AUTHOR

Neil B. Christianson (a veteran of the Korean conflict) obtained an engineering degree at Seattle University. He retired from a successful aerospace engineering career in 1988. A simple truth, learned during his career; one cannot engineer with theory, it requires the use of materials with laboratory demonstrated physical characteristics.

He became interested in planetary body formation, during the heady days of Moon walks, when he was chief engineer for the Titan II Weapon System. The condensed, cold-core model held promise, so he worked out an earth model condensed from the primary constituents of molecular clouds. However, his cold-core model failed to meet the low moment of inertia needed to keep earth from flattening.

This impediment bothered him, because the workings of a condensed, cold-core model matched well events reported by paleontologists, archaeologists, geologists and historians. They also matched well events reported in the Bible, including future events foretold by the prophets. Further, they brought reason to the **Global Warming** debate by introducing a natural heat pump cycle of Ice Ages and warming periods.

Fortunately, he finally realized the packing effect of gravity had never been calculated. His calculations show the validity of a condensed, cold-core model. To read his paper **Click** mouse; or, to view his PowerPoint presentation **Click**:

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A MISSED VECTOR

by

Neil N. Christianson

Two hundred years ago, faulty reasoning led scientists to believe Sir Isaac Newton's calculations show vectors of horizontal gravity cancel each other out.

But, Newton never calculated gravitational forces at work within the earth. He confined his work to the flight of cannon balls and orbits of satellites. He sidelined horizontal gravitational vectors because they had no effect on orbiting objects. This led to a misunderstanding that later caused scientists, who were trying to determine earth's moment of inertia, to identify the vertical gravitational vector as the only force needed to be overcome by an outward push of earth's rotation to cause her to flatten.

In the hydrostatic model of earth's cross section, the absolute difference (C-A) between earth's moments of inertia about polar and equatorial axes are expressed in terms of geodetically determined flattening[1]. Her flattening (*f*) is given by the following equation:

$$f = 1.5(C\text{-}A/Ma^2) + 0.5(\omega^2 a/g_e):$$

C Polar moment of inertia
A Equatorial moment of inertia
a Equatorial radius
ω Earth's rate of rotation
g_e Vertical gravity at the equator

Since $(C-A)/Ma^2$ has been determined from satellite orbits with great precision, that data is now used in geodesy. Therefore, the approximate value for the second half of the equation—rate of rotation (ω) squared, multiplied by equatorial radius (a), divided by vertical gravity at the equator (g_e)—is believed to set the flattening experienced by the earth.

The moment of inertia of a uniform sphere is $0.4Ma^2$; so, the value for C (derived after incorporating the fractional differences in the principal moments of inertia of the earth) of $0.33078Ma^2$ (80.378×10^{36} kg m^2) sets a vital boundary condition on the radial density profile within the earth. As a result, earth scientists concluded that earth's low moment of inertia required the bulk of her mass to be located in her core. Thus, they abandoned the ancient cold-core model for a hot-core model—wherein heavy materials sink deep into her molten core—driven there by the pull of gravity.

Gravity is a strange phenomena—it always pulls. Earth's gravity pulls the moon toward earth with the same amount of force that moon's gravity pulls the earth toward the moon. It is an elastic force that can best be visualized as an invisible rubber cord pulling equally on the two bodies in question. Since it is an elastic force, it can never be cancelled out by another elastic force (balanced, but never cancelled out, as has been taught).

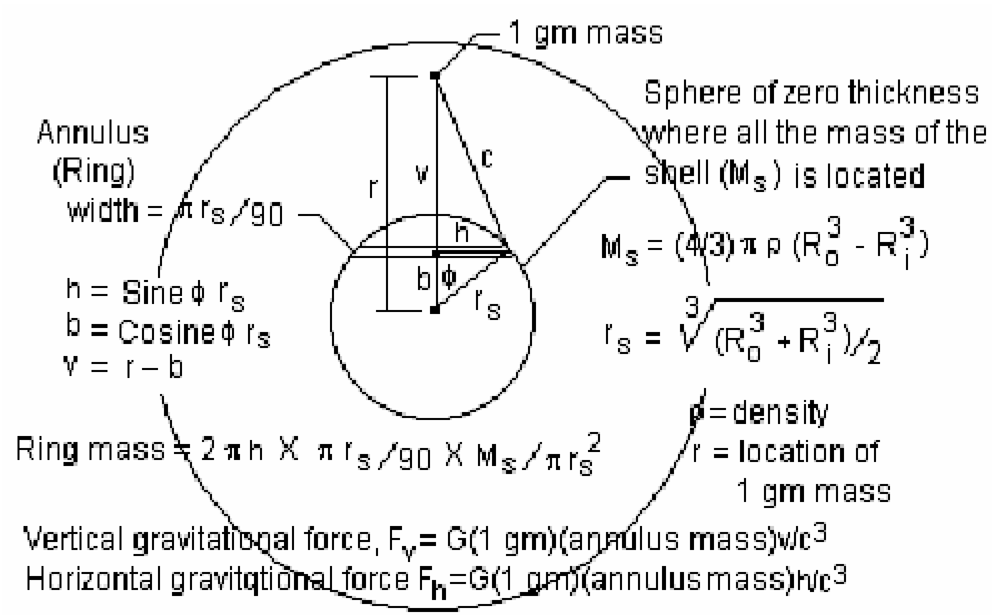
Applying gravity's elastic nature to gram masses inside the earth, suggests gravity's horizontal vectors work in a manner similar to the pull exerted by molecules in the skin of a rubber balloon. It seemed reasonable then that the strength of pull (packing effect) by a gram mass at any depth within an orb would be obtained by rerunning calculations similar to the ones Newton used to prove that an orb's total mass can be considered to be located at the orb's center—a very tedious trigonometric calculation.

