MAN, MACHINE, SCIENTIFIC MODELS AND CREATION SCIENCE

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ICC

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  - Presuppositions
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- Computational Methods and Tools
  - Models
  - Example: Earth's Magnetic Field
  - The Computer as a Tool
  - Data Science and Machine Learning
  - Tool Selection and Use
- Conclusion

How have quantitative measures been used in creation science and what is the role of computational machines to enhance this research in the future?

WHY DO WE DO SCIENCE?

- How do we know? (Epistemology)
  - Revelation from God (Scripture, prophecy, miracles)
  - General revelation (Common grace)
- Charge to man in the Garden (Dominion mandate)
  - Stewardship (Responsible management of resources entrusted by the Creator)
  - Effective management comes through observation and understanding of relationships.
- Ultimately for His glory
  - "everyone who is called by my name, whom I created for my glory, whom I formed and made." (Isaiah 43:7)

WESTERN CIVILIZATION AND MODERN SCIENCE

- "It was not that there was no order in nature for the Chinese, but rather that it was not an order ordained by a rational personal being, and hence there was no conviction that rational personal beings would be able to spell out in their lesser earthly languages the divine code of laws which he had decreed aforetime. The Taoists, indeed, would have scorned such an idea as being too naïve for the subtlety and complexity of the universe as they intuited it."
  - *Science and Civilisation in China, Needham (1954)*

CREATIONIST'S VIEW OF SCIENCE

- Christian worldview provides a solid basis for science.
  - Creation has value
  - God is rational
  - Man is given rationality
  - Creation acts rationally and lawfully
  - Man is able to understand and codify the lawfulness of the Creation
- Limitations of Science
  - Man is finite
    - Limited information
    - Limited conceptualization
    - Constrained means of exploration
  - Man is fallen
    - Creation altered in the fall
    - Wrong motives in exploration

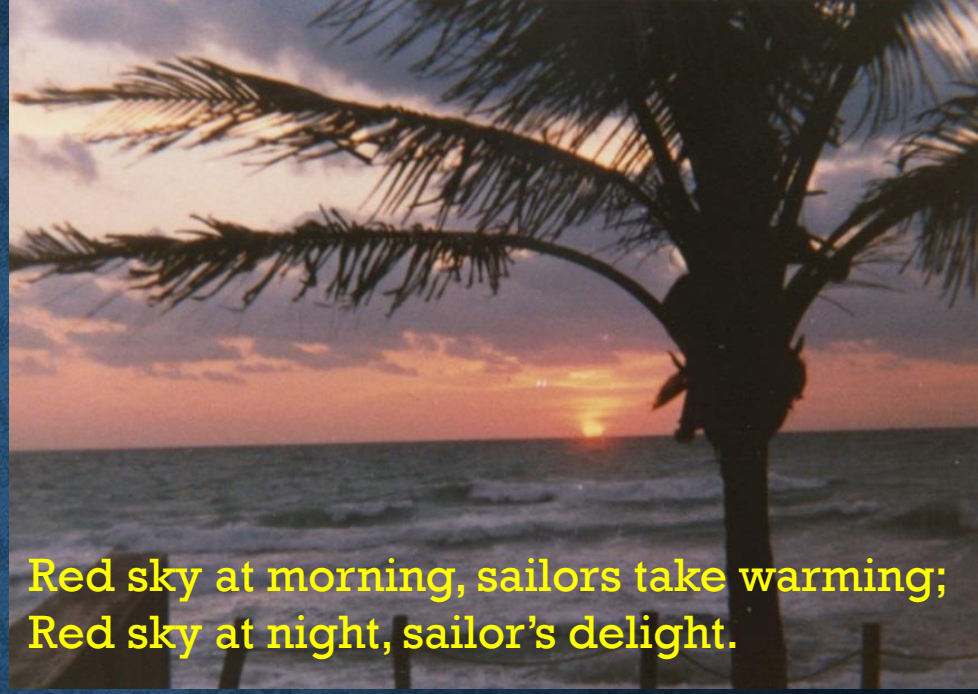
EXAMPLE: WOLKENDEUTER

- Literal Meaning: "Interpreter of Clouds"
- Deuteronomy 18:10
  - Es soll niemand unter dir gefunden werden, der seinen Sohn oder seine Tochter durchs Feuer gehen lasse, oder ein Wahrsager, oder ein Wolkendeuter oder ein Schlangenbeschwörer, oder ein Zauberer, (Schlacher, 1951)
  - There shall not be found among you anyone who burns his son or his daughter as an offering, anyone who practices divination or tells fortunes or interprets omens, or a sorcerer (ESV)
- Aeromancy (One of the seven forbidden arts of Renaissance magic)

