Wouter & Michael's Solo Newsletter
Monday 28 Mar 2022

What's On

Sat 2 Apr - Begining of Ramadan

Saturday marks the begning of the Muslim holy month of Ramadan.

Sun 3 Apr - Gran Premio Michelin de la Republica Argentina

Will be a late race, being in the Americas. Manir's Family Kitchen for best viewing

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Coming Up

Sun 10 Apr	Red Bull Grand Prix of the Americas
Sun 10 Apr	Formula 1 Heineken Australian Grand Prix
Fri 15 Apr	Good Friday
Sun 24 Apr	Grande Premio de Portugal
Sun 24 Apr	Formula 1 Rolrex Grande Premio dell'Emila Romagna
Fri 29 Apr	Solo Menari dance festival

The News This Week

Vibrationg Mountains

As Kathryn Vollinger prepared to climb Castleton Tower, a 120-meter-tall sandstone formation in the desert near Moab, Utah, the outdoor guide assessed her gear. Ropes? Check. Helmet and harnesses? Check. Climbing rack? Check. That day in March 2018, Vollinger's checklist also included an unusual piece of equipment: a seismometer. The excursion wasn't solely for pleasure; it was also for science.

Castleton Tower, a soaring sandstone formation near Moab, Utah, is among the most popular climbing destinations in the world

Castleton Tower and its peers may appear still. But these soaring geologic structures are in constant motion, vibrating in response to earthquakes, human activity and even distant ocean waves. The same goes for fins, rock formations that are irregularly shaped instead of cylindrical or rectangular like towers, says geophysicist Riley Finnegan of the University of Utah in Salt Lake City.

The seismometers measure how much the towers and fins naturally vibrate. Those data are key to assessing the formations' stability and could even help researchers search the rocks for possible signs of seismic activity in the distant past. Such insights are important not just to scientists, but also to Native Americans, including the Eastern Shoshone, Hopi, Navajo, Southern Paiute, Ute and Zuni peoples. Many of the landforms, which are located on the traditional lands of these groups, hold cultural and religious significance, Finnegan says.

Finnegan's team has been working with Vollinger for nearly five years to assemble the first dataset on the dynamic physical properties of 14 towers and fins, which the researchers published February 16 in *Seismological Research Letters*. Without experienced climbers like Vollinger on board, the project wouldn't have been possible, Finnegan says.

Collecting the data was a tremendous challenge. Safely scaling the trickiest formations requires climbing chops, strength, endurance and a sizeable dose of planning. “There’s only so much risk I’m willing to take for getting those seismometers up,” Vollinger says. “When you’re hauling extra gear, that adds another element to it.” Vollinger and her climbing partner, husband Nathan Richman, had to ensure that the rock faces were vertical enough to avoid dragging the equipment. Dragging would “likely knock loose rock off,” she says. Once Vollinger reached the top of a formation - after anywhere from one to six hours of climbing - she read books or chatted with her husband while a seismometer collected data. They then hauled the instrument and their other gear back down.

Back at the University of Utah, Finnegan and colleagues analyzed the data, finding that the structures’ lowest natural frequencies - called fundamental frequencies - range from 0.8 to 15 hertz. In other words, the towers sway roughly one to 15 times per second. The team also used computer models to study the ways in which the formations bend and twist at a given frequency. Those simulations helped provide a more complete picture of how physics influences the behavior of towers and fins, Finnegan says.

