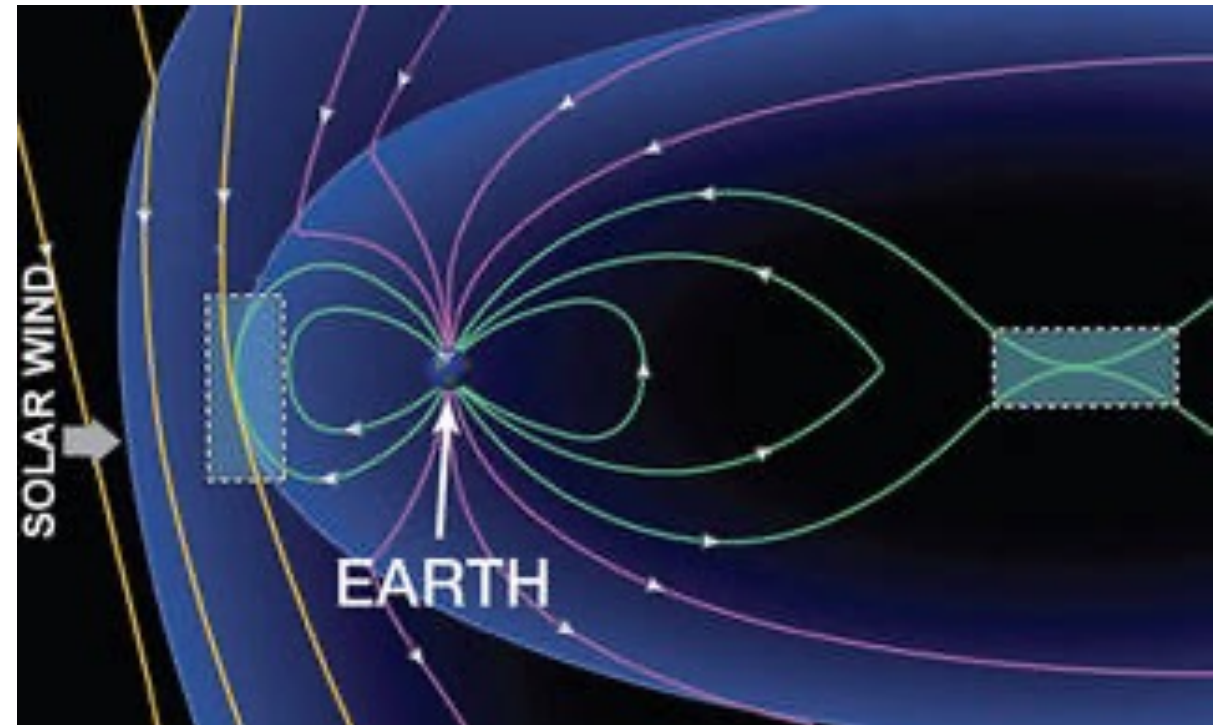




# Neural Networks: Using Small Amounts of Data to See the Big Picture



- Neural networks are a form of artificial intelligence that models the way neurons connect in a brain. This technique has proven extremely useful in computer models of large, complex, interconnected systems.
- The Earth's magnetosphere is a great example of this: the way our magnetic field behaves is constantly changing with different solar wind conditions, and a change in one part can have a huge effect on other parts very far away.
- Our spacecraft in the magnetosphere, such as the Magnetospheric Multiscale Mission (MMS), can take local observations, but they can't be everywhere at once.
- This research explores the question: can we combine small pieces of data and mathematical models, then use neural networks to create a full picture of the Earth's magnetosphere?
- With further development, NASA could use this framework to explore the magnetosphere — or other areas of study in space — in entirety, with only small amounts of data, even if from just one mission.



MMS looks at the two pieces of the magnetosphere highlighted in this illustration. With this research, scientists could potentially view the entire magnetosphere, even with data from just some areas.