III. Solar System Weather Changes Challenge Conventional Theories

by Meghan Rouillard

It is not only on our own planet Earth where we have much to learn about what factors are driving the weather. All around our Solar System, changes are occurring which point toward the need to improve our understanding of Solar System weather as a unified process and study, and the role that solar, galactic, and other factors might be playing.

It is also in examining weather on other bodies in our Solar System that we can easily dismiss assertions that the mere fact that weather on Earth is "changing" is an automatic sign of the massive role that man (and technological progress) must be playing to cause this.

Planet Earth is the only planet currently burdened by a species which, on the whole, has a lot of assumptions about what is, or is not, causing its weather. But the case continues to build for the role which galactic cosmic rays are playing in affecting cloud cover, precipitation, and climate on Earth. Studies have demonstrated the likely presence of this effect at many different time scales— from global ice houses events which corresponds to Earth's passage through the spiral arms of our Galaxy, to changes which seem to mirror solar cycle activity, and even much shorter term changes caused by geomagnetic storms. While these effects appear to vary region by region, and to have different relatively localized expressions, the evidence continues to grow.

Changing Martian Climate

About 10 years ago, the deafeningly stupid, lying campaign of Al Gore, on behalf of truly evil forces who have made no secret of their desire to depopulate (notably Prince Philip), worked many into a frenzy, convinced that man's actual progress was destroying the planet. Many of Gore's forecasts completely failed to pan out. For him, the solar and galactic factors likely driving climate are the real "inconvenient truth!"

While the status of ice caps and glaciers on Earth is far from meeting Al Gore's assertion that, for example, by 2013 the Arctic would be ice-free, Earth is not the only planet which has changes in its surface ice. Take Mars. Some people have put this forth as a quick example in an attempt to silence those who refuse to think on the matter of climate change. This takes the form of "Ice caps are melting on a planet without human life, so please shut up." As an individual case, it is not really a proof of anything—and with minimal overall ice melting on Earth, trying to show that both planets have global warming is really beside the point. But some of the specifics, and the response to them, were certainly revealing.

In 2005, the Mars Global Surveyor and Odyssey missions showed three years of melting of Mars' southern ice caps prompting debate about what causes climate change on Mars and other planets which don't have human life, and not surprisingly, this evidence was cited frequently during 2007, in the midst of and likely in response to Gore's big campaign. Early indications of the melting prompted some to say that it was simply seasonal and a local change "with no sign of external forcing," but as it continued for three years, reports then focused on the fact that it is no secret that many of Mars' temperature changes are due to changes in Mars' own Milankovitch cycles, which also affect Earth's climate, as changes in orbital characteristics and the planet's wobble and tilt affect its relationship to the Sun.

But these reports usually claimed that this was "well studied" (ironically, these non-anthropogenic cycles are not often discussed with reference to Earth, but this case made it unavoidable). Scientists who posited that changes in solar irradiance could be a factor were generally dismissed for not holding the majority opinion. Essentially, it was claimed that nothing happening on Mars was a surprise. If only that were the only example!

Stormy Planets

There are other changes on Mars and elsewhere in the Solar System which reveal how much more we have to learn about weather and the forces that control it.

