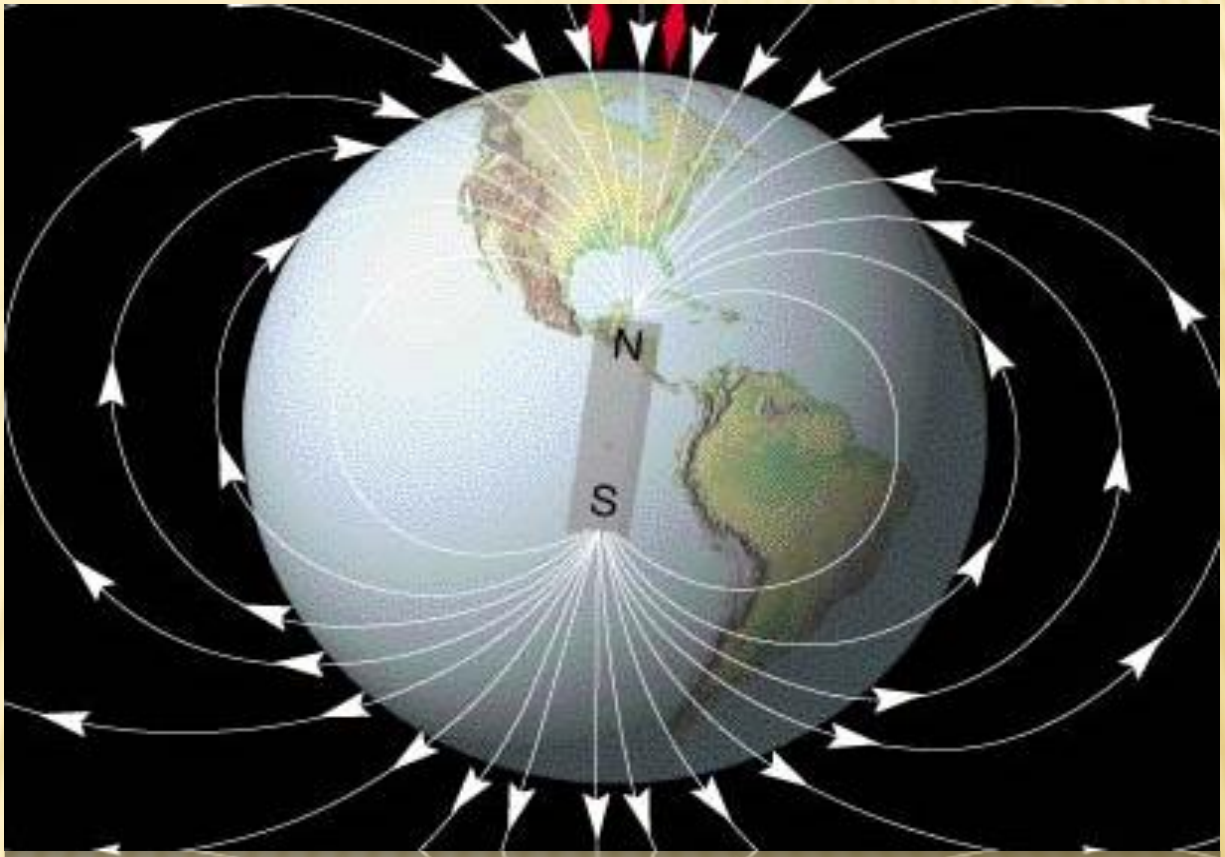



# MAGNETIC FIELDS AND CLIMATE

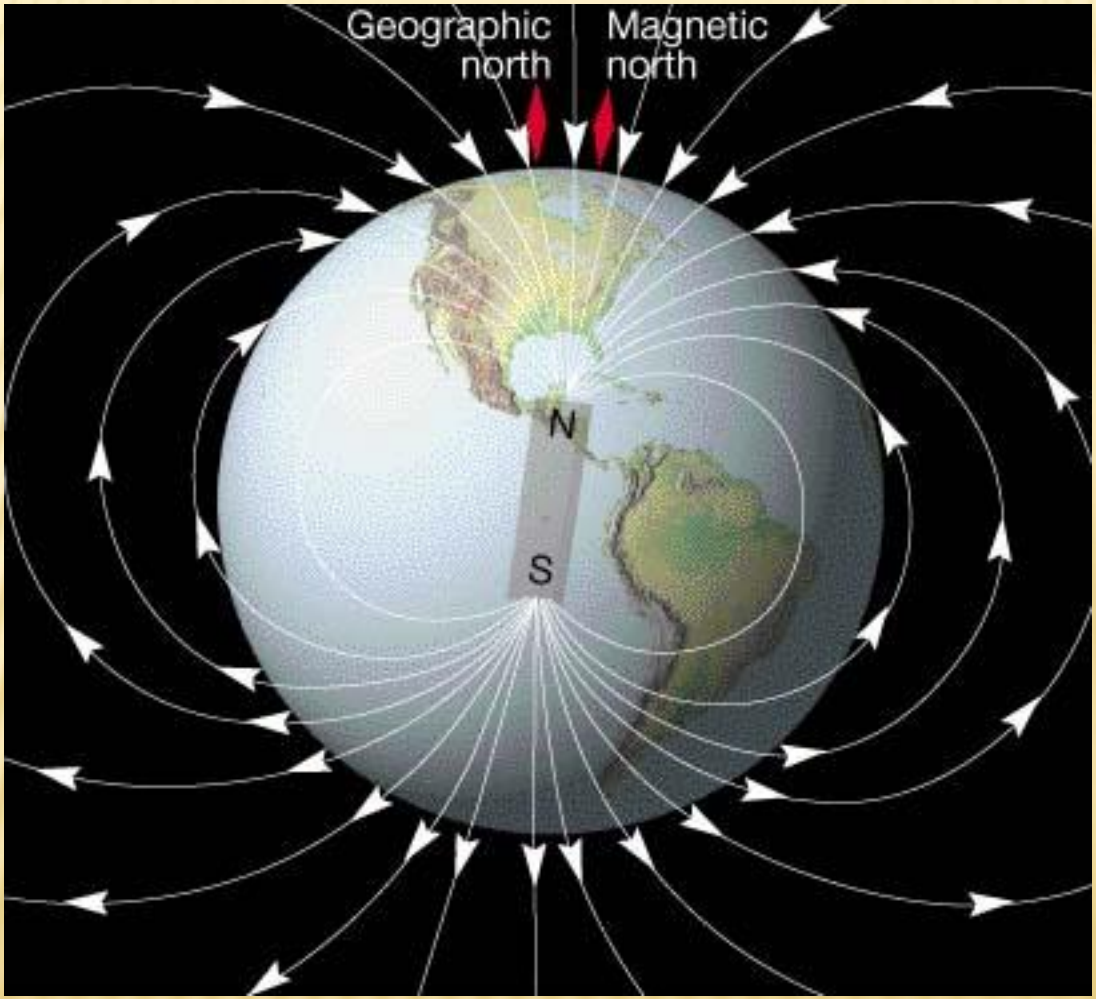
Reno, NV

June 25, 2009

# MAGNETIC FIELDS/CLIMATE

- The earth's climate has been significantly affected by the planet's magnetic field, according to a Danish study that could challenge the notion that human emissions are responsible for global warming.
- "Our results show a strong correlation between the strength of the earth's magnetic field and the amount of precipitation in the tropics," one of the two Danish geophysicists behind the study, Mads Faurschou Knudsen of the geology department at Aarhus University in western Denmark, told the Videnskab journal.
- He and his colleague Peter Riisager, of the Geological Survey of Denmark and Greenland (GEUS), compared a reconstruction of the prehistoric magnetic field 5,000 years ago based on data drawn from stalagmites and stalactites found in China and Oman.
- The results of the study, which has also been published in US scientific journal Geology, lend support to a controversial theory published a decade ago by Danish astrophysicist Henrik Svensmark, who claimed the climate was highly influenced by galactic cosmic ray (GCR) particles penetrating the earth's atmosphere

