



COSMIC IGNITION WEATHER TOOL KIT

GRAVITATIONAL WAVES DEMONSTRATED AS CLOUDS

As wind blows air over a mountain or other obstacle air is forced upwards and gravity forces it back down. This generates a wave in the atmosphere called a "gravity" wave. The wave amplitude of a such a vertically propagating wave can increase with altitude because air density decreases with height. The increased energy in the wave can exceed the local speed of sound and result in a broken crest as shown in the photograph above. *Cosmic ignited plasmas in the atmosphere can be heated by microwaves and generate gravitational waves. There is some indication that HAARP may be generating them now. (See Penn State Lecture below)*

COSMIC IGNITION WEATHER MODIFICATION TOOLS

The plasma formed in the atmosphere using the [cosmic particle ignition](#) methods can be used for weather research and weather modification in a number of ways. The plasma can act as a heater. It can be designed to have energy deposited in the air. This energy can be used to heat water droplets in the case of [tornado](#) modification or to generate acoustic and gravitational waves by heating the atmosphere and modulating the heating rate by modulating the power of the heating beam. The heating can be applied to specific portions of a [hurricane](#) and potentially modify its strength or direction.

WEATHER MODIFICATION SCIENCE

The techniques embodied in the methods and apparatus (three patents pending) for cosmic particle ignition of plasmas in the atmosphere (CIPPA) can be important tools in developing a science of weather modification. Numerical simulations can be used with these methods to predict results, and the methods can provide experimental cross checks.

PENN STATE-LEHIGH LECTURE

Some of the concepts for weather modification using cosmic particle ignited plasmas were presented in a lecture at [Penn State Lehigh](#) in October, 2005.

ARTIFICIAL GENERATION OF ACOUSTIC AND GRAVITATIONAL WAVES IN THE ATMOSPHERE

By
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OUTLINE

- OVERVIEW
- NATIONAL ACADEMY GUIDELINES
- SEVERE STORM ENERGY TURNOVER
- WEATHER MODIFICATION CONCEPTS
- THUNDERSTORM: SOLAR POWER SATELLITE
- ARPS CODE
- ARPS MESOCYCLONE WITH TORRADO
- ELIMINATION OF HOOK ECHO WITH MICROWAVE HEATING
- ARTIFICIAL IONIZED PLASMA PATTERNS IN ATMOSPHERE
- COSMIC PARTICLE IGNITION OF PLASMA PATTERNS
- PLASMA PATTERNS AS ATMOSPHERIC HEATER
- WEATHER RESEARCH WITH ATMOSPHERIC HEATERS

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 Penn State Lehigh Campus
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- GRAVITATIONAL WAVES GENERATED BY HAARP?
- IMPACT OF GRAVITATIONAL WAVES ON WEATHER SYSTEMS
- SUMMARY AND CONCLUSIONS

OVERVIEW

- Eastlund background is in plasma physics and commercial applications of microwave plasmas
- This lecture reviews applications of microwaves to tornadogenesis mitigation and presents new concepts for electromagnetic wave interactions with the atmosphere that could be used for weather modification research.
- Modification of steering winds by atmospheric heating
- Modification of electrical charge distribution with plasmas
- Artificial generation of acoustic and gravitational waves with heated plasma patterns in the atmosphere

NAS SEVERE WEATHER MITIGATION RESEARCH GUIDELINES

- Theoretical modeling and simulation analysis of the physics, chemistry and biology of the relevant geophysical, geochemical climate and ecological systems
- Study of potential for instability and chaos
- Small-scale mitigation experiments to determine physical, chemical and biological properties where they are known
- Detailed design, development and cost analysis of deployment systems
- Study of related natural events to understand their relevant properties including the statistics of their occurrence
- Study of possible ecological, geophysical, geochemical and atmospheric side effects, including consideration of reversability.

