study of GJ 1214b's atmosphere by larger and space-based telescopes will likely answer some of the questions about it.

The next paper, by Mark Swain of the Jet Propulsion Laboratory and his colleagues, presents a near-infrared emission spectrum of the atmosphere of the transitting planet HD 189733b, obtained from a *ground-based* telescope on Mauna Kea (NASA's Infrared Telescope Facility). This is the first time that such a spectrum has been obtained from the ground, and it appears to show the signature of methane in fluorescence (this is seen in the atmospheres of Jupiter, Saturn, and Titan). The IRTF has a diameter of just 3 m, so it is not by any means a large telescope, and the instruments have not been optimized for work on exoplanets. That it is able to do this is quite striking and bodes well for future observations, particularly with the infrared-optimized Gemini 8-m telescopes on Mauna Kea and in Chile.

The final paper, by Shulin Li of Peking University and her collaborators there and at the University of California at Santa Cruz, reports an analysis of the properties of a recently discovered planet, WASP-12b (the discovery was reported by Hebb *et al.* 2009 *ApJ 693,* 1920). WASP-12b is orbiting only 3.1 stellar radii above the surface of its parent star, which means that it is subject to very large tidal forces. The planet's radius is substantially larger than those of other hot Jupiters, and only tides seem to provide sufficient energy to puff it up so much, so Li decided to investigate. What she found is that the planet must be losing mass to its star at a rate of $\sim 10^{-7}$ Jupiter masses per year. Given that its mass is just 1.4 $M_{Jupiter}$, this is an uncomfortably large rate, as the planet would evaporate in about 10 million years. Moreover, the tidal dissipation is so great, given normal assumptions, that it would spiral into the star on the same timescale. Astronomers tend to get very uncomfortable when they find objects in what appears to be a transitory state that is very short compared to expected lifetimes, which for an M star is of the order of 100 billion years. Li concludes that the mass loss is inescapable, but she suggests that the tidal heating the planet is experiencing now may be transient. The planet is in an eccentric orbit, which it should not be, given how close it is to the star — the orbit should rapidly circularize. She postulates that there may be a second planet that is pumping WASP-12b's eccentricity, and complex dynamical reactions recently drove it into its current state. She makes some interesting predictions, too. The material flowing into the star should reflect starlight and emit its own light. At about the ten-percent level, this will differ from what is expected from a spherical planet, and it may be detectable observationally. The infalling gas also should produce an accretion disk with a temperature of 3000-4000 K, which might produce marginally observable line emission from CO molecules in the disk.

As the Kepler mission, which is targeting 150,000 stars in its search for orbiting planets, continues (see `www.kepler.nasa.gov` for updates), we will find yet more surprises, and hopes are high that sometime in the next few years an Earth-mass planet will be found orbiting a Sun-like star at distance comparable to Earth's distance from the Sun. Amazing progress for just 15 years.

Leslie J. Sage is Senior Editor, Physical Sciences, for Nature Magazine *and a Research Associate in the Astronomy Department at the University of Maryland. He grew up in Burlington, Ontario, where even the bright lights of Toronto did not dim his enthusiasm for astronomy. Currently he studies molecular gas and star formation in galaxies, particularly interacting ones, but is not above looking at a humble planetary object.*

Through My Eyepiece

By Geoff Gaherty, Toronto Centre (geoff@foxmead.ca)

Brasch's Law

Klaus Brasch is, quite simply, my oldest and best friend. We first met 52 years ago when we were both 17. Astronomy was what first drew us together, but we soon discovered many other interests in common, especially music and science fiction. Though we've gone our separate ways over the years, we somehow manage to stay in touch, and, when we do get together, we always continue the dialogue that began so many years ago.

A few years ago in *SkyNews,* Terry Dickinson, who's been Klaus's friend almost as long as I have, published an editorial concerning Brasch's Law. This states how bad the odds are against Canadian astronomers, given the cold in winter, the mosquitoes in summer, and the clouds all year round. Recently I undertook a semi-quantitative study of Brasch's Law as it applies to me, and would like to present my results here.

We start out with 365 potential observing nights in the year. Following Brasch's Law, we rule out all nights in the three worst months of winter, December through February, which leaves us with 275 nights.

Figure 1 — Klaus and Maggie Brasch in their observatory in Flagstaff, Arizona.

Secondly, we have mosquito season. That wipes out about two whole months, leaving us with 215 nights.

Now reality sets in. No matter how keen we are as astronomical geeks, we do have lives, which mean family, work, and social activities. Let's allow another month for these, bringing us down to 185 nights.

