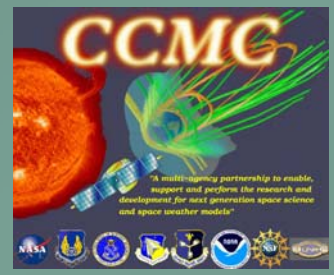
The Chapman-Ferraro Problem



- BATSRUS
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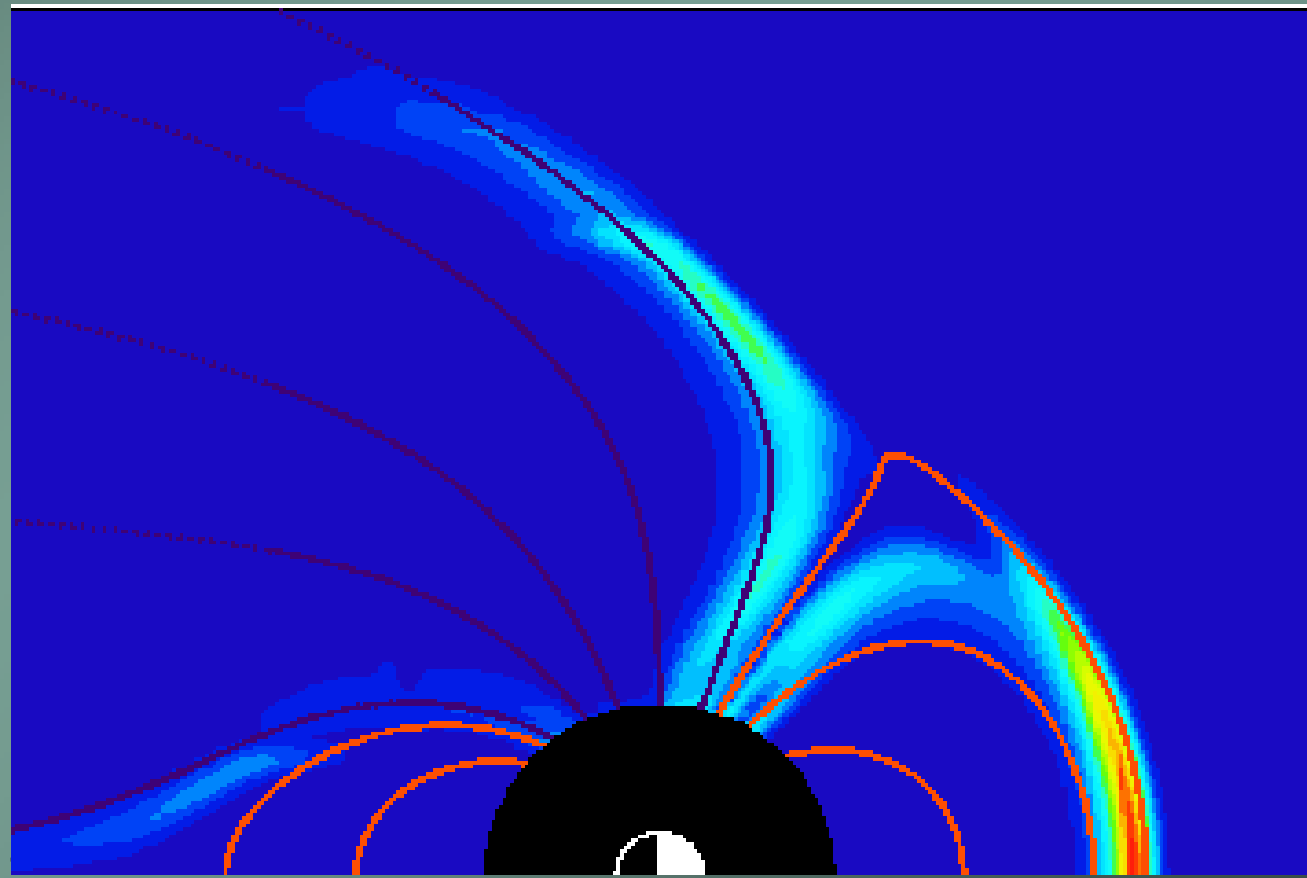
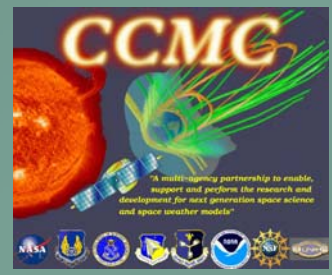
The Analytic Solution

Find the size and shape of the boundary between the solar corpuscular radiation and the earth-enclosing cavity it forms, and determine the magnetic field everywhere within the cavity.