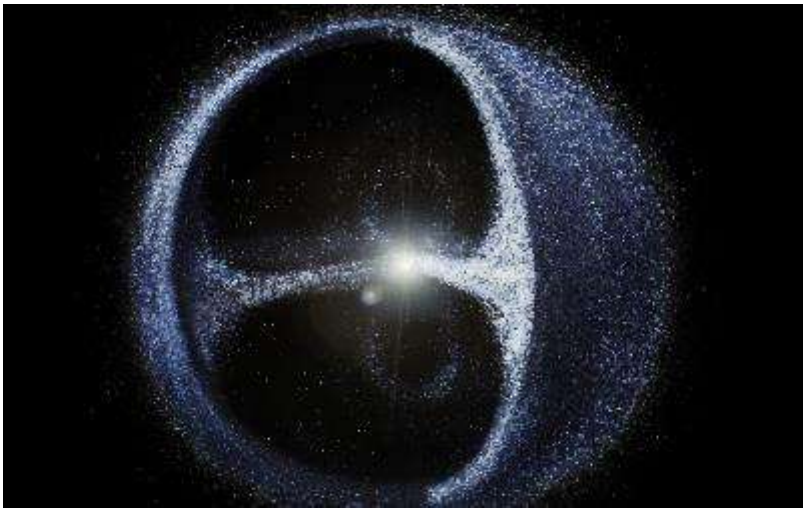
Outdoor guide Kathryn Vollinger carries equipment through rough terrain on the way to climb one of Utah’s many red rock tower formations. Vollinger has been helping geophysicists study the geologic structures for nearly five years

What’s more, inputting the height, density, cross-sectional area and other material properties of the formations into the model predicted the formations’ fundamental frequencies. The findings “strengthen our understanding of the dependence on height and width for the [fundamental frequencies] of these features,” says Ramon Arrowsmith, a geologist at Arizona State University in Tempe who wasn’t involved with the work. Finnegan and her colleagues have proven that “the geometry is sufficient to really talk about the dominant frequencies for the behavior of the pillars.”

Eventually, such a model could eliminate the need for climbers to deploy seismometers to measure frequency. And should future scientists require seismic measurements, Arrowsmith envisions robots putting seismometers in place and drones flying by to collect data later. But for now, Vollinger will continue scaling these formations for science.

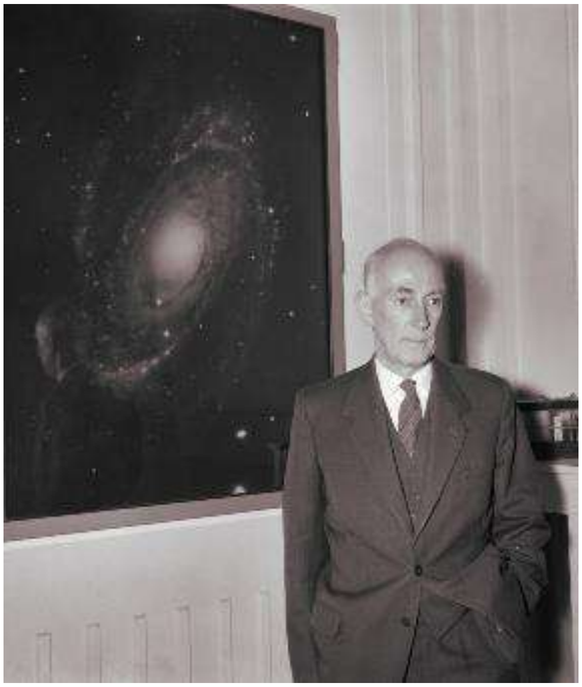
History of the Halo Around the Sun

A sphere dotted with gas, ice and huge bits of debris surrounds our solar system. This thick sphere of stellar detritus, the Oort cloud, is the farthest entity that is still deemed part of the solar system - and begins at about 40 times the distance of the sun to the former planet Pluto.



An artist’s imression of the Oort Cloud

Despite all the interest, though, no one knew which came first - the Oort cloud or the planets - and how things progressed. There may be a little less uncertainty now, according to a preprint by Simon Portegies Zwart and other researchers at Leiden University. They have concluded that the Oort cloud is a remnant of the time that the solar system sprung out of a cluster of newborn stars - cutely termed a stellar nursery. The planets? Well, they slowly coalesced some time later - give or take a few billion years.



Now, looking back in time is hard enough when digging through ruins of past cities - at least the matter is still there. It is harder when trying to make out where a careening comet or patch of gas started out. Zwart, a professor of computational astrophysics at Leiden University, and his team started with a full image of their jigsaw puzzle and then worked backward. The effort was to create a complete chronology of the Oort cloud. The Oort cloud??!

