SuperDARN Symposium, Sep 11, 2017, NICT

Development of convection to the substorm

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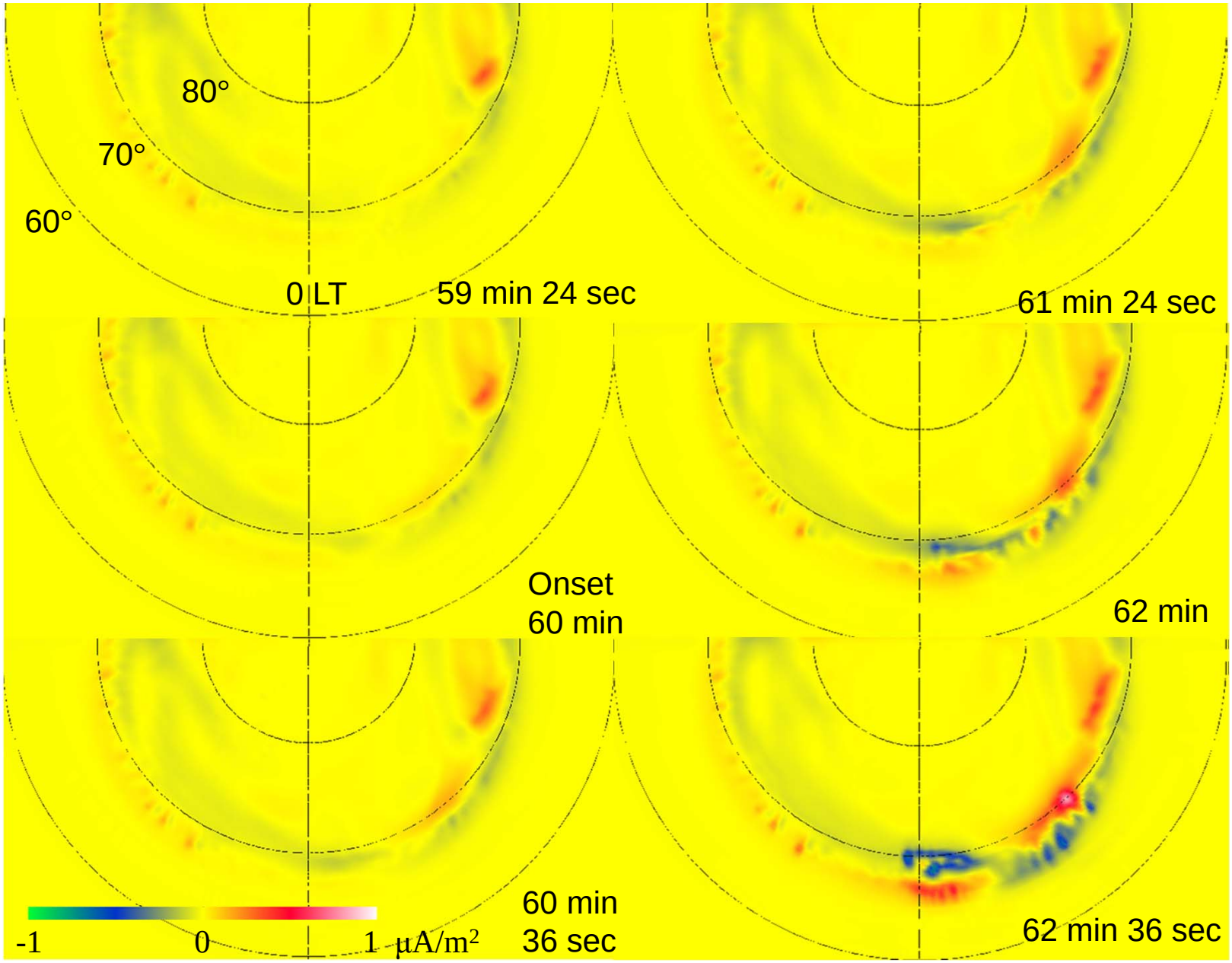
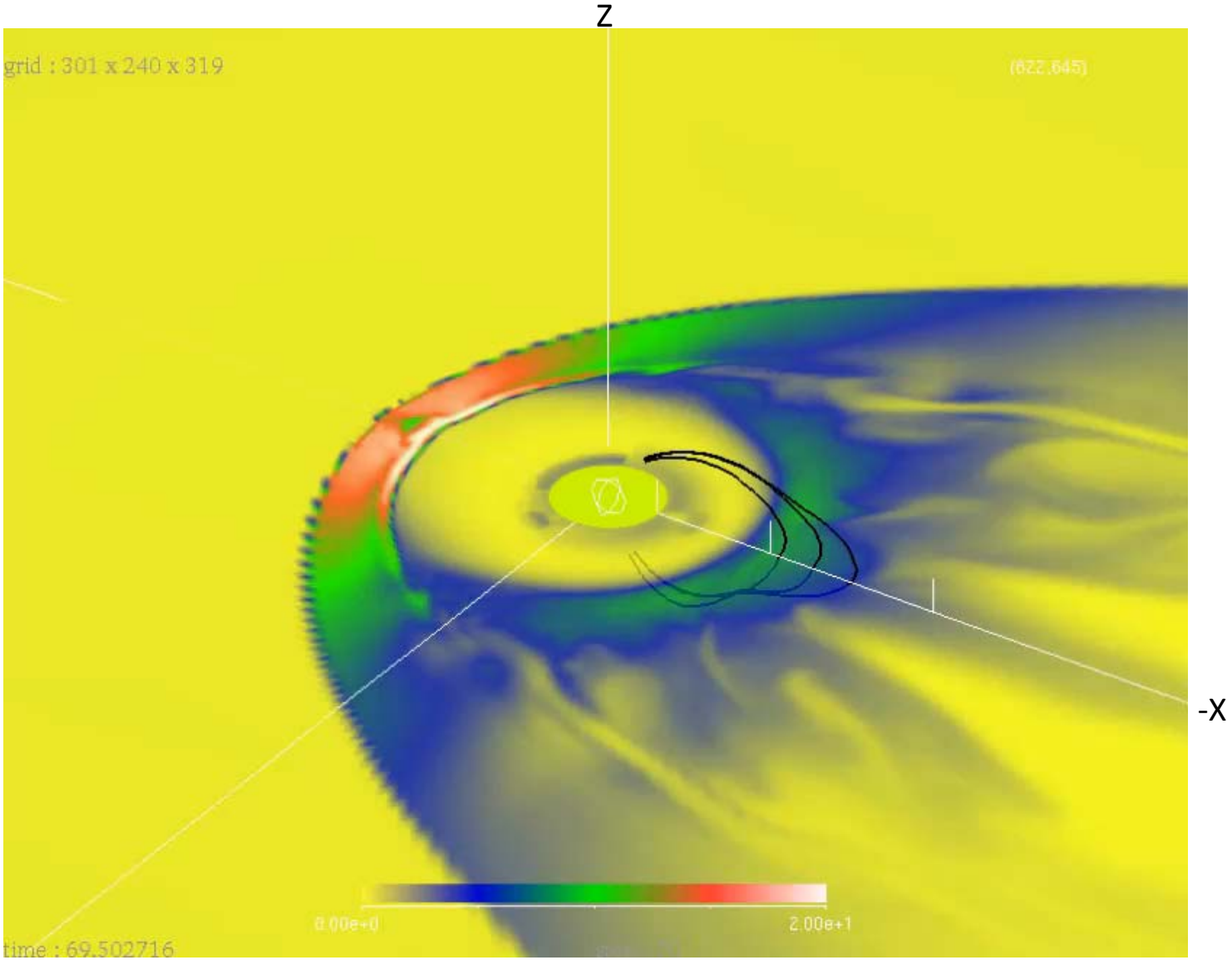
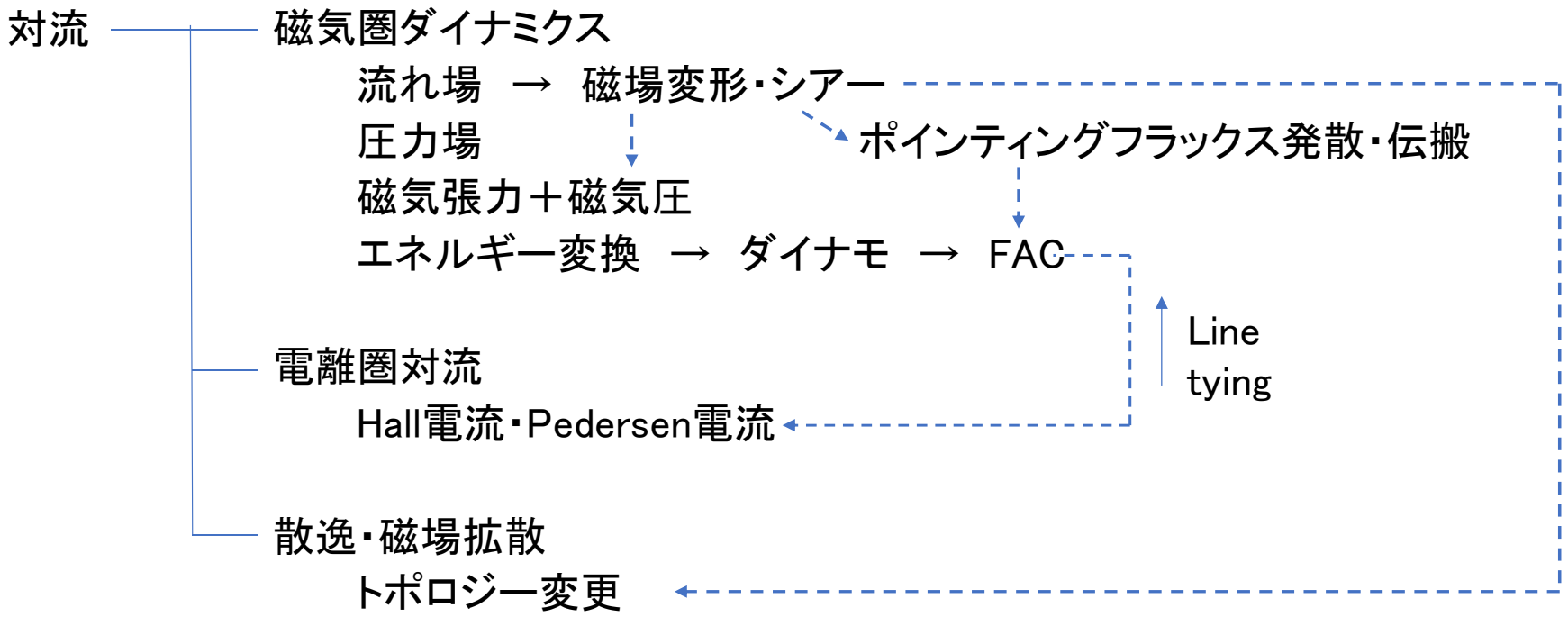
Substorm onset in the ionosphere (FAC)