The Chapman-Ferraro Current System



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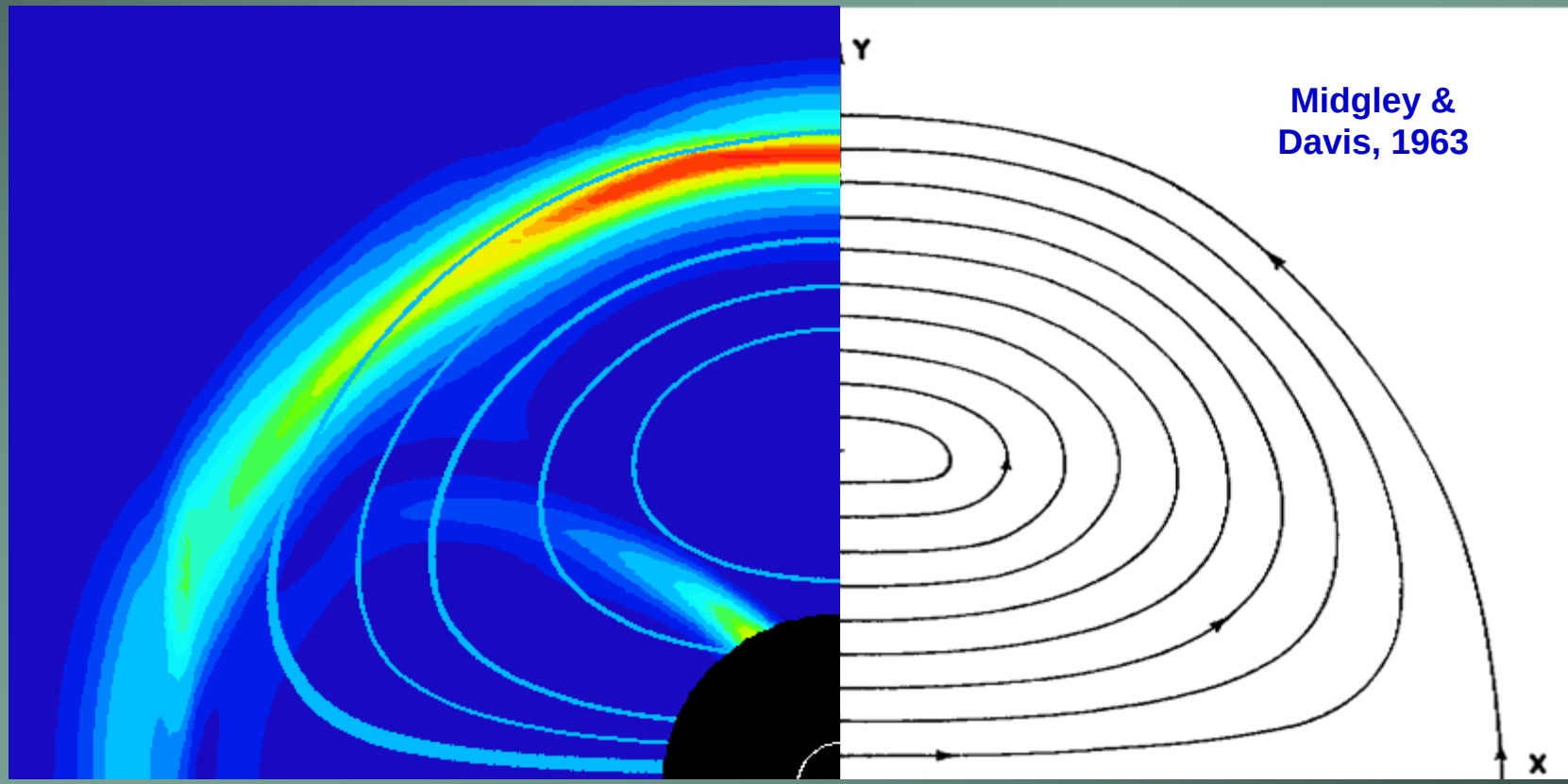
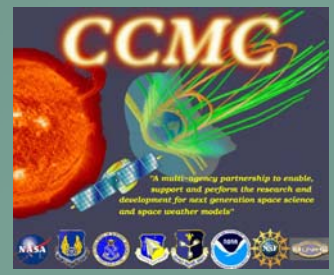


The Chapman-Ferraro Force



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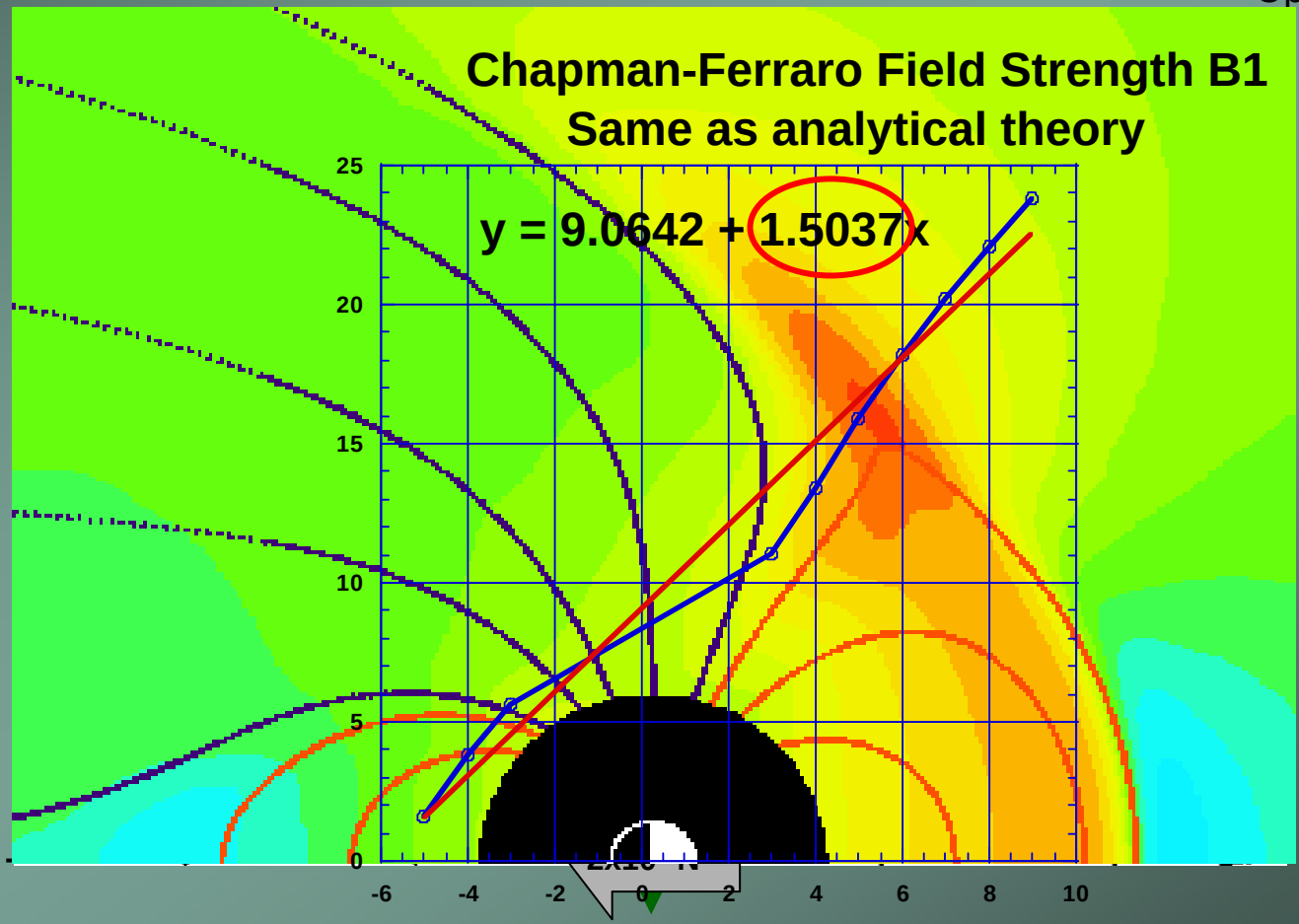
The Analytic Solution