To analysis the packing vectors at work within the earth, I used three models—cold-core, hot-core, and average density. Each model uses the same eighteen divisions of seismically known shells: crust, lithosphere, asthenosphere, 1st bonded shell, 1st transition (phase change), 2nd bonded shell, 2nd transition, five divisions of the 3rd bonded shell, four divisions of the outer core and two divisions of the inner core. Except for the average model, which has the same density for each of its shells, density is proportional to seismic wave speeds in the cold-core model and, as required above, density is concentrated in the core in the hot-core model. All models have a radius of 6371 km and all have the same total mass. See below.

		Cold-core model			Hot-core model			Average model	
Shell Radius	Radius	ρ g/cc	M kg 10^{23}	I kg m^2 10^{36}	ρ g/cc	M kg 10^{23}	I kg m^2 10^{36}	M kg 10^{23}	I kg m^2 10^{36}
6.365	6.371	2.69582	0.16470	0.44479	2.165	0.13227	0.3572	0.33695	0.91001
6.325	6.359	5.01853	1.71570	4.77556	3.350	1.14528	3.0540	1.88548	5.02859
6.204	6.291	4.54448	3.84734	9.87278	3.425	2.89890	7.4390	4.66798	11.97920
6.073	6.116	4.72950	2.29453	5.62413	3.475	1.68591	4.1320	2.67569	6.55870
5.986	6.011	5.28128	1.16909	2.84029	3.525	0.78366	1.8960	1.24175	2.96621
5.842	5.961	5.85933	6.03012	13.72360	3.825	3.93650	8.9590	5.67590	12.91800
5.690	5.721	6.25345	1.27406	2.75727	4.250	0.86643	1.8740	1.12435	2.43185
5.525	5.671	6.62130	7.61090	15.48350	4.500	5.17259	10.5200	6.33945	12.89740
5.130	5.371	6.77580	11.17420	19.61140	4.750	7.83339	13.7500	9.09521	15.96340
4.630	4.871	7.06482	9.48852	13.57200	5.015	6.73547	9.6340	7.40719	10.59540
4.130	4.371	7.46210	7.97261	9.08072	5.215	5.57178	6.3460	5.89245	6.71176
3.685	3.671	7.69858	5.05651	4.58060	5.400	3.54678	3.2130	3.62241	3.28163
3.220	3.485	1.06151	0.79760	0.54956	10.300	7.73927	5.3310	4.14400	2.85487
2.625	2.900	1.08253	0.55423	0.25527	11.500	5.65737	2.6060	2.82364	1.30060
2.045	2.300	1.09830	0.33374	0.09231	11.600	3.52489	0.9749	1.67590	0.46355
1.495	1.700	1.10881	0.14446	0.02141	12.036	1.56806	0.2326	0.71850	0.10653
1.025	1.217	1.27171	0.07770	0.00533	12.351	0.75531	0.0517	0.33730	0.02313
0.554	0.700	1.35054	0.01940	0.00380	12.701	0.18248	0.0035	0.07920	0.00155
	0.000	1.41890	0.00000	0.00000	13.000	0.00000	0.0000	0.00000	0.00000
		Total	59.74630	103.091	Total	59.74630	80.3800	59.74300	96.99300

Eighteen separate shell divisions of the three models of earth's cross section

To fill in a mental picture of what goes on deep within the earth, with respect to gravitational vectors, I used an adaptation of Newton's model of Thin Spherical Shells, which he used to solve gravitational vectors acting on a small body (gram-mass) external to earth's surface[2]. That model effectively rotates the total mass of an annulus around to a single point where the gravitational vectors merge into a single vector (c). This vector can then be broken into two vectors; a vertical vector (v) and a horizontal vector (h). See sketch below.