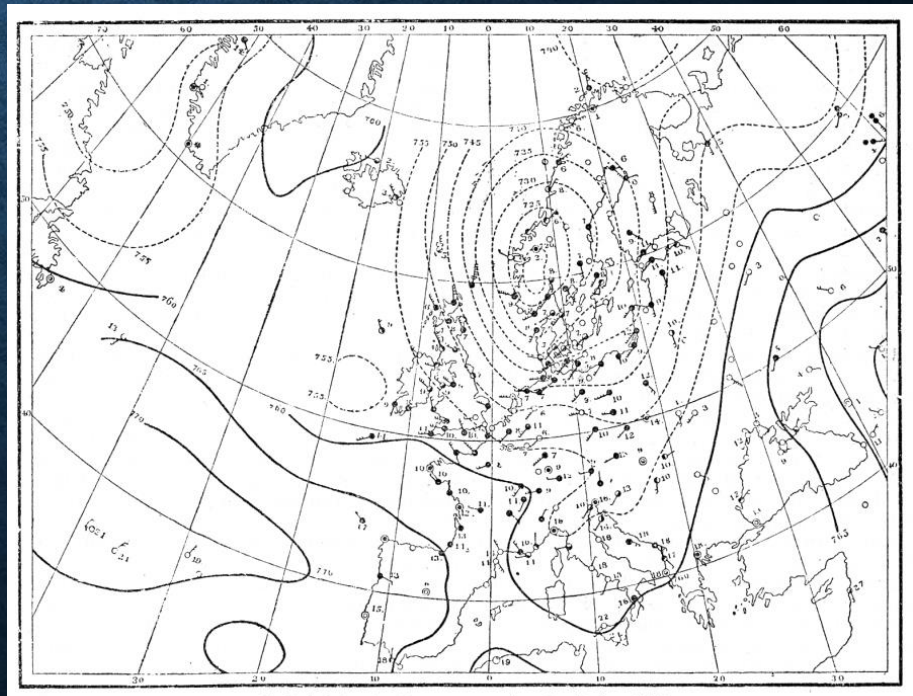
What is the difference between this and meteorology?

SCIENCE OF WEATHER FORECASTING

- Matthew 16:1-4
- Techniques of Prediction
  - Persistence
  - Steady State
  - Pattern Recognition
  - Climatology
- Knowing the basics gives insight to the more complex
  - Mechanics & Thermodynamics
- Numerical Forecasting
  - 6 hr forecast takes 6 weeks (1922)
  - 24 hr forecast takes 24 hours (1950)
  - 3.5 day forecast every 6 hours (today)



Red sky at morning, sailors take warming;
Red sky at night, sailor's delight.



Väderlekskarta på morgonen den 22 oktober 1874.

CREATION SCIENCE

Thinking beyond our observations and immediate conclusions to what is consistent with reality (worldview).

- Modern YEC Movement
  - The Genesis Flood
  - Fundamental Biology
- Publications
  - CRS Quarterly
  - Journal of Creation (CMI)
  - Answers Research Journal (AIG)
  - Origins (GRI)
  - Studium Integrale (W&W)
  - ICC (CSF)
- Quantitative Topics
  - Radiometric dating
  - Earth's magnetic field
  - Speed of light and cosmology models
  - Thermodynamics of the vapor canopy
  - Sea sediment/Ice cores
  - Post-Flood ice age
  - Improbability of biochemical evolution

What makes the results of science acceptable?