Plasma sheet disturbances from the high-resolution simulation



磁気圏ー電離圏結合対流の構造
（対流研究会の成果）

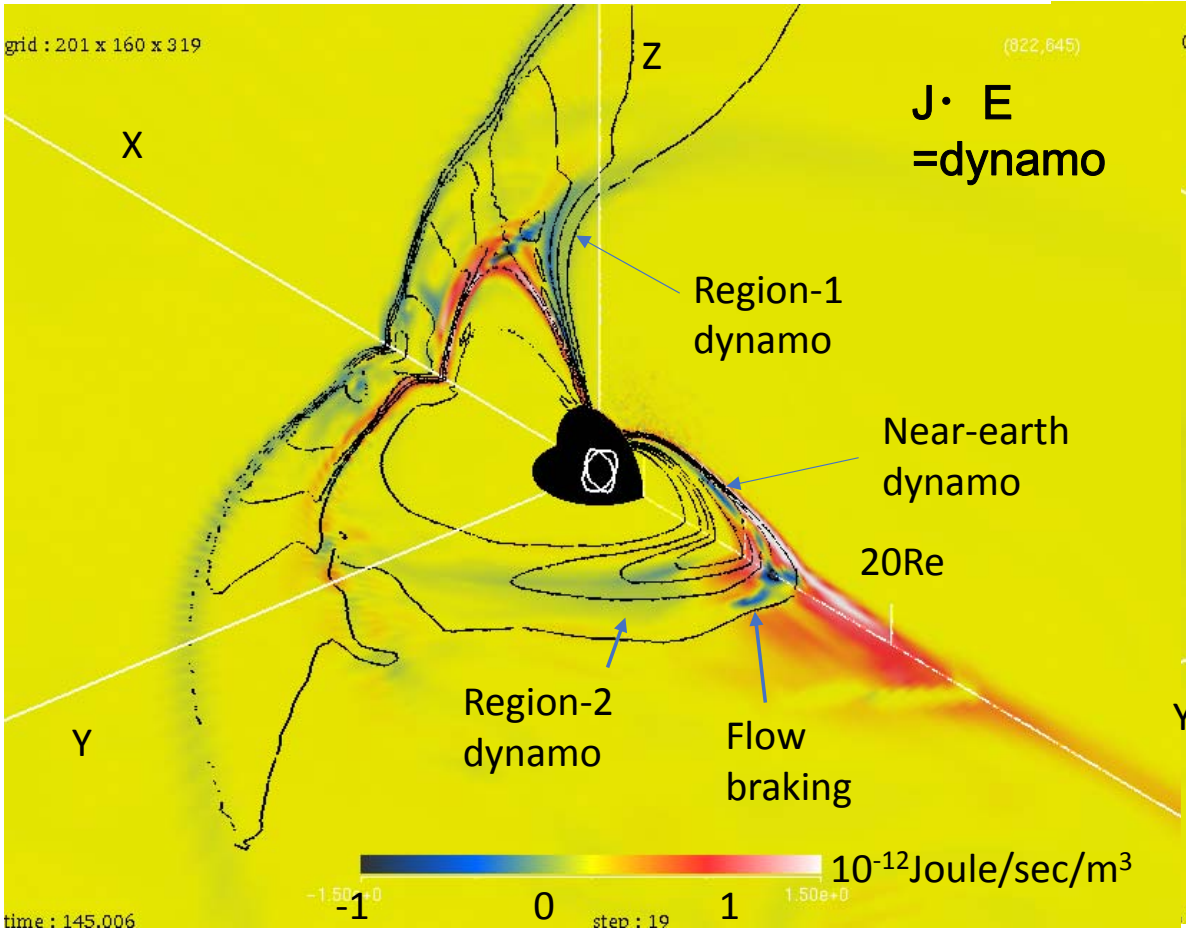


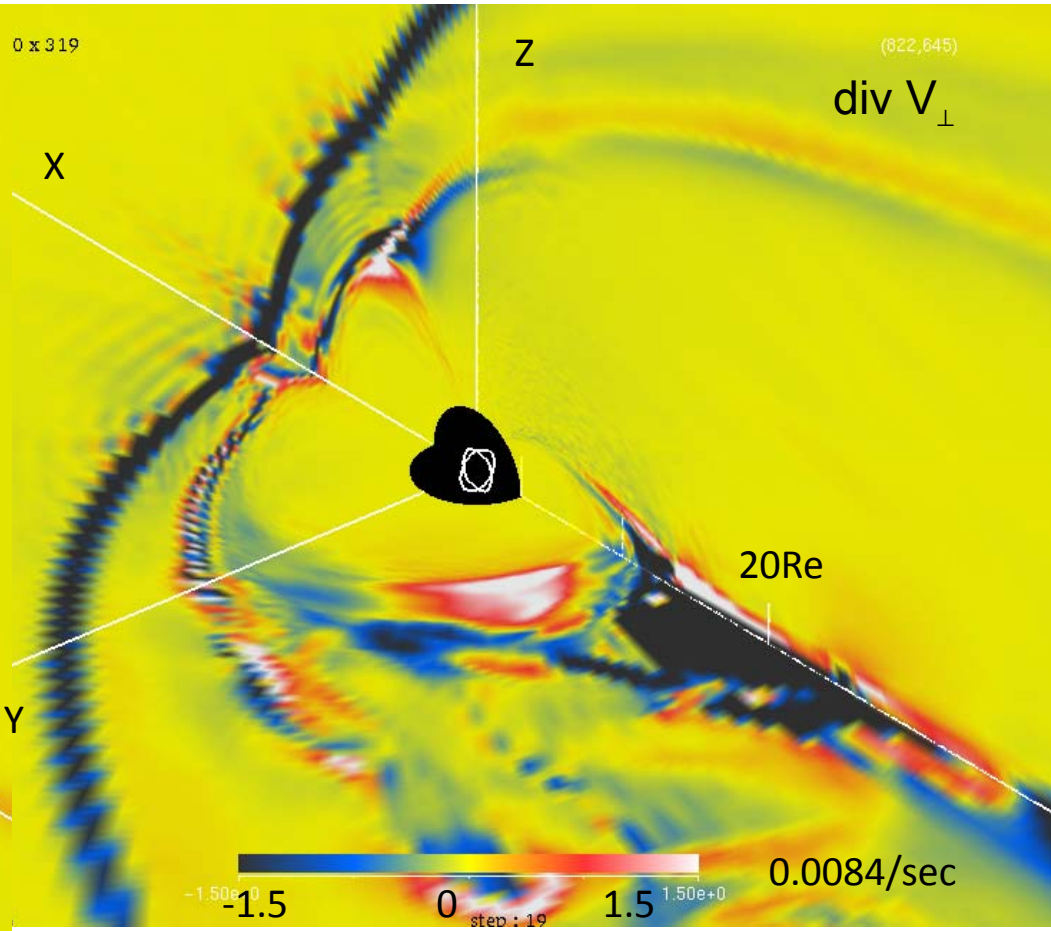
磁気圏ー電離圏結合対流のモデル

	-ダンジェー対流-	-対流研究会-
ダイナモ	magnetosheath flow 減速	圧力ダイナモ
ポインティングフラックス発散	magnetic tension	slow mode expansion
散逸(トポロジー変更)	反平行リコネクション	ヌルーセパレーター構造
↓		
サブストームオンセット	CW	near-earth dynamo

Region-1 dynamo (left) and slow mode expansion (right)

