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ELF and other frequencies

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zonabi

Registered User
145 posts

i have come to wonder why the government likes to do ELF testing and shoot ELF waves throughout our oceans. most of the answers i get when searching are conspiracy theories that would sicken most of the viewers of this forum.

so, aside from the speculations, i want to know if anyone here is familiar with the ELF frequencies, where tests are conducted, howcome underwater bases are sending ELF waves at 200+ dB into the ocean, killing the water animals that live there, such as whales and dolphins?

Other concerns i have are HPM technologies and the workings thereof. Is anyone familiar with this? and can provide me useful info?

I see no logical reasons to use these technologies, other than to directly alter a human's conciousness, or effects thinking patterns of humans; since these waves effect our own magnetic fields and waves that our human bodies function on.

nobody else sees these testings and ELF things a bit wierd?

03-15-04, 01:44 PM

[reply](#)

Nasor

Registered User
1,190 posts

What is ELF? Extremely Low Frequency? I imagine it has something to do with sonar, underwater mapping, or something similar.

03-15-04, 01:49 PM

[reply](#)

blackholesun

Registered User
316 posts

Extremely Low Frequency *sound* can travel for thousands of miles through land and water. The military likes to use it to communicate with our nuclear subs at depth. The subs deploy a mic boom behind them to receive the transmission. The trouble is that, yes, it sometimes can interrupt the sensory organs of certain marine life at the powers they broadcast at, which isn't good. It's not weird, and I don't see how ELF *radiation* (another technique they use for deep sea communications in which a long antenna is dragged behind a sub) could control my thoughts...that's more of a "don't know shit for science kook" thinking, since a cell phone should make us all zombies too.

Last edited by blackholesun : 03-15-04 at 03:51 PM.

03-15-04, 03:44 PM

[reply](#)**Stokes Pennwalt**Only one way to be sure..
872 posts

ELF is RF between 0 and 30khz. It propagates through the earth because its waves are so long that it takes a huge, monolithic, conductive object to absorb or reflect them. In order for RF to be reflected it needs to strike an object as large or larger than its wavelength. ELF reduces the chances of this by using really, really long waves.

The drawbacks are that you need gigantic antennas to receive them, because the transmission/reception process uses the same rules as the reflection/refraction process does. We're talking transmission sites with antennas a mile long for a full wave antenna. Also, with such low frequencies, bandwidth is infinitesimally tiny, so the only modulation mode that can be used is RATT/FSK, which will only reliably modulate at a data rate of roughly 45 baud. With the encryption and flow control overhead, that reduces data throughput to an aggregate of just over 30 baud, or a line of 80 column text every minute.

This is why long messages aren't broadcasted over VERDIN (the circuit the SSBNs use to get their EAMs). Rather, they only send one or two lines of text, and it's a string of alpha-numeric codes. These codes correspond to a prepared attack plan that's already onboard the submarine. When the US goes to war, the NMCC will select one of a multitude (read: hundreds) of possible strategies from their master SIOP. Any one of these strategies is a tightly scripted evolution that has been prepared years in advance and wargamed out dozens of times over to ensure success. When the SIOP subchapter is activated, a predrafted message is broadcasted to all of our fleet ballistic missile subs. That message is authenticated, then decoded, and all it does is give the crews of the missile boats *another* set of codes to punch into the missiles themselves. These are the missile's targets. Anyway my point was that the ELF VERDIN stuff is so slow that it's only used to transmit what you could think of as a page number to a book that went to sea with the submarine when it left port. That book is the real message.

As far as mind control and killing sea life goes, those are both myths.

03-15-04, 07:01 PM

[reply](#)**15ofthe19**Registered User
622 posts

A question Stokes. The movie Crimson Tide dealt with this situation, only the message was interrupted. What are the mechanisms in place that would alert a sub that it must surface in order to receive communications that aren't part of a pre-determined action plan? I guess this would amount to an "Oh Shit" code that meant that all bets were off, and we need to talk immediately?

03-15-04, 07:58 PM

[reply](#)**Nasor**Registered User
1,190 posts

Thanks Stokes, that was very informative.

03-15-04, 10:31 PM

[reply](#)**Stokes Pennwalt**Only one way to be sure..
872 posts

Quote:

Originally Posted by **15ofthe19**
A question Stokes. The movie Crimson Tide dealt with this situation, only the message was interrupted. What are the mechanisms in

place that would alert a sub that it must surface in order to receive communications that aren't part of a pre-determined action plan? I guess this would amount to an "Oh Shit" code that meant that all bets were off, and we need to talk immediately?

Ah yes, the Hollywood take on things. As you may have guessed, it's not entirely accurate. Then again, 99% of the stuff the military does would get booted off the screen were it portrayed in its banal realism, so I can't blame them.

