet-hotspot, and located close to the South-West-Indian-Ridge (SWIR), the Agulhas LIP or the Kerguelen Plateau (LIP) The small red Blobs are no Eddy's on the surface ! **These blobs are stationary-hydrothermal sources as the SST-anomalies from 13th Dec. 2013 indicate ! At that date the** (nearly) **same pattern of red Blobs** (→blobs at nearly the same positions !) **is visible !** However here the hydrothermal-sources were considerable less active.

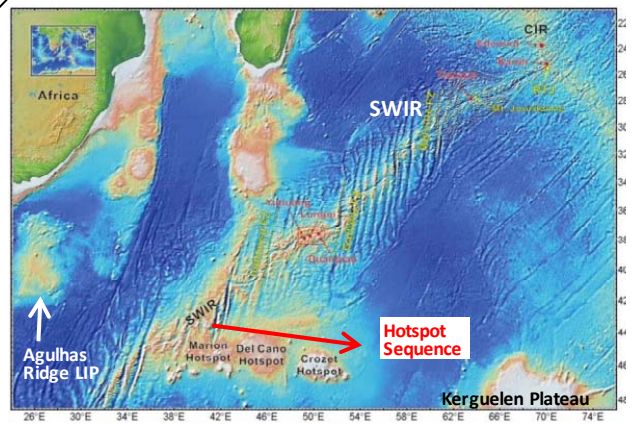
Earthquakes ≥ 6.0 along the plate boundaries – 1990 to 2023.06

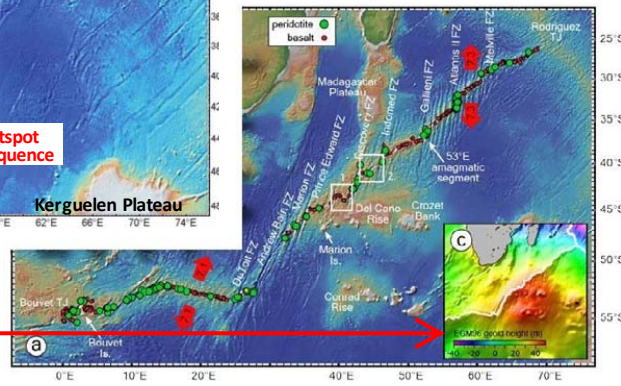


Main Hotspots & Plate Boundaries



Tectonic Map of the South-West Indian Ridge (SWIR)



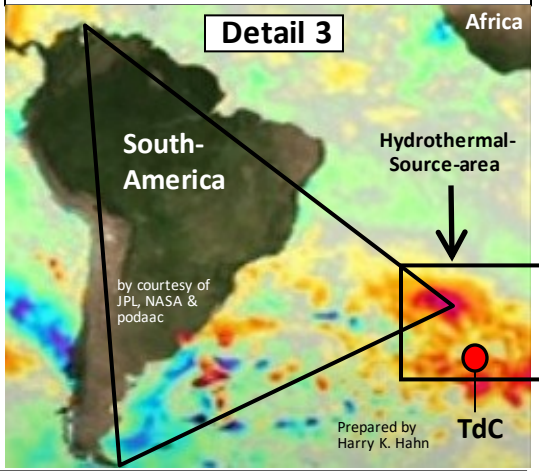


Note the **positive Geoid anomaly** under the hydro-thermal source area !

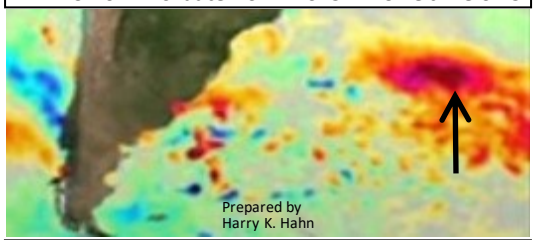
2014-16 El Nino : SST-anomalies were caused by hydrothermal-sources at tectonic-fractures near the Tristan-da-Cunha hotspot

→ weblink to SST-animation : El Nino Watch 2015

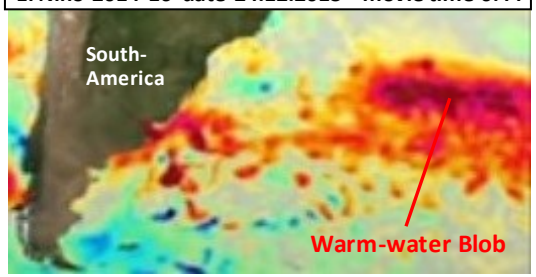
El Nino 2014-16 date 18.12.2013 - movie time 0:42



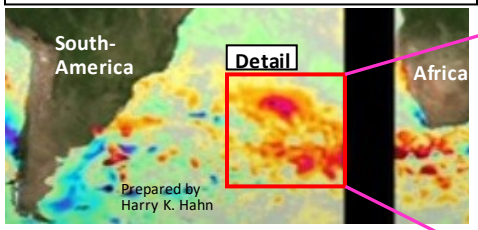
El Nino 2014-16 date 20.12.2013 - movie time 0:43



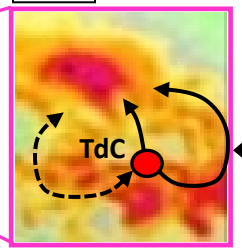
El Nino 2014-16 date 24.12.2013 - movie time 0:44



El Nino 2014-16 date 18.12.2013 - time 0:42

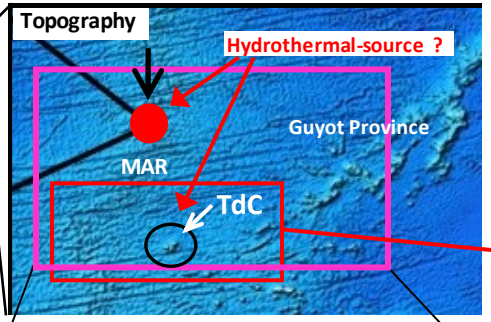


Detail

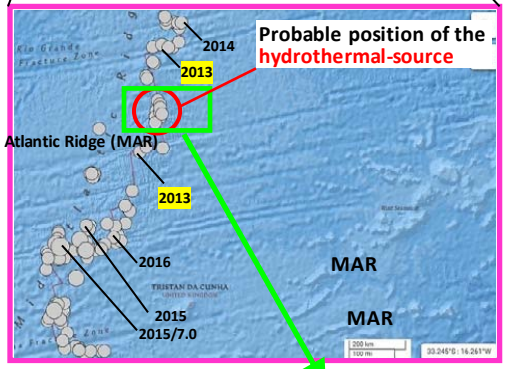


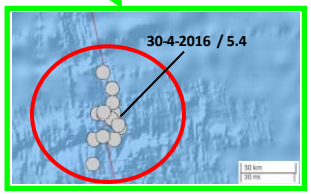
The image from 18.12.2013 shows the second possibility where Tristan da Cunha is the true hydrothermal-source and surface currents accumulated the warm water further North

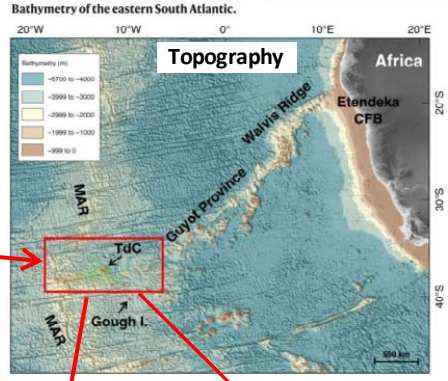
At the beginning of the **2014-16 El Nino event**, there was a strong warm-water anomaly developing in the Atlantic Ocean, starting around Dec. 18th 2013 (see images on the left). Like the other strong **SST-anomalies** of the **2014-16 El Nino** this Warm-water Blob in all probability was caused by a strong **hydrothermal-event**/ submarine volcano on the ocean floor too. Indication for this assumption comes from the fact, that the warm-water anomaly precisely developed above the Mid-Atlantic Ridge (MAR), as the center-point of the SST-anomaly indicates. This point is close to the Rio-Grande Fracture-Zone, which is orientated perpendicular to the MAR. Near the indicated area of the Mid-Atlantic Ridge (MAR) earthquakes >5.0 took place in the time 2013-16. The island **Tristan da Cunha** is located around 650 km south of the shown warm-water-blob above the MAR. Because this blob developed not far away from the **Tristan da Cunha hotspot** (TdC) where a large mantle plume is located below Earth's crust, there is the probability that the hydrothermal-water from the TdC was moved a bit northward by currents.



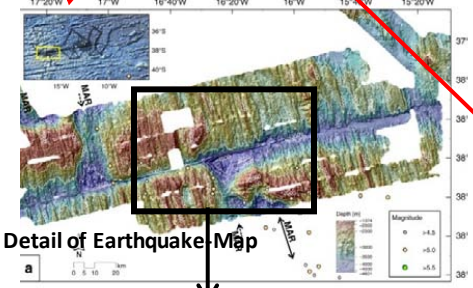
Earthquakes ≥5.0 along the MAR - 1990-2023





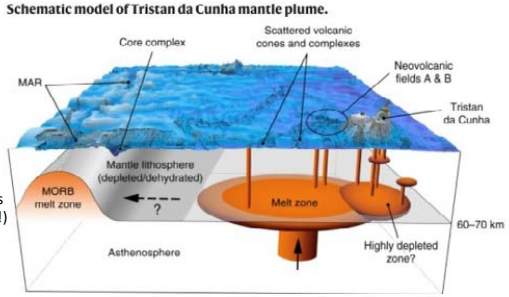


a.) Bathymetry of a Mid-Atlantic Ridge area.
Dots mark earthquake epicenters from teleseismic observations
b.) Close-up of an Oceanic-Core-Complex (rotated orientation !)
(**TTFZ** = Tristan da Cunha Fracture Zone System).



Exploration of the Tristan da Cunha area :

These images are from an exploration around **Tristan da Cunha** (TdC) that explored the submarine volcanic activity around this island, and which recorded the topography of the MAR-section west of the island. (this is the closest explored area to the hydro-thermal source which I found) → **see Study**



3D sketch of the lithosphere and potential mantle plume location SW of Tristan da Cunha. The model is based on Geissler et al.[21], Humphreys and Niu[30], and Schloemer et al.[31].