# MAGNETIC FIELDS/CLIMATE



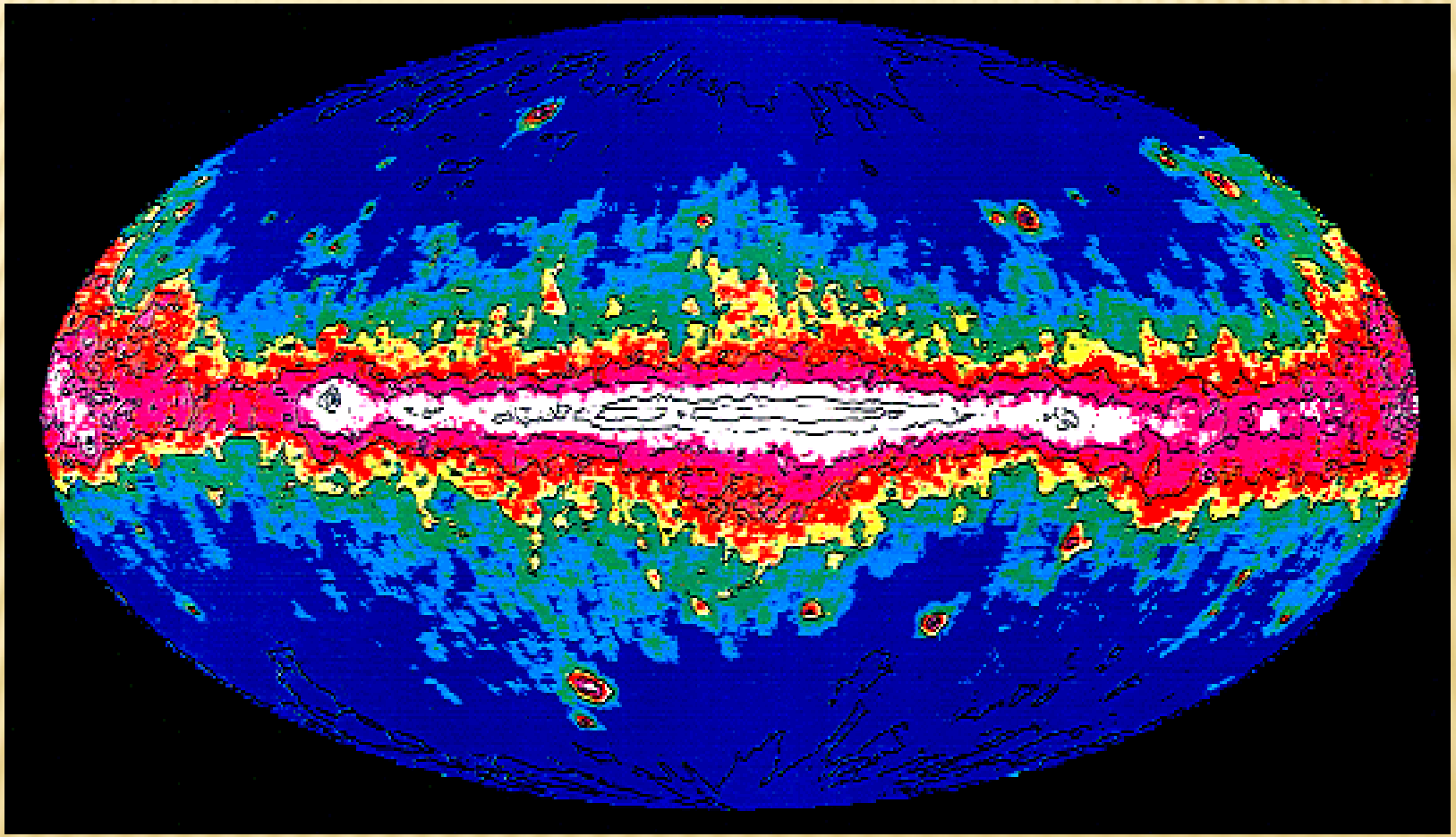
# MAGNETIC FIELDS/CLIMATE

- Svensmark's theory, which pitted him against today's mainstream theorists who claim carbon dioxide (CO2) is responsible for global warming, involved a link between the earth's magnetic field and climate, since that field helps regulate the number of GCR particles that reach the earth's atmosphere.
- "The only way we can explain the (geomagnetic-climate) connection is through the exact same physical mechanisms that were present in Henrik Svensmark's theory," Knudsen said.
- "If changes in the magnetic field, which occur independently of the earth's climate, can be linked to changes in precipitation, then it can only be explained through the magnetic field's blocking of the cosmetic rays," he said.
- Galactic cosmic rays (GCRs) come from outside the solar system but generally from within our Milky Way galaxy. GCRs are atomic nuclei from which all of the surrounding electrons have been stripped away during their high-speed passage through the galaxy. They have probably been accelerated within the last few million years, and have traveled many times across the galaxy, trapped by the galactic magnetic field.

