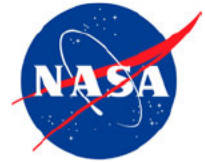


National Aeronautics and Space Administration



Headquarters
Washington, DC 20546-0001

February 27, 2024

Reply to attn. of: Office of Communications
History and Information Services Division

Mr. Brandon Hacha

[REDACTED]
Madison, Wisconsin 53703

Re: FOIA Tracking Number [REDACTED]

Dear Mr. Hacha:

This is our final response to your Freedom of Information Act (FOIA) request to the National Aeronautics and Space Administration (NASA), dated February 20, 2024, and received in this office on the same date. Your request was assigned the above-referenced tracking number. You seek:

"On Mar. 15, 2023, Randall Munroe of xkcd.com published a web comic humorously complaining that NASA wouldn't entertain his proposal of flattening all the planets in the solar system. On Feb. 22, 2024, Munroe shared that NASA SMD sent a humorous review of the "proposal" (XKCD-2750). I am seeking records, including notes and relevant memoranda, relating to NASA SMD's processing of this "Panel Evaluation" of the "Unsolicited Proposal".

In response to your request, we conducted a search of NASA's Office of Science Mission Directorate using the search terms "XKCD-2750," "XKCD 2750, and "<https://xkcd.com/2750/>." That search identified records responsive to your request. We reviewed the responsive records under the FOIA to determine whether they may be disclosed to you. Based on that review, this office is providing the following:

13 page(s) are released in full (RIF);¹
2 page(s) are released in part (RIP);

NASA redacted from the enclosed documents certain information pursuant to the following FOIA exemptions:

¹ All page counts are approximate numbers.

Exemption 6, 5 U.S.C. § 552(b)(6)

Exemption 6 allows withholding of “personnel and medical files and *similar files* the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.” 5 U.S.C. § 552(b)(6) (emphasis added). NASA invokes exemption 6 to protect work cell phone numbers.

Fees

Provisions of the FOIA allow us to recover part of the cost of complying with your request. In this instance, because the cost is below the \$50 minimum, there is no charge.

Appeal

You have the right to appeal my action regarding your request. Your appeal must be received within 90 days of the date of this response. Please send your appeal to:

Administrator
NASA Headquarters
Executive Secretariat
ATTN: FOIA Appeals
MS 9R17
300 E Street S.W.
Washington, DC 20546

Both the envelope and letter of appeal should be clearly marked, “Appeal under the Freedom of Information Act.” You must also include a copy of your initial request, the adverse determination, and any other correspondence with the FOIA office. In order to expedite the appellate process and ensure full consideration of your appeal, your appeal should contain a brief statement of the reasons you believe this initial determination should be reversed. Additional information on submitting an appeal is set forth in the NASA FOIA regulations at 14 C.F.R. § 1206.700.

Assistance and Dispute Resolution Services

If you have any questions, please feel free to contact me at Alyssa.k.bias@nasa.gov. For further assistance and to discuss any aspect of your request you may also contact:

Stephanie Fox
Chief FOIA Public Liaison
Freedom of Information Act Office
NASA Headquarters
300 E Street, S.W., 5P32
Washington D.C. 20546
Phone: 202-358-1553
Email: Stephanie.K.Fox@nasa.gov

Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services it offers. The contact information for OGIS is as follows: Office of Government Information Services, National Archives and Records Administration, 8601 Adelphi Road-OGIS, College Park, Maryland 20740-6001, e-mail at ogis@nara.gov; telephone at 202-741-5770; toll free at 1-877-684-6448; or facsimile at 202-741-5769.

Important: Please note that contacting any agency official including myself, NASA's Chief FOIA Public Liaison, and/or OGIS is not an alternative to filing an administrative appeal and does not stop the 90 day appeal clock.

Sincerely,

Alyssa Bias

Alyssa Bias
Government Information Specialist

From: [Bernstein, Max \(HQ-DA000\)](#)
To: [RINEHART, Stephen A {he, him } \(HQ-DG000\)](#); [Throop, Henry \(HQ-DG000\)\[Agile Decision Sciences\]](#)
Subject: Re: We may need to send a humorous decline letter to Randall Munroe for XKCD
Attachments: [XKCD Panel evaluationV1.docx](#)

Attached is what I have so far. We could say something about cost and relevance if its funny?