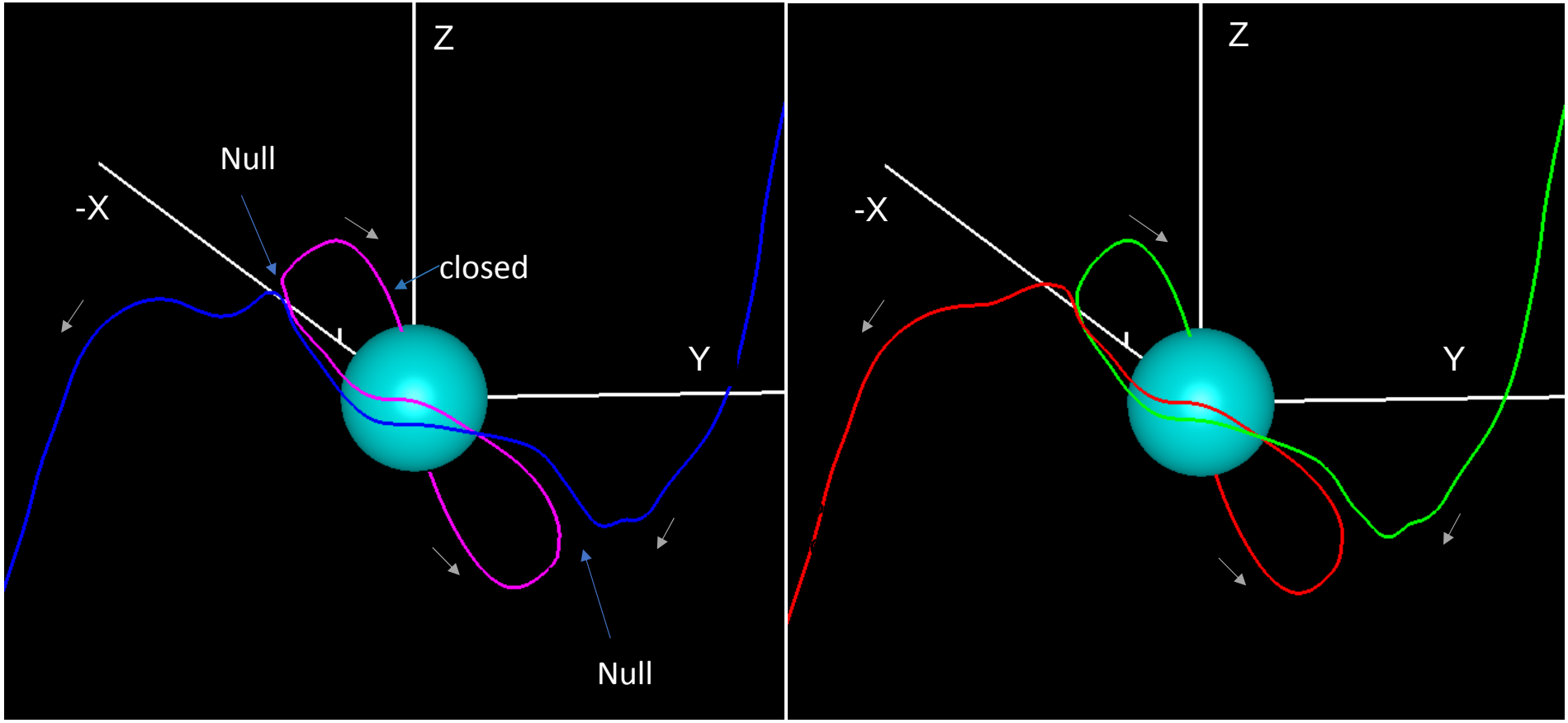
(Contour : P, Generation of the FAC)





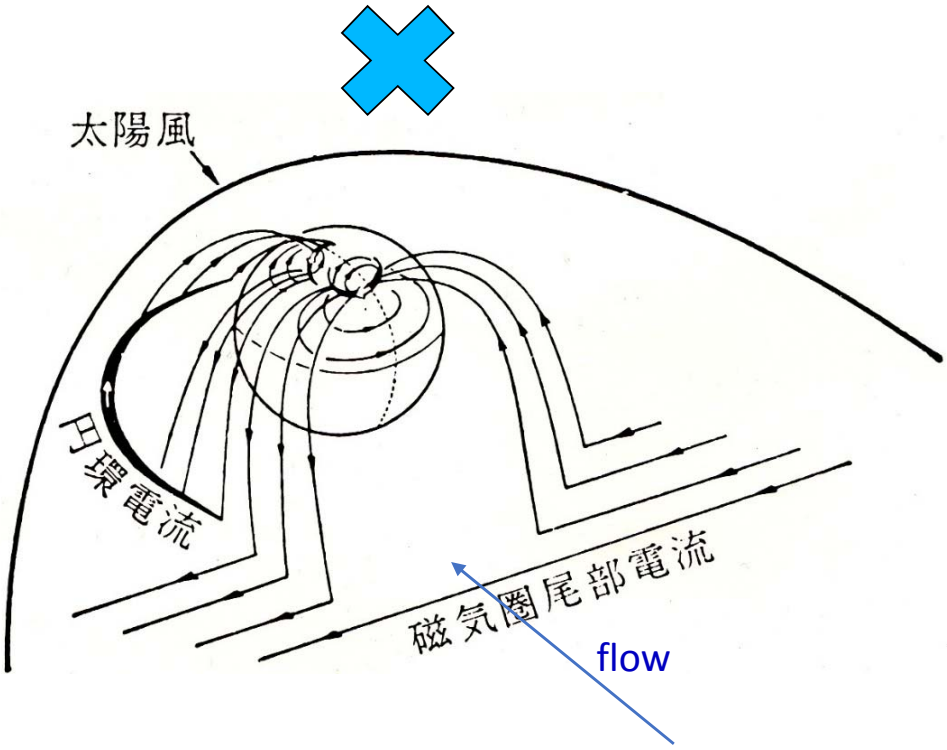
3D separator reconnection under the southward IMF