First, a little background on VERDIN

When a SSBN slips silently below the waves at the beginning of her patrol, she deploys the CATAS, or Cable Towed Antenna System. Like I said above, VLF* has an advantage for global broadcast because there are nary a few things on this earth that can absorb it, lending to ease of propagation. To receive VLF, the boat has a mile of antenna that she streams from the top of her sail (don't worry about screw fouling, the cable has steerable fins and can 'fly' itself). The whole time she's submerged on deterrent patrol, the SSBN is streaming CATAS and her radio shack is copying VERDIN. VERDIN broadcasts all the time for two reasons.

- The TSEC/KWR-46 cipher device that performs the deciphering uses four 128 bit keys, overlapped, to decrypt the traffic. KWR-46s are top of the line encryption devices. In fact, they ooze so much enciphered goodness from each seam that some if it overflows into their user interface, making them nearly impossible to operate unless you've been to the Navy's four month school for them. That's four months learning how to operate something the size of a toaster. The running joke was that even if the Soviets got their hands on a KWR-46, its tech manuals, and effective editions of keymat, the damn things were so hard to operate that our secrets would be safe beyond our years. Anyway, to keep their cipher engine synchronized so that they're decoding As as As and Bs as Bs, the KWR-46s have to have a steady input of data. When they drop sync or are rebooted it takes around five minutes to resync them, and because an EAM has a target latency of under 10 minutes, you don't want to tack 5 on there for a crypto cold boot. By keeping VERDIN chugging along 24/7/365, our fleet is always in sync and ready to go. 99.9% of the time VERDIN is clattering out news or short stories to keep the radio watch entertained.
- The second (and more important) reason is that anybody can listen to our VLF channels, including our enemies. They might not be able to tell *what* we are saying, but they know we're talking. If VERDIN was silent by default, 99% of the time, then suddenly came alive with traffic, the Soviets would've been suspicious with a quickness. Keeping it running kept them guessing.

* Yeah, it's VLF rather than ELF. Check [this chart](#) out. ELF is between 0 and 3 khz, while VLF takes the sweep from 3-30. As far as the Navy goes, anything below 30khz is VLF simply because it's too low to matter much anymore. And for the record, the VERDIN broadcast is somewhere in the neighborhood of 20-22khz, depending on what area you're copying.

Now that you know how the radio works, it's good to understand the basics of the process.

Fault Tolerance

In the case of Crimson Tide, where a boat only copied part of an EAM, their weapons posture would fail-safe. There is no way that a US FBM submarine could loose her birds "on a hunch", or whatever. And if a captain tried to do so, he'd have every member of his crew aligned against him. But it's not even left to human devices, as they are intrinsically undependable. A US Navy emergency action message looks something like this, colors added by yours truly:

Code:

```
ZTTCZYUW RUWNADRO412-TTTT--RHMCSUU.
ZZZZ TTTT
032341Z MAR 04
FM COMSUBPAC PEARL HARBOR HI
TO SSBNS PAC
T O P   S E C R E T //FLASH-EAM-YANKEE//
EAM/EE OS 32 J8 01 CC QL 8R 2J S9 KN 54 8U SF//
AUTH/SI DN 39 HN JF DS 84 89 WI UG FF WO I3 OD//
BT
END#
```

← red
← green

In the above example, the RED text is the battle plan, while the GREEN text is the authentication code. Both of these must be received, as well as the BT and END# in order for the EAM to be legitimate. When the EAM is received in radio it will first sound an alarm in the message center (the ZZZZ TTTT preamble tells the comms computers to start bitching) to wake up the radiomen. The groggy comms supervisor will then wipe the sleep scars from his unshaven face, and take the EAM to the bridge, where the CO and XO will meet him (there are EAM alarm annunciators in the CO and XO staterooms, the wardroom, and a few other places on the boat). On the bridge there is a safe. It has two digital locks on it, and two people aboard know the combination for each. The CO and weapons officer know the combination for the "A" lock, while the XO and operations officer know the "B" combo. They open the safe and withdraw a binder of authentication codes. After performing a few procedures that I'm not inclined to disclose here, they find an entry of text that is the same as the GREEN field above, right down to the letter. All four of them confirm that the authenticator is a perfect match with the code in the authentication manual by reading the EAM to each other while the others read along in the book. To the side of this GREEN entry is a sequence of numbers that corresponds to a page in the second binder in the safe. They extract that binder, find the correct page with the numbers on it, and then confirm the RED text above with the entry the GREEN text pointed them to. The RED text is the attack profile. There's one more kicker though: There is a mathematical parity relationship between the GREEN and RED lines, so that there is only one possible authenticator for an attack plan. In other words, you can't have any old text as an authenticator to match any attack plan. Now you get the idea of how thoroughly these things are prepared.

Missiles Without Mr. Murphy

In a "perfect" world, here is how the process would go down after the EAM is authenticated. Once the officers have read the attack plan to each other under the romantic blue mood lighting of the bridge and confirmed its accuracy, the CO and weapons officer take the RED binder with them to the missile control room. When they get there, they enter the RED line of text into the Trident missile's fire control computer (or rather watch the missile tech do it) and wait for the computer to accept it. At this point, the computer communicates to each of the 24 dormant Trident missiles nestled in the tubes, feeding them whatever geographic

coordinates the RED code translated into. At no time during this entire sequence does anybody onboard the submarine know what targets they've been ordered to strike; all they see is that one line of coded text. The fire control computer doesn't even know. All it does is further decrypt the string into something else and upload it to each missile's guidance package.