From: Stephen Rinehart <stephen.a.rinehart@nasa.gov>
Date: Thursday, March 16, 2023 at 12:39 AM
To: MAX BERNSTEIN <max.bernstein@nasa.gov>, "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>
Subject: Re: We may need to send a humorous decline letter to Randall Munroe for XKCD

Note from NASA: Pluto is still, however, not a planet, despite reviewer 2s comment

From: "Bernstein, Max (HQ-DA000)" <max.bernstein@nasa.gov>
Subject: We may need to send a humorous decline letter to Randall Munroe for XKCD
Date: 15 March 2023 16:20
To: "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>, "Rinehart, Stephen A. (HQ-DG000)" <stephen.a.rinehart@nasa.gov>

Oooo, I didn't know about the prior one. This is all really good. Do we dare put this on letterhead?

From: "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>
Date: Wednesday, March 15, 2023 at 5:17 PM
To: MAX BERNSTEIN <max.bernstein@nasa.gov>, Stephen Rinehart <stephen.a.rinehart@nasa.gov>
Subject: Re: We may need to send a humorous decline letter to Randall Munroe for XKCD

Oh, this is awesome!

As he alludes to in the text, this is a resubmission! Proposal "Solar System Changes #1" was submitted as XKCD 2258: <https://xkcd.com/2258>. I actually like that one more, but here are additional comments on the current version of the proposal, submitted as XKCD 2750:

Major Strengths:

- Calculation of orbital resonances would be far easier in case with azimuthal symmetry.

- Effect of seasons is mitigated entirely.
- Substantially decreased cost of launch vehicles, in the event that one needs to go out of the solar system's plane. (I think... I'm not sure how to calculate the v_{esc} from a flat plane, but it's got to be less than from a sphere.)
- For motion within the plane, Hohmann transfer orbit no longer necessary. Anything with wheels *becomes* a spacecraft as it can drive to the planets directly (albeit slowly: there won't be much of a grip due to reduced surface gravity).
- In 1787, Laplace showed that a uniform solid ring surrounding Saturn would be broken apart by differential shear, as subsequently demonstrated in decades by undergraduate problem sets for any known materials. Successful implementation of the proposed architecture would demonstrate the first real-world use of apparently novel incredibly strong materials, paving the way to their future use.

Major Weaknesses:

- At 250 microns thick, Mars would be liable to be pierced completely by interplanetary dust particles. It would not stand a chance against the rover wheels.
- Proposal has not sufficiently accounted for thermal energy released when Jupiter re-accretes.
- WHERE DID PLUTO GO?? It was in proposal 2258 but has been dropped from this iteration. NASA's most recent statement on this matter is summarized as 'I believe Pluto is a Planet' [Bridenstine 2019].

-Henry

From: "Bernstein, Max (HQ-DA000)" <max.bernstein@nasa.gov>

Date: Wednesday, March 15, 2023 at 4:28 PM

To: "Rinehart, Stephen A. (HQ-DG000)" <stephen.a.rinehart@nasa.gov>, "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>

Subject: Re: We may need to send a humorous decline letter to Randall Munroe for XKCD

Also

Major strengths:

Increased wheelchair accessibility and roller skating and skateboarding substantially improved in the inner Solar System

Ice skating and cross-country skiing substantially improved in the outer Solar System

The mail-in French reviewer regards it as a major strength that all ducks will become Pressed duck. Representative Frank Wolf purportedly pleased that they will replace Peking Duck.

Major weaknesses:

Sailing will be negatively impacted, and Max would be very upset about that.

No more eclipses. Lika, who runs the program that periodically solicits research on eclipses, will be quite cross.

Slides and roller coasters much less fun

Wedding cakes significantly less impressive

Minor weakness

Rock climbing will be negatively impacted. Max don't rock climb so he don't care much, so its minor.

Other comments:

Space elevator becomes space train, much to the delight of train enthusiasts but elevator manufacturer Mr. Oits has purportedly very put out so Dr. Munroe should take the stairs from now on.