# MAGNETIC FIELDS/CLIMATE

- GCRs have been accelerated to nearly the speed of light, probably by supernova remnants. As they travel through the very thin gas of interstellar space, some of the GCRs interact and emit gamma rays, which is how we know that they pass through the Milky Way and other galaxies.
- The elemental makeup of GCRs has been studied in detail , and is very similar to the composition of the Earth and solar system. but studies of the composition of the isotopes in GCRs may indicate the that the seed population for GCRs is neither the interstellar gas nor the shards of giant stars that went supernova. This is an area of current study.
- Included in the cosmic rays are a number of radioactive nuclei whose numbers decrease over time. As in the carbon-14 dating technique, measurements of these nuclei can be used to determine how long it has been since cosmic ray material was synthesized in the galactic magnetic field before leaking out into the vast void between the galaxies. These nuclei are called "cosmic ray clocks".
- The two scientists acknowledged that CO2 plays an important role in the changing climate, "but the climate is an incredibly complex system, and it is unlikely we have a full overview over which factors play a part and how important each is in a given circumstance," Riisager told Videnskab.

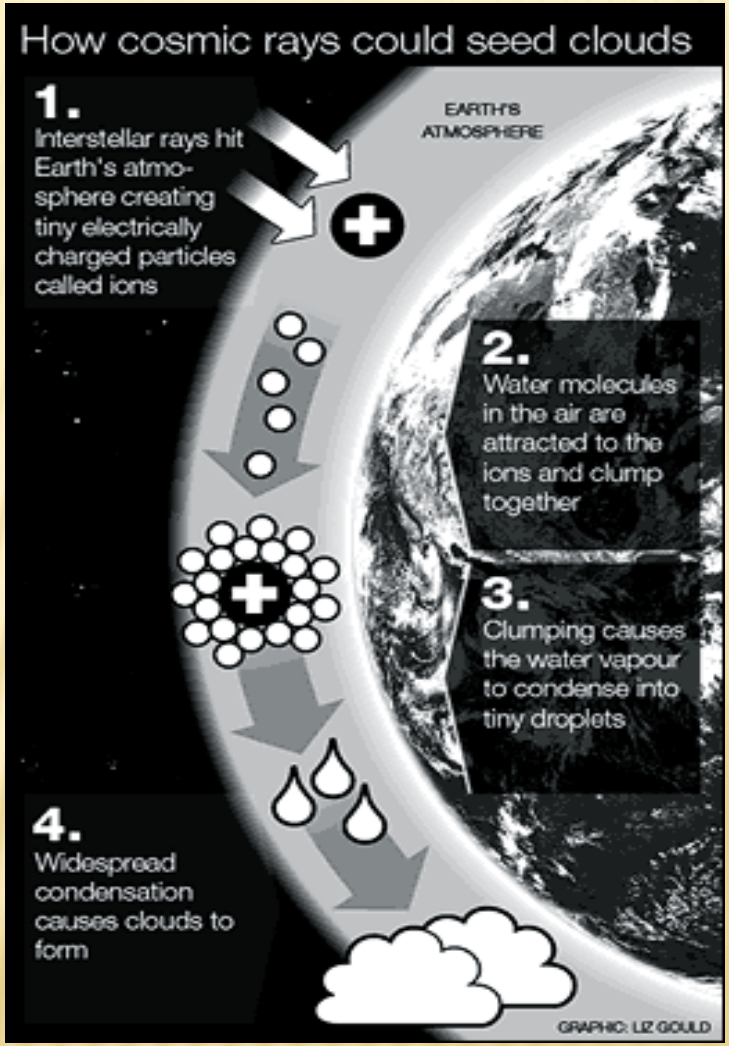
# MAGNETIC FIELDS/CLIMATE



# MAGNETIC FIELDS/CLIMATE

- **Svensmark's Theory Explained**
- Man-made climate change may be happening at a far slower rate than has been claimed, according to controversial new research.
- Scientists say that cosmic rays from outer space play a far greater role in changing the Earth's climate than global warming experts previously thought.
- In a book, to be published this week, they claim that fluctuations in the number of cosmic rays hitting the atmosphere directly alter the amount of cloud covering the planet.
- High levels of cloud cover blankets the Earth and reflects radiated heat from the Sun back out into space, causing the planet to cool.
- Henrik Svensmark, a weather scientist at the Danish National Space Centre who led the team behind the research, believes that the planet is experiencing a natural period of low cloud cover due to fewer cosmic rays entering the atmosphere.
- This, he says, is responsible for much of the global warming we are experiencing.

# MAGNETIC FIELDS/CLIMATE



# MAGNETIC FIELDS/CLIMATE

- He claims carbon dioxide emissions due to human activity are having a smaller impact on climate change than scientists think. If he is correct, it could mean that mankind has more time to reduce our effect on the climate.
- The controversial theory comes one week after 2,500 scientists who make up the United Nations International Panel on Climate Change published their fourth report stating that human carbon dioxide emissions would cause temperature rises of up to 4.5 C by the end of the century.
- Mr Svensmark claims that the calculations used to make this prediction largely overlooked the effect of cosmic rays on cloud cover and the temperature rise due to human activity may be much smaller.