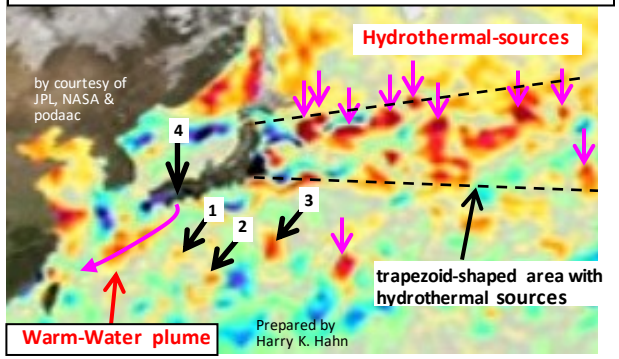
Benthic Terrain Model - Yellow dots with red ellipses mark local **earthquake epicenters associated with submarine volcanic activity** in 2004.
Areas A and B outline relatively young volcanic fields and lava flows.

2014-16 El Nino: At least 10 hydrothermal-sources in a trapezoid area east of Japan and ≥4 sources south of Japan caused SST-anomalies

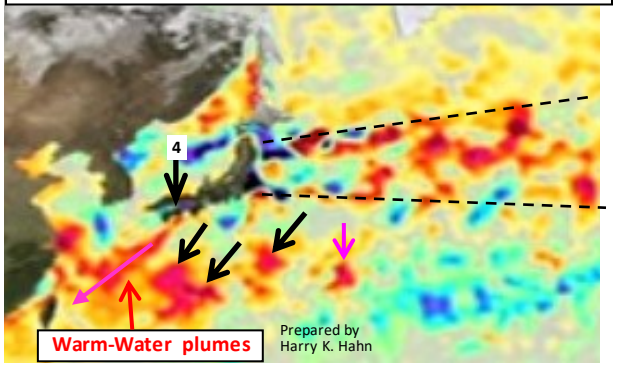
The animation of (SST)-anomalies of the 2014-16 El Nino indicates ≥10 hydrothermal/submarine-volcanic-sources in a trapezoid-shaped area east of Japan and ≥4 bigger sources south of Japan that caused warm water blobs/plumes ! I marked the approximate positions of these stationary **hydrothermal-sources** with yellow and red dots on the topographic map. And **I will describe the four yellow sources (1-4) in more detail**. The probable **hydrothermal sources 1 & 2 are located in areas with very thin Earth-crust** with **<5km** at **Pos.1** ! **Source No.3 probably is the Nishinoshima- &/or Torishima (→info) -volcanic-area. Source No. 4 is located in the Nankai-Trough-area where an extreme heatflow anomaly was detected. Note: The images below show a warm-water plume coming from this area !!** For the other red-marked sources no info was found.

→ **weblink to SST-animation : El Nino Watch 2015**

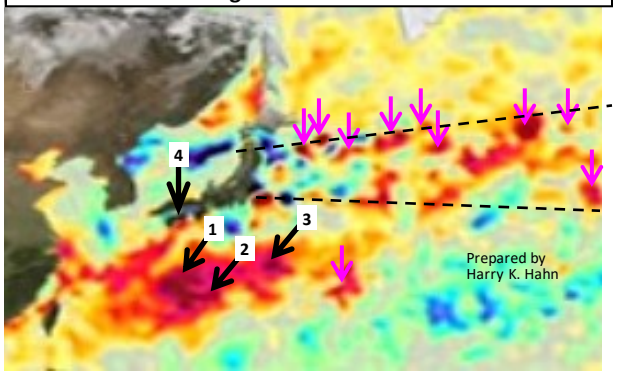
El Nino 2014-16 : image from 29.3.2015 - movie time 2:46

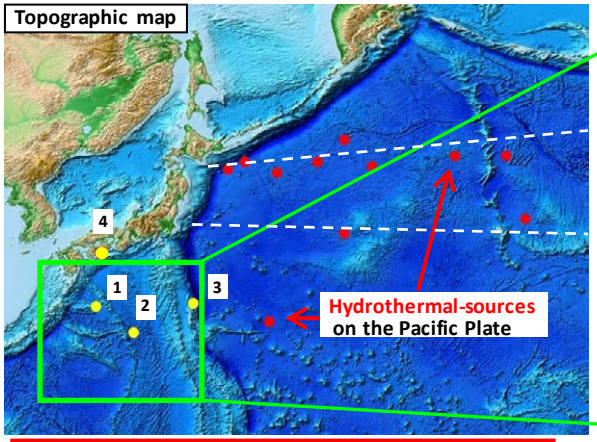


El Nino 2014-16 : image from 4.4.2015 - movie time 2:48



El Nino 2014-16 : image from 6.4.2015 - movie time 2:49

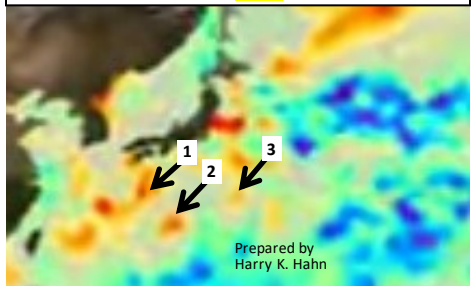




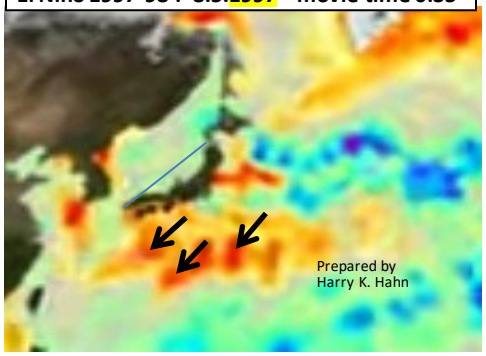
Note : During the 1997-98 El Nino event hydro-thermal-sources in the same locations south of Japan were active as during the 2014-16 El Nino !

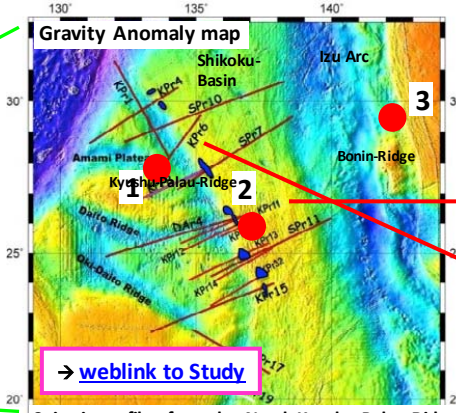
→ **Weblink to SST-animation : "1997-1998 El Nino..."**

El Nino 1997-98 : 28.4.1997 - movie time 0:34

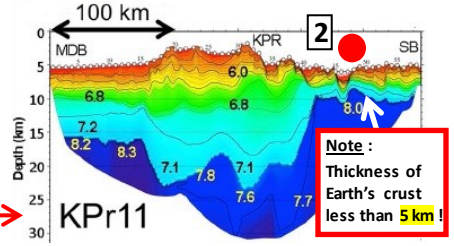


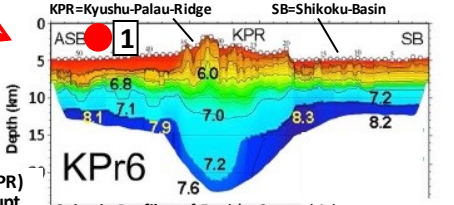
El Nino 1997-98 : 8.5.1997 - movie time 0:35





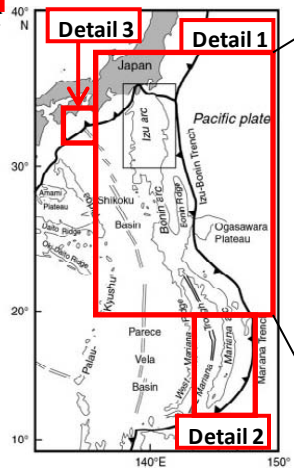
Seismic profiles from the North Kyushu-Palau-Ridge (KPR)
At the transition from the KPR to the Shikoku Basin **abrupt crustal thinning to < 5 km occurs** (→ **blue marked areas**)



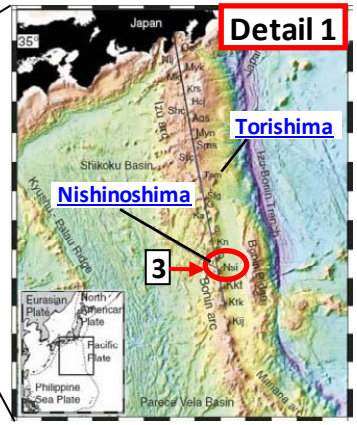


Seismic Profiles of Earth's Crust-thickness
middle crust: Vp = 6 km/s, lower crust: Vp = 6.8–7.3 km/s

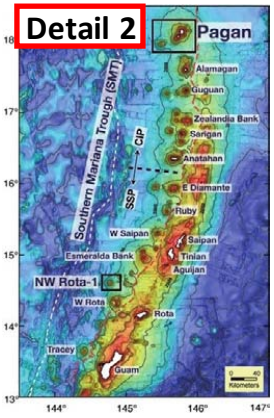
Overview map



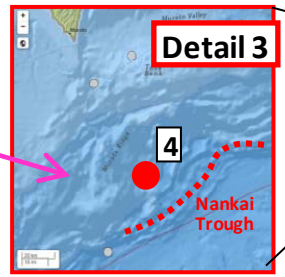
Izu Islands – see Study1 , Study2

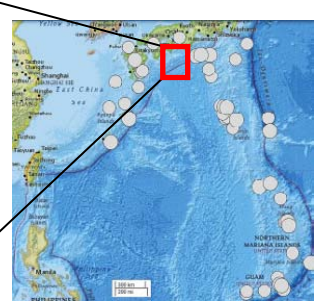


Mariana Islands



Note : An extremely high heat-flow anomaly has been detected in the central part of the Nankai Trough.
A possible cause of the anomaly is reheating of the lithosphere by post-spreading thermal activities.
→ **weblink to this Study !**

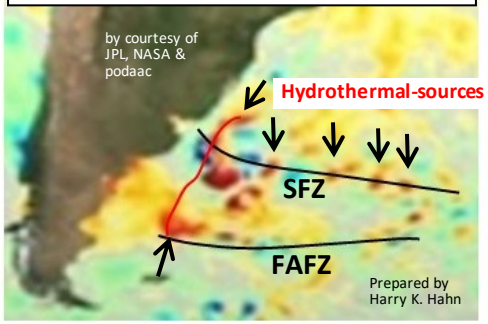




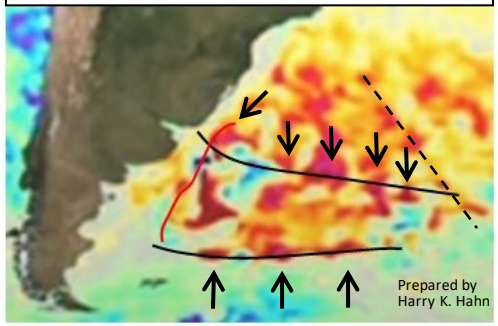
2014-16 El Nino : East of Argentina ≥ 10 hydrothermal-sources caused large SST-anomalies