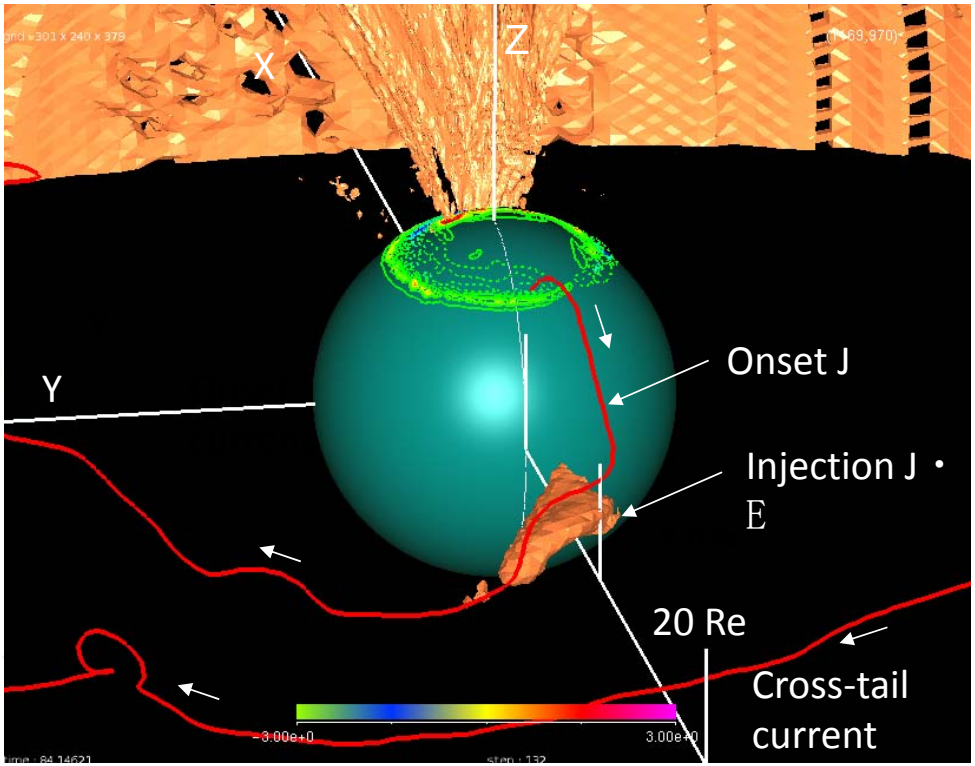
(dayside)



Current wedge (left) and the near-earth dynamo (right)

(Generation of the onset FAC)