Stagnation Streamline Parameters Hydrodynamic (Zero IMF) Case

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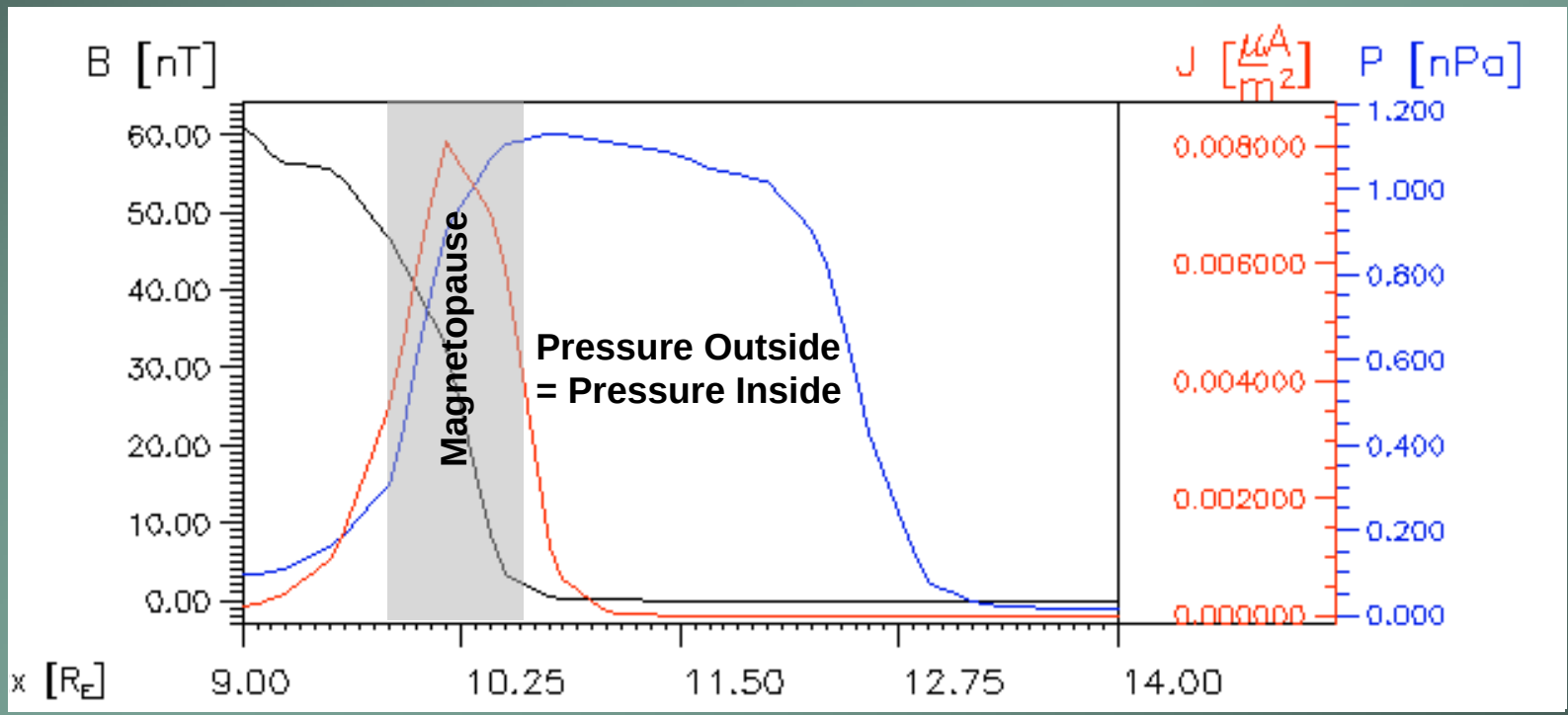
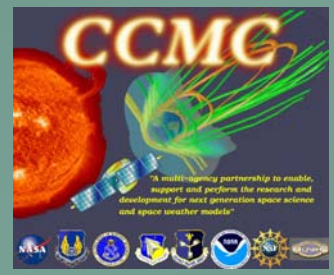
OPEN GGCM



Variation with IMF Orientation Distance to Stagnation Point



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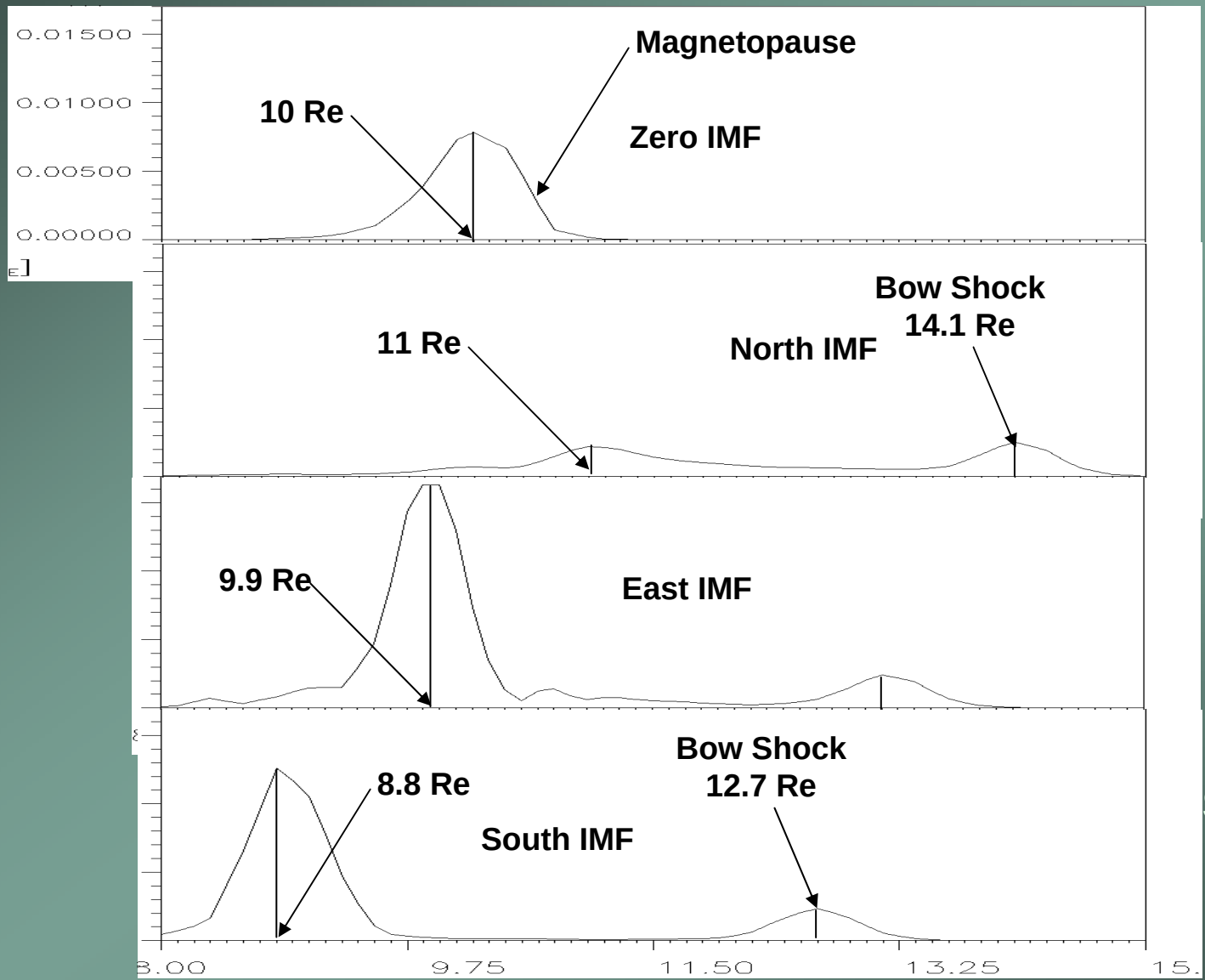
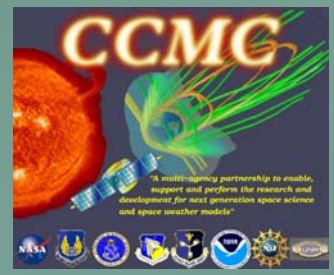