In the animation SST-anomalies of the 2014-16 El Nino I have found ≥ 10 stationary hydrothermal-sources (-fields) on the ocean-floor east of the SE-coast of South-America, which caused warm water blobs/plumes east of Argentina & Brasilia ! Five of these hydrothermal-fields that were particular strong (& durable) are located along the Salado-Fracture-Zone (SFZ) And another 4 - 5 hydrothermal-sources (-fields) are located along the Falkland-Agulhas-Fracture-Zone (FAFZ) (→**see maps below**). Other sources seem to be located in the area of the Rio-Grande Rise and near the continental shelf.
I have marked the approximate positions of these hydrothermal-sources with yellow dots on the topographic map

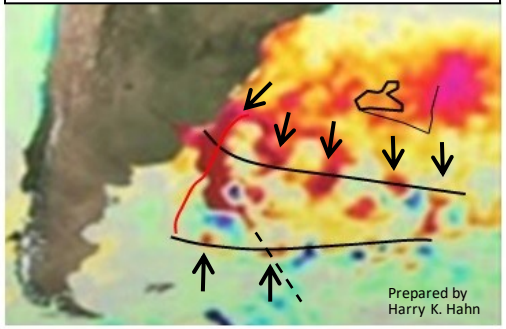
El Nino 2014-16 : 1.12.2013 - movie time 0:36



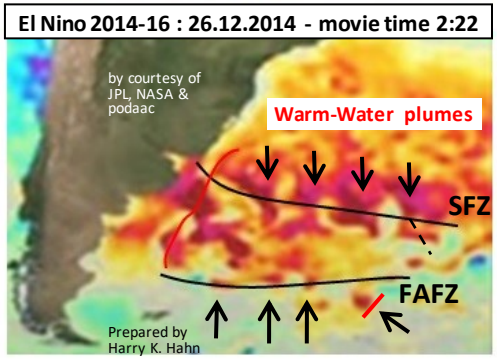
El Nino 2014-16 : 14.4.2014 - movie time 1:13



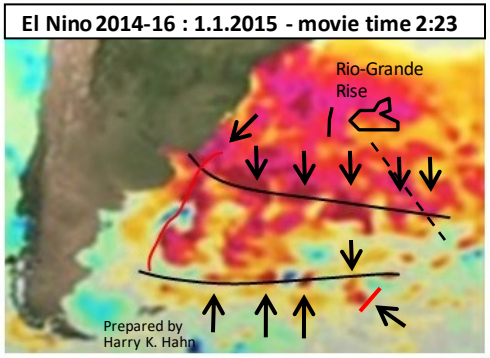
El Nino 2014-16 : 2.11.2014 - movie time 2:07



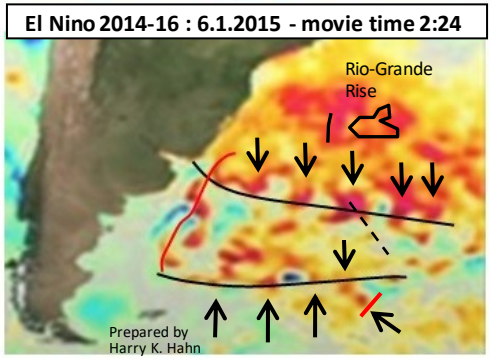
El Nino 2014-16 : 26.12.2014 - movie time 2:22



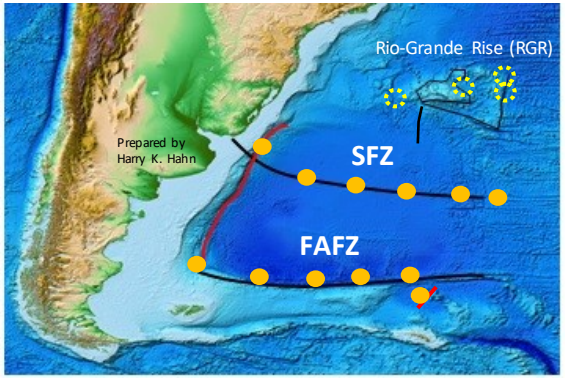
El Nino 2014-16 : 1.1.2015 - movie time 2:23



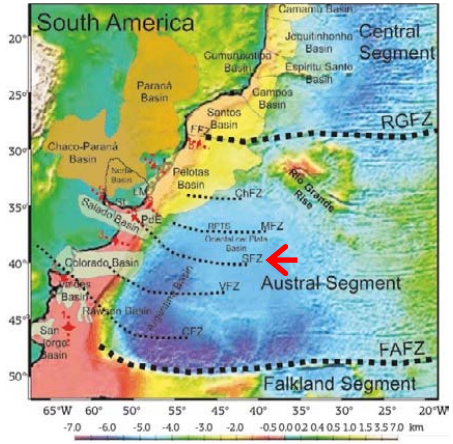
El Nino 2014-16 : 6.1.2015 - movie time 2:24



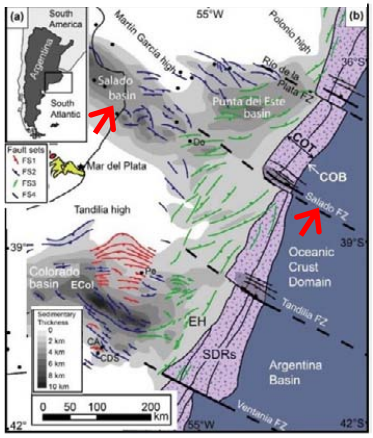
Topographic map with locations of the FAFZ, SFZ & RGR → positions of probable hydrothermal sources are marked



Topographical map of SE-South-America overlain by basins & structural elements



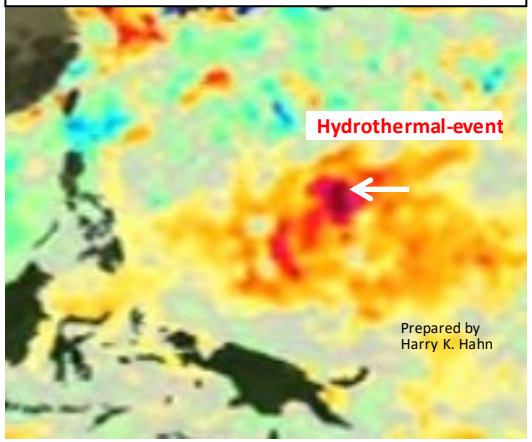
Structural map of the Colorado- and Salado -basins offhore of Argentina



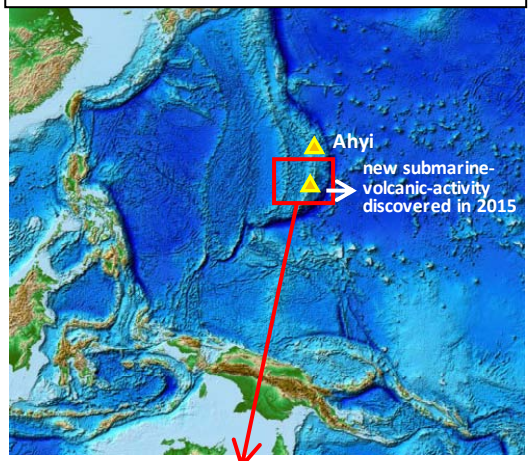
2014 : Eruption in the Mariana Arc

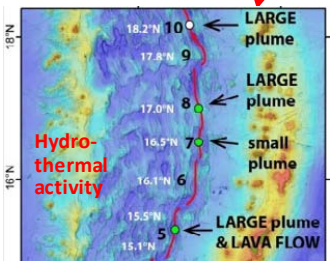
Another hydrothermal-source of the 2014-16 El Nino probably was caused by a submarine eruption-/ hydrothermal-event in the Mariana Arc-area. This is indicated by eruptions of the Ahyi-volcano on **24.4.2014** and by **new** found volcanic activity in **2015** → **Weblink1**, **Weblink2**

El Nino 2014-16 : date: 27.2.2014 - movie time 1:01



Topographic map + with position of Ahyi- volcano

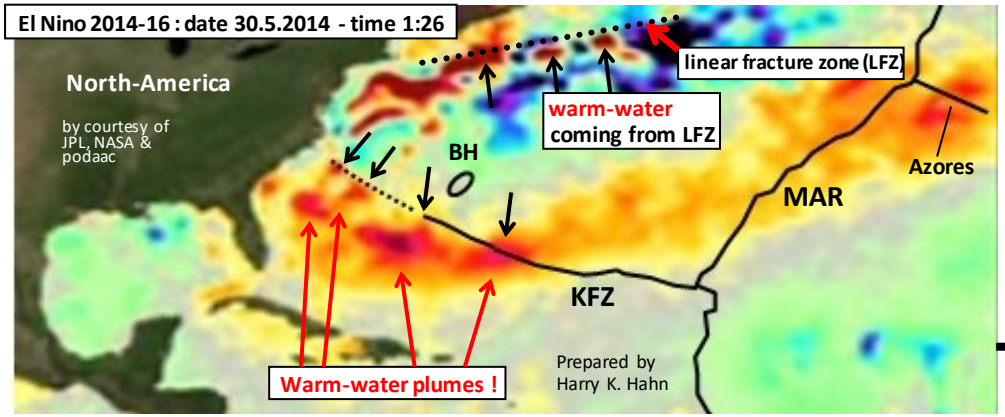




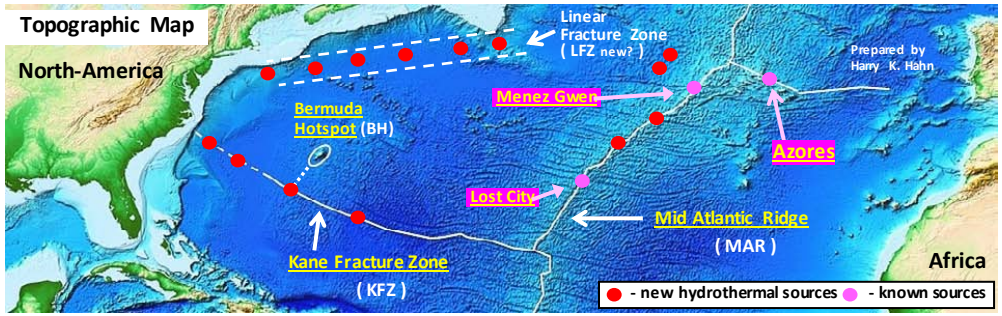
New hydrothermal vents and new lava-flows were discovered in 2015 by an expedition in the shown section of the Mariana-Arc (MA). Note: There are **≥60** volcanic-centers (sea-mounts) with **≥ 26** having hydrothermal vents in the MA → See : **Weblink**