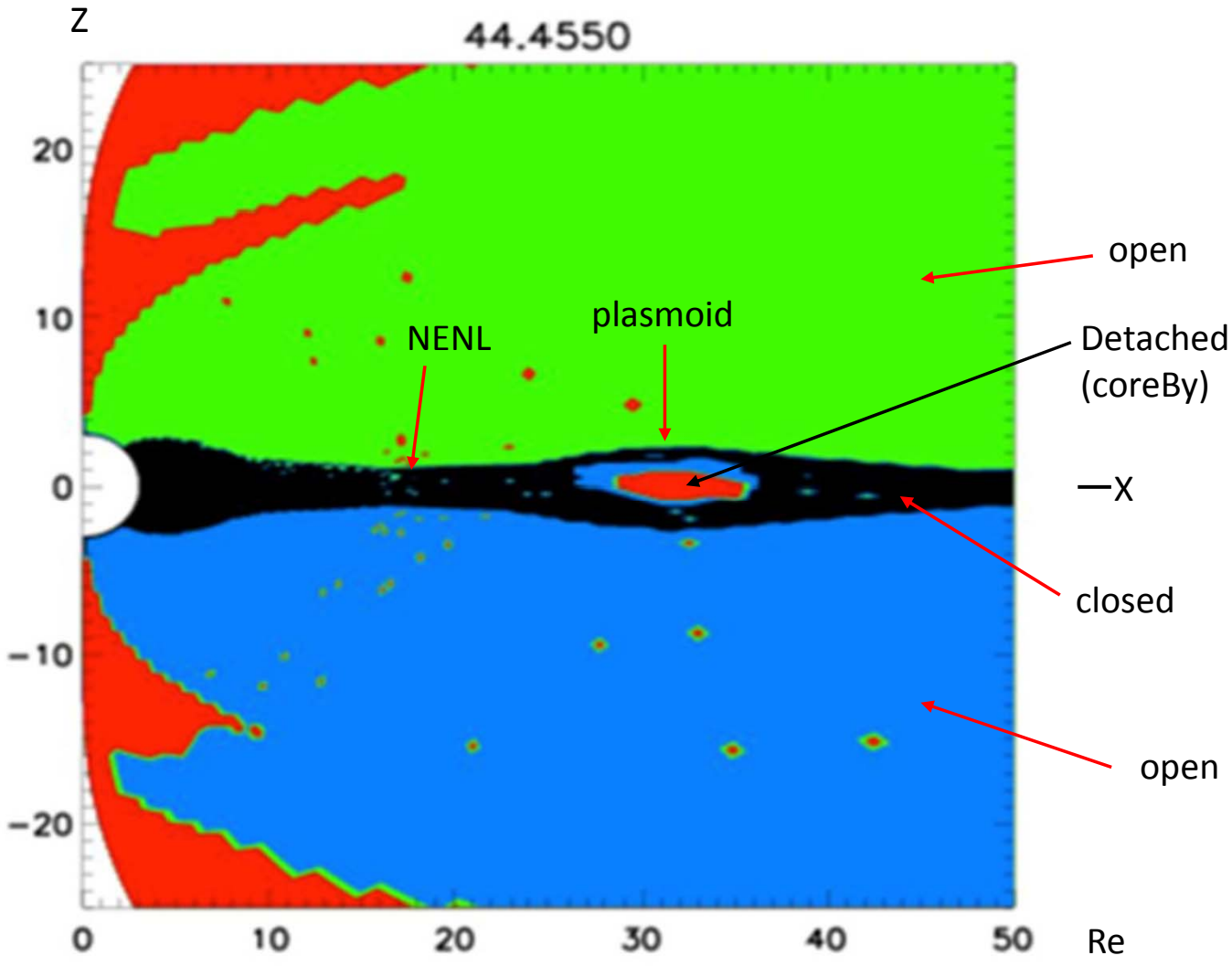




NENL

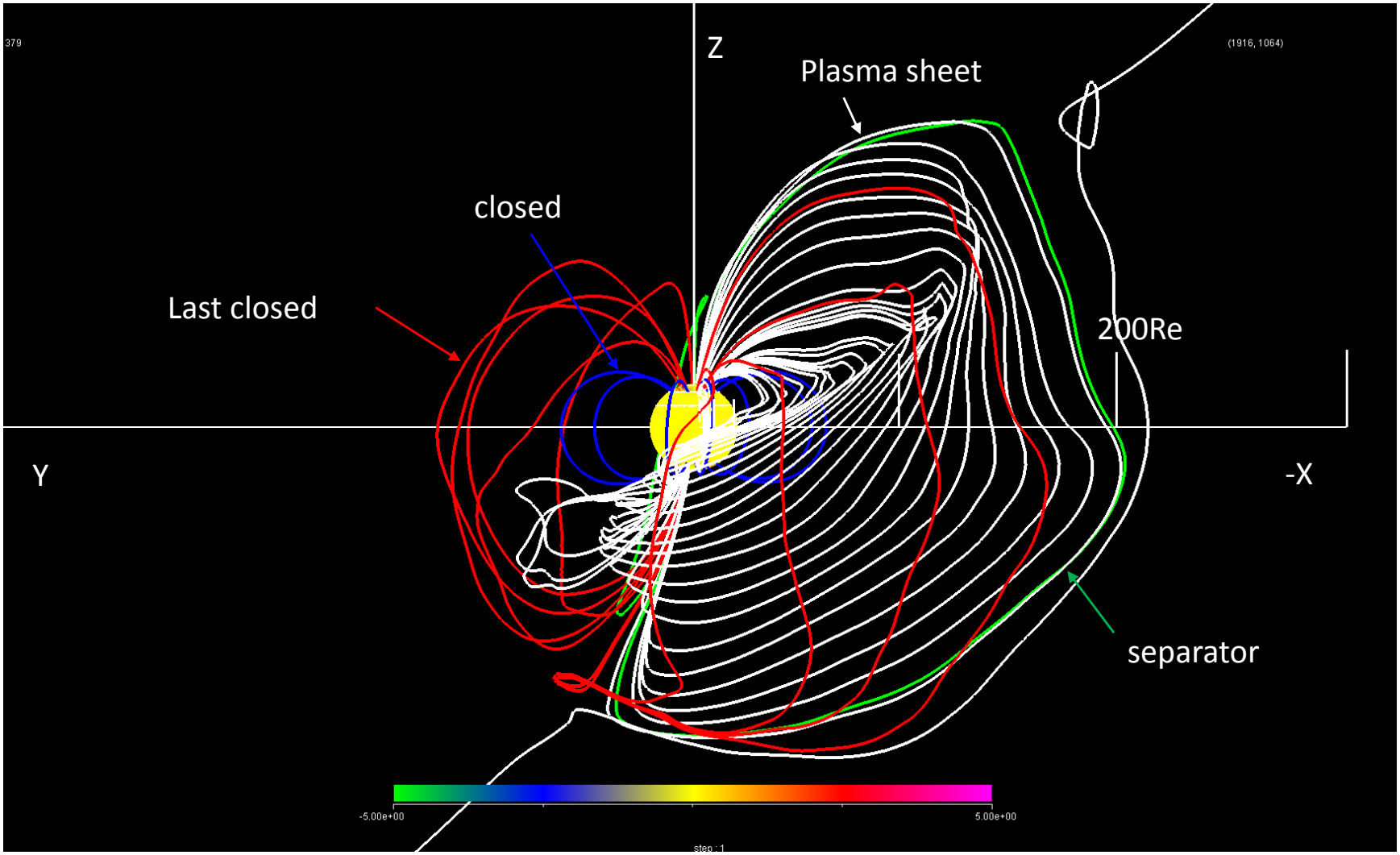
反平行リコネクション？

Formation of the core By during the growth phase