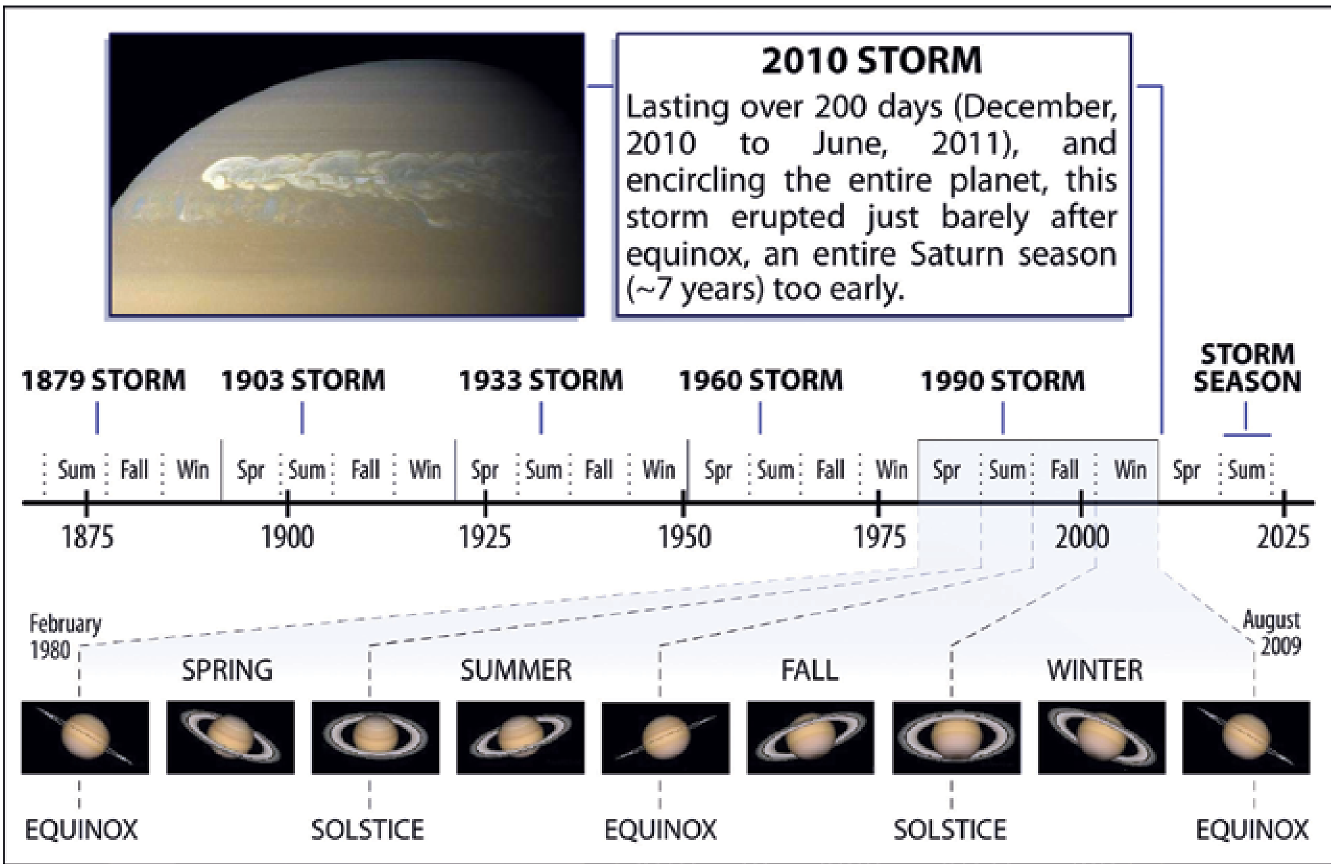
Mars is known for some storms, mostly in the form of "dust devils," but recent plumes seen on Mars baffled astronomers. In 2012, several massive plumes were

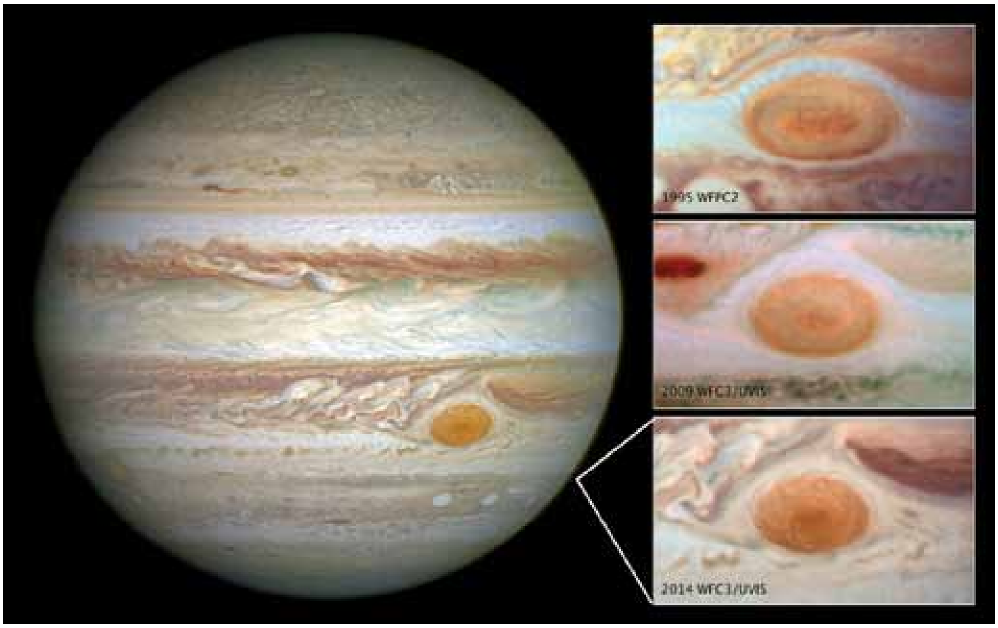
P. James (Univ. Toledo), T. Clancy (Space Science Inst.), S. Lee (Univ. Colorado), and NASA. May 20, 1997.