2014-15 : Along the Mid-Atlantic Ridge, Kane Fracture-Zone and a new FZ, hydrothermal-vents caused SST-anomalies (plumes)

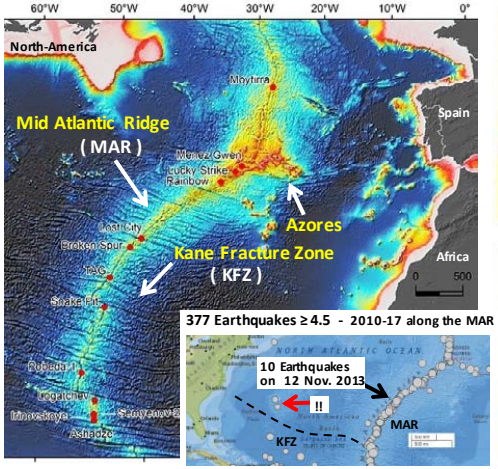
SST-anomalies of the 2014-16 El Nino show a number of active hydrothermal-sources (-fields) along the **Mid-Atlantic Ridge** (**MAR**), along a (new?) **Linear Frature Zone** (**LFZ**) and along the **Kane-Fracture Zone** (**KFZ**) which runs south of the **Bermuda Hotspot** (**BR**) from East to West. There were clearly visible warm-water plumes coming from **hydrothermal-fields** located on the **Kane Fracture Zone** (**KFZ**), on the **LFZ** and on the **MAR** in **2014** & **2015**. Two of the found **hydrothermal-fields** are already known (**Lost City** & **Menez Gwen**) see:→ **Weblink1**, **Weblink2**



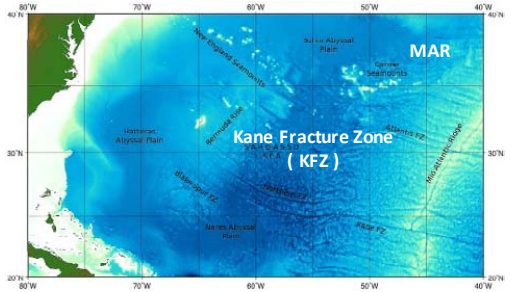
Positions of the ≥ 8 discovered hydrothermal-fields marked on the map →

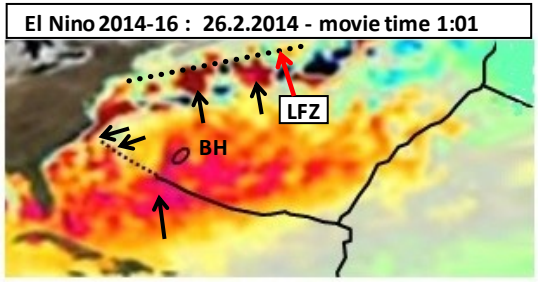


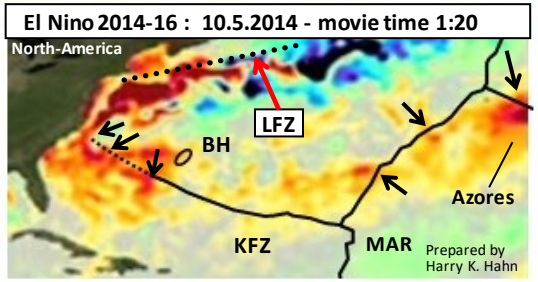
known hydrothermal-fields along the MAR

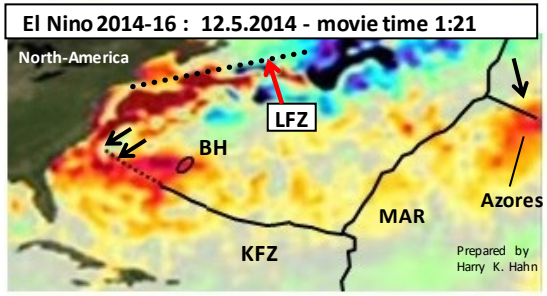


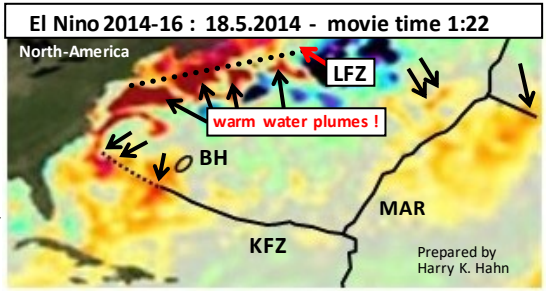
Fracture Zones & Seamount-areas in the NW-Atlantic

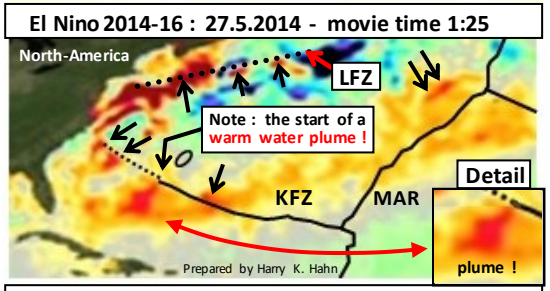


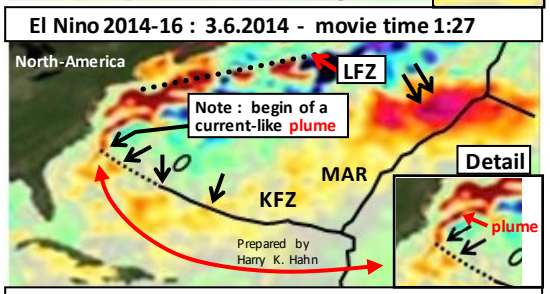


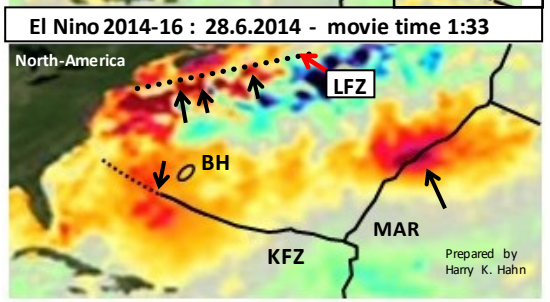


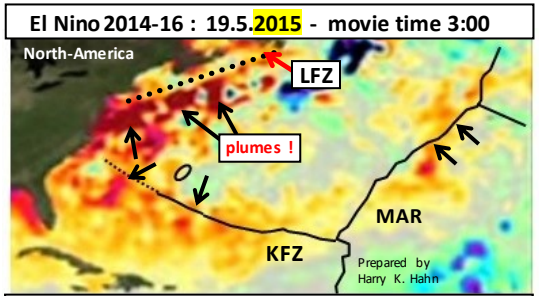


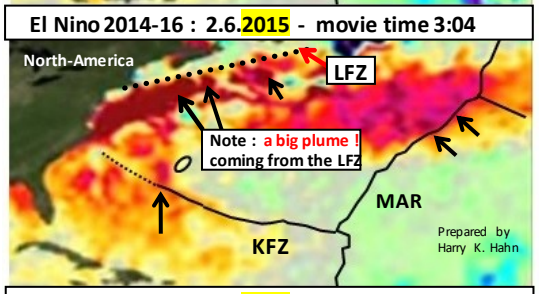


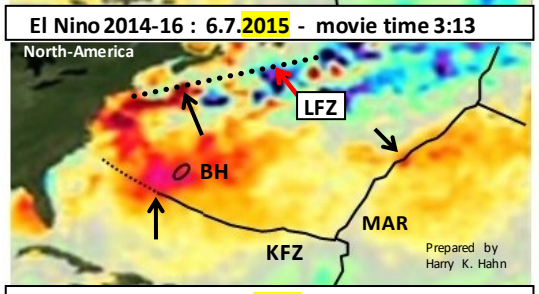


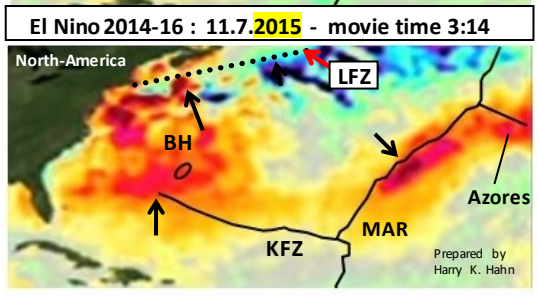












Summary & What must be done now ?

What are the consequences of the discovery that hydrothermal activity is the main cause of recent global warming ?

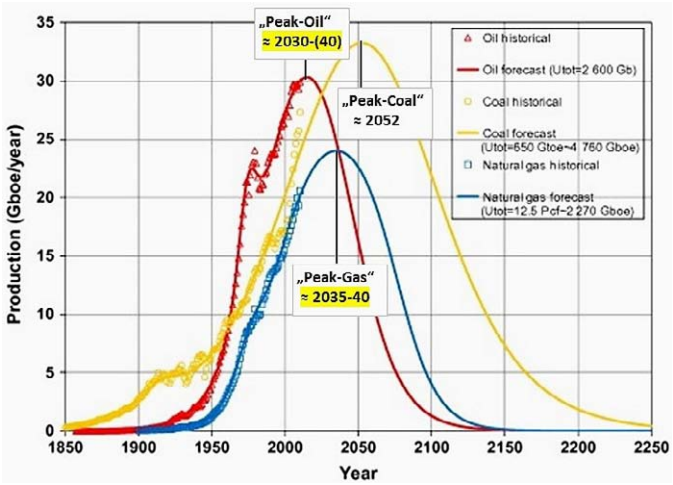
And what is the best way forward now ??

→ This will strongly depend on the further (future) development of the described global hydrothermal activity !

I believe that we just pass a kind of **„peak-situation“** regarding the described global hydrothermal activity, and that this hydrothermal-activity will slowly get weaker in the future. As decribed in **Part 2** & **Part 3** of my study, I consider changes in Earth's magnetic field as the main cause of the global hydrothermal-activity (and volcanism).