Standoff Distance = 3.1 Re

Standoff Distance = 3.9 Re

Variation with IMF Orientation Magnetic Field Geometry



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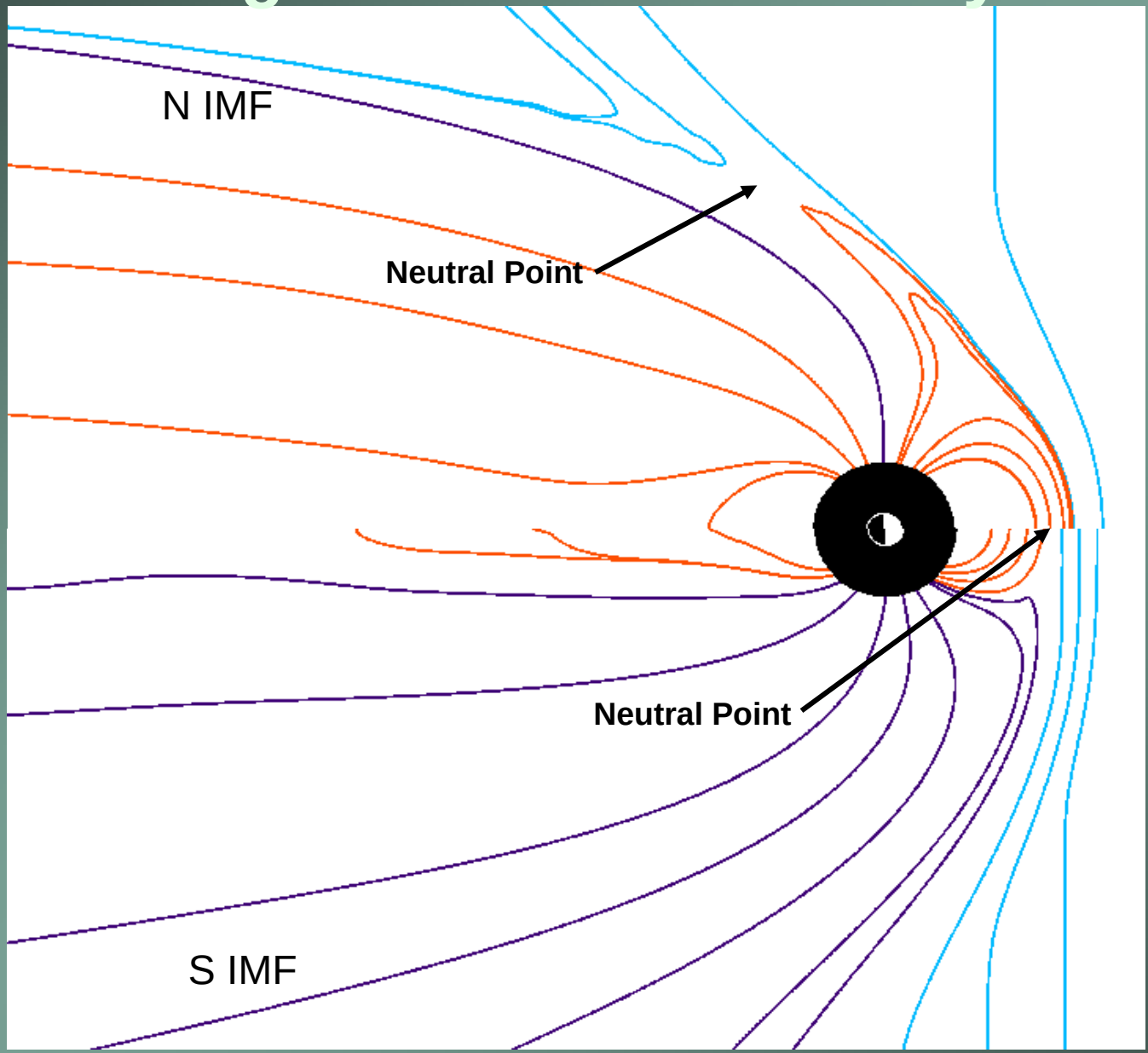
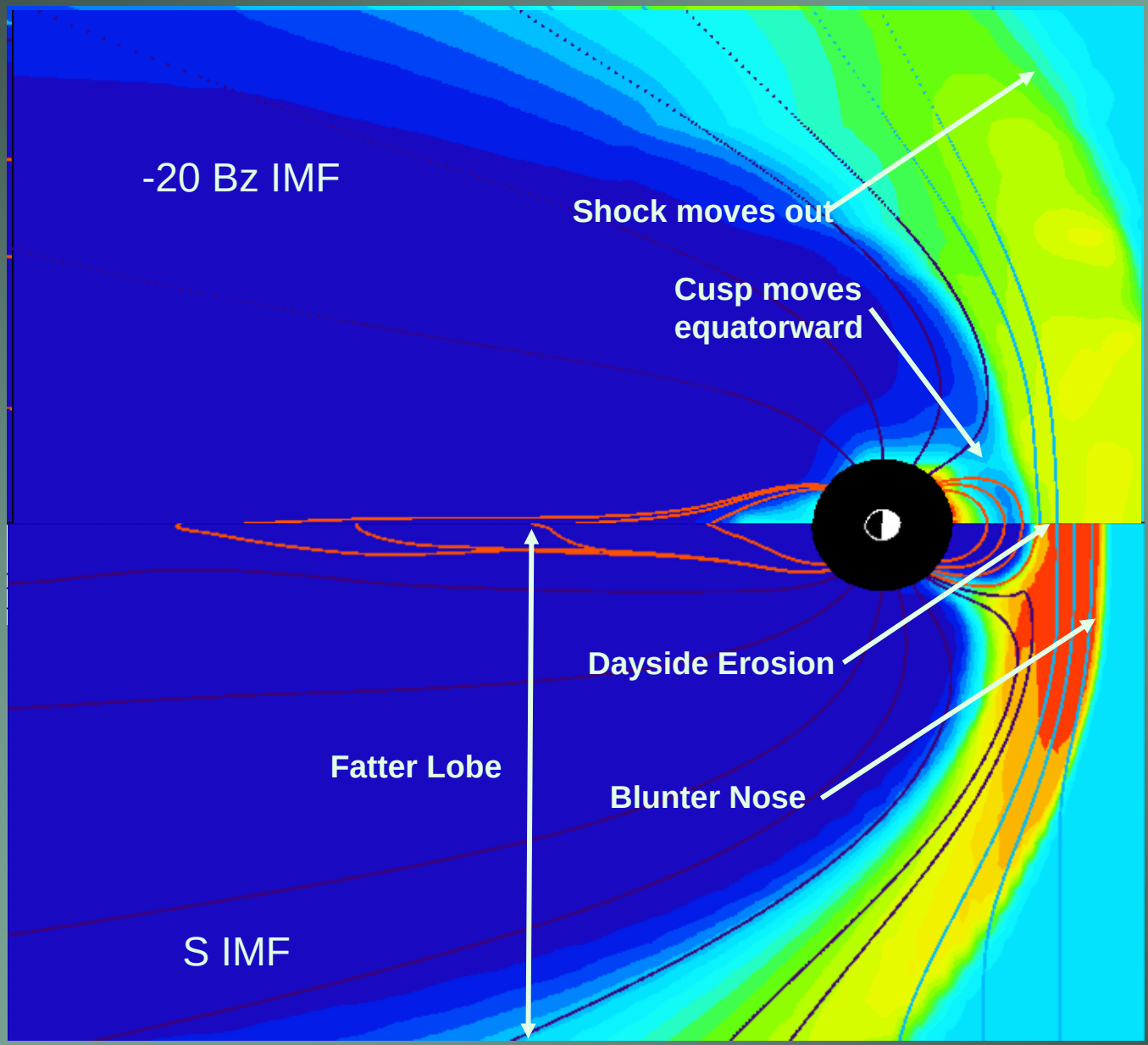
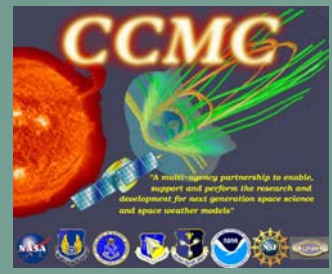


