If the Earth had a Ring - "What If" Seasonal Forecasts for Years to Come L. Hancock, Consultant, Washington, DC

EARTH: A RINGED PLANET?

The notion of an Earth ring system significantly affecting weather was proposed by O'Keefe (1980) who suggested that the Earth might once have had a ring in its equatorial plane, that growth of such a ring could have driven onset of the Ice Age, and that ring decay could account for climate warm-up and the end of the Ice Age. This presentation explores the possibility that a faint Earth ring system exists today.





Saturn, photographed by Cassini

Earth with rings, a visualization

The approach taken here amounts to using weather as a proxy for photometry. The program is:

- (a) Set out a ring system "like" others in the solar system;
- (b) Work out where the shadows of the ring system would fall;
- (c) Propose weather events that follow if these shadows are significant;
- (d) See whether significant events occur as forecast.

PROBLEMS WITH THE IDEA OF AN EARTH RING

"But has anyone ever reported seeing an Earth ring?

During the Perry expedition to Japan, the Rev. G. Jones (its chaplain), made 6 days/week observations of the zodiacal light from shipboard for about two years. (See example below.) He proposed a ring around the earth in the ecliptic plane as the best explanation for this moving arc of light. Jones's proposal was not taken up, perhaps because it was in opposition to the ideas of Cassini, who had earlier proposed the zodiacal light was a ring around the Sun in the plane of the ecliptic, and Maxwell, who pointed out in 1859 that rings in a planet's equatorial plane are dynamically favored.





Above: Rock carving from Loughcrew, Ireland, ca. 5500 years old. Photo by Renee Tatusko, 2011. *Right*: One of Jones' daily records of the position of the zodiacal light changing over the course of a single night.

A ring in the equatorial plane is likelier than a ring in the plane of the lunar orbit and should be brighter as well. Yet no report of such an object is made. Perhaps a ring in the equatorial plane has go unnoticed for its very familiarity. It would cause a swathe of light at the celestial equator and below - in northern midlatitudes, it would be low on the southern horizon. Its brightness would vary during a single night, but the pattern would be constant from night to night, every season, every year, in any given place. Such consistent lightening of the sky might be flatfielded out, mentally or photographically.

And after all perhaps people *have* seen and recorded these rings, a few millennia ago when the rings must have been brighter if indeed they caused the Ice Age.

- Ancient cultures record legends of sky serpents that repeatedly swallow the sun, e.g., the Hindu **Rahu.** Rahu and Ketu are located at the points where the moon's path crosses the sun's. There is nothing to see at either point. It seems odd that Hindu astrology makes much of these abstractions. But if a ring in the plane of the lunar orbit were visible then Rahu and Ketu would locate where on the ring the Sun would visibly sink into the Ring's shadow and where it would later rise above. Loops and arcs recur all over the carvings on Ireland's astronomical monuments - often stacks of arcs (see photo above) just as ring systems with gaps would appear for observers at high latitudes.
- Near Eastern knowledge of the Saros cycle would be easy to understand if the observers were watching a ring in the plane of the moon's orbit circulating about the sky season to season. The return period for this pattern would be the Saros cycle.

"Satellites or spacecraft should have seen an Earth ring system."

Accidental discovery might not be favored -

A large field of view is needed, looking toward earth, backlit by the sun. POES fields of view may not be large enough; GOES are located in the plane of a ring and would be looking through it. Interplanetary spacecraft on missions to the outer solar system would not see the rings backlit; SOHO is always looking at the Sun.

"A steady source of material is needed to replenish rings."

Yes. Still let's have observations lead theory, not the other way around.

The likeliest component of an Earth Ring system is a ring in the plane of the Earth's equator, like Saturn's well-known bright ring. This "Main Ring" would be the most dense component of the Earth ring system. Its density would be concentrated within a few Earth radii

The Main Ring's shadow would travel north to south and back, every year in exactly the same way. So its effects should be "baked into the cake" of climate, never to be distinguished unless the ring were to fade - or grow denser - causing global warming (or cooling).

MOON RING - Mother of All Teleconnections

The "Moon Ring" wouldn't be a ring around the Moon, rather a ring around the earth, in an orbit like the Moon's - tilted a bit with respect to the Main Ring. (See figure to left below.) This is very nearly the orientation Jones suggested to account for the zodiacal light: the plane of the lunar orbit is tilted about five degres from the ecliptic. Today we know that Saturn has rings in the plane of its moons' orbits, so with this slight adjustment, Jones' proposal is panning out at last. Accordingly let us hypothesize a Moon Ring orbiting the Earth-Moon barycenter, densest far out near the Moon but not confined there. (See figure to the right, below.) Jones's identification of zodiacal light as consistent with sunlight reflected from such a ring is dead-on geometrically.