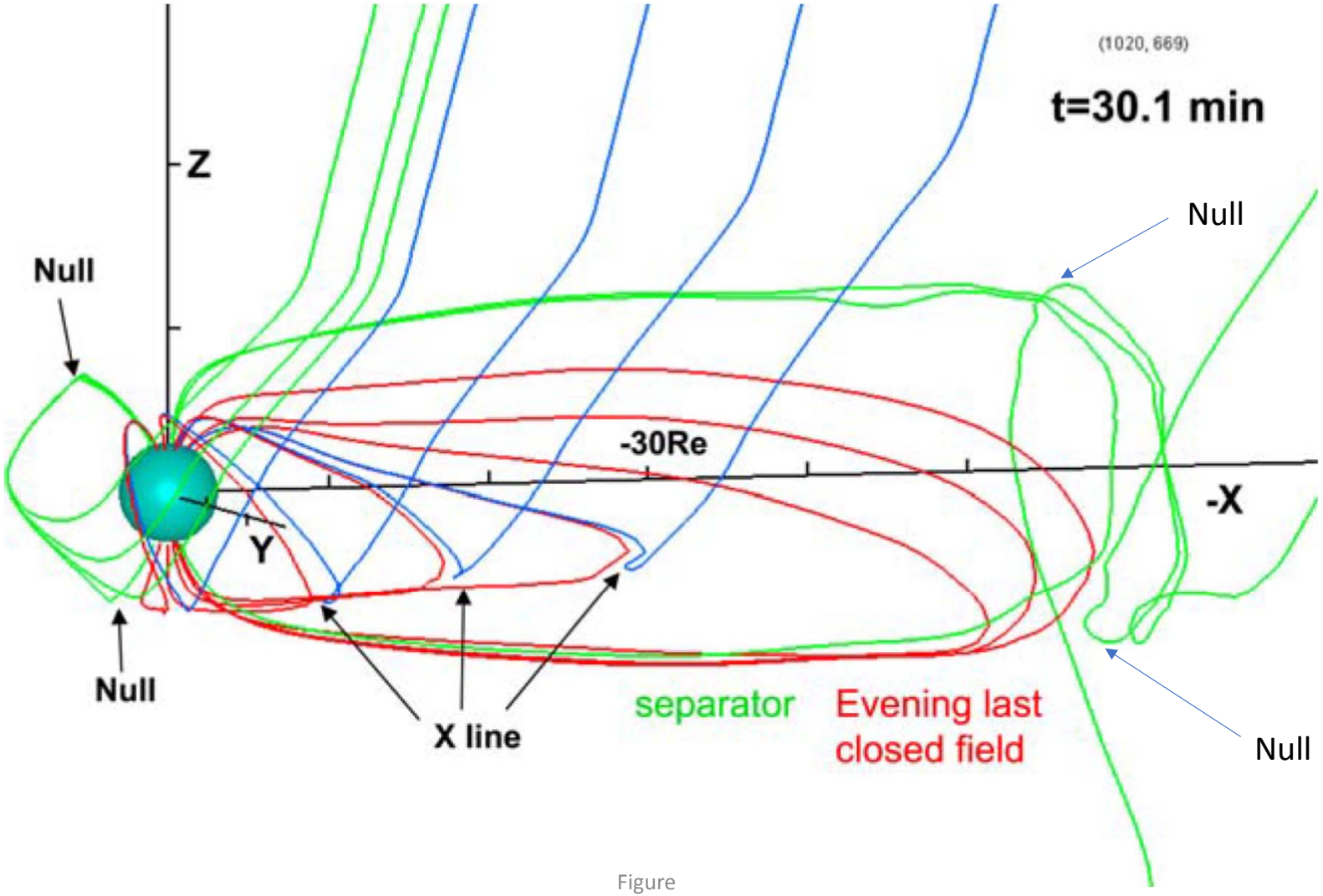


Configuration of magnetic field in the skewed plasma sheet

(northward IMF)