Magnetosphere Shape





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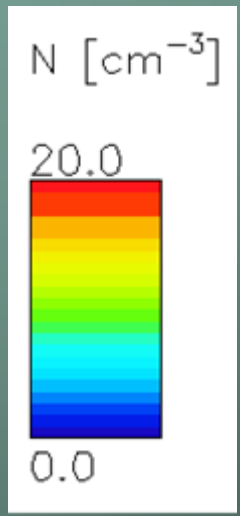
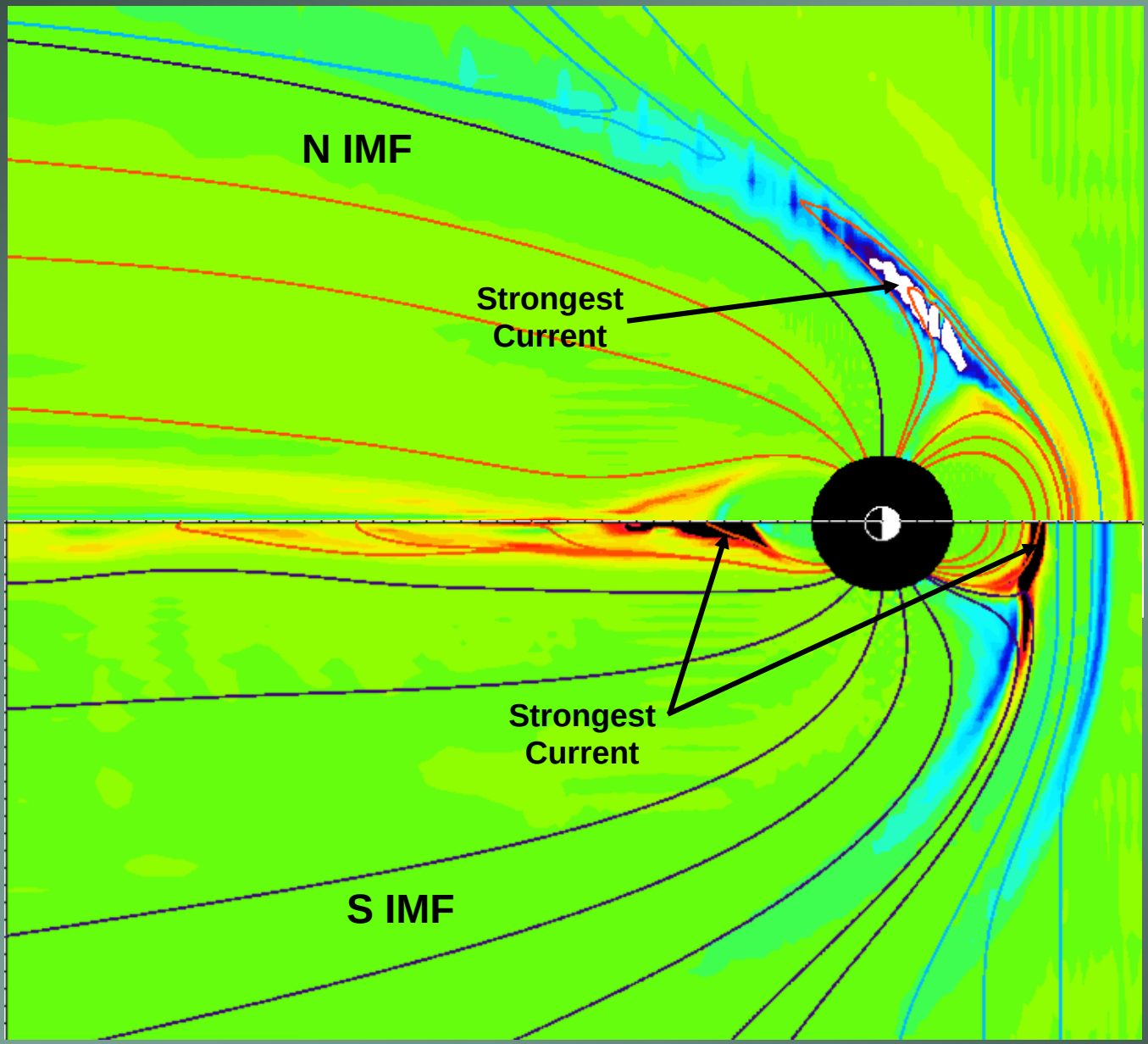
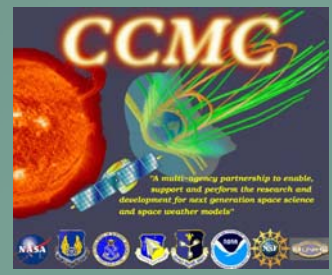