Now add the reality of the Canadian weather. Thanks to Attilla Danko's Clear Sky Charts, I have accurate statistics for my observing location, Foxmead Observatory. The actual numbers for my site show either planetary or deep-sky observations possible on 29 percent of nights, bringing us down to just 54 nights.

So, how does this forecast compare with what I actually have achieved? Over the past six years, I've averaged 73 sessions a year, rather better than predicted, despite serious health problems.

Several things have contributed to my high totals. First, I now live in the country, and dark skies are just a step outside my door. Secondly, having a large telescope always ready to go in a SkyShed POD encourages short observing sessions on iffy nights. Thirdly, my Coronado Personal Solar Telescope adds many daytime observing sessions; there seem to be many more clear days than nights, and it's a lot warmer in the daytime. Also, no mosquitoes!

Geoff Gaherty recently received the Toronto Centre's Ostrander-Ramsay Award for excellence in writing, specifically for his JRASC *column,* ***Through My Eyepiece****. Despite cold in the winter and mosquitoes in the summer, he still manages to pursue a variety of observations, particularly of Jupiter and variable stars. Besides this column, he writes regularly for the* Starry Night Times *and the* Orion Sky Times. *He recently started writing a weekly column on the Space.com Web site.*

A Moment With…

by Phil Mozel,
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Dr. Brigette Hesman

"How do you know if you don't go?" Into space, that is. This was the question Dr. Brigette Hesman asked herself at an early age. She knew how to do something about it, too: become an astronaut. "That would be the ultimate thing to do: to go into space and see other worlds." In preparation, she attended Space Camp in Huntsville, Alabama — twice, once at her parents' expense and once at her own. The astronaut thing didn't quite work out, but Dr. Hesman isn't complaining. Being an astronomer allows her to "go" anyway, at least in a virtual or observational sense, and to pursue questions dating from her youth: "What's out there?" "Is it different?" "Are there other beings in the Universe?"

Undergraduate studies in astronomy and physics at York University gave her a start, and allowed Dr. Hesman to focus some attention on satellite communications. With an NSERC scholarship in her hand, she then went on to complete a Ph.D. at the University of Saskatchewan (2005), where she examined the carbon-monoxide profile in the atmosphere of Neptune. She also thought Mars was pretty cool, and — while never pursuing the Red Planet as a topic — did many interviews during the rover landings.

Further opportunity came as a post-doc at the Goddard Spaceflight Center, where she observed Saturn at various wavelengths using a spectrometer, tracing out the dynamics of the planet's atmosphere. She explains that, while the upper atmosphere of a giant planet may sometimes seem calm, deeper down there may be a lot of activity, akin to a swan seeming to effortlessly float about a pond while just below the surface, the legs are paddling like mad. Hydrocarbons, specifically ethane and acetylene, were her target. Theory predicted that atmospheric ethane would be long lasting and would have a constant profile across latitudes. Acetylene, on the other hand, would be more concentrated near the equator. Dr. Hesman found that these hydrocarbons actually peak in abundance at Saturn's south pole. Reality is obviously something quite different from the models! That "something" is likely a Hadley cell, whereby atmospheric gases in the equatorial regions rise, travel to higher latitudes, and then sink back to lower levels in a kind of monster-scale conveyor belt. Such a system operates on Earth, where it is driven by solar heating.

Figure 1— Dr. Brigette Hesman.

Hydrocarbons are important as tracers of winds, and provide clues about how an atmosphere works. On Neptune, for example, it turns out that there is both an internal and external source of carbon monoxide. Observations Dr. Hesman made from Mauna Kea indicate that the external CO was brought to Neptune hundreds of years ago by an impactor. Correspondingly, CO was also detected after the Comet Shoemaker-Levy 9 impact with Jupiter in 1994.

Moons come under Dr. Hesman's scrutiny as well. She has looked at the ratio of carbon-12 to carbon-13 in the ethane in the atmosphere of Titan, the principal satellite of Saturn. Such observations provide clues to the molecular abundances in the early solar nebula, and help determine where in the Solar System the planets actually formed.

Dr. Hesman does occasionally "leave" the Solar System. While still an undergrad, and with her supervisor Dr. John Caldwell, she attempted to image a brown dwarf for the first time. Brown dwarfs are like super Jupiters in size and give off light and lots of heat. Most people at the time were looking for these as faint stellar companions that impart a characteristic wobble to their larger companion stars. Dr. Hesman wanted an image. The plan was to obtain such an image in infrared with the *Hubble Space Telescope* using selected infrared filters and a model of the light around a bright star that could be