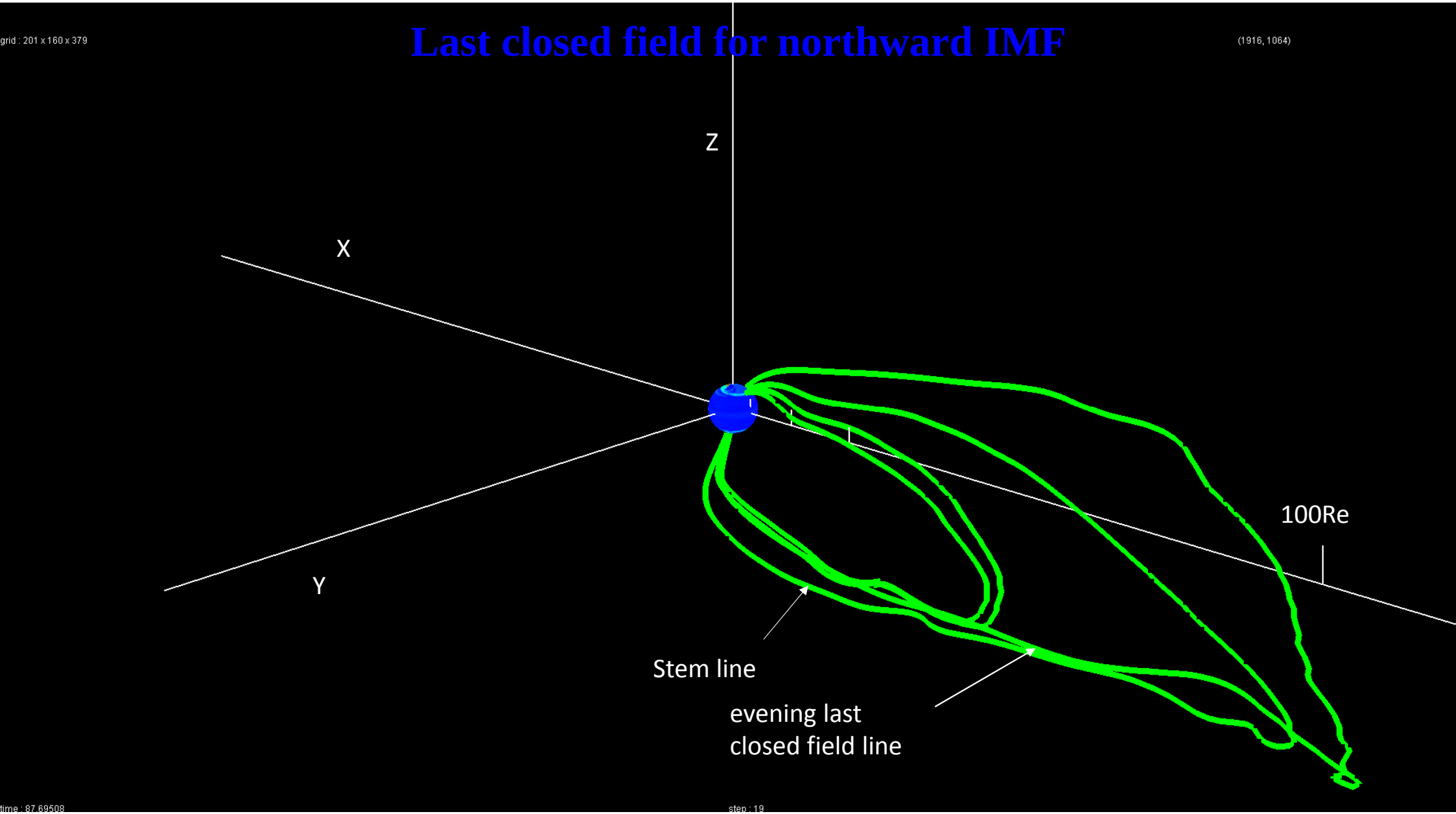


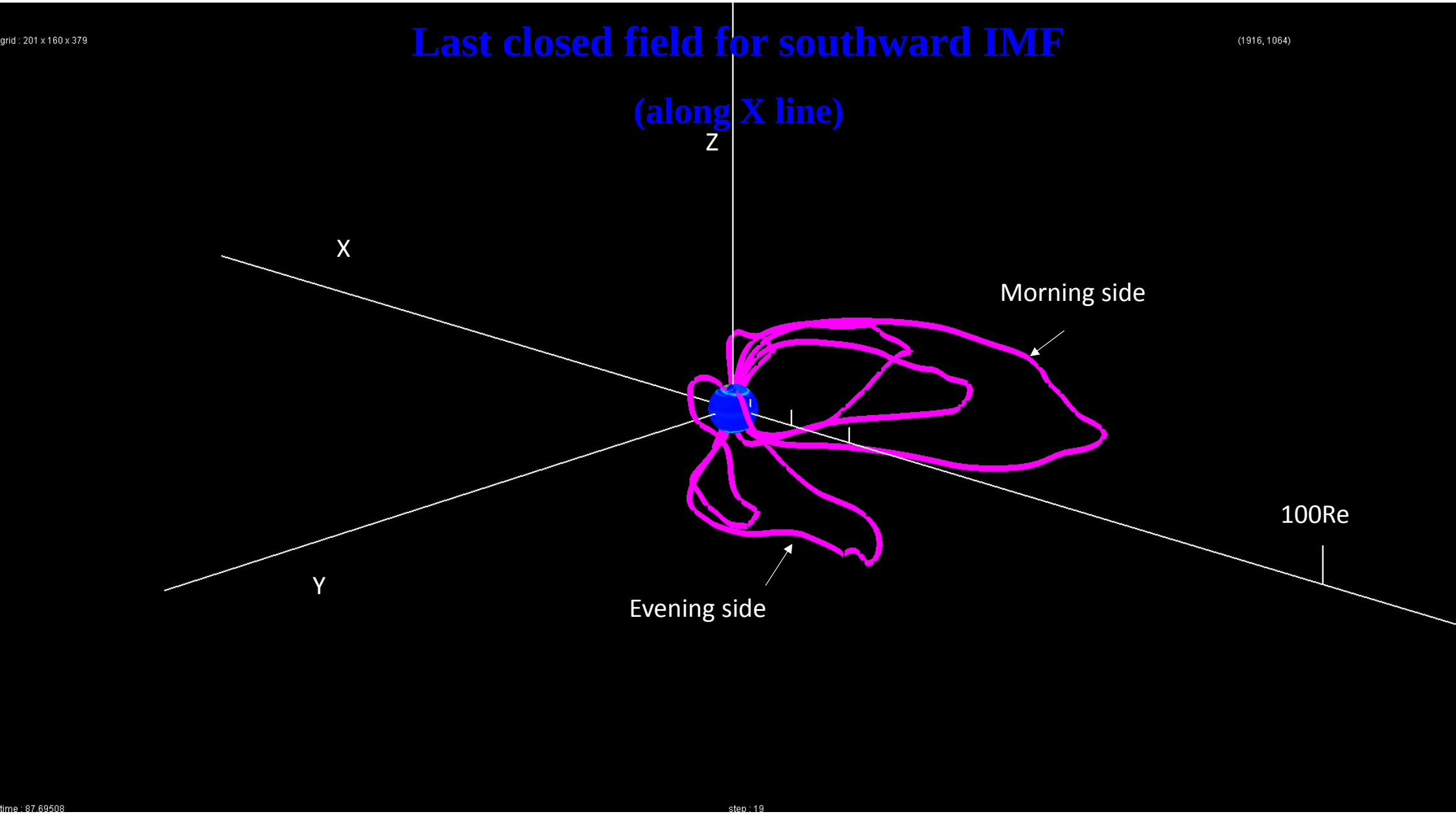