PRESUPPOSITIONS

- Misconceptions about science
  - Seen as objective and dealing only with facts (No role for faith)
  - Only means of understanding the physical universe
  - Present is the key to the past and future.
- Creationist Presuppositions
  - Omniscient, omnipotent, volitional Creator (Can do anything)
  - Personal, relational Creator (Perspicuity in communication)
  - Lawfulness of Creation can be modeled (Uniformitarianism)
  - Purposeful in miraculous action (Supernatural, Providential)

PARADIGMS

- Philosophical Traditions from the Greeks
  - Reasoning to answer "why"
  - Aquinas' arguments for the existence of God (Scholastics)
  - Aristotelean science
- Scientific Revolution
  - Experimentation and quantitative observations (Galileo)
  - Mechanical Universe (Newton, Laplace)
  - Physics-based methodology ("All science is either physics or stamp collecting.")
- Emergence
  - Holism in response to reductionism
  - Novel behavior (order, life, mind) arises within complex non-equilibrium systems.

METAPHORS

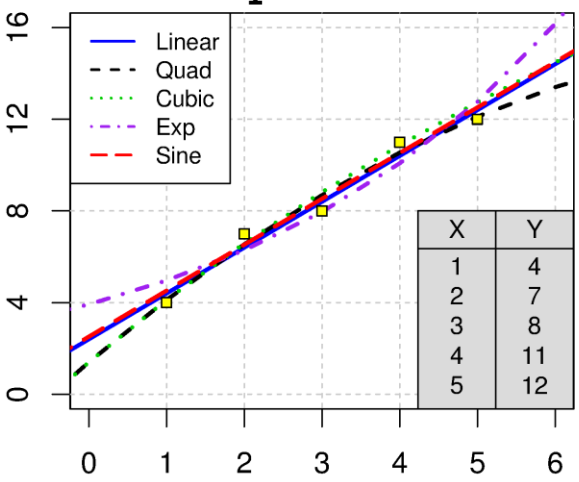
- Definition: A figure of speech not literally true, but is used to help make a comparison.
- Machine (Clockwork universe)
  - Paley's Watchmaker
- Information (DNA)
  - Gitt
- Computer (Programmed response – development, regulation)
  - Intelligent Design
- Neural Networks (Cognitive science, machine learning)

Are these metaphors sufficient to describe mankind?

MODELS – FITTING DATA

- Adjustable (free) parameters are used to give the least error between the model and the data.
  - Avoid "over-fitting" by using fewer parameters than data.
  - Best results occur when there is a representative sampling of the data (well distributed) within a controlled environment.

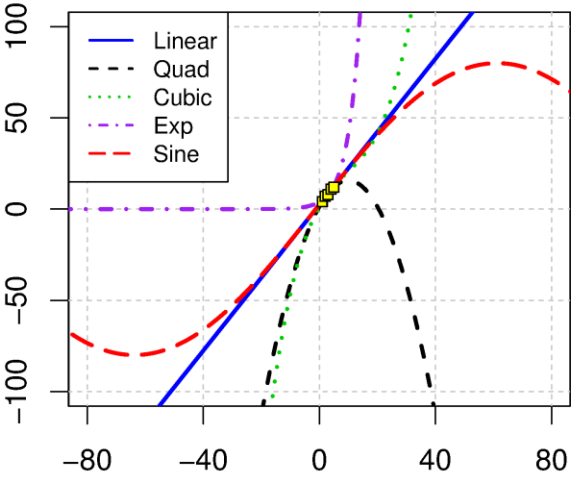
Interpolation



X	Y
1	4
2	7
3	8
4	11
5	12

What is the difference between lab and historical science?