Because the strongly increased North Magnetic Pole Velocity, which is an indicator of strong geomagnetic-changes within Earth's mantle, seems to go back to a normal level until **≈2040**. And because the sun, which is causing external induced disturbances to Earth's magnetic field (trough strong solar-wind), will go into an extended „Solar-Minimum“ (similar to the **Dalton-Minimum**) in the next decades (see e.g. Study from R. Salvador), my conclusion is as follows :

Latest in the 2050-years the global hydrothermal-activity & volcanism should be back to a lower level ! It may even be the case that we then enter a global cooling period, because the Ocean-Heat-Content (0-2000 m) seems to drop if the geomagnetic (smoothed) Ap-Index ≤10, which is caused by an extended Solar Minimum (similar as in 2006-11)

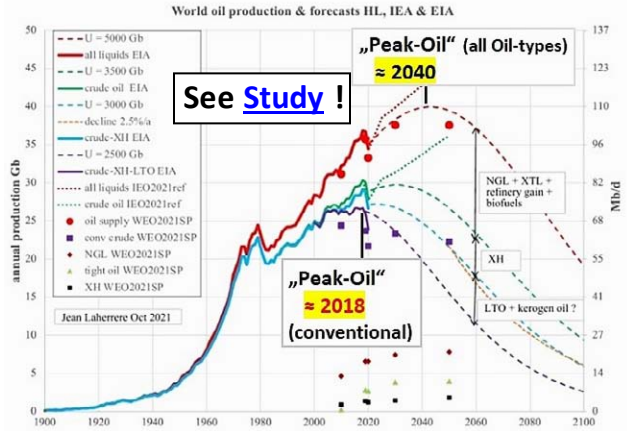


The forecast time of Peak-Oil (conventional) ; Peak-Gas and Peak-Coal

What are the consequences for the transformation of the world's energy production (industry) ?

Because hydrothermal-activity was the main-driver of global warming in the last three decades, and not CO_2 we don't have to reduce CO_2-emissions at all costs ! But we must still further follow the steady transformation of the world's energy industry towards a sustainable- & clean energy -industry, which produces less CO_2 & less pollution (e.g. coal) !

In the future we must use forecasts of the global production (supply) profiles of the main fossil energy resources as the main-reference for the transformation of the world's energy industry ! (→ see charts on the righthand side) That means we must first reduce our oil-consumption, because crude-oil is the most critical resource as the charts clearly indicate !! A senior analyst at Rystad Energy estimated, that If oil-discoveries continue trending down, we will have worldwide oil-shortages in around 2030 !! That's why we must quickly move to Electric- & H2-mobility !! Other important tasks are the protection of the rain-forrests & stopping the pollution of the Oceans with plastics !!



Comparison of crude-oil production forecasts based on URRs with those of IEA & US EIA. → red dots : Total global oil supply ; purple squares : Conventional crude oil ; green : shale oil ; black : tar sand oil

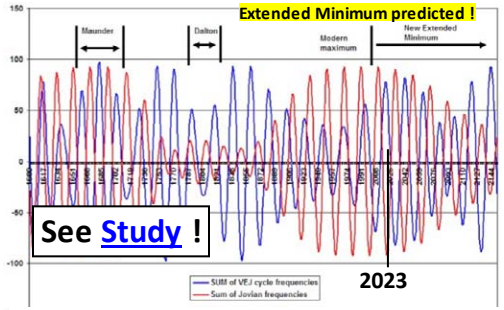


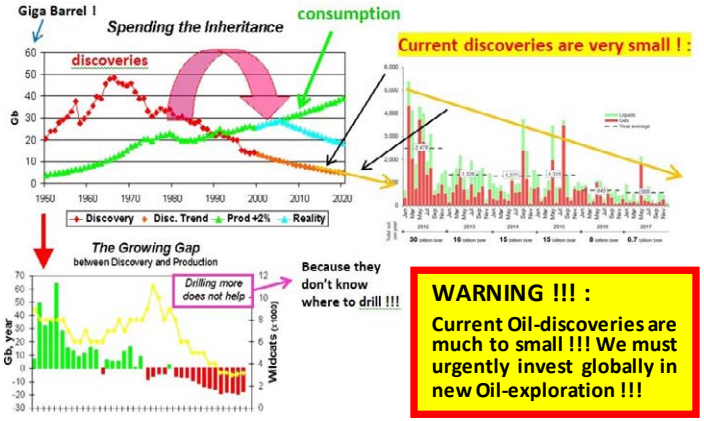
Fig.: The blue line is the interference contribution pattern for the sum of the two Venus-Earth-Jupiter (VEJ)-frequencies (19.528, 22.14), and the red line is the interference contribution for the sum of two Jovian frequencies (19.585, 21.005) to the polarity-adjusted sunspot model **for the years 1600 to 2100**. The periods of destructive interference during solar minimums and constructive interference during the solar maximum can be seen by inspection of these two interference patterns.

This model is an attempt to produce a more quantitative prediction of monthly **sunspot-number forecasts.** The model is based primarily on a **Tidal Torque theory** and **two Jovian harmonics** that account for the positioning of three Jovian Planets which influence changes in solar activity

What must be done in the Climate Research ?

Climate Reserach **needs a second group of scientists** that especially focusses on the impact of submarine hydrothermal- & volcanic–activity on our Climate, and on the influence of solar activity on Earths Magnetic Field, Volcanism and on our Worlds Climate !

Note : The solar dynamo is partially synchronized by external harmonic planetary (tidal) forcing. That's why Jovian harmonics (e.g. the **VEJ**-interactions) will allow us to make predictions for the future amplitudes of sunspot cycles. Scientist also must **access future risks** of Ultra-Plinian eruptions (→ **see Study1, Study2, Study 3**)



WARNING !!! :
Current Oil-discoveries are much to small !!! We must urgently invest globally in new Oil-exploration !!!

Appendix 1 : → How to use the NASA – Worldview tool & → How to analyse the sea surface temperature-anomalies by yourself

NASA – worldview is a free tool to analyse satellite images from ≥ 1000 data-sets (e.g. sea surface- temperatures, -anomalies, -salinity etc.)

To use this tool please follow these steps :

1.) Register as user on Worldview :

first goto :
https://www.earthdata.nasa.gov/

then goto : **Find data**
https://www.earthdata.nasa.gov/learn/find-data

then **Register**
This is necessary to be able to use Worldview

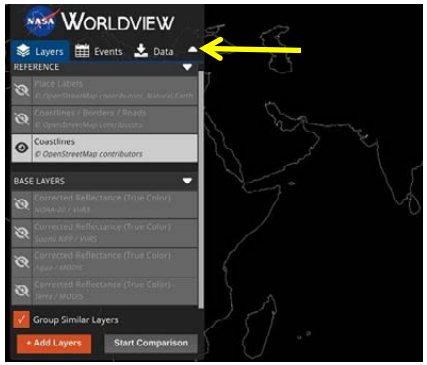
then goto : **Eartdata Login :**
https://urs.earthdata.nasa.gov/documentation/for_users/welcome

Now you can start using the map tools.

Goto : **Find Data**

← Then scroll down and clic on : **Worldview** (see image on the left)

Worldview : (direct weblink)
https://worldview.earthdata.nasa.gov/



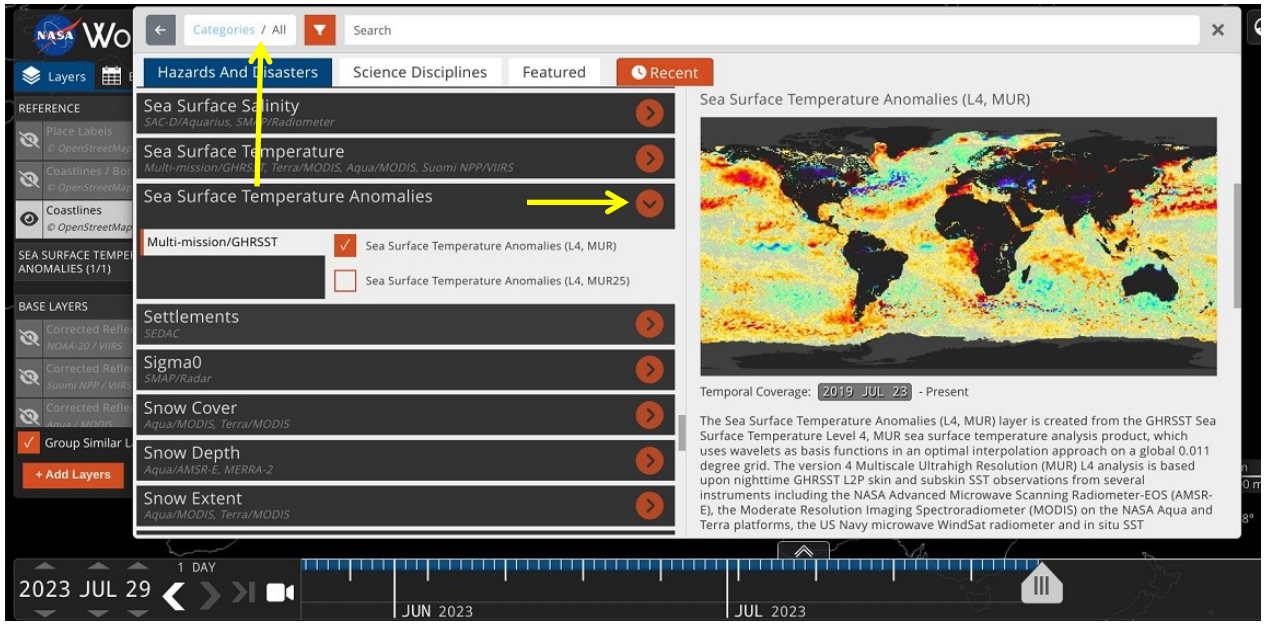
2.) Starting the map tool

To start the map-tool you must clic on the small arrow (triangular symbol) on the top menue. (→ yellow arrow) Then the shown **menue-list** appears.

