

# SCIENCE & ENVIRONMENT

## Magnetars burst on the scene

BY ALAN LEBLANC

Roughly 20,000 years ago a neutron star known as SGR 1900+14 released a tremendous burst of gamma radiation and charged particles in a gigantic "starquake". The effects of this burst hit Earth's atmosphere last Aug. 27, overloading the sensors of many satellites and interfering with radio transmissions for roughly five minutes.

The culprit — magnetars, a newly discovered breed of stars with incredibly intense magnetic fields.

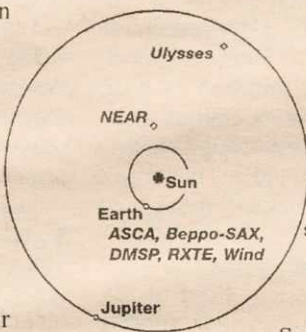
Magnetars are formed in the same manner as other neutron stars, with a mass of about twice that of our sun yet confined to a diameter of twenty kilometres. They are created when a giant star explodes in a supernova, leaving behind its core.

What gives magnetars its unique properties is their rate of spinning. The magnetar SGR 1806-20, discovered in May by Chryssa Kouveliotou et al. of the University of Alabama in Huntsville, is calculated to be spinning once every 7.5 seconds. This generates a powerful magnetic field 100 times more powerful than your average neutron star.

The field works out to be roughly one quadrillion Gauss (a unit of measure of a magnetic force). In contrast, the Earth's magnetic field is only 0.6 Gauss. This magnetic field also causes the star to trap plasma, heating the star's surface to 10-million degrees Celsius.

The stars are classified as Soft Gamma Repeaters (SGRs). Discovered in 1979, these are bodies which regularly emit gamma radiation. The magnetic force of the magnetar is so strong it periodically causes its own metallic shell to crack, causing a starquake. Low-energy gamma radiation, like the burst observed in August, is released from the star's interior. The energy released in this one event produces more energy per second than the sun produces in an entire year, making the SGRs among the brightest objects in the sky.

So why haven't we seen these objects before 1979?



"No one was actually looking," said Peter Woods, a Ph.D. student

at the Marshall Space Flight Centre in Huntsville, Alabama. "X-ray detectors with sufficient sensitivity were not launched aboard satellites until the seventies."

"Another reason is that their behaviour is chaotic and unpredictable, so you have to be watching that part of the sky all of the time. For example, the source of this particular burst [SGR 1900+14] produced only seven comparably weaker bursts in 18 years, and has since produced well over one hundred."

The paradigm of magnetars was first proposed by Robert

Duncan of the University of Texas and Chris Thompson of the University of North Carolina in 1992. They theorized that a neutron star's core must be spinning at least 200 revolutions per second to form a magnetar, rather than a normal pulsar. At first ridiculed for their theory, the two were relieved when Kouveliotou's research in May proved their existence. Thompson, according to Kouveliotou, "went completely nonlinear" upon hearing the news.

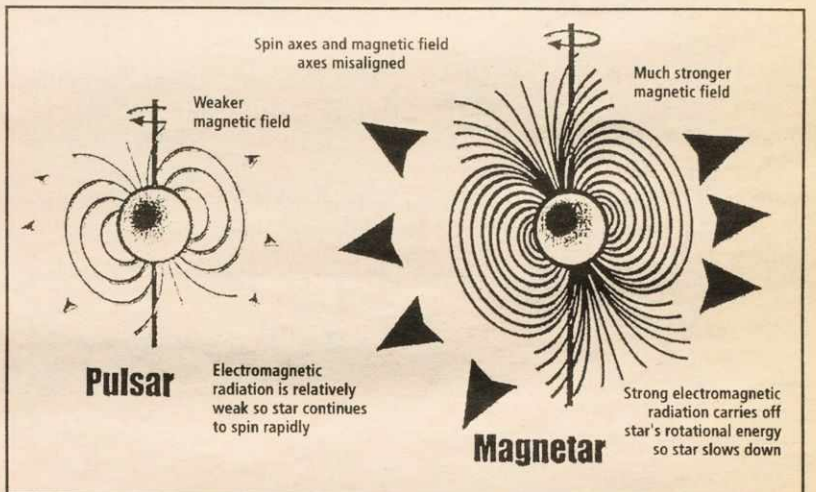
The starquakes, as powerful as they appear, pose no immediate danger.

"Given the distance of all the known SGRs, they would have no impact on our health," said Woods.

Since the Earth's atmosphere blocks out all X-rays, these bursts never reach the Earth's surface. This is why magnetars cannot be observed with ground-based telescopes and must be viewed using an X-ray spectrum detector.

The existence of magnetars may help explain why many observable supernova nebulae, the remnants of exploded stars, appear to have no neutron stars at their centres. Magnetars typically lose their magnetic force and "die" roughly 10 000 years after their formation. When they lose this force they do not produce starquakes, nor do they continue to trap plasma, rendering them dark and virtually undetectable.

Magnetars have their own official website ([www.magnetars.com](http://www.magnetars.com)), maintained by Robert Duncan, the same man who originally proposed their existence.



## Grannies tackle pollution

BY JULIA GARRO

TORONTO (CUP) — Take it from your grannies, Great Lakes pollution is no joke — but it sure is something to sing about.

Members of the Raging Grannies say despite a 1972 international water quality agreement that calls for the reduction of toxins and the complete elimination of some chemicals in the Great Lakes, industry is getting away with environmental murder.

"You're seeing fewer fines being levied and fewer industries being caught," said Shelley Petri, a member of the national organization of senior women who advocate environmental and social issues.

Wrapped in shawls and topped with flowered hats, she and others presented a musical request at the Great Lakes United public hearing.

"You can catch people off guard this way," said group member Phyllis Creighton.

The hearing was one of seven scheduled on both sides of the Canada-U.S. border.

Murray Brooksbank, of the federal ministry of environment, also worries that industries are getting away with polluting natural resources.

"There is some concern that the government seems to be backsliding," Brooksbank said, adding that it isn't for lack of commitment.

The presentation by the Raging Grannies and hundreds of others will be compiled by the Great Lakes United and handed over to Ottawa and the provinces when the Great Lakes Water Quality Agreement comes up for review in February.

But environmentalists who hope the review of the agreement will lead to reforms shouldn't be too optimistic, said Michael Barluk, press secretary to the federal minister of the environment.

"The review does not necessarily mean change," Barluk said.

### Clarification

Last week, a story entitled "Geologist Keller debunks extinction theory" appeared in the Science and Environment section of the Gazette. Dr. Jim Hall, a professor in Dalhousie's Earth Sciences department, has asked the Gazette to make it clear that he is not the same Jim Hall who wrote the article. Jim Hall, our reporter, is a student at Dalhousie.

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