Extrapolation

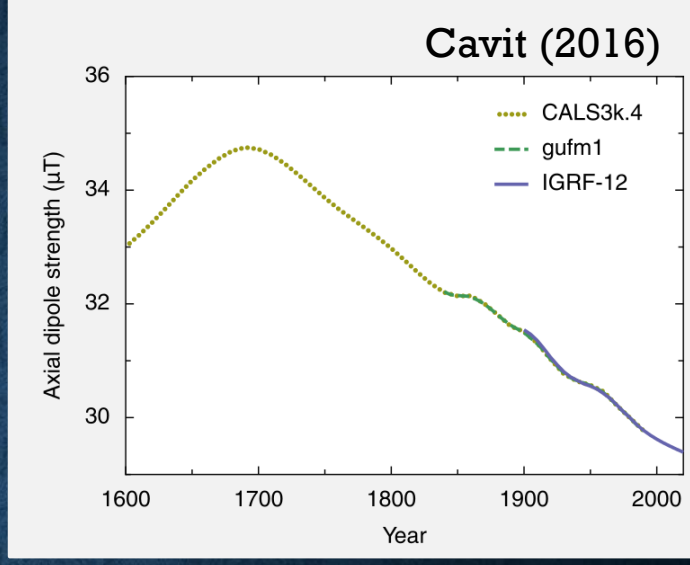


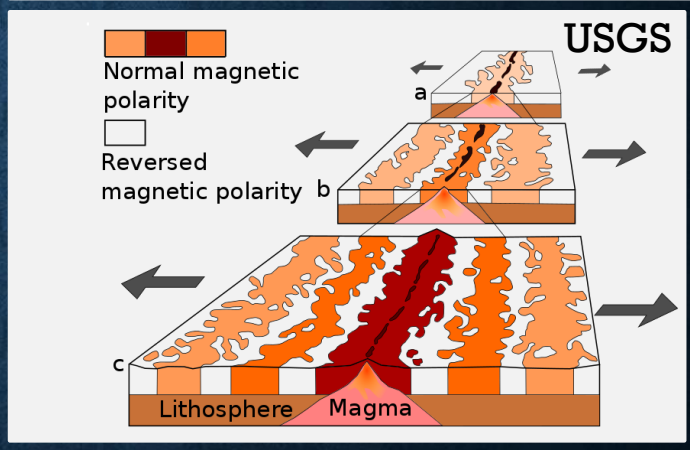
WHAT IS THE "BEST" MODEL?

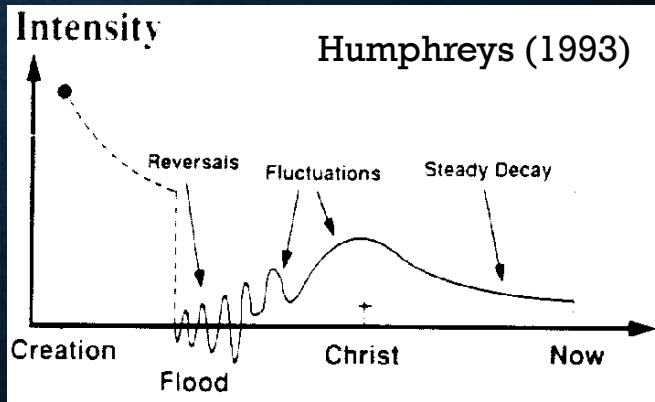
- Data collected over a short span of time must be supplemented with proxy data.
  - Ice cores, sea floor sediments, tree rings, …
  - Utility of proxy data is contingent on an interpretive framework.
- Three inherent assumptions of all historical modeling
  1. A prior state of the system is known.
  2. Disturbance of the system is absent or can be taken into account.
  3. Processes acting on the system operate at a predictable rate.
- RATE Project (ICR, 2005)

EARTH'S MAGNETIC FIELD

- Barnes (1971)
  - 6% decrease in dipole strength since 1840
  - Assumed exponential decay
  - Earth less than 10,000 years old
- Dynamo Theory
  - Pole reversals every ½ million yrs
  - Transitions over thousands of yrs
- Humphreys (1993)
  - Multiple reversals due to the Flood event
  - Rapid reversals
  - Steen's Mountain (6˚/day)







COMPUTER AS A TOOL

- Universal computing machine - Turing
- In the last half century computing power has become ubiquitous. (Anybody can use powerful computing techniques.)
- Goals of Computer Modeling
  - More than just fitting data
  - Consistent with known science
  - Gain further understanding of the system
  - Model should fit in a broader framework

COMPUTER MODELS FROM SCRATCH

- Examples
  - TERRA – Mantel convection and crustal motion (Baumgardner)
  - Mendel's Accountant – Population genetics (Sanford)
- Process of construction
  - Core function must be consistent with known data
  - Validate against known test cases
  - Add features based on well understood principles
  - Avoid saving mechanisms without rationale (Parameterization)