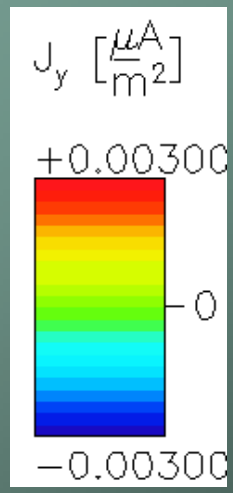
Magnetopause Current



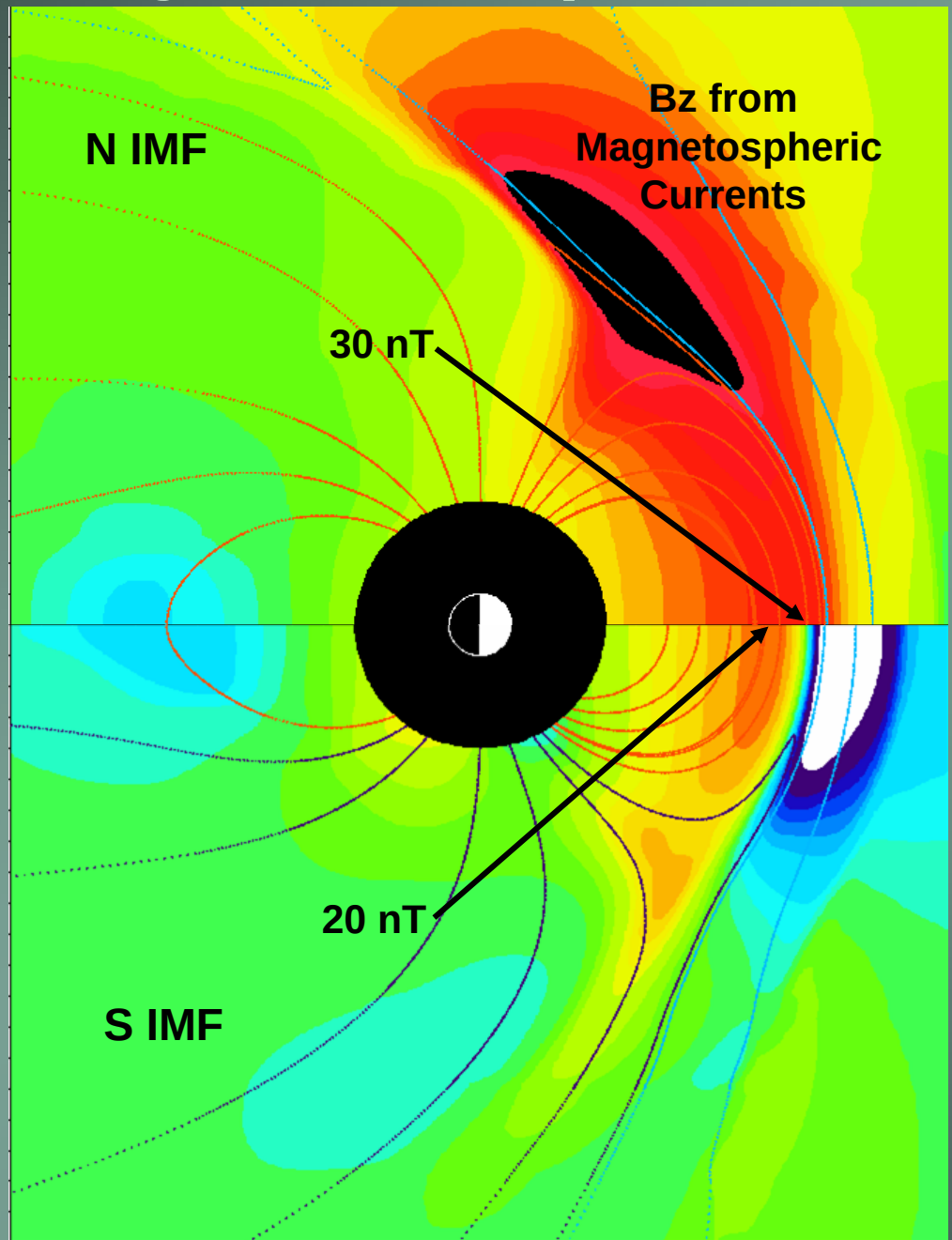


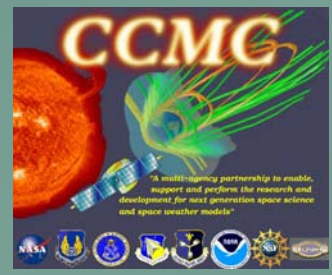
BATSRUS

● Open GGCM

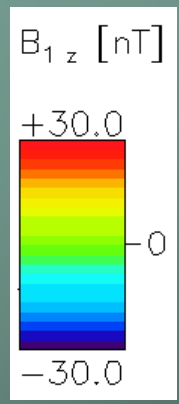


Dayside Compression