The Moon Ring's shadow would travel north/south yearly, at a tilt to the equator and with a period about 11.5 months. It would chill winter for a few years, then summers, driving climate oscillations at 18-19 year cycles and at all other periods of the Earth-Moon relationship. Something like ENSO would come about in the oscillation of climate. It could in fact be called the La Nina ring as its calculated shadow is usually positioned to account for La Nina flooding.

Its orbits would be unstable, so its density would be sensitive to disruptions. Thus its effects though regular would vary in magnitude. Cassini first noticed the zodiacal light in 1683, a few decades after onset of the Maunder Minimum, during the Little Ice Age. Perhaps this fragile ring had the opportunity to coalesce and chill the earth during that period of Quiet Sun; perhaps after Jones' observations it was disrupted by the Carrington flare; perhaps the intense La Nina just experienced shows this ring is gathering density again.

To estimate how much global warming could NOT POSSIBLY be caused by ring fading, we measured the trend in daily maximum temperature (trend in the 20-year high), by day of the year. Warming trends in this could not possibly be accounted for by fading of the ring system. (Rising Tmin could be rings, rising Tmean could be rings, rising Tmax taken year to year could be rings, rising Tmax 20-year high in winter could be rings. But there is no warming of Tmax 20-year high in summertime.

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Global average in trend for 20-year high value of Tmax, by day of the year. (Green squares are average for northern hemisphere, red circles are southern hemisphere and displaced by six months). The yearly cycle is presented twice (the same data) to avoid edge effects.

Midsummer highs are cooling, in fact. Maybe Earth has a halo of dust that settles into the ring system when things are guiet, and flies up again when disturbed, like a lava lamp.

Poster 281, 92nd American Meteorological Society Annual Meeting, Monday 23 January 2012, Hall E, New Orleans Convention Center.

MAIN RING – Baked in the Cake





DUST HALO – Lava Lamp

ummertime maximum temperatures are dropping - a growing cloud of dust?



22-Jun 21-Sep 21-Dec 23-Mar 22-Jun 21-Sep 21-Dec 22-Mar 21-Jun 20-Sep Day of Year (Two Cycles)

HOW A RING SYSTEM COULD HAVE AFFECTED 2011

COLD IN AUSTRALIA DECEMBER 6, 2011

The ring system would affect weather because its shadow would cool the Earth. Twice a year this would be especially important, when the Moon Ring shadow would collapse into a narrow band, and the optical density of the ring would be concentrated. Deep shadow would cause unusua cooling of the air below it.



FLOODING IN PAKISTAN, JUNE 2010 and 2011



7/20/2009. No flood.

7/20/2010. Rain and flooding

Cooled air should diverge outward from deeply shadowed land in both radial directions. If such a wind were to blow across water onto a heated land mass, the air would be warmed, would rise, and would drop rain on the land mass below, just like an out-of-season monsoon.

DROUGHT IN TEXAS SPRING 2011



What if the shadow is oriented so that it drives a wind across land, and not across water? The wind should bring no moisture with it and could drive moisturebearing events offshore, causing drought.

WARM AUTUMN IN 2011

Rings don't bring warmth, but it might appear otherwise! If the Main Ring is fading, then any land mass shadowed by the Main Ring and NOT by the Moon Ring should be warm by historical standards.





7/20/2010 Rain and flooding.

HOW A RING SYSTEM WOULD AFFECT 2012 (see <u>accompanying video</u> at YouTube)

Mid-APRIL-MAY: CHILLY & STORMY IN CANADA & US

Mid-APRIL-MAY: DRY IN C EUROPE, S. E. EUROPE, WEST US, NORTH AND WEST CHINA, KOREAS

Mid-APRIL-MAY: RAIN IN THE MAGHREB, NORTHERN **IRAN, TURKEY'S BLACK SEA COAST**

MAY 24-25: RAIN IN TEXAS (gather it up), COLD IN S. FLORIDA, CENTRAL MEXICO, CENTRAL SAUDI **ARABIA, NORTH/CENTRAL INDIA**

MAY 25: RAIN BEGINS IN PAKISTAN

MAY 26 : RAIN BEGINS OMAN, YEMEN, DJIBOUTI, TO **CONTINUE A WEEK OR SO**

MAY 24-25: RAIN BEGINS IN JAPAN, KOREAS, SOUTHERN CHINA, TAIWAN, HAINAN, BURMA, **THEN FROM MAY 29 PHILIPPINES THEN INDOCHINA**

MAY 27-29: RAIN IN BANGLADESH AND E INDIA

MAY 28: RAIN IN DAKAR, THEN COASTAL GUINEA-**BISSAU, GUINEA, SIERRA LEONE, LIBERIA, COTE** D'IVOIRE, GHANA, TOGO, BENIN, NIGERIA

JUNE 2: RAIN IN MOGADISHU

JUNE 2: RAIN IN CARIBBEAN, MEXICO FROM **GUADALAJARA TO SOUTH, AND IN CENTRAL AMERICA**

OCT-NOV: CHILLY AND STORMY IN SOUTH HEM.