WELL-ESTABLISHED MODELS

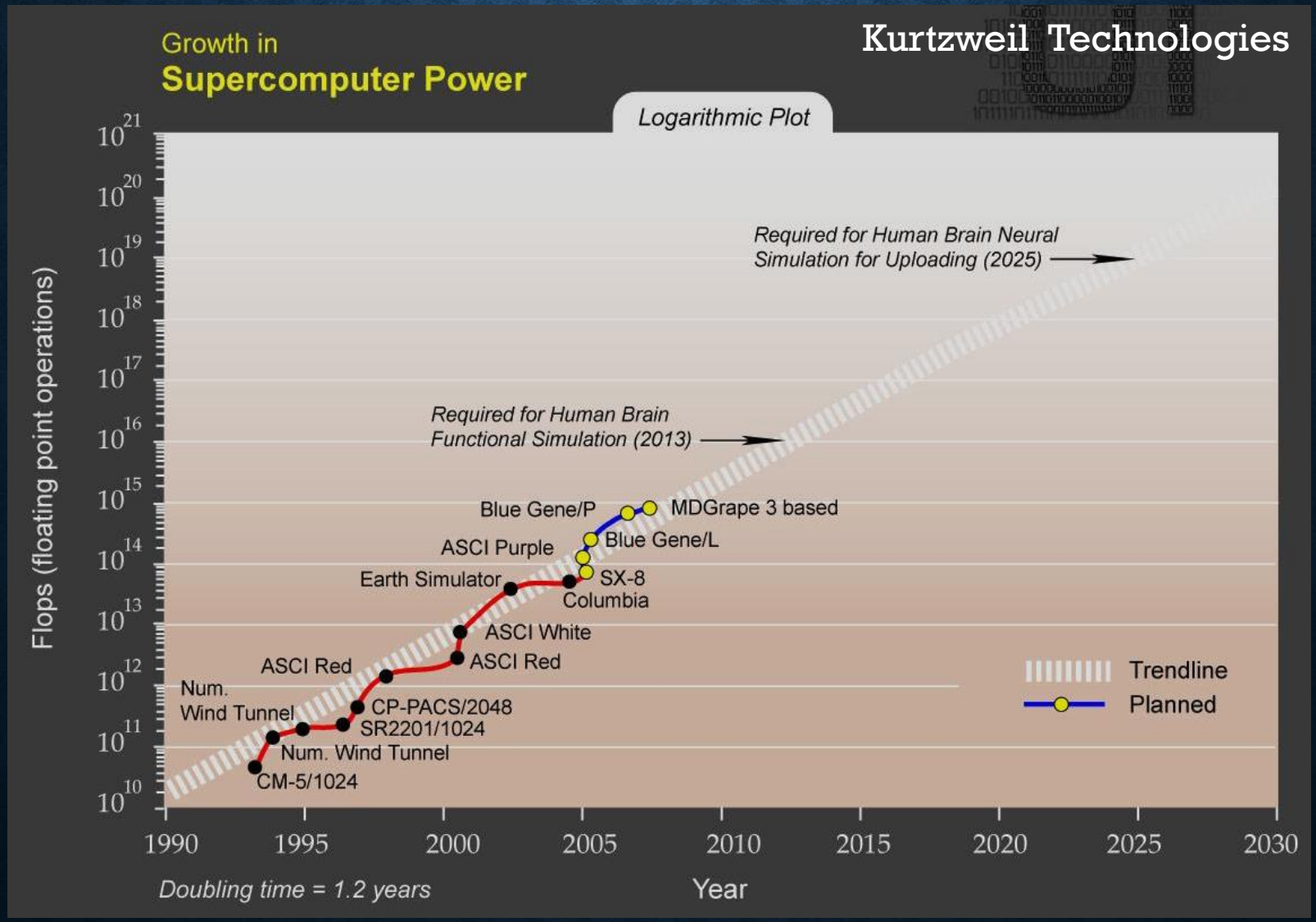
- Examples
  - NCAR CCM1 – Climate model (Vardiman)
  - GISS ModelE – Climate model (Gollmer)
  - NCAR MM5 – Mesoscale model (Vardiman)
- Validity of simulation results
  - Constructed using physical principles by community of scientists.
  - Tested against present day climate and weather.
  - Initial conditions (IC) and boundary conditions (BC) can be changed to explore feasible scenarios.
  - May be limited by present day bias.