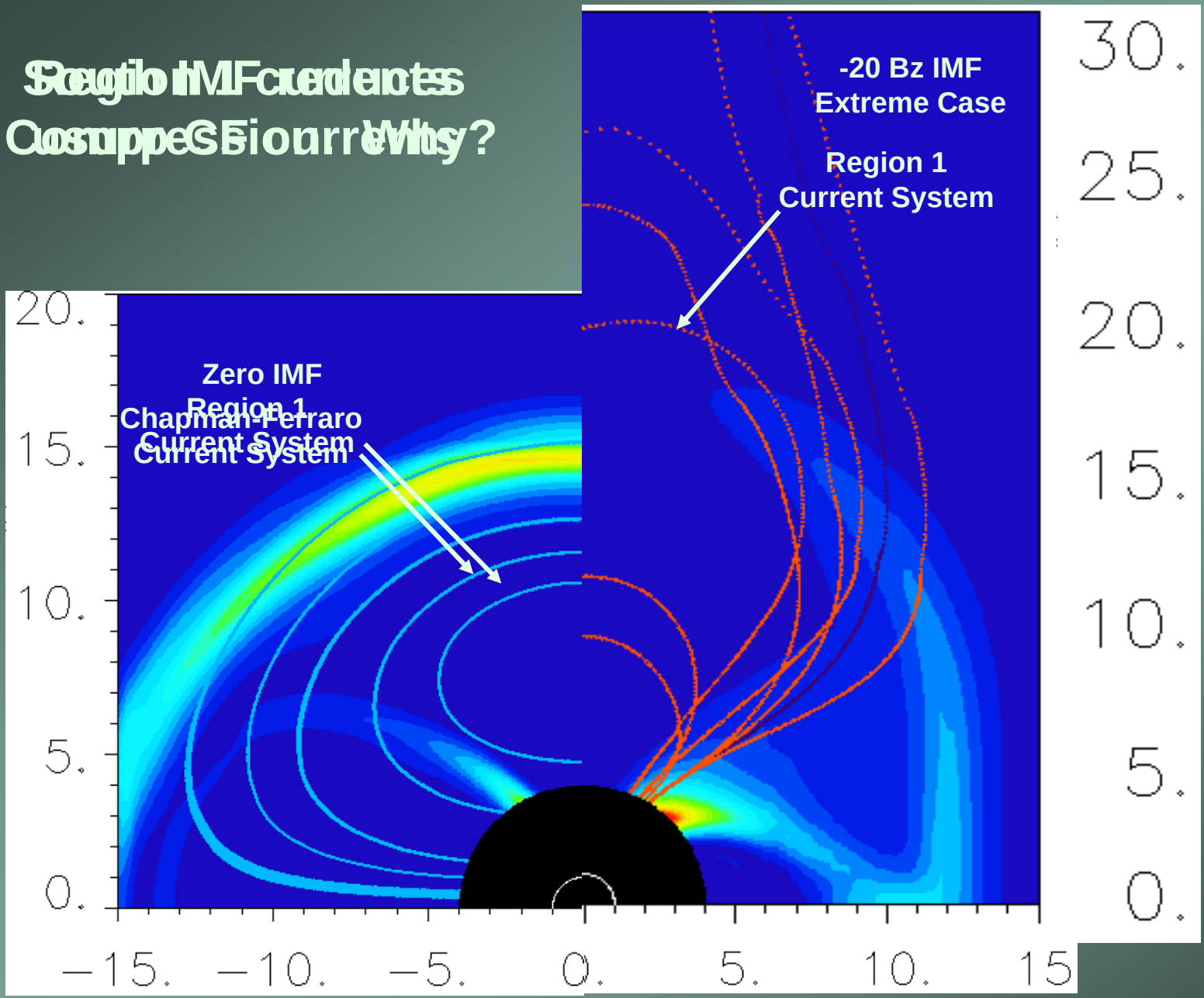


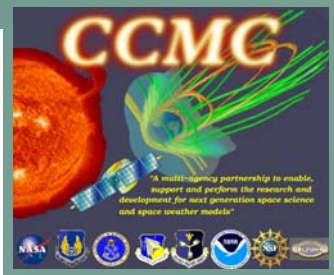
- BATSRUS
  Open GGCM



South IMF reduces compression

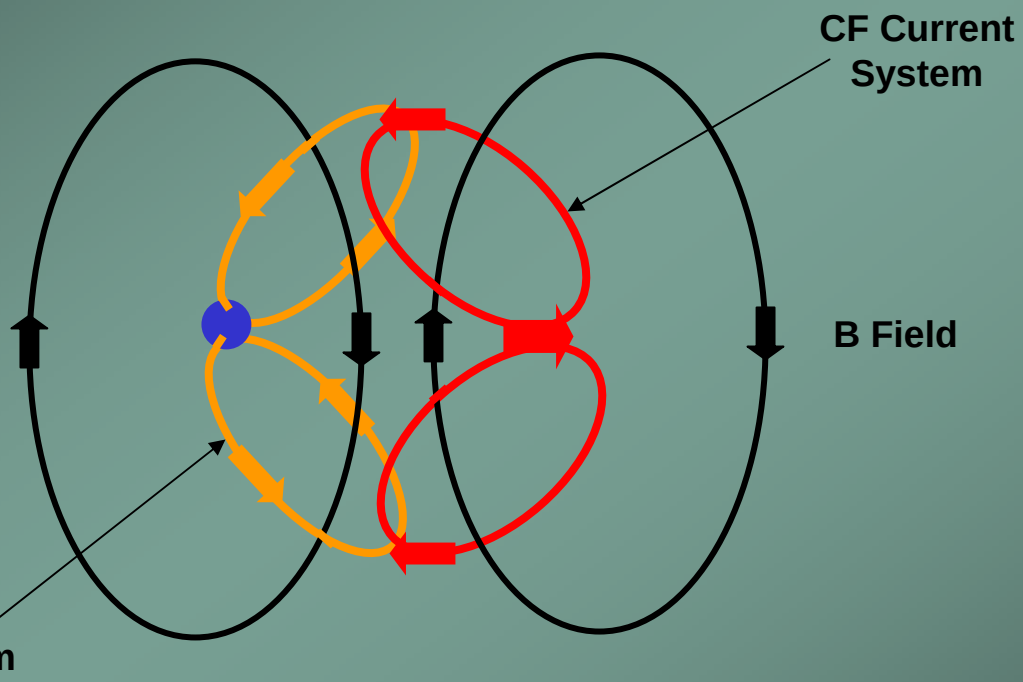
Region 1 currents
Compression Why?