- He said: "It was long thought that clouds were caused by climate change, but now we see that climate change is driven by clouds.
- "This has not been taken into account in the models used to work out the effect carbon dioxide has had.
- "We may see CO2 is responsible for much less warming than we thought and if this is the case the predictions of warming due to human activity will need to be adjusted

# MAGNETIC FIELDS/CLIMATE

- Mr Svensmark last week published the first experimental evidence from five years' research on the influence that cosmic rays have on cloud production in the Proceedings of the Royal Society Journal A: Mathematical, Physical and Engineering Sciences. This week he will also publish a fuller account of his work in a book entitled The Chilling Stars: A New Theory of Climate Change.
- A team of more than 60 scientists from around the world are preparing to conduct a large-scale experiment using a particle accelerator in Geneva, Switzerland, to replicate the effect of cosmic rays hitting the atmosphere.
- They hope this will prove whether this deep space radiation is responsible for changing cloud cover. If so, it could force climate scientists to re-evaluate their ideas about how global warming occurs.
- Mr Svensmark's results show that the rays produce electrically charged particles when they hit the atmosphere. He said: "These particles attract water molecules from the air and cause them to clump together until they condense into clouds."

# MAGNETIC FIELDS/CLIMATE

- Mr Svensmark claims that the number of cosmic rays hitting the Earth changes with the magnetic activity around the Sun. During high periods of activity, fewer cosmic rays hit the Earth and so there are less clouds formed, resulting in warming.
- Low activity causes more clouds and cools the Earth.
- According to Svensmark:
- **"Evidence from ice cores show this happening long into the past. We have the highest solar activity we have had in at least 1,000 years.**
- **“Humans are having an effect on climate change, but by not including the cosmic ray effect in models it means the results are inaccurate.The size of man's impact may be much smaller and so the man-made change is happening slower than predicted."**
- Some climate change experts have dismissed the claims as "tenuous".
- Giles Harrison, a cloud specialist at Reading University said that he had carried out research on cosmic rays and their effect on clouds, but believed the impact on climate is much smaller than Mr Svensmark claims.

# MAGNETIC FIELDS/CLIMATE

- Mr Harrison said: "I have been looking at cloud data going back 50 years over the UK and found there was a small relationship with cosmic rays. It looks like it creates some additional variability in a natural climate system but this is small."
- But there is a growing number of scientists who believe that the effect may be genuine.
- Among them is Prof Bob Bingham, a clouds expert from the Central Laboratory of the Research Councils in Rutherford.
- He said: "It is a relatively new idea, but there is some evidence there for this effect on clouds."