NOV 10-17: FREAKY STORMS IN SOUTH HEM.

NOV 15-17: CHILL IN PARAGUAY AND NEIGHBORS

NOV 17 FF: RAIN IN AUSTRALIA, NZ, NEIGHBORS

NOV 27: STORMS AIMING AT PHILIPPINES, MALAYSIA, PNG, BRAZIL, C AMERICA

NOV 25-DEC 7: QATAR – BANDS OF COOL AND RAIN

POSSIBLE NOVEMBER HURRICANE N ATLANTIC

ENSO MAX IN MAR-APRIL 2015 (STRONG EL NINO)

ENSO MIN IN APRIL 2024 (STRONG LA NINA)



NOW WE WAIT AND SEE

contact info

We will be keeping track of the outcome of all these forecasts at a website for the purpose, <u>www.naturesverdict.net</u>. We can be contacted at <u>lucy@naturesverdict.net</u>, so you can point out our errors. Please do.

forecasts for 2012

(tape poster handouts here)

how to try it yourself

Click here

references and acknowledgments

(1856). Observations on the zodiacal light: from April 2, 1853, to April 22, 1855, made chiefly on board the United States steam-frigate Mississippi, during her late cruise in eastern seas, and her voyage homeward : with conclusions from the data thus obtained. The first place it is proposed that the Earth has a ring. Review of earlier work on the zodiacal light (Cassini, etc.). Irreplaceable diagrams of position of zodiacal light, in a place (and time) when it may have been brighter. (Google has made it available - many many thanks.)

O'Keefe, John A. (1980), "The terminal Eocene event: formation of a ring system around the Earth?" Nature 285, 309 - 311 (29 May 1980); doi:10.1038/285309a0. First to suggest Earth rings would influence climate; the first since Jones to suggest Earth might have a ring at all. It was O'Keefe who first noted the many legends in many cultures that describe a great serpent in in the sky that swallows the sun from time to time (pers. comm.). Thanks to O'Keefe's children and their spouses for essential help and encouragement and recollections.

Jayawardena, J. (2004), "The formation of tektites from a terrestrial ring arc," Journal of the Royal Astronomical Society of Canada 98: 192-197, October 2004. A very intriguing exploration of the geological effects of an Earth ring system, exploring where matter would fall from an equatorial ring perturbed slowly by tectonic effects, and what the geological characteristics of the fallen material might be.

Esposito, *L*. (2006) has written a very interesting summary of work on the rings of other planets in our solar system. *Planetary Rings*, Larry Esposito, Cambridge University Press, New York 2006.

Hal Povenmire provided knowledge, key insights, recollections of the views of Dr. O'Keefe, and his trademark encouragement.

Celestia, astronomical visualization software, the brainchild of C. Laurel. See celestia.sourceforge.net

NOAA's re-analysis and its weather data archive provided means of testing this hypothesis on historical data.

list of time series used for "Lava Lamp" figure

A list of the Northern Hemisphere sites used follows. These stations were selected for geographic variety from all stations that had maintained relatively long, relatively continuous records of daily maximum temperature. Nuwara Eliya (Sri Lanka), Isabella (PR), Kailua (US), Izana (Spain), Gyshgy (Turkmenistan), Lisbon (Portugal), Albacete (Spain), Madrid (Spain), Tashkent (Uzbekistan), Tbilisi (Georgia), Sochi (Russia), Toronto (Canada), Huron SD (USA), Bologna (Italy), Milan (Italy), Zagreb (Croatia), Pecs (Hungry), Geneva (Switzerland), Chateaux Roux (France), Stuttgart (Germany), Poronajsk (Russia), Frankfurt (Germany), Prague (Czech Republic), Soesterberg (Netherlands), Irkutsk (Russia), Berlin (Germany), Barkerville CA (USA), Kustinai (Kazakhstan), Dublin (Ireland), Mogoca (Russia), Ufa (Russia), Petropavlovsk (Kazakhstan), Nordby (Denmark), Tranebjerg (Denmark), Nizhny Novgorod (Russia), Vaexjoe (Sweden), Stornoway Airport (Great Britain), St. Petersburg (Russia), Archangelsk (Russia), Sodankylam (Finland), Ilulissat (Greenland).

A list of the Southern Hemisphere sites follows. Again, stations were selected for having maintained relatively long, relatively continuous records of daily maximum temperature, and again this was aimed to be as representative as possible of the Southern Hemisphere's stations, though of course an equivalently representative station set was impossible. In Australia: Gunnedah Pool, Sydney, Deniliquin, Cape Otway, Burketown, Melbourne, Inverell, Goondiwindi, Rockhampton, Gayndah, Boulia, Camoweal, Burdekin, Georgetown, Darwin, and also Buenos Aires (Argentina), East London (South Africa), Paysandu (Uruguay), Agalega (Mauritius), Estanzuela (Uruguay), Plaisance (Mauritius), La Boulaye (Argentina).