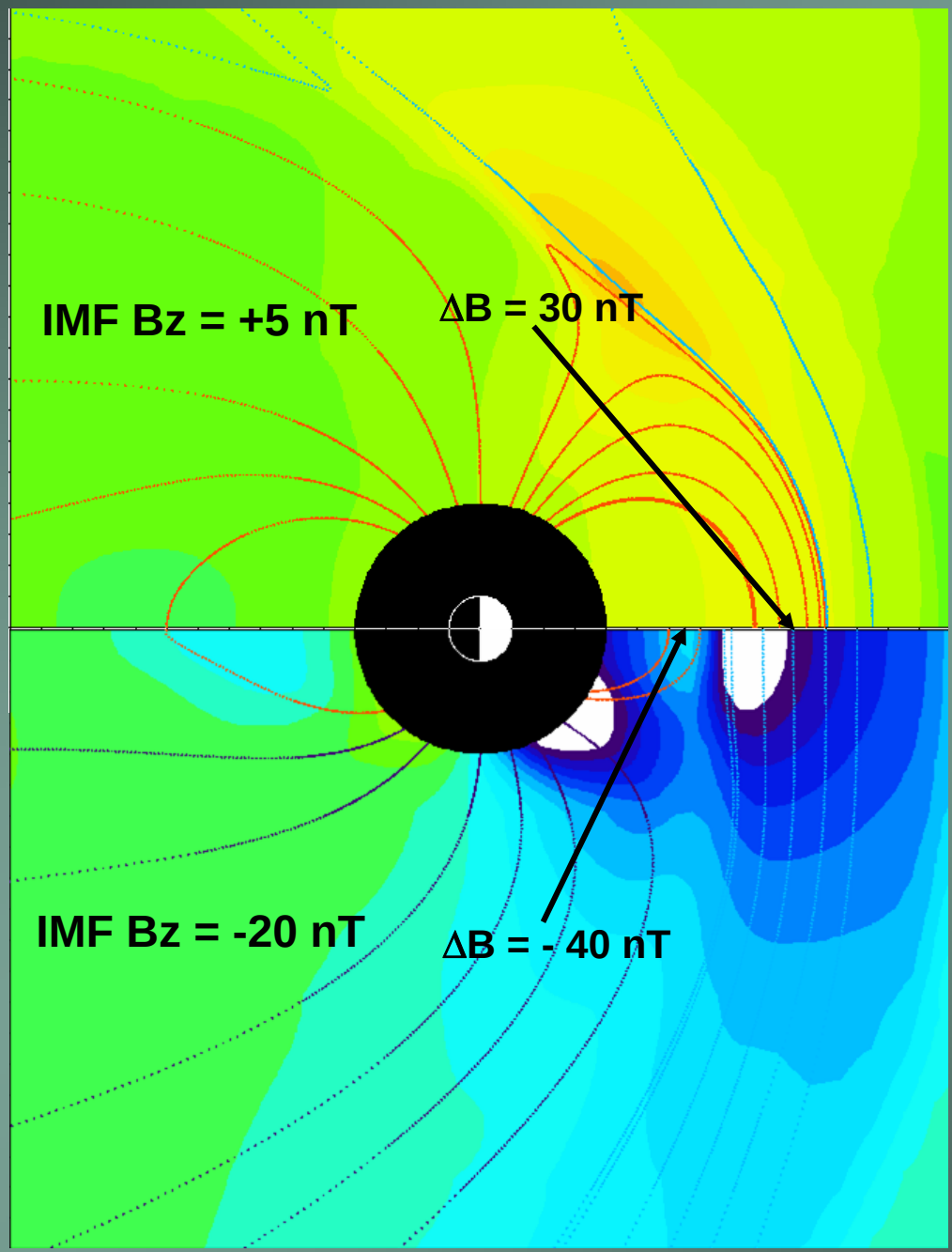
- BATSRUS Open GGCM

Explanation

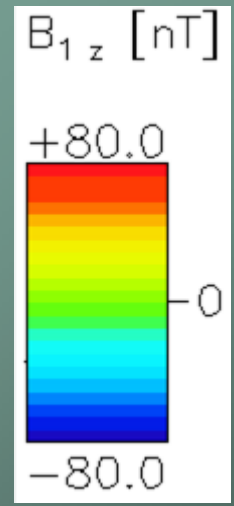


BATSRUS
Open GGCM

Extreme Case



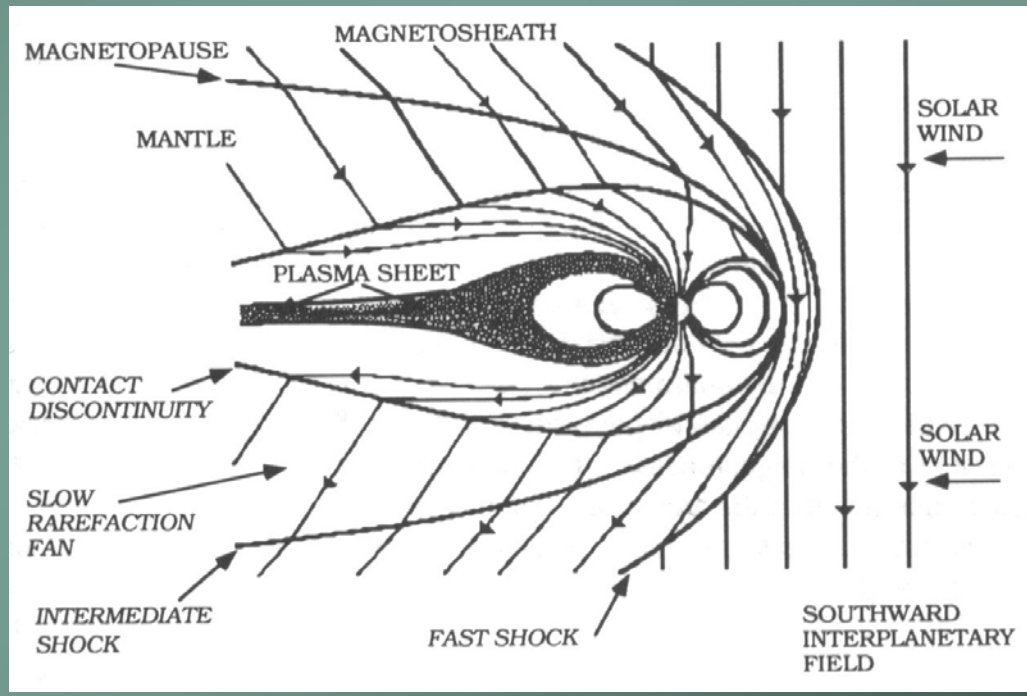
- BATSRUS
- Open GGCM



Negative Dayside Compression

The Plasma-Entry Problem

How does solar wind plasma get into the plasma sheet?



(Coroniti and Kennel, 1979)