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Welcome to program 69 of Shortwave Radiogram.

I'm Kim Andrew Elliott in Arlington, Virginia USA.

Here is the lineup for today's program, in MFSK modes as noted:

1:38 MFSK32: Program preview (now)  
2:55 Progress towards geostationary amateur radio satellite\*  
8:56 MFSK128: Voyager 2 near edge of solar system\*  
12:21 MFSK64: International panel issues climate change warning\*  
17:28 New font might improve your memory\*  
19:36 Images and painting of the week\*  
27:25 MFSK32: Closing announcements\*

\* with image(s)

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And visit <http://swradiogram.net>

Twitter: @SWRadiogram

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From ARRL.org

AMSAT-DL Symposium Hears Update on Es'hail-2 Geostationary Satellite

4 October 2018

Progress toward the launch of the Es'Hail-2 geostationary Amateur Radio satellite was reported as AMSAT-DL held its annual symposium on September 29 at the Institute for Environment and Future Research (IUZ) Bochum Observatory in Germany. Es'hail-2 is set to go into space this fall or early winter aboard a SpaceX vehicle; a specific launch date is not available. AMSAT-DL President Peter Gülzow, DB2OS, and Achim Vollhardt, DH2VA, reported that AMSAT-DL recently finalized the individual components for the Es'hail-2 ground station in Doha, Qatar.

"Last week, we finished the work and made the equipment ready to

ship," Gülzow said. The components are to be installed in Qatar in the near future. A second facility at the Qatar Amateur Radio Society (QARS) in Doha will serve as a backup, while a third ground station will be installed at Bochum Observatory.

Es'Hail-2 will offer two AMSAT-DL-designed Phase 4 Amateur Radio transponders operating in the 2.4 GHz and 10.450 GHz bands. A 250 kHz bandwidth linear transponder is intended for conventional analog operation, while an 8 MHz bandwidth transponder will provide experimental digital modulation schemes and DVB digital amateur television (DATV). Both transponders will be equipped with antennas capable of providing full coverage of about one-third of Earth's surface.

"We hope to be able to present live broadcasts in DATV at the next HAM RADIO [in Friedrichshafen], June 21 - 23," Gülzow said.

AMSAT-DL has been offering technical assistance on the Es'Hail-2 project. The commercial Qatari satellite will provide the first Amateur Radio geostationary communication and will be capable of linking amateurs from Brazil to Thailand.

Gülzow will deliver a presentation, "Es'hail-2 and its Amateur Radio Payload" at the AMSAT-UK International Space Colloquium, October 13 - 14, as part of the Radio Society of Great Britain Convention in Milton Keynes, England.

Colloquium presentations will be live-streamed starting October 13 at 0830 UTC. Recordings of all presentations will be posted on the AMSAT-UK YouTube channel following the event.

<http://www.arrl.org/news/amsat-dl-symposium-hears-update-on-es-hail-2-geostationary-satellite>

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Image: Illustration of the Es'hail 2 satellite ...

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From New Atlas:

Voyager 2 shows first signs of entering interstellar space

Michael Irving  
8 October 2018

After 40 years of zipping through the solar system, Voyager 2 appears to be close to leaving the neighborhood. Currently at a distance of about 17.7 billion km (11 billion mi) from Earth, the probe's instruments have begun picking up radiation signals that suggest it is breaking out of the Sun's protective bubble, and will soon join its sibling in interstellar space.

Voyager 1 and 2 were launched in 1977 before conducting a grand tour of Jupiter, Saturn, Uranus and Neptune, where the probes collected some of the clearest photos and data of the planets for the time. But their job wasn't done yet - given their exit trajectory, astronomers figured they could help study the very boundaries of the solar system.

In a similar way to how the Earth's magnetic field creates a shield that protects it (and us) from the deadly radiation of space, so too does the Sun create its own bubble. Known as the heliosphere, this huge bubble surrounds the entire solar system and is made up mostly of "solar wind" or plasma ejected from the Sun. Beyond that is the cold expanse of interstellar space, made up mostly of hydrogen and helium gases.

In 2012, Voyager 1 became the first human-made object to leave that bubble and go interstellar. Six years later and it now looks like Voyager 2 is about to follow suit, after journeying through the heliosheath (the very edge of the bubble) for the past decade.

NASA has now reported that the probe's onboard instruments have begun to detect more cosmic rays hitting the spacecraft. Since late August, Voyager 2's Cosmic Ray Subsystem has picked up a five percent increase in the rate of cosmic rays, while the Low-Energy Charged Particle instrument has registered a similar bump.

Since the heliosphere blocks many cosmic rays, this kind of increase was expected to be seen when the craft crossed the barrier. In fact, Voyager 1 reported a similar increase about three months before it officially entered interstellar space.

That said, Voyager 1's journey isn't a perfect model for what the

second probe will experience. For starters, they whizzed off in wildly different directions, so the heliosphere could be very different in different areas. On top of that, the six-year gap could play into things too, since the Sun's 11-year activity cycle can cause the heliopause to swell inwards and outwards, as though the solar system is breathing.

"We're seeing a change in the environment around Voyager 2, there's no doubt about that," says Ed Stone, a Voyager Project scientist. "We're going to learn a lot in the coming months, but we still don't know when we'll reach the heliopause. We're not there yet - that's one thing I can say with confidence."