From: Stephen Rinehart <stephen.a.rinehart@nasa.gov>

Date: Wednesday, March 15, 2023 at 4:11 PM

To: MAX BERNSTEIN <max.bernstein@nasa.gov>, "Throop, Henry (HQ-DG000) [Agile Decision Sciences]" <henry.throop@nasa.gov>

Subject: Re: We may need to send a humorous decline letter to Randall Munroe for XKCD

Major strengths:

The proposed new solar system architecture would greatly simplify sample return.

Major weaknesses:

The timescale for the actual flattening of the planets was not sufficiently addressed.

Given the size of rolling pins generally available, rolling out a single planet would require timescales much longer than the duration of the proposed effort.

The proposal fails to address the impact of differing compressibility of the planets.

I'm sure we could come up with many more...

Dr. Stephen Rinehart
Director, Planetary Research Program
Planetary Science Division
NASA HQ, Mary W. Jackson Building
Office 3A041
202-358-1884

(b) (6) (cell)

Pronouns: he/him/his

From: "Bernstein, Max (HQ-DA000)" <max.bernstein@nasa.gov>

Date: Wednesday, March 15, 2023 at 3:31 PM

To: "Rinehart, Stephen A. (HQ-DG000)" <stephen.a.rinehart@nasa.gov>, "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>

Subject: We may need to send a humorous decline letter to Randall Munroe for XKCD

We may need to send a humorous decline letter to Randall Munroe for <https://xkcd.com/2750> which has the caption "I don't know why NASA keeps rejecting my proposals to improve the Solar System".

PANEL EVALUATION of XKCD 2750

PI: Munroe, Randall

Proposal Number: XKCD 2750

Title: Second proposal to improve the Solar System

All proposals and reviews are proprietary and should be handled by the reviewer in a confidential manner. Comments on this page may be transmitted anonymously to the proposer.

BRIEF SUMMARY OF OVERALL EVALUATION:

Xx.

INTRINSIC MERIT

Major Strengths:

- The proposed new solar system architecture would greatly simplify sample return.
- Calculation of orbital resonances would be far easier in case with azimuthal symmetry.
- Effect of seasons is mitigated entirely.
- Substantially decreased cost of launch vehicles, in the event that one needs to go out of the solar system's plane. (I think... I'm not sure how to calculate the v_{esc} from a flat plane, but one would think it's got to be less than from a sphere. Perhaps the PI could consider this in his next "What if" book)
- For motion within the plane, Hohmann transfer orbit no longer necessary. Anything with wheels *becomes* a spacecraft as it can drive to the planets directly (albeit slowly: there won't be much of a grip due to reduced surface gravity).
- In 1787, Laplace showed that a uniform solid ring surrounding Saturn would be broken apart by differential shear, as subsequently demonstrated in decades by undergraduate problem sets for any known materials. Successful implementation of the proposed architecture would demonstrate the first real-world use of apparently novel incredibly strong materials, paving the way to their future use.
- Increased wheelchair accessibility and roller skating and skateboarding substantially improved in the inner Solar System
- Ice skating and cross-country skiing substantially improved in the outer Solar System

Minor Strengths:

- The mail-in French reviewer regards it as a major strength that all ducks will become Pressed duck. Representative Frank Wolf purportedly pleased that they will replace Peking Duck.

Major Weaknesses:

- At 250 microns thick, Mars would be liable to be pierced completely by interplanetary dust particles. It would not stand a chance against the rover wheels.
- Proposal has not sufficiently accounted for thermal energy released when Jupiter re-accretes.
- WHERE DID PLUTO GO?? It was in proposal 2258 but has been dropped from this iteration. NASA's most recent statement on this matter is summarized as 'I believe Pluto is a Planet' [Bridenstine 2019].
- Sailing will be negatively impacted, and Max would be very upset about that.
- No more eclipses. Lika, who runs the program that periodically solicits research on eclipses, will be quite cross.
- Slides and roller coasters much less fun
- Wedding cakes significantly less impressive
- The timescale for the actual flattening of the planets was not sufficiently addressed. Given the size of rolling pins generally available, rolling out a single planet would require timescales much longer than the duration of the proposed effort.
- The proposal fails to address the impact of differing compressibility of the planets.

Minor Weaknesses:

Rock climbing will be negatively impacted. Max don't rock climb so he don't care much, so its minor.

