Evidence for a Large Anomalous Nuclear Explosions in Mars Past

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STAIF II 2014
Mars Isotopes: Baseline

We can compare Mars isotopes with those from meteorites, Earth and other Planets which sampled the solar nebula.
Viking Lander 1976

Mars Noble gas isotopes, especially Xenon and Krypton are exotic
Mars Meteorites

Mars meteorites were identified as Martian because of trapped Mars atmosphere—because of its exotic isotopic signature.
Mars atmosphere found in Mars Meteorites

[Graph showing the relationship between Mars Atmosphere and Shergottite Glass with various isotopes indicated.]
Agenda

• Introduction: Mars was disaster prone
• Mars Xenon Anomaly
• Mars Krypton- the neutron paradox
• Mars Thorium and Uranium paradox
• Hypothesis: Nuclear Weapon Detonations Over Mare Acidalium and Utopia Planum
• Correlation with Cydonia and Galaxias Archeological sites
• Summary
Mars as a Disaster-Prone Planet

• Mars was apparently Earthlike for most of its history with an ocean and persistent greenhouse like on Venus
• Then, ~0.5 Billion years ago Mars suffered a Chixulube-size impact formed the Lyot Impact Basin and apparently collapsed Mars climate and dried up its oceans
• Then, after some indeterminate period Mars suffered a bizarre nuclear disaster
Lyot impact occurred late in Mars history near Cydonia Mensa and appears to have collapsed Mars climate
Mars Approximate Chronology

Nuclear explosions
4.2 Billion years?
Mars Isotope Anomalies
Mars Versus Earth Xenon

Mars Vs Earth Natural Xenon
(Normed to Xenon130=100)

Xenon isotope mass (amu)

number density (Xe 130=100)

Earth (natural)
Mars
Mars Versus Earth Fission Xenon

Mars Vs Fission Xenon
(normed to Xenon 129=100)
Earth Fission Xe Due to H-Bomb Testing

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<th>Inventory</th>
<th>$^{124}\text{Xe}$</th>
<th>$^{126}\text{Xe}$</th>
<th>$^{128}\text{Xe}$</th>
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<td>1640.0</td>
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<td>514.7</td>
<td>646.0</td>
<td>258.7</td>
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Hydrogen bombs are boosted by fission of a uranium or thorium casing ~50% of yield is fission. This creates xenon isotopes.
Mars Versus Earth Mixed Xenon

Mars Vs Mixed Earth and Fission Xenon (30/70)
(normed to Xenon 129=100)

Xenon isotope mass (amu)

number density (Xenon 129=100)

Mixed Earth natural and Fission Xenon
Mars Xenon
Fission Yeild vs Neutron Energy

Iodine 129 decays to Xenon 129 in 17 Million years, normal low-neutron energy creates little Xe 129
Fission Yield vs Neutron Energy

Xe 129 production enhanced by higher neutron energy
Thermal Fission Xenon

But Xe 129 is normally less than Xe 132
Fission Yield From 14 MeV Neutrons

However fission driven by 14MeV neutrons in hydrogen bomb, produces more Xe129 than other isotopes
Hydrogen Bomb Testing

Fission of Uranium-Thorium casing doubles power of Hydrogen bombs
Mars Krypton

• Mars $^{80}$Kr/$^{84}$Kr is enhanced 10% over Solar nebula baseline (Earth $^{80}$Kr/$^{84}$Kr ~enhanced 1%)

• $^{80}$Kr believed generated by neutron capture on $^{79}$Br

• Neutron fluence of $10^{15}$/cm$^2$ required on Mars rock
Mars Irradiation Evidence

EETA79001_476 Lithology A
No neutron irradiation

EETA79001_482 Lithology B
Neutron irradiated ~ $10^{15}$/cm$^2$

Mars Meteorite ETA79001 – 180Myr old
Mars Ar 40 is Super-abundant

Argon 40 is produced by neutron irradiation of Potassium 39 changing it to Potassium 40 which decays after 1.28 Billion years to Argon 40

Mars $^{40}\text{Ar}/^{36}\text{Ar}$, $1.9(\pm 0.3) \times 10^3$ vs Earth
$^{40}\text{Ar}/^{36}\text{Ar}$, 298.56 or Mars ~ 6x Earth Consistent with large neutron flux on Mars soil
Mars Uranium and Thorium Paradox
Mars Uranium and Thorium Paradox

Fig. 5. K, Th variations on Mars compared to Martian (SNC) basaltic meteorites. Typical statistical uncertainty shown on right.
Mars Potassium

![Potassium Map]
Mars Thorium

Hot spot

antipode

Thorium

ppm
Global Debris Dispersal

Surface Enrichment
- Strongest
- Moderate
- Weakest

antipode
Mare Acidalium

Hot spot
Mare Acidalium
Lyot Impact

Lyot impact appears to have dried up ocean with nuclear explosions following northern ocean disappearance. Nuclear explosions appear to have been follow-up “planetary sterilization”

Lyot Impact and Nuclear Explosion bracket Cydonia Mesa
Correlation of Catastrophes to Archeological Sites

Northern region near Cydonia appears to have been “accident prone”
Hypothesis: Mars suffered explosion of large Thermonuclear weapon with fusion+fission over Mare Acidalium and possible a smaller one over Utopia Planum. Both had mixed U-Th casing and D-T secondary.
Delayed Neutrons after Event

- Acidalia debris
- Delayed neutrons

Before event
- Old surface
Immediately after event
- Old surface
Present
- Old surface

Gamma rays
1 meter
Model parameters

- Xenon 129 ~ $10^{33}$ atoms ~ $10^{35}$ Fissions
- Thorium layer ~ $10^{37}$ atoms ~ $10^{35}$ Fissions
- $10^{15}$/cm$^2$ delayed neutrons x $10^{18}$ cm$^2$ = $10^{33}$ delayed neutrons ~ $10^{35}$ Fissions
- $10^{35}$ fissions x $3 \times 10^{-11}$ J/fission~ $10^{24}$J
- $10^{24}$ J = 1 Chixulube ~ $10^6$ MT (terraton)
- $10^6$ MT~ total nuclear energy released on Earth (Xenon (fission) Earth ~ ~ Xenon Mars)
Size and Yield

- Yield ~ 1 billion megatons
- Size 100 meter diameter cylinder 800 meters long
Mare Acidalium Site?
Mare Acidalium Site?
Predictions

• Residues of Uranium plutonium fission will found in surface layer
• Residues of Thorium-U233 fission will be found in surface layer
• Large amounts of radioactive K 0.7Gyr half life will be found buried in high amounts at Acidalium site
Problems

• Evidence for Mars paleo-nuclear event is strong- *but no crater at ground zero*

• Natural nuclear reactor explosion would have created a large deep crater

• Absence of crater suggests Air Burst after ocean dried up
Summary

• The Xenon, Krypton and U-Th anomalies can be explained by a large Thermonuclear weapon explosion in the past—*and little else*

• The weapon exploded over Mars Acidalium after ocean was dried up, throwing debris globally and releasing large amounts of Xenon while a U-Th rich debris layer irradiated the surface by delayed neutrons

• Residues of Thorium-Uranium fission will be found in surface layer—radioactive K will be found buried in high amounts at Acidalium site