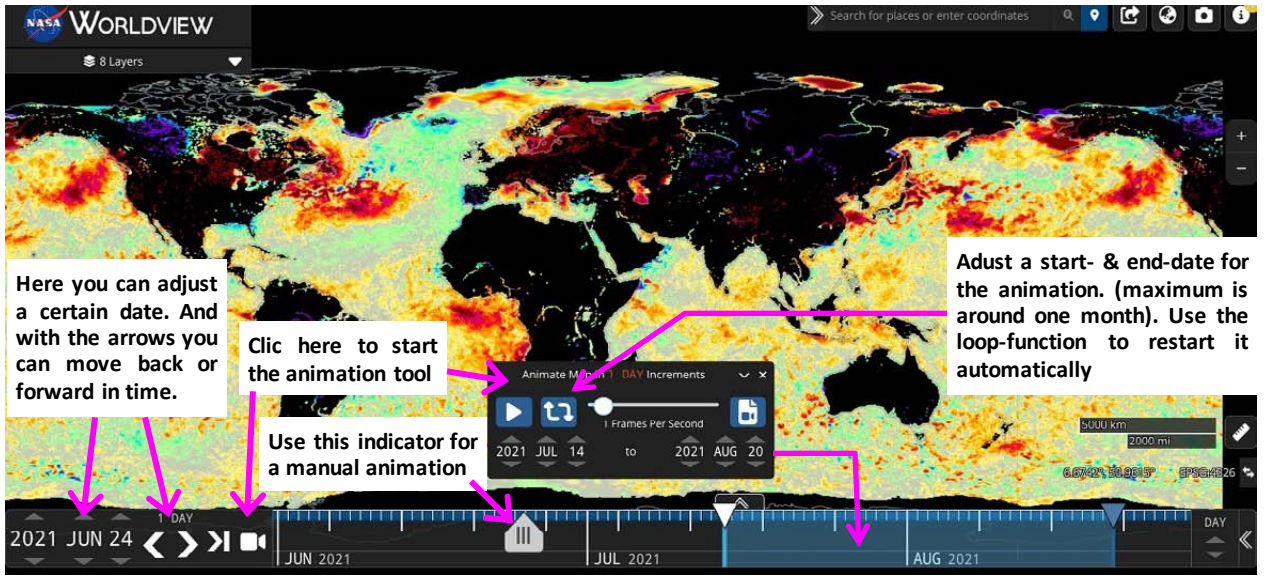
Disable all lines except of "**Coastlines**"

Then clic on "**Add Layers**"

3.) Then select the "Sea Surface Temaperature Anomalies" data-set . → Find that in the **Categorie :** All



4.) Now you can analyse the "Sea Surface Temaperature Anomalies" of the last few years in detail



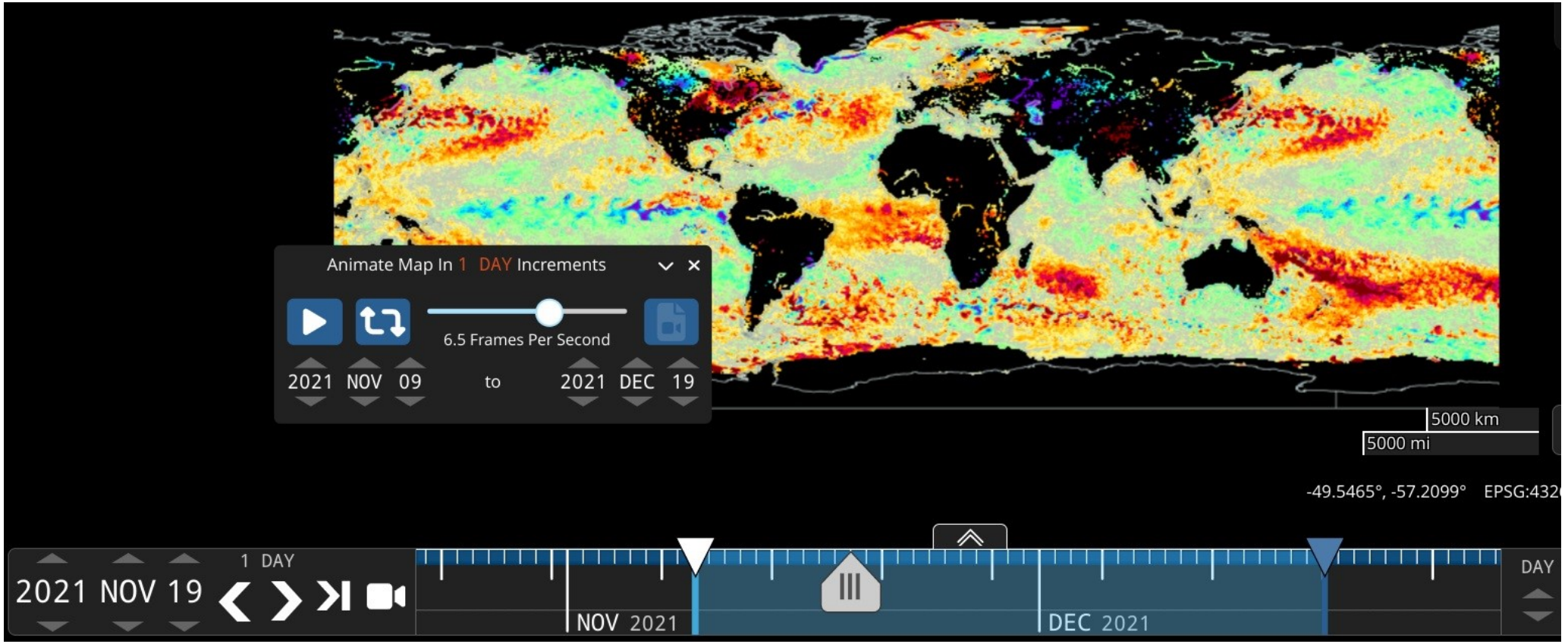
Appendix 1.1 : → Animations of the Sea-Surface-Temperature-Anomaly worldmap

→ Recommended time-periods for own studies & observations, in order to get a feeling for the described „global-hydrothermal-phenomenon“

1.) **see the Animation : El Nino Watch 2015** - by Nasa/JPL/podaac - 29 November 2015
weblink: https://podaac.jpl.nasa.gov/animations/ElNi%C3%B1o_Watch_2015
Interesting is here the time period **9.12.2013 to 21.12.2013** (12 days) in which the hydrothermal-activity reached a maximum level in at least four of the five areas (1-5)
This period corresponds to the movie-sequence 0:40 to 0:44 → This movie-sequence shows the SST-anomalies of the whole December 2013. **Please watch it a few times !**

2.) **see the Animation : 1997-1998 El Nino-Southern Oscillation (ENSO) Sea Surface Temperature Anomalies (SSTA)** - by Nasa/JPL/podaac - 12 December 2014
weblink: https://podaac.jpl.nasa.gov/node/592
Interesting is here for example the time period **15.1.1997 to 15.2.1997** (1 month) in which 3 of the 5 hydrothermally active areas get active and reach a maxima.
This period corresponds to the movie-sequence ≈ 0:20 to 0:25

3.) **use the NASA-Worldview as described on the previous page (Appendix 1) and activate the layer : „Sea Surface Temperature Anomalies (L4, MUR)“**
Interesting is here for example the time period **20.11.2021 to 20.12.2021** (1 month) in which 4 of the 5 hydrothermally active areas get active and reach maximum activity.
Just adjust the dates as shown on the image below and activate the „loop-function“ (the blue button with the two arrows) and press start. Adust a high frame-rate of 6 – 9.
Note that with NASA-Worldview only SST-anomaly datas are available from **23.7.2019** to present . To observe older SST-datas you must watch older NASA-movies, see 1.) + 2.)



Appendix 2 : El Ninos and the "warm" Pacific decadal oscillations have the same cause, activity-cycles of hydrothermal-sources on a global scale !

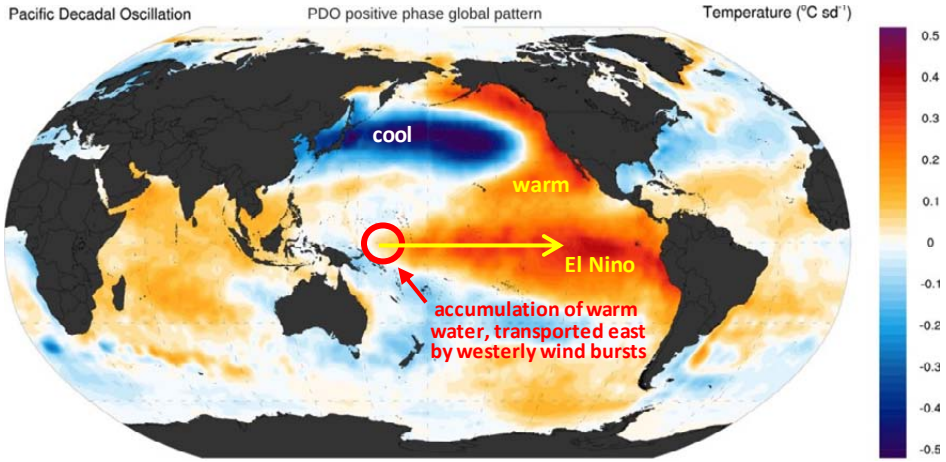
Periodic active hydrothermal-sources on the ocean floor, which are the root-cause of El Nino events, also cause "warm" PDOs !

→ the **Pacific decadal oscillation** (**PDO**) is a recurring pattern of ocean-atmosphere climate variability centered over the mid-latitude Pacific-basin. During a "warm, or "positive", phase of the PDO, the West-Pacific becomes cooler and part of the eastern ocean warms during a "cool", or "negative", phase, the opposite pattern occurs. (→ see image below !) → the video time **0:03-0:07** shows the **2014 warm-PDO**

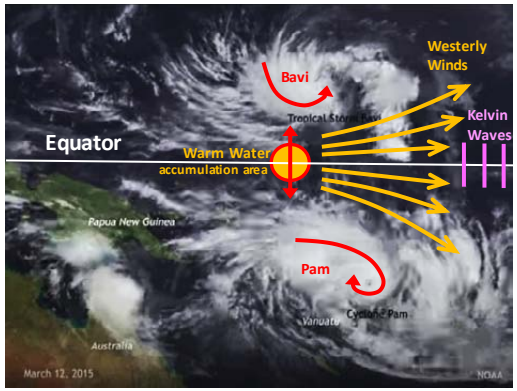
In early 2014 there was a flip from the cool PDO-phase to the warm PDO-phase, which is similar to a long and extended El Niño event.

This warm PDO-phase caused warm surface-water (the Blob) along the US-west-coast (→see news article), and record-breaking surface temperatures worldwide in 2014, and it represented in principle the fore-runner (pre-stage) of the **strong 2014-16 El Nino event** !
The start of an El Nino event was indicated by a large area of warm surface-water near the international date-line (near the Marshall- & Gilbert-Islands). In the same area a large atmospheric convection was present in association with the development of an unusual amount of early-season tropical cyclones. After Typhoon Higos developed during February 2015, this indicated the start of an **El Nino**.