Jan Oort, who discovered the Oort cloud

Its existence was first suggested by Ernst Öpik, an Estonian astronomer. in 1932. Dutch astronomer Jan Hendrick Oort rejuvenated the idea in 1950. Despite some evidence, there have been no direct observations of the Oort cloud.

Some of the gas, ice and debris occasionally jostled out of it swings into the inner solar system. Comets that come calling many years apart, such as Halley's, are believed to be products of the Oort cloud. This has earned it the moniker "the birthplace of comets." The solar system is more or less in a flat plane, all the major planets being at the same level. But the Oort cloud is a sphere enveloping it.

While scientists knew about the Oort cloud for decades, its history was an enigma an intractable riddle wrapped in a mystery that long defied explanation. The fact that so much of the Oort cloud is unknown is what first drew Zwart and his team to the subject. He says that astronomers have bumped up against an assortment of roadblocks, including the Oort cloud's own virtual invisibility and its huge distance from Earth. Its amorphous consistency also meant that astronomers learned about it from the few comets from it they could track.

"It is like listening to one tone in the entire spectrum of music to deduce all the music that has been composed by any human in the history of mankind," Zwart says, "That is how absurd the whole situation is. There are 100 billion comets, probably, in the Oort cloud, and yet we only know about 100 of them."

Simon Portegies Zwart, the lead member of the team that put together a coherent story of the history of the Oort cloud.

Now, astronomers did come up with the histories of a few objects, making for a patchwork of information. Zwart and his team brought that data together into what might be a coherent story.

The researchers used a software called AMUSE: the Astrophysics Multipurpose Software Environment. AMUSE uses publicly available codes that address gravity, star evolution and other factors. It has incorporated at least two codes that solve the same physics. With AMUSE, the team generated two sets of simulations.

The first set, consisting of two simulations, studied the evolution of a disk of an isolated solar system. It started where the sun might have been a billion years ago and ends a billion years later.
The second set, with 224 simulations, studied how the solar system developed in its birth cluster.
The team concluded that the sun was born in the aforementioned stellar nursery with a whole lot of other baby stars at the center of the galaxy. That was where a huge ball of gases, roiled by gravity, formed into clump of matter that became stars.

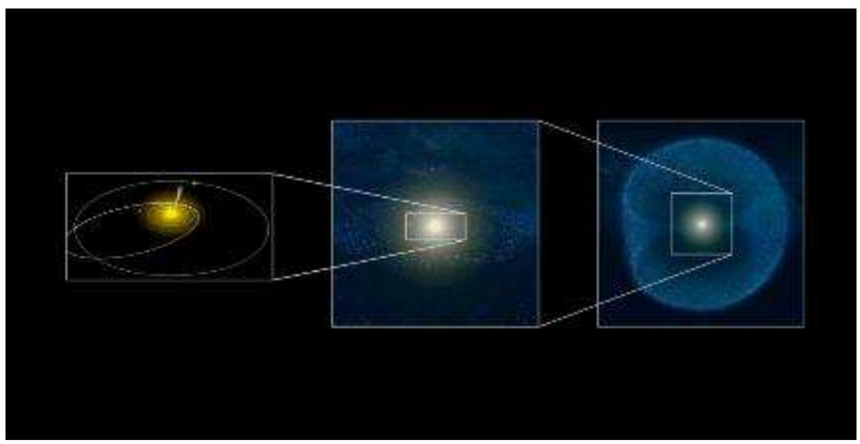
While still developing a solar system, the sun drifted away from the area. The researchers believe the surrounding stars in the nursery could have disrupted any forming cloud around it. So the comparatively fragile Oort cloud must have formed when the sun struck out on its own. That may have taken hundreds of million of years. Meanwhile, the sun was doing its own star trek to our current address: the Orion Arm of the galaxy.