Weather Modification Concepts

CONCEPT	PERTURBATION
• Cloud Seeding	< 10 ⁻⁵
• ARCO Patents	• 10 ⁻⁵ to 100
• ESA Paper	• ~1 for 20 Minutes
• Ross Hoffman (oil)	• < 10 ⁻⁸
• Moshe Alamaro (Jets)	• < 10 ⁻⁸
• HAARP	• ~10 ⁻⁷

PHYSICS OF HEATING PROCESS

$$dB(\text{absorption}) = 10 * \log_{10} \frac{2\chi d}{c}$$

d = thickness of plasma pattern

χ = absorption coefficient of microwaves

WEATHER RESEARCH WITH ATMOSPHERIC HEATERS

- COSMIC PARTICLE IGNITED PLASMA PATTERNS CAN BE FORMED FROM 10 KM TO 100 KM
- PATTERN DIMENSIONS CAN BE FROM A FEW METER TO KILOMETER SIZES
- COULD PROVIDE WEATHER RESEARCH WITH AN EXPERIMENTAL TOOL AS VALUABLE AS ACCELERATORS ARE TO PARTICLE PHYSICS

WEATHER RESEARCH APPLICATIONS

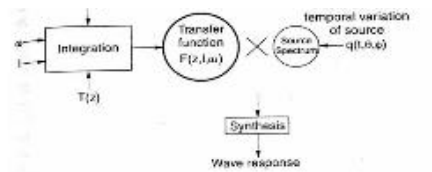
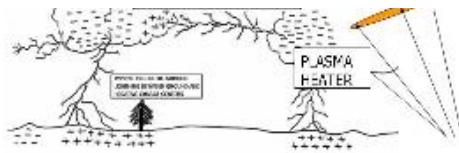
- HEATING OF STEERING WINDS IN MESOCYCLONES AND HURRICANES
- MODIFICATION OF ELECTRICAL PATTERNS IN MESOCYCLONES
- GENERATION OF ACOUSTIC AND GRAVITATIONAL WAVES

PLASMA PATTERNS PROVIDING ELECTRIC CIRCUIT ELEMENT IN MESOCYCLONE

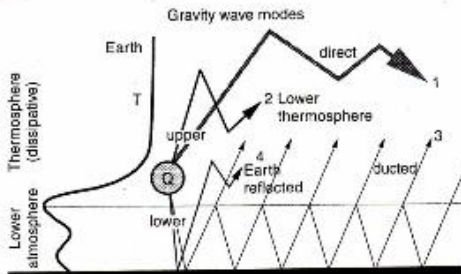


THERMOSPHERIC GENERAL CIRCULATION MODEL FOR GRAVITY WAVE PROPAGATION (Hoekse and Schlegel, Ann. Geophysicae 14, 917-940, 1996)





GRAVITY WAVE MODES



GRAVITY WAVE ENERGY TRANSPORT

- Vertical Flux of Energy Density Over Surface Corrugations From Wind Flow typically 1-2 watts/m² (Nappo, 2002)
- Solar Irradiance about 1367 watts/m²
- 10⁻¹ watts/m² out of troposphere (Hines, 1960)
- 10⁻³ watts/m² above 80 KM (Gossard, 1962)

GRAVITY WAVE AMPLIFICATION

- Wave Amplitude of a Vertically Propagating Wave Can Increase with Altitude because air density decreases with height.



OBSERVATIONS OF GRAVITY WAVE WEATHER EFFECTS

- Gravity Waves Propagating Across a stationary thunderstorm outflow associated with a jet streak in a boundary Produce Thunderstorms. (Koch and Dorian, Monthly Weather Review, Vol. 116, p2570, 1988)
- Succession of Gravity Waves Produced Severe Weather in Oct. 22, 1996 Convection band. (McUllough, NWDO San Angelo, Texas, SR/SSD 97-20, May 1, 1997.)
- The Unstable Cloud Layers in the Previous Figure Are Another Example of Gravity Waves Transferring Energy and Resulting in Unstable Behavior.

COMPARISON OF SOURCE FUNCTIONS OF NATURAL AND ARTIFICIALLY GENERATED GRAVITY WAVES

- Vertical Energy Flux of Plasma Pattern Heaters Range from 50 to 500 watts/m²
- Control of Heating Depth Can Directly Effect the Brunt-Vaisala Frequency. Where Γ = dry adiabatic laps rate in °K/m, and

$$\frac{d^2 z}{dt^2} + \left[\frac{\gamma(\alpha(z)) - \Gamma(\alpha(z))}{\gamma(\alpha(z))} - 1 \right] z = 0$$