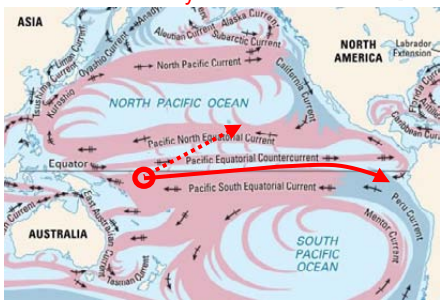
The image below shows the warm-phase of the Pacific decadal oscillation (PDO) and an El Nino event. During this warm-(PDO) phase the West-Pacific becomes cooler and part of the East-Pacific warms. **Both events result from a global event in which many hydrothermal-sources on the ocean floors are active.**



The image shows the **twin** tropical cyclone (storms) Pam & Bavi that formed on both sides of the equator in March 2015 → **Movie of Pam & Bavi** / **Weblink2**



The map below shows the **ocean currents** of the Pacific Ocean. The map shows that the **Pacific North Equatorial Current** would normally prevent a transport of warm water from the Marshall islands to the **west-coast** of the USA. But strong westerly wind-bursts can cause westerly-surface-currents **w → NE**



How can hydrothermal-sources cause El Nino events ? :

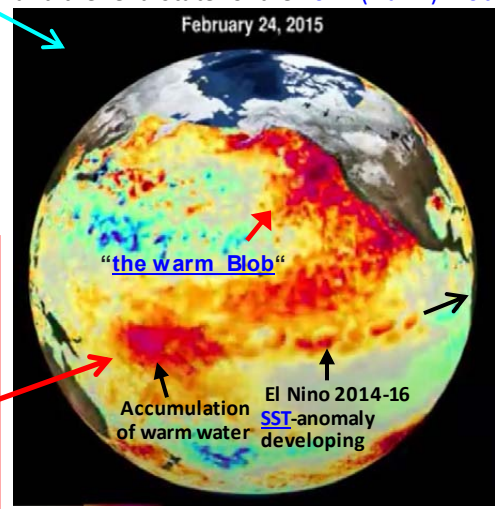
1.) A global event in which many hydrothermal-sources on the worlds ocean floors are active causes big amounts of warm water that accumulates in the Pacific, especially in the West-Pacific near the date-line at the Equator.

2.) This big amount of warm water in the West-Pacific causes big convection cells near the equator which cause cyclones just **north** & **south** of the equator. Because of the Coriolis Force this causes counter-rotating storms which cause strong westerly-wind-bursts & Kelvin-wave-systems that transport the warm water to South-America

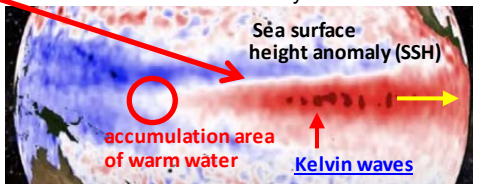
Description of the 2014-16 El Nino event :

A change of the Pacific climate towards El Nino conditions was first indicated in late 2013 by an intense burst of typhoon-activity towards the end of 2013, and by persistent westerly winds until the begin of 2014 at equatorial Latitudes, which were displaced eastwards towards the Marshall Islands.
This typhoon-activity and the Westerly winds moved warm water from the Marshall- & Gilbert-Island-area to the US west-coast by June 2014. → this phenomenon was called "the (warm) Blob"
In the equatorial area an intense **easterly**-wind-burst in June 2014 stalled (delayed) the development of an **El Nino** for a few months. Then in January 2015, westerly wind-burst-activity picked up again, and the first Kelvin wave developed around March and another formed around May. (→ a Kelvin wave balances the Coriolis force against the equator. It is a wind-generated wave).
More such Kelvin Waves developed and moved large amounts of warm water from west to east to South-America, along the equator, in the second-half of 2015 and early in 2016.
The first Kelvin wave event was caused by **strong** westerly windburst events which were produced by the **twin** tropical cyclones (storms) **Pam** & **Bavi** that were positioned on both sides of the equator in March 2015. More such **twin-cyclone events**, which produced Kelvin waves, took place in July, October and in December 2015 into January 2016, causing the 2014-16 El Nino.

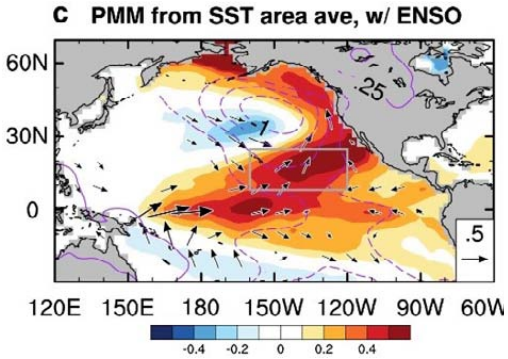
→ **The image below is from the video : "Contrasting the 97/98 & 2014-16 El Nino"**
The video shows Sea Surface Temperature anomalies of the extreme 2014-16 El Nino and the "end-state" of the 2014 (warm) Blob



The image below shows the **warm westerly-surface-current** (Kelvin waves) that causes the 2014-16 El Nino indicated by **SSH-anomalies**



→ **video : "MEaSUREs SSH-anomalies V2205**



Regression of the Pacific Meridional Mode (PMM) onto SST-anomalies (in °C), surface winds (in m/s, vectors), and sea-level pressure, without removing ENSO-(El Nino) Variability → **See this Study**

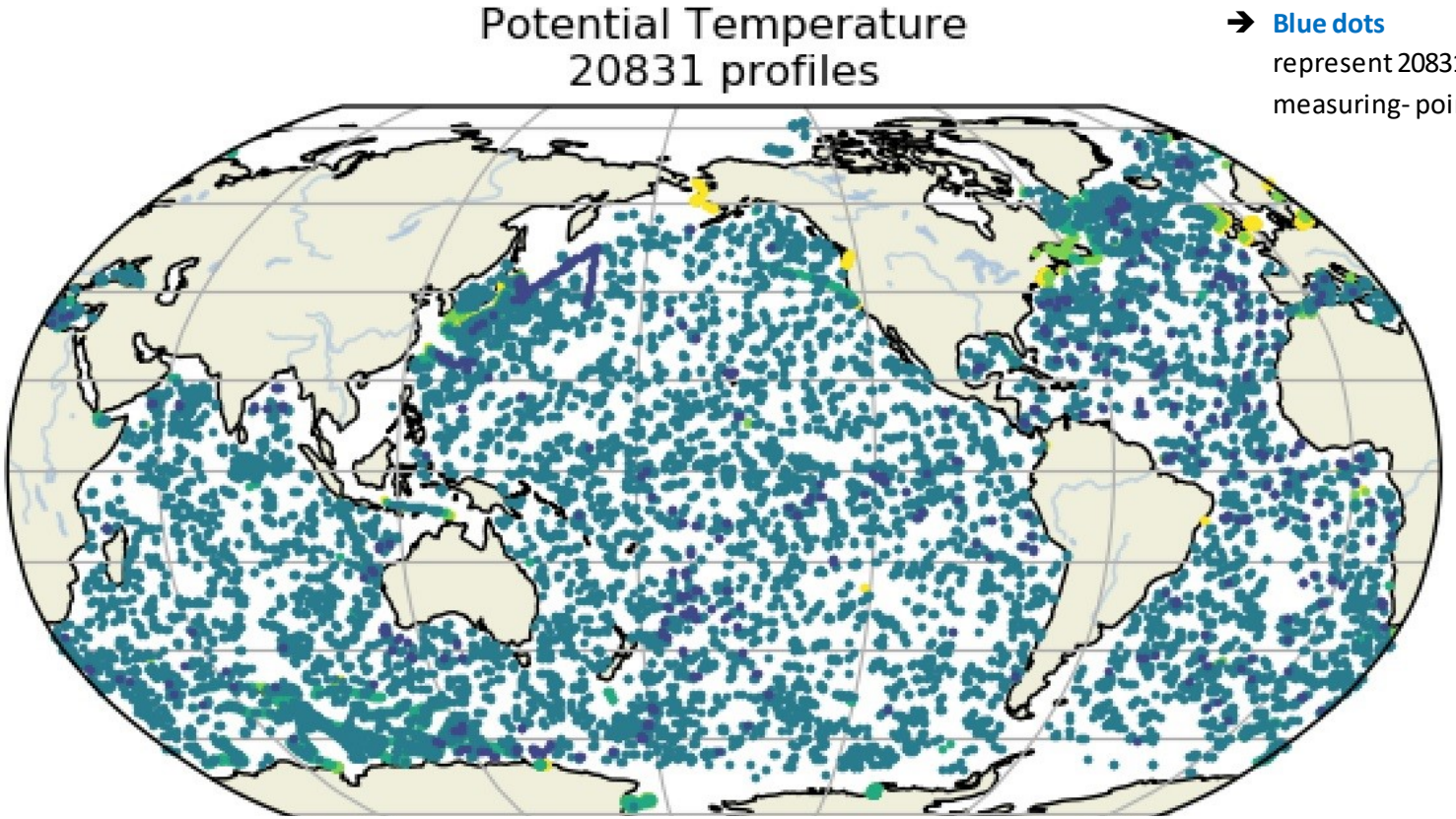
Appendix 3 : Info to the EN4 (Chart) → subsurface temperature- and salinity- measurements for the global oceans

EN4 → is a **subsurface temperature and salinity dataset for the global oceans, spanning 1900 to present at a monthly timestep**. It includes two types of data products: (1) a database of quality-controled *in situ* profiles and (2) **a spatially complete analyses at 1 by 1 degree horizontal resolution and 42 depth levels for 83S to 90N. Input data include Argo (Argo, 2000), ASBO (Arctic Synoptic Basinwide Oceanography), GTSPP (Global Temperature and Salinity Profile Program) and WOD13 (World Ocean Database). The profiles include quality control flags while the analyses include observation weighting and standard error information.**

EN4 is used for monitoring ocean heat content and thermostreric sea level, initializing models and forecasts, and satellite data validation, among other applications. Due to the sparseness of ocean observations in some regions and time periods, studies of trends and variability should be approached with caution. Where observations are lacking, EN4 relaxes to a 1970-2000 climatology. Users should check the observation weights when doing such analyses.