Current estimates suggest Voyager 2 will finally enter interstellar space in late 2019 or early 2020. It's believed that both craft have enough power to continue transmitting data until 2025, before continuing silently outwards as symbols of human achievement, possibly long after we're gone.

<https://newatlas.com/voyager-2-interstellar-space-heliosphere/56668/>

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Image: Illustration of the Voyage 2 spacecraft ...

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VOA NEWS

## Scientists Warn Catastrophic Global Warming Looming

Lisa Schlein  
8 October 2018

GENEVA - A new report by the Intergovernmental Panel on Climate Change warns the world is heating up faster than predicted. If the pace of global warming is not scaled back drastically, the panel says climate-related risks to human well-being, ecosystems and sustainable development will escalate to dangerous, unreversible levels. Scientists of the Intergovernmental Panel on Climate Change report global warming since pre-industrial times already has exceeded one degree Celsius. At the current rate of greenhouse gas emissions, it says the level of warming will reach 1.5 degrees during the next few decades.

The report says the world needs to reach zero net emissions of carbon dioxide by 2050 to prevent a further rise in temperature.

It warns a further increase to two degrees Celsius would greatly escalate the number of natural disasters, accelerate the melting of the Arctic sea ice, cause islands to disappear under rising seas, and make it impossible to produce enough food to feed the world's growing population.

World Meteorological Organization Secretary-General Petteri Taalas says there is still time for people to change their behavior to keep carbon emissions from rising. He says preventing the global temperature from going up by one half degree would make a huge difference in the well-being of the planet.

"One of the major issues is that there would be 420 million people less suffering because of climate change if we would be able to limit the warming to 1.5-degree level," said Taalas. "And, we have certain areas in the world, which are extremely sensitive. Small island states, Mediterranean region and also Sub-Saharan Africa, which are already suffering and will suffer the most in the future."

Taalas recommends several actions governments and individuals can take to lower the world's temperature. He says fossil fuels, which are the greatest emitter of carbon dioxide in the atmosphere, must be phased out.

He says solar power, hydro power, wind power and other forms of so-called green energy are available to meet peoples' energy needs. He says more emphasis should be placed on using electric powered public and private modes of transportation.

He tells VOA people can help save the planet by changing their lifestyles. He points to diet as one area that could lessen the problem.

"For example, the fact that we eat so much meat means that we are using a fairly large fraction of our agriculture for the cattle instead of for using vegetarian food that would be more carbon

friendly," said Taalas.

Taalas says governments have a 30-year window in which to stop using fossil energy and limiting global warming at 1.5 degrees Celsius. He says this is not impossible, but agrees that it is a major challenge.

<https://www.voanews.com/a/scientists-warn-catastrophic-global-warming-is-looming/4604528.html>

See also:

<https://newatlas.com/global-warming-ipcc-report/56678/>

<http://www.ipcc.ch>

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Image: Cartoon caption -- And this little warning light flashes when the outside air becomes too polluted to breathe ...

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Sans Forgetica, the new font that helps your memory

Alistair Walsh

5 Octobe 2018

Australian researchers have created a font that aids memory recall, a Melbourne university announced this week.

The font Sans Forgetica was developed by a trio of designers and researchers specializing in typography and behavioral science at RMIT University in Melbourne.

The design is based on a font called Albion, but with heavy modifications to reduce familiarity. The font is back-slanted and includes distinctive gaps that engage the brain, improving recall.

RMIT Behavioral Business Lab's Janneke Blijlevens said normal fonts were very familiar.

"Readers often glance over them and no memory trace is created," said Blijlevens. But she warned that if a font is too outlandish the brain struggles to process the text and the information is not retained.

"Sans Forgetica lies at a sweet spot where just enough obstruction has been added to create that memory retention."

The modifications force readers to spend longer on each word, allowing the brain to engage in deeper cognitive processing.

Behavioral economist Jo Peryman said the new font would benefit students revising for exams. "We believe this is the first time that specific principles of design theory have been combined with specific principles of psychology theory in order to create a font," she said.

Experiments involving about 400 students found the font boosted recall, albeit not substantially. In one experiment, 96 participants were asked to recall word pairs presented in three different fonts. Participants recalled 69 percent of the word pairs presented in Sans Forgetica compared to 61 percent for the other fonts.

In an online experiment, 303 students took a mock multiple-choice exam. When the text was presented in Sans Forgetica, participants remembered 57 percent of the text, compared to 50 percent of the surrounding text that was written in a plain Arial font.

<https://www.dw.com/en/sans-forgetica-the-new-font-that-helps-your-memory/a-45765663>

See also:

<http://sansforgetica.rmit/>

<https://newatlas.com/sans-forgetica-font-memory-recall/56638/>

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This week's images ...



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An aurora behind a bridge in Alberta. From [bit.ly/2EdpmI5](http://bit.ly/2EdpmI5) ...

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An example of futuristic illustrations from the Soviet  
engineering magazine Technika Molodezhi. From [bit.ly/2IOjlAe](http://bit.ly/2IOjlAe) ...

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Our painting of the week is by Carol Stewart. From  
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I'm Kim Elliott. Please join us for the next Shortwave Radiogram.

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