Now that the missiles have accepted the code and reported back that it checks out, their lights go from red to amber and they're ready to have their INS gyros spun up and oriented. While this is being done, the captain will take the boat from its patrol depth up to about 60 feet below the surface and begin a hover maneuver in preparation for launch. He will open the missile doors, and once the missiles are ready, he will issue the fire command. The lowly enlisted missile tech is actually the one to press the fire button, sending the 60 ton missiles hurtling toward the surface inside a jacket of nitrogen gas. Right as they clear the surface their first stage boosters ignite and they're off and running, about 5-7 minutes from disgorging their MIRVs over their targets. That's an exciting sequence of events too, but that's another story for another day.

The Denzel Factor

Were something like Crimson Tide to happen in real life, you can see from the authentication process that the missiles are impossible to even energize and prep for launch without the entire EAM being received. It just wouldn't happen like that. Ever. But that's no fun, and doesn't really answer your question. So what happens if an incomplete EAM is received?

First of all, EAMs are rebroadcasted continuously for at least 30 minutes. If you miss it the first time around, you can reboot, re-sync your crypto, and get it again. But what if your VERDIN suite is tits up? In the movie, they floated their comm buoy. That's one possible avenue to take, but it's really a last-ditch measure. In reality the SSBN would raise to periscope depth and poke her tiny little EHF SATCOM antenna above the surface. This thing operates around 44 GHz, so it's only 5 inches wide, but has decent gain. The SSBN would use her EHF rig to get in touch with her ISIC, probably COMSUBLANT or COMSUBPAC, and simply ask "what do we do, boss?" It doesn't sound very sexy, but that's probably what the captain would decide to do. It's entirely up to him though. He could either:

- Do nothing, and wait to regain comms through VERDIN
- Float his comms buoy and listen to the HF or UHF satellite broadcasts for activity
- Come to periscope depth and poke his comms mast up, acquiring comms via EHF SATCOM and receiving the order that way

And as I said, the latter would happen more times than less. One final caveat: I wasn't a bubblehead, I was a skimmer puke. I drove targets for a living, and knew a good many submarine officers. So take this information as hearsay with that in mind.

03-16-04, 03:00 AM

[reply](#)

zonabi

Registered User

145 posts

Thank you very much Stokes for the facts, i really appreciate it !

I know my mind tends to wander when reading all these things, so I do not know what to take seriously, and what to disregard.

I usually take everything at face value first, and continue to

research.

Your data is detailed and you seem to know alot about the missile defense system and things of that sort.

I have read in many different places that this ELF, or perhaps something similar, has been effecting marine life, more specifically causing hemorrhages in dolphins and whales, which use Sonar as you all know.

It is said these low frequency devices and waves interupt the animal's sonar system, causing them probably the worst headaches imaginable.

is there any truth behind these statments? I think they hold some fact, because marine life that uses sonar could possibly be effected by frequencies that are similar, dont you think ?

03-16-04, 10:29 AM

[reply](#)

Stokes Pennwalt

Only one way to be sure..

872 posts

Quote:

Originally Posted by **zonabi**

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Yeah, I think I was confused by the first post. The original poster was asking about ELF sonar rather than ELF radio waves. Yes, sonar can be harmful to marine life. Naturally, naval sonar potentially moreso because it uses very high power levels. Depending upon the application, naval sonar operates from as low as 500hz to as high as 18khz or so, which is inside of the ELF spectrum.

The lower frequencies, although having less resolution or directional effect, propagate farther underwater and can penetrate the temperature inversion of the thermocline layer. That's the depth at which the water drops by up to 40F in temperature within 20 feet or so, and the drastic change in density results in a barrier that is either highly refractive or totally reflective of most active sonar. The surface Navy generally uses towed sonar arrays from ships or dipping sonar from helicopters to drop down below the thermocline, where they can hear the sub hiding below it. A third option is the use of ELF sonar, which involves frequencies low enough to be able to penetrate the layer for the same reasons that ELF radio waves penetrate the oceans.

Few units have ELF sonar capability. Destroyers, cruisers, and frigates, the three combatants the US Navy uses for ASW ops, don't have it. Our helicopters don't have it. Our attack subs don't have it. The equipment is specialized and unweildy, and the only vessels that carry it are the older *Sturgeon* and *Benjamin Franklin* submarine hulls. It's been phased out in favor of ships with towed array sonar and attack subs that can chase the enemy below the thermocline.

The negative effects that ELF sonar has on marine life are mainly on vertebrates that use sound for communication and navigation.

Dolphins and whales get confused by ELF and can become lost, while whales can end up beaching themselves. While this is plausible, there have been no documented studies of ELF sonar causing such problems, and the Navy has moved on from it because modern ultrasonic sonar is far superior in most aspects.

Yesterday, 01:12 AM

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