MERIT RATING: Very Good

RELEVANCE

Strengths:

xx

Weaknesses:

xx

COST REASONABLENESS

xx

xx.

Note to the PI (optional): Adherence to these comments does not constitute a guarantee of future funding.

Space elevator becomes space train, much to the delight of train enthusiasts but elevator manufacturer Mr. Oits is purportedly very put out so Dr. Munroe should take the stairs from now on.

Pluto is still, however, not a planet, despite the second reviewer's comment.

From: [Bernstein, Max \(HQ-DA000\)](#)
To: [Throop, Henry \(HQ-DG000\)\[Agile Decision Sciences\]](#); [RINEHART, Stephen A {he, him } \(HQ-DG000\)](#)
Subject: Re: [EXTERNAL] Document shared with you: "XKCD Panel evaluation -- Flatten the Planets" - Max draft cover email
Attachments: [image001.png](#)

OK, If I can find a good email address, I'm going to send it from the SARA box but I'm going to close it with: If you have any questions regarding the evaluation, please contact Henry Throop at henry.throop@nasa.gov or Stephen Rinehart at stephen.a.rinehart@nasa.gov.

From: "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>
Date: Wednesday, May 31, 2023 at 10:02 AM
To: MAX BERNSTEIN <max.bernstein@nasa.gov>, Stephen Rinehart <stephen.a.rinehart@nasa.gov>
Subject: Re: [EXTERNAL] Document shared with you: "XKCD Panel evaluation -- Flatten the Planets" - Max draft cover email

Yes -- that's great!

-Henry

P.S. He is not a Dr., but I think we should use the honorific on the grounds of professional courtesy.

From: "Bernstein, Max (HQ-DA000)" <max.bernstein@nasa.gov>
Date: Wednesday, May 31, 2023 at 9:03 AM
To: "Rinehart, Stephen A. (HQ-DG000)" <stephen.a.rinehart@nasa.gov>, "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>
Subject: Re: [EXTERNAL] Document shared with you: "XKCD Panel evaluation -- Flatten the Planets" - Max draft cover email

OK. I'll send it, I guess, from the SARA mailbox, with a cover email that says something like:

Dr. Munroe,

It recently came to our attention that you have asserted publicly that you don't know why NASA keeps rejecting your "proposals" to "improve" the Solar System. We in the Science Mission Directorate pride ourselves on providing thorough evaluations and helpful response to proposers. Please find attached the evaluation provided by experts from the Planetary Science Division to <https://xkcd.com/2750/>.

Max

P.S. Though the NASA HQ evaluators regarded it as a strength that the absence of resonances would reduce the need for future NASA's investment in

orbital dynamics research, I know some folks who are paid by NASA to study orbital dynamics who would like to have a word with you.

From: Stephen Rinehart <stephen.a.rinehart@nasa.gov>
Date: Tuesday, May 30, 2023 at 8:11 PM
To: MAX BERNSTEIN <max.bernstein@nasa.gov>, "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>
Subject: Re: [EXTERNAL] Document shared with you: "XKCD Panel evaluation -- Flatten the Planets"

I'm good to go!

Dr. Stephen Rinehart
Director, Planetary Research Program
Planetary Science Division
NASA HQ, Mary W. Jackson Building
Office 3A041
202-358-1884
(b) (6) cell)
Pronouns: he/him/his

From: "Bernstein, Max (HQ-DA000)" <max.bernstein@nasa.gov>
Date: Tuesday, May 30, 2023 at 9:46 AM
To: "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>
Cc: "Rinehart, Stephen A. (HQ-DG000)" <stephen.a.rinehart@nasa.gov>
Subject: Re: [EXTERNAL] Document shared with you: "XKCD Panel evaluation -- Flatten the Planets"

Hilarious. Ready to go if Stephen approves. We'll have to send it via email.

From: "Henry Throop (via Google Docs)" <drive-shares-dm-noreply@google.com>
Reply-To: "Throop, Henry (HQ-DG000)[Agile Decision Sciences]" <henry.throop@nasa.gov>
Date: Monday, May 29, 2023 at 7:56 AM
To: MAX BERNSTEIN <max.bernstein@nasa.gov>
Cc: Stephen Rinehart <stephen.a.rinehart@nasa.gov>
Subject: [EXTERNAL] Document shared with you: "XKCD Panel evaluation -- Flatten the Planets"

CAUTION: This email originated from outside of NASA. Please take care when clicking links or opening attachments. Use the "Report Message" button to report suspicious messages to the NASA SOC.