CAUTIONS WITH COMPUTER MODELS

PlanetMinecraft

- Models are not reality.
- Desirable results may be the result of unrealistic IC, BC and additional programming.
- Program cannot go beyond its programming.
- Program is only as objective as its programmer.
- Cannot exhaustively test complex models.
- Cannot program miraculous action.

WHAT ABOUT THE FUTURE?



BIG DATA AND DATA SCIENCE

- Examples
  - Analysis of Patterns (ANOPA) – Cavanaugh and Sternberg
  - Baraminic Distance (BDIST) – Wood
  - Megasequences with GIS – Clarey
  - Fossil mapping with GPS – Turner, Chadwick and Spencer
- Vast Sources of Data (Astronomy, geological, genomics,…)
- Tools (R, Python, GIS, Web Services)
- Machine Learning and Artificial Intelligence

CAUTIONS WITH MACHINE LEARNING

- Data Selection
  - More is not necessarily better.
- Application of Tools
  - Know the strengths and weaknesses of the tools.
  - It is not one tool fits all.
  - Don’t over-train the model.
- Interpretation of Results
  - Identifying factors and generating acceptable outcomes does not imply understanding.
  - Presuppositions affect what is valued and what has significance.

EFFECT OF PARADIGMS

- Materialism
  - Human intelligence is reduced to a complex biochemical system and its programming.
  - Man as a physical being is the measure of all things.
- Theism
  - Man is made in the image of God and is more than physical qualities that can be measured.
  - God defines what it means to be human.
  - Man is a worshipper and cannot be replaced by a machine.
- As technology and science "advances," God is dismissed.
  - Man is not viewed as unique in the physical realm.
  - It is believed that one day machine intelligence will match or surpass human intelligence. (Singularity)

FEAR OF THE FUTURE

- "The development of full artificial intelligence could spell the end of the human race….It would take off on its own, and re-design itself at an ever increasing rate. Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded."
  - (Stephen Hawking, 2014)
- "I visualize a time when we will be to robots what dogs are to humans, and I'm rooting for the machines." (Claude Shannon, 1987)
- Uncanny Valley
  - As simulations of human appearance and behavior improve, the artificial nature of the simulation becomes more apparent.
    - Text to Speech, Computer generated human motion
  - As artificial intelligence advances, its inherent limitations will become more apparent.
  - Current forms of artificial intelligence are achieved with deep learning from big data, not from an understanding that can be generalized.

CREATION SCIENCE IN A TECHNOLOGICAL WORLD

- No fear that artificial intelligence will supplant mankind.
  - Will enhance the ability of a few to affect many.
  - Increasingly complex tasks will be automated.
- Many opportunities exist to process data, generate models and validate models.
  - Potential for testing creation models is greatly enhanced.
  - Need knowledgeable practitioners to avoid misuse.
- The role of the creationist with proper presuppositions is vital to the scientific process.
  - One's view of "what is man" is inseparable from one's science.

QUESTIONS

ABSTRACT

- Historically, physics was the most quantitative of the sciences. Geologists and biologists built their models based on observation, categorization and generalization. This distinction between qualitative and quantitative sciences prompted the quote attributed to Ernest Rutherford that "All science is either physics or stamp collecting." In the intervening 80 years all sciences have exploded in the use of quantitative measures to find patterns and trends in data. A review of a half-century of creationist literature shows that this transition has not been lost to the creationist community.
- As this trend continues to accelerate, two areas of caution need to be taken seriously: 1) the use of properly validated techniques and 2) evaluating the role of assumptions in the development of models. In addition, advancements in machine learning tend to blur the lines between human insight and computational power. With a proper understanding of the nature of man, creation scientists are well suited to evaluate the unique role human investigators play in the choice, guidance and interpretation of that which is processed by the machine.