Development of nulls and x-line during the growth phase

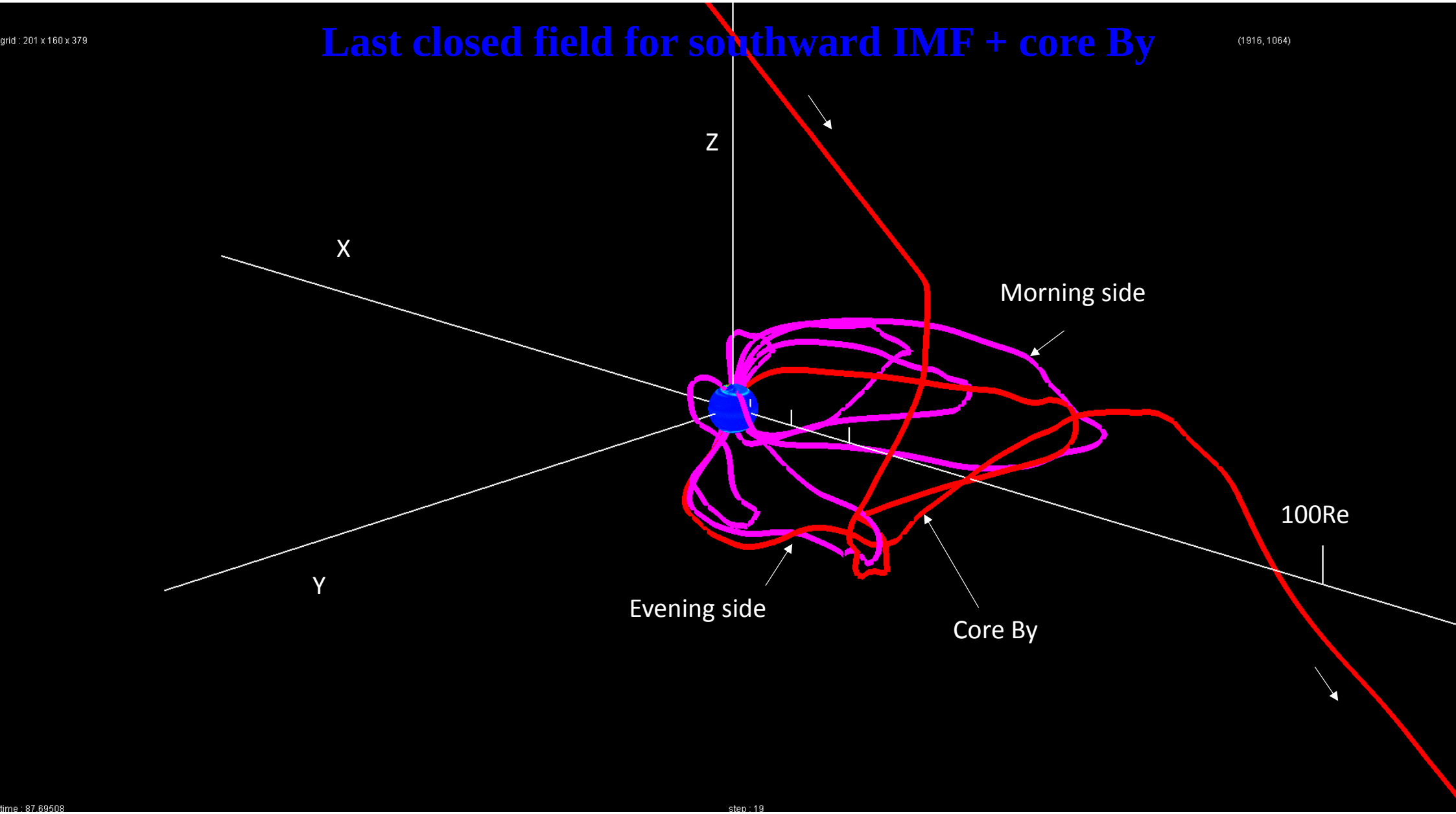