Henry Throop shared a document

Henry Throop (henry.throop@nasa.gov) added you as an editor. Verify your email to securely make edits to this document. You will need to verify your email every 7 days. [Learn more](#).

 [XKCD Panel evaluation -- Flatten the Planets](#)

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[Workspace](#)

From: [HQ-Senior-Advisor-for-Research-and-Analysis](#)
To: contact@xkcd.com
Subject: Re: Proposal Number: XKCD-2750
Attachments: [XKCD2750eval.pdf](#)

Dr. Munroe,

It recently came to our attention that you have asserted publicly that you don't know why NASA keeps rejecting your "proposals" to "improve" the Solar System. We in the Science Mission Directorate pride ourselves on providing thorough evaluations and helpful response to proposers. Please find attached the evaluation provided by experts from the Planetary Science Division to <https://xkcd.com/2750/>. We hope this is useful for understanding the perceived strengths and weaknesses of your proposal.

Though the NASA HQ evaluators regarded it as a strength that the absence of resonances would reduce the need for future NASA's investment in orbital dynamics research, I know some folks who are paid by NASA to study orbital dynamics who would like to have a word with you.

We regret to inform you that we will be unable to fund proposal XKCD-2750.

The decision was based on primarily on the findings of the peer review, but in some cases programmatic considerations are also a factor.

If you have any questions regarding the evaluation, please contact Henry Throop at henry.throop@nasa.gov or Stephen Rinehart at stephen.a.rinehart@nasa.gov.

Sincerely,

Max Bernstein

--

Lead for Research
Science Mission Directorate
NASA HQ
202 358-0879
sara@NASA.gov

**NASA PANEL EVALUATION OF RESEARCH PROPOSAL
XKCD-2750
RESEARCH PROGRAM: UNSOLICITED PROPOSAL**

PI: Munroe, Randall
Proposal Number: XKCD-2750
Title: Flatten the Planets

All proposals and reviews are proprietary and should be handled by the reviewer in a confidential manner. Comments on this page may be transmitted anonymously to the proposer.

BRIEF SUMMARY OF OVERALL EVALUATION:

The project would modify the Solar System by flattening the planets to homogeneous rings, thereby giving the Solar System the rough appearance of a large Saturn. Each ring would be centered on a planet's existing semi-major axis. Each ring would extend from the previous ring, to roughly halfway to the next planet. The innermost 'Mercury ring' would terminate at approximately 0.03 AU. Asteroids would be converted into round bearings to enable the low-friction rotation of the presumably rigid rings.

The proposal states it is a follow up to XKCD-2258. The PI claims this precursor proposal was declined, although NASA does not have a record of that proposal's formal rejection.

INTRINSIC MERIT

Major Strengths:

- The proposed new Solar System architecture would provide an effective 'radial space elevator' which would greatly simplify NASA's exploration of the Solar System, including flybys, landers, and sample return missions. For motion within the plane, Hohmann transfer orbits would be no longer necessary. Anything with wheels could become a spacecraft as it could drive to the planets directly (albeit slowly: there won't be much of a grip due to reduced surface gravity). Travel outside the plane would become unnecessary entirely, except for special purposes, such as space tourism, bungee jumping, or research.
- Orbital resonances between the planets (cf. Neptune vs. Pluto, or Mercury's rotation vs. orbit) would cease to exist, reducing the need for NASA's future investment in orbital dynamics research.
- The effect of seasons would cease to exist on Earth and other planets, simplifying seasonal migration patterns for both animal species and humans.
- If successful, implementation of the proposed architecture would demonstrate the first real-world use of apparently novel incredibly strong materials, paving the way to their future use. Traditional materials would be broken apart by differential keplerian shear (e.g., Laplace 1787, and undergraduate problems sets annually since then).
- The improved Solar System would allow for increased ice skating, cross-country skiing, and keplerian ice-boat racing in the outer Solar System.

- The proposal would result in increased visibility of the Solar System to our galactic neighbors, due to the highly unnatural shape of the resultant occultation light curve. Forget micro-lensing: if the Solar System wants to be detected, flying a 6-billion-km opaque frisbee through space is the way to do it.