Melting Martian ice caps: "Here a progressive shrinking of one of the Martian polar ice caps is very visible. While this fact should give pause to those who equate melting ice caps with human activity, there is much more to be discovered about the dynamic weather across our solar system."

visible and larger than anything previously observed. Dust has never been seen at comparable altitudes, up to 155 miles above the surface. Two of the explanations put forward, that the plumes were carbon dioxide ice particles or auroral activity, also didn't quite work. Mars' magnetic activity would be too weak for such auroral activity, and its atmosphere should not be cold enough for ice particles to exist at that level. Studies published in *Nature* magazine stated that the plumes seem to defy our current understanding of atmospheric physics on the red planet.

Almost every planet in our Solar System has storms,

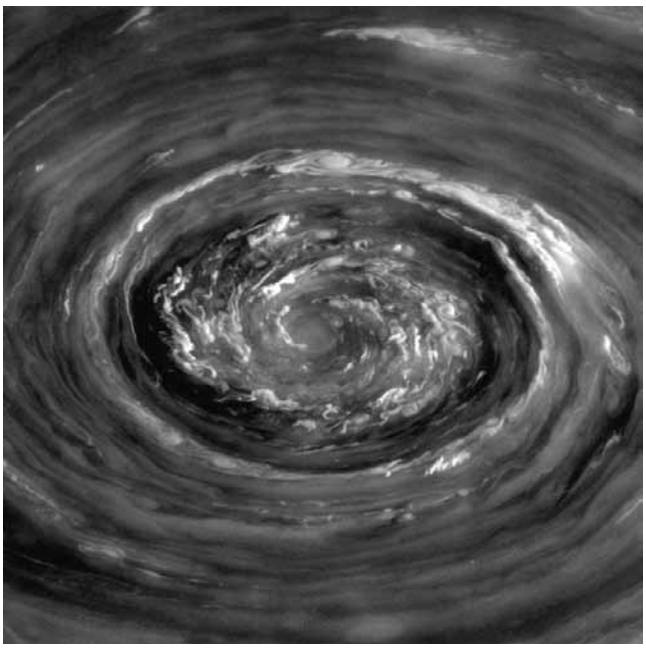




NASA

Jupiter's shrinking spot: "The accelerated shrinking of Jupiter's Great Red Spot currently lacks any clear explanation."

and storms which change in ways we don't expect. Extraterrestrial vortices are apparent on every planet but Mercury, and even some moons. Venus has such storms as relatively permanent fixtures at each pole, discovered in 2006 by the Venus Express probe. Venus' atmosphere is known to rotate relatively quickly around the planet, compared to its year. Its winds now appear to be rapidly speeding up, clocking in at 300 km/h in 2006 and 400 km/h by 2013. This large variation is new, and has not been observed before, nor is it understood.



Benjamin Deniston, LaRouche PAC

Saturn' early storm: "As this infographic shows, Saturn's recent "seasonal" storm was anything but seasonal."

Other unprecedented and unexplained changes literally surround us. Jupiter's famous "Great Red Spot" has becomes less intense, and surprisingly so. We have observed this storm for 150 years, but it is now smaller than ever, less than half the size we originally observed. While some note that eddies surrounding the storm appear to be changing it, or hypothesize something within the planet's atmosphere that is serving to drain energy from the storm, nothing is certain, and the shrinking appears to be accelerating.