Gas collapsing in the preparation to form infant stars in a stellar nursery in nebula NGC 346

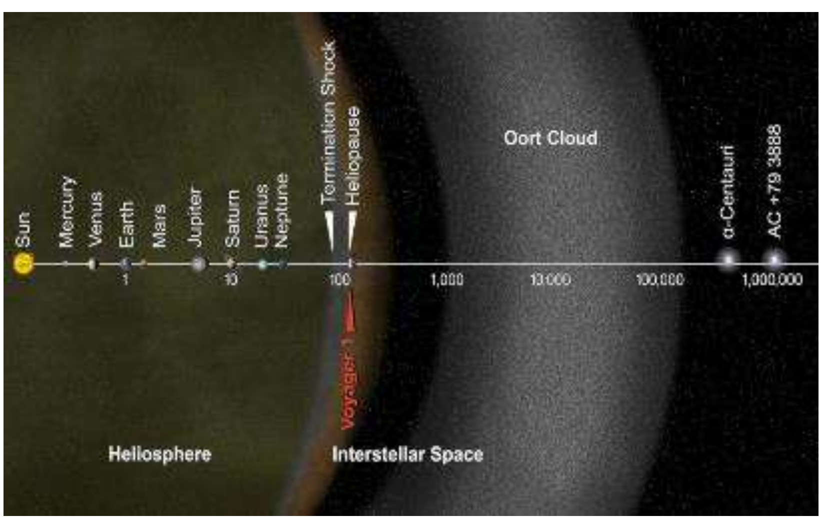
Zwart and his team calculated where about 70% of what makes up the Oort cloud today came from. That would be the region that now lies near Uranus and Neptune, and a cluster of asteroids called the Centaur family that lie between Jupiter and Neptune.

The researchers believe that the Oort cloud is still rather fragile. They think that as more comets and debris are pulled into the sun, it will lose mass and finally disappear.
While their main work was on the origins of the Oort cloud, they also considered the solar system's history. They found support for the assertion that a planetoid named Sedna was pulled in from another star. Since it is in a stable area in terms of gravity, that could have been billions of years ago.

"I like to study that which others might not consider interesting, and then see, actually, that they are very interesting," Zwart says. He gives the analogy of a biologist who makes an active choice to study particularly ugly birds. While it is natural for other biologists to be drawn to prettier subjects, true curiosity calls for seeing the value in these "ugly" birds.



The Oort cloud in relation to the solar system.



"That shows courage - to study something that no one seems interested in," he says. "But, you know, it's about the science; it's not about me." Still, there are downsides to venturing into uncharted territory. Vast pieces of the timeline were missing, and the astronomers had to study those "soft spots" closely. They had to fill that in based on what preceded and what followed. "You analyze your data and all the pieces improve at the same pace," Zwart says. "You have a model that sort of works, but not quite. You start looking. Where does it go wrong. Can I improve that part? There's no one starting point."

The red arrow indicates the location of space probe Voyager 1, which will reach the Oort cloud in about 300 years.

While there was no clear, single starting point to this simulation, there certainly was a tentative end. Most of the time, a scientist deems an experiment complete when there is a reasonably stable answer to whether the hypothesis holds. While a study based on minimal data like this, it may seem hard to reach any conclusion. But Zwart says that was not happened in the case of his team. "There's a moment when you know this must be right," he says, "That's the moment you realize, this must be the way it works."

Solo News

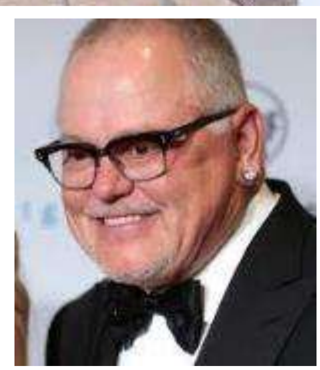
Help Needed

Our friend in Solo, Susanne Krober, needed to get some masks to Germany for an exhibition. Does anyone have a container going soon or is planning to travel there in the future that can help her. Please contact direct"
Susanne Krober
Hp/WA +62 (0) 813 2698 1330
Email susyas@gmx.de

Rewards For Getting This Far

Quote: "When you're ready to quit, you're closer than you think' – American entrepeneur Bob Parsons (1950-)

Thought for the week: I bet it's called Almond Milk because noone can say Nut Juice witha straight face.


Bob Parsons

Contact: Michael or Wouter
Hp: 0815 4841 8500
Email: michael@armadaorient.com