Minor Strengths:

- The mail-in French reviewer regards it as a strength that all ducks will become Pressed Duck. Peking Duck would be removed from menus.
- 3D visualization of the Solar System is historically one of the most difficult ideas in introductory astronomy classes. Generations of future students would benefit from the simplified ‘flatland’ approach taken by the proposed configuration, which would eliminate the need for spherical geometry calculations and Euler angles.
- All asteroids and comets would be moved to the orbital plane. All future comet discoveries would then by definition be of interstellar comets, removing any ambiguity about their origins and allowing for a direct detection of all interstellar asteroids and/or spacecraft.
- Because all asteroids would be moved to the plane, zodiacal dust would be reduced to zero, causing a darker night-time sky. This would be mitigated by the fact that the concept of ‘night’ would disappear entirely in the proposed model.
- If Apophis’s current orbit were to be maintained, then the new Solar System configuration would ensure that the 2029 encounter with Apophis would result in an actual impact onto the Earth, rather than the ‘near miss’ currently predicted by orbital dynamicists.

Major Weaknesses:

- NASA’s orbital assets (JWST, Juno, SOHO, and dozens more) would require rapid transfer to a heliocentric orbit passing near Mars, which would be the only region of the inner Solar System passable in the new configuration.
- At 250 microns thick, Mars would be liable to be pierced completely by interplanetary dust particles. It would not stand a chance against the rover wheels.
- WHERE DID PLUTO GO?? Pluto was discussed in proposal XKCD-2258 but has been dropped from this follow-up proposal. NASA’s most recent statement on this matter is summarized as “I believe Pluto is a planet” [Bridenstine 2019].
- The timescale for the actual flattening of the planets was not sufficiently addressed. Given the size of rolling pins generally available, rolling out a single planet could require timescales much longer than the duration of the proposed effort.
- The figure showed that the flattened planets would be homogeneous, but the proposal failed to address the impact of differing compressibility and/or density of the planets. Self-gravity would be unable to maintain Jupiter’s 18” thickness except in small portions made of solid material.
- The required Environmental Impact Statement did not accompany the proposal, nor was it referenced in the NSPIRES cover page. The panel believes this may have been an intentional omission.

Minor Weaknesses:

- The proposal would result in the end of all solar eclipses. Eclipse fans with reservations already booked for the upcoming 6'22" eclipse in Egypt in 2027 would be particularly frustrated. Heliophysics science would undoubtedly suffer.
- Earth-based gravity entertainment such as slides and roller coasters would be much less compelling for adults in the new configuration. Standard-height wedding cakes would become significantly less impressive.
- A similar technique could be used to flatten the Kuiper belt and Oort cloud, but the proposal does not quote inferred thicknesses for these structures.
- The proposal did not sufficiently account for the substantial thermal energy to be released when Jupiter would re-accrete.
- The proposal did not sufficiently account for absorption of solar energy by Mercury. This heated material would cause the planet to rapidly expand from its 1/8" thickness into a silicate atmosphere surrounding the Sun.

MERIT RATING: Good / Fair

RELEVANCE

Strengths:

If successful, the project would enable new methods of exploring the solar system, and thus has some relevance to NASA's goals.

Weaknesses:

Several unintended consequences of the proposed work may be in conflict with NASA's vision statement ("Exploring the secrets of the universe for the benefit of all.")

COST REASONABLENESS

No cost estimate was provided. The single laboratory item necessary would be a rolling pin of sufficient size to perform the work. The proposal does not specify a surface to roll against (e.g., tabletop) but this would not be necessary with an appropriately large rolling pin acting upon sufficiently fluid and/or brittle planetary materials.

Note to the PI (optional): Adherence to these comments does not constitute a guarantee of future funding.

For a PI as experienced in exploring *ad nauseam* the flood of unexpected consequences of small actions (c.f., "What If?" Volumes 1 and 2), the proposal considers only a shockingly narrow view of any ramifications of the planned activities.

The “space elevator” would become in this model a “space train,” much to the delight of train enthusiasts. The PI might consider taking the stairs from now on so as to minimize further disenfranchisement of space elevator manufacturers.