Other storms are picking up in intensity, or simply arriving early based on our understanding of seasons. This was the case for Saturn's last storm. Saturn's seasonal storms have tended to arrive on time like clockwork in the Saturn spring (roughly every 29) years since we began observing in 1876, but this storm arrived quite early—seven years early, to be specific, or an entire season, and it was the largest storm we had ever seen on Saturn. There is also the fascinating case of "Saturn's hexagon," a persisting hexagonal cloud pattern at its North Pole. Attempts to simulate such a formation in the laboratory, by rotating a circular tank of liquid at different speeds between its center and surface, sometimes yielded this shape, but not always.

Studies of the Saturnian moon Titan point towards a solar, and solar-magnetic, influence upon planetary and satellite atmospheres, even at this far distance from it. In a recent paper submitted to the American Geophysical Union entitled "Observed Decline in Titan's thermospheric methane due to solar cycle drivers," the authors put forward evidence of an 11-year cycle, corresponding to the Sun's own 11-year change from solar minimum to solar maximum (corresponding with the intensity of its magnetic activity).

Titan is the only moon in our Solar System with an atmosphere as thick as Earth's. Changes in its atmosphere's chemical makeup, specifically the methane component, is seen to vary according to this cycle, with its methane levels declining with the Sun's activity, and increasing with its inactivity. The authors believe that the radiation expelled from the Sun during flares and other eruptions is actually capable of reaching Titan and breaking apart the methane molecules, a process which was evident during the 2008-2013 period, with methane levels declining as the Sun reached its maximum. This analysis, based on reviewing data from Cassini, also corresponds to the earlier 1980 observations of Voyager, which coincided with a solar maximum and low levels of methane.

NASA, ESA, and L. Sromovsky (University of Wisconsin)

Neptune spots: "In this image, the two visible spots represent storm activity on Neptune, one of the most distant and most active bodies in our Solar System."

The Forgotten Ice Giants

The windy worlds of Uranus and Neptune, with top wind speeds of 560 and 1500 mph respectively, also present paradoxes. These winds are thought to originate due to causes that are either very deep, or, alternatively, very shallow processes in their atmospheres. The fact that the body which is farthest away from the Sun has some of the most intense weather in the Solar System does not have an obvious explanation. In a 2014 BBC documentary on the Ice Giants (part of a series called "The Sky At Night"), planetary scientist Leigh Fletcher of the University of Oxford said the following of these mysterious bodies, which he believes are well worthy of new missions:

> If you look at Uranus and Neptune, they formed at roughly the same sort of temperature, they took about the same length of time to form, you would expect them to be roughly the same. The same sort of composition, the same sort of weather, they have similar colors and that's because of the amount of methane they have in their atmospheres. . .
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> But that's where the similarities really end. In fact, Neptune, despite being the farthest planet from the Sun, is actually one of the most dynamic places in our Solar System. It has these incredibly strong weather patterns and weather systems with clouds popping up and large cumulus systems developing that then get sheared apart by all the winds and jets and these can happen on an hourly basis, so that Neptune really doesn't look the same each night that we look.
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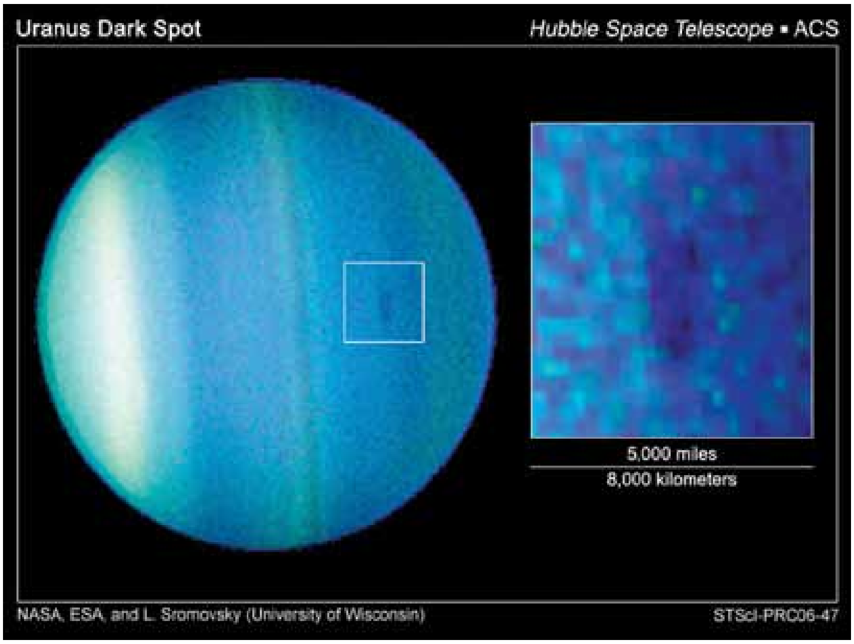
> Now contrast that with somewhere like Uranus. Uranus, when Voyager flew past it in the 80's, was a very sluggish, dare I say boring planet. All said and done, Neptune is a much more powerful, much more active planet than Uranus despite being much much farther away at 30 AU vs 20. [The expectation is that this would make the weather less "dynamic."] Most of the giant planets, if you were to look at them with infrared eyes, would be glowing hot, they are emitting energy. Neptune has the biggest heat source of any of the giant planets. . . maybe that's contributing to this really powerful weather we see on that planet. But then contrast that with somewhere like Uranus. Uranus has almost no appreciable heat source that we can detect.