Just as Newton did, I set up my model's eighteen separate divisions as individual spherical shells of zero thickness. Ninety annulus-masses for a selected shell-radius rotate around to concentrate at odd (1, 3, 5 ... 177, 179) degree points. After creating spreadsheets for each shell, I used a series of trigonometric functions to solve for horizontal, as well as vertical gravity vectors. By moving the radius at which the gram-mass is located and employing an iterative process, I solved for the vertical and horizontal gravity vectors produced by each individual division. Resultant gravity vectors for the radius selected for the location of the gram-mass are shown below. Values for vertical gravity in my hot-core model match well with values obtained by Adam M. Dziewonski[1] (Harvard). This makes me confident that my trigonometric approach is equivalent to his way of calculating vertical gravity for various depths within the earth.

While calculating gravitational pulls on gram masses located at various depths within an earth model of average density, an interesting relationship popped up. At all depths, the **absolute value of vertical gravity** plus the **absolute value of horizontal gravity** equals twice the **absolute value of vertical gravity on the orb's surface.** This means that the surface of the earth has more than one gravitational force that must be overcome before her outward push will cause her to flatten. The determining component of the flattening equation is the ratio of her equatorial outward push to her gravitational pull. That ratio must be modified to include the packing effect of horizontal gravitational pulls. Since vertical and horizontal gravities are of equal strength in the earth's surface, the vertical gravitational pull of gravity at the earth's equator can be doubled to account for the packing effect of horizontal pulls. Doubling that force changes the value of earth's moment of inertia to 0.4347 Ma^2 (105.6×10^{36} kg m^2) to allow the location of the bulk of her mass in her bonded shells. Hence, a condensed, cold-core model of earth's cross section is supported historically, physically and mathematically.

Radius	Fv cold	Fh cold	Fv hot	Fh hot	Fv average	Fh average
6371	9.8331	10.0604	9.9307	8.0351	9.8253	9.7883
6370	9.8346	10.0715	9.8327	8.0434	9.8263	9.7998
6365	9.8381	10.1121	9.8399	8.0735	9.8306	9.8574
6359	9.8475	10.1943	9.8525	8.1349	9.8343	9.9264
6291	9.8625	10.9073	9.9326	8.6772	9.8173	10.6533
6116	9.5896	12.3340	9.8759	9.7748	9.3648	11.9878
6011	9.5305	13.0232	9.9336	10.2814	9.3448	11.9978
5961	9.5833	13.3707	10.0280	10.5344	9.2707	12.7471
5721	8.9975	14.9015	9.9450	12.6066	8.7429	13.8600
5671	9.0731	15.1980	10.6211	12.9735	8.8248	14.0673
5371	8.1993	16.4861	9.9468	13.2172	8.2447	15.0086
4871	6.8711	18.2949	9.9203	15.2165	7.5047	16.4868
4371	5.2188	19.6469	9.9668	17.3052	6.7336	17.8049
3871	3.1122	20.1582	10.2350	19.7396	5.9698	18.9608
3485	1.0304	19.0349	10.6725	22.3436	5.3613	19.6641
2900	0.8926	16.8419	9.2710	25.9242	4.4675	20.3327
2300	0.7240	15.9334	7.6043	28.8435	3.5435	21.0659
1700	0.5570	15.4330	5.7847	30.8358	2.6197	21.5241
1217	0.4372	15.2446	4.2219	32.2407	1.8750	21.8904
700	0.2639	15.1213	2.4838	32.8782	1.0785	21.9731
0	0.0000	14.9443	0.0000	32.0258	0.0000	21.5092

Gravitational forces for the three models of earth's interior.

In addition, there long has been debate in the Halls of Astronomy as to what triggers a cooling molecular cloud to fragment. Since horizontal gravity within the cloud can be considered to be a packing vector it must play a part in a cloud's initial fragmentation; and, a fragment's subsequent progression into a star. My average model uses a constant density of 5.5154 g/cc for all shells. Since it was trigonometrically (consisting of right angle triangles) derived, its results can be proportionally applied to a molecular cloud fragment by reason of similar triangles. Hence, a molecular cloud's central region must have a packing vector that is at least twice as strong as vertical gravity on its surface. That packing vector would start the condensation of hydrogen, cause cloud fragmentation and literally pull a fragment in upon itself—exactly what observers see happening.

References:

1. Stacy, F., 1977. "Physics of the Earth," Wiley & Sons Inc., New York/London.
2. Prussing, John E., and Bruce a. Conway, 1993. "Orbital Mechanics," Oxford

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