See weblink : https://climatedataguide.ucar.edu/climate-data/en4-subsurface-temperature-and-salinity-global-oceans

and : https://en.wikipedia.org/wiki/Argo_(oceanography) → **Argo** : international program that uses profiling floats



→ **Blue dots** represent 20831 measuring- points

References :

Please also read Part 2 & Part 3 of my Climate-Change-Hypothesis :

Weblink : → **Part 2** : **Changes in Earth's Magnetic Field are a main cause of Volcanism, Earthquakes, HGFA-seismicity & Global Warming** - by Harry K. Hahn

Weblink : → **Part 3** : **Correlation of Volcanism with geomagnetic-changes (solar storms and North-Pole shift) - List of geomagnetic storms from 1800-2023**

Sources of the Sea-Surface-Temperature (SST)-Anomaly - Maps used in my Analysis :

NASA Worldview : → direct weblink : https://worldview.earthdata.nasa.gov/ - **Note : To use Worldview it is necessary to Register !! → see exlanation in Appendix 1 !**

Short explanation : → **How to register** : → first goto : https://www.earthdata.nasa.gov/ → then goto : **Find data :** https://www.earthdata.nasa.gov/learn/find-data
→ then **Register** → then goto : **Eartdata Login :** https://urs.earthdata.nasa.gov/documentation/for_users/welcome
Now you can start using the **Worldview map tools**.! → Go again to : **Find Data** https://www.earthdata.nasa.gov/learn/find-data → Then scroll down and clic on : **Worldview**

Animations (Movies) of the Sea-Surface-Temperature Anomalies of the 1997/98 El Nino and the 2014-16 El Nino :

Animation : El Nino Watch 2015 - by Nasa/JPL/podaac - 29 November 2015
weblink : https://podaac.jpl.nasa.gov/animations/ElNi%C3%B1o_Watch_2015

Animation : 1997-1998 El Nino-Southern Oscillation (ENSO) Sea Surface Temperature Anomalies (SSTA) - by Nasa/JPL/podaac - 12 December 2014
weblink : https://podaac.jpl.nasa.gov/node/592

Animation : Contrasting the 1997-98 and 2015-16 El Nino Events - by Nasa/JPL/podaac - 30 September 2016
weblink : https://podaac.jpl.nasa.gov/animations/Contrasting_1997_98_and_2015_16_El_Nino_Events

Animation : MEaSUREs Gridded Sea Surface Height anomalies – Version 2205 - by Nasa/JPL/podaac - 15 June 2022
weblink : https://podaac.jpl.nasa.gov/animations/MEaSUREs-Gridded-Sea-Surface-Height-Anomalies-Version-2205

Studies regarding the Ocean-Heat-Content (OHC) and the fluctuations in the sea-surface-temperature (SST) :

EN4 – Global Ocean Heat Content dataset (chart) - by UCAR
weblink : https://climatedataguide.ucar.edu/climate-data/en4-subsurface-temperature-and-salinity-global-oceans

Reconstructing Ocean Heat Content for Revisiting Global Ocean Warming from Remote Sensing Perspectives - Hua Su , Tian Qin, An Wang and Wenfang Lu
weblink : https://www.mdpi.com/2072-4292/13/19/3799

20 century cooling of the deep ocean contributed to delayed acceleration of Earth's energy imbalance - by A. Bagnell , T. DeVries
weblink : https://www.researchgate.net/publication/353554359_20_century_cooling_of_the_deep_ocean_contributed_to_delayed_acceleration_of_Earth's_energy_imbalance

An Ocean View of the Global Surface Warming Hiat - by Wei Liu & Shang-Ping Xie
weblink : https://www.researchgate.net/publication/327151730_An_Ocean_View_of_the_Global_Surface_Warming_Hiat

A fluctuation in surface temperature in historical context: reassessment and retrospective on the evidence - by James S Risbey , S. Lewandowsky & others
https://www.researchgate.net/publication/329763956_A_fluctuation_in_surface_temperature_in_historical_context_Reassessment_and_retrospective_on_the_evidenc e

General : Studies to Hydrothermal-Vents, Submarine-Eruptions, Tectonic-Fracture-Zones, Mantle-Plumes & Large-Igneous-Provinces

On the Global Distribution of Hydrothermal Vent Fields - by Edward T. Baker & Christopher R. German
weblink : https://www.pmel.noaa.gov/pubs/outstand/bake2544/bake2544.shtml

Volcanic Eruptions in the deep sea - by Kenneth H. Rubin, S. Adam Soule & others
weblink : https://www.researchgate.net/publication/236589699_Volcanic_Eruptions_in_the_Deep_Sea

Marine Transform Faults and Fracture Zones: A Joint Perspective Integrating Seismicity, Fluid Flow and Life - by Christian Hensen, Joao C. Duarte & others
weblink : https://oceanrep.geomar.de/id/eprint/46240/1/feart-07-00039.pdf

Mantle Plumes - by Cinzia G. Farnetani & Albrecht W. Hofmann
https://www.ipgp.fr/~cinzia/2011-FarnetaniHofmannNEW.pdf

Low velocity channels in the oceanic asthenosphere from full waveform inversion using Spectral Element Method - by Scott French, Vedran Lekic & B. Romanowicz
Weblink 1 : https://seismo.berkeley.edu/wiki_br/Low_velocity_channels_in_the_oceanic_asthenosphere_from_full_waveform_inversion_using_the_Spectral_Element_Method
Weblink 2 : https://cs.lbl.gov/news-media/news/2013/new-model-of-earth-s-interior-reveals-clues-to-hotspot-volcanoes/ → see also Weblink 3 : **3D-animation**

Large Igneous Provinces : Crustal Structure, dimensions, and external consequences - by Millard F. Coffin & Olav Eldholm
weblink : http://www.mantleplumes.org/WebDocuments/Coffin94_RevGeophysr.pdf

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Studies regarding the described hydrothermal active areas : 1 - 5 → Studies to volcanism, hydrothermal-activity, earthquakes etc. in these areas

1 - South-west Pacific :

Submarine hydrothermal activity along the mid-Kermadec Arc, New Zealand: Large-scale effects on venting - by C. E.J. de Ronde , E.T. Baker and others
weblink : https://www.researchgate.net/publication/235764446_Submarine_hydrothermal_activity_along_the_mid-Kermadec_Arc_New_Zealand_Large-scale_effects_on_venting

Two Decades of Monitoring Hydrothermal Plumes at the Brothers Submarine ArcVolcano, Kermadec Arc, New Zealand - by Walker, S. , de Ronde, C., Baker, E.
weblink : https://ui.adsabs.harvard.edu/abs/2018AGUFM.V33A..03W/abstract alternative → Weblink 2

The largest deep-ocean silicic volcanic eruption of the past century - by REBECCA CAREY, S. ADAM SOULE, MICHAEL MANGA and others
weblink : https://www.science.org/doi/10.1126/sciadv.1701121

2019-2020 South Pacific Blob and Antarctica warming in February 2020 - by Wyss W.-S. Yim & Alvin Wong
weblink : https://www.researchgate.net/publication/355158638_2019-2020_South_Pacific_Blob_and_Antarctica_warming_in_February_2020
→ **see lecture on YouTube – movie :** https://www.youtube.com/watch?v=dxBEIsvlKGo → **South-Pacific Blob** : start around **6:30** - start of blob description at around 12:20 to 19:00 , and see also the Info to the **North Pacific blob** : → **see section 3:45 - 5:15** , caused by the Nishinoshima submarine volcano

Earth's deepest earthquake swarms track fluid ascent beneath nascent arc volcanoes - by Lloyd T. White , Nicholas Rawlinson and others
weblink : https://core.ac.uk/download/pdf/222805845.pdf

Analysis and Impact of the Hunga Tonga-Hunga Ha'apai Stratospheric Water Vapor Plume - by M. R. Schoeberl , Y. Wang & others
weblink : https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2022GL100248

Tonga's strange volcanic eruption was even more massive than we knew - BY MAYA WEI-HAAS
weblink : https://www.nationalgeographic.com/science/article/tonga-volcano-largest-eruption-pacific-ocean-tallest-plume#:~:text=Newsletters-,Tonga's%20strange%20volcanic%20eruption

An examination of the junction between the Solomon Sea Plate, the Bismarck Plates and the Pacific Plate - by Keren Francis 2018
weblink : https://www.geolsoc.org.uk/~/media/shared/documents/education%20and%20careers/Plate%20tectonic%20stories/Keren%20Francis.pdf?la=en

The Gilbert Islands Earthquake Swarm of 1981-83 (→ 86 earthquake-events had : **mb > 5.0** & 217 events had : **mb > 4.0**) - by Thorne Lay & Emile Okal
weblink : https://websites.pmc.ucsc.edu/~thorne/TL.pdfs/LO_Gilbert_PEPI1983.pdf

Giant palaeotsunami in Kiribati (Gilbert Islands) in the 16th century : Converging evidence from geology and oral histor y
weblink : https://onlinelibrary.wiley.com/doi/10.1111/iar.12417?af=R

The Melanesian Volcanos – some of the top-10 SO_2 emmiting volcanos on Earth are located in this area
weblink : https://www.volcano-waka-lab.com/volcanoes or : https://www.volcano-waka-lab.com/

2 - Southern-Ocean & Indian-Ocean :

Tectonic Background of Four Hydrothermal Fields Along the Central Indian Ridge - byKyoko Okino , Kentaro Nakamura
weblink : https://link.springer.com/chapter/10.1007/978-4-431-54865-2_11

Influence of the Reunion/Rodrigues Hotspot on the Structure of the Central IndianRidge Near 19\deg S - by Anne Briais , Marcia Maia
https://www.researchgate.net/publication/241529713_Influence_of_the_ReunionRodrigues_Hotspot_on_the_Structure_of_the_Central_Indian_Ridge_Near_19deg_S

Geology and Morphostructural Evolution of Piton de la Fournaise - by Laurent Michon, Jean-Francois Lenat & others
weblink : https://hal.science/hal-01147341/document

Climatic impacts of the SW Indian Ocean Blob - by Wyss W.-S. Yim
weblink : https://www.researchgate.net/publication/337210565_Climatic_impacts_of_the_SW_Indian_Ocean_Blob

Seafloor evidence for pre-shield volcanism above the Tristan da Cunha mantle plume - by Wolfram H. Geissler , Paul Wintersteller , Marcia Maia
weblink : https://www.nature.com/articles/s41467-020-18361-4

Widespread Neogene volcanism on Central Kerguelen Plateau, Southern Indian Ocean – by R. A. Duncan, Trevor J. Fallon and others
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Please also read my Hypothesis about the Permian Triassic Impact-Event (PTI) → weblinks to the Parts 1 to 6 of my hypothesis : → available on **vixra.org**

Weblinks to my studies on → vixra.org :

Part 1 : https://vixra.org/abs/2012.0210
Part 2 : https://vixra.org/abs/2101.0052
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