Fletcher supports a new mission to Uranus to answer some of these questions. But with winds upwards of 500 miles per hour, it can't really be fairly described as



NASA, ESA, and L. Sromovsky (University of Wisconsin)

Uranus Dark spot: "The first image of a dark spot on Uranus, which often appears calm and opaque, obtained in 2006."

boring, and it, like Saturn, has also recently shown evidence of surprising storms.

Uranus' virtual 90 degree tilt to the rest of the planets in our system makes it quite unconventional (and the cause of this tilt in and of itself is an interesting question), but theoretically it could have seasonal weather. In part, it simply hasn't been observed very much or very closely, but there was an increase in reported observations of cloudy spots in 2014, which turned out to be intense storms, viewed by the Hubble Telescope and from the Keck Observatory in Hawaii, with the initial observations drawing attention to it. This activity came seven years after the Northern Spring Equinox of 2007, when each pole was equally illuminated, and which was expected to be the height of convective activity.

The 2014 storms came from the Northern polar region, which, however, should not have sufficiently warmed after its long winter to produce such intense storms. "Why we see these incredible storms now is beyond anybody's guess," said Heidi Hammel of the Association of Universities for Research in Astronomy, and a co-investigator in these recent studies. "These unexpected observations remind us keenly of how little we understand about atmospheric dynamics in outer planet atmospheres," the authors wrote in their paper.

Interplanetary Comparative Cosmoclimatology

All this should be taken as a reminder that we should hesitate before boldly proclaiming that we understand the causes of weather on our own planet. Will we make more progress in our study of weather, and increase the accuracy of our forecasts, if we stop studying each body in our Solar System as a totally unique and distinct place? Should we approach weather in a more systemic way, taking into account the respective differences of each planet, but always the fact that they all interact with our changing Sun and galactic environment?

Of course we shouldn't expect that all the answers we would desire are just a question of analyzing existing data, although there might be interesting discoveries awaiting us there. We should design new missions which seek to answer questions about the role which cosmic radiation might play in driving Solar System-wide weather, as well as comparing cycles in seismicity and volcanism, considerations which have been factored into an upcoming Mars mission called Insight.

Initial comparisons of Earth and recent lunar volcanism appear to show intense activity at roughly the same time. Simply a coincidence? We can reasonably start from the hypothesis that as part of a Solar System, the Sun and its changes may very well play a critical role in all planetary weather, with differences in composition, distance, and other factors determining the magnitude of that effect and its expression.

Let's not close our minds to the possibilities of the science of weather forecasting at this Solar System and even galactic level—it would be a tragedy to block out the study of these forces in the name of blind ideological promotion of the theory of anthropogenic global warming, of which there is scant legitimate evidence at best (not to mention that many promoters of this theory simply view it as a means to encourage depopulation). Let's create a new science—Interplanetary Comparative Cosmoclimatology—the means by which we will improve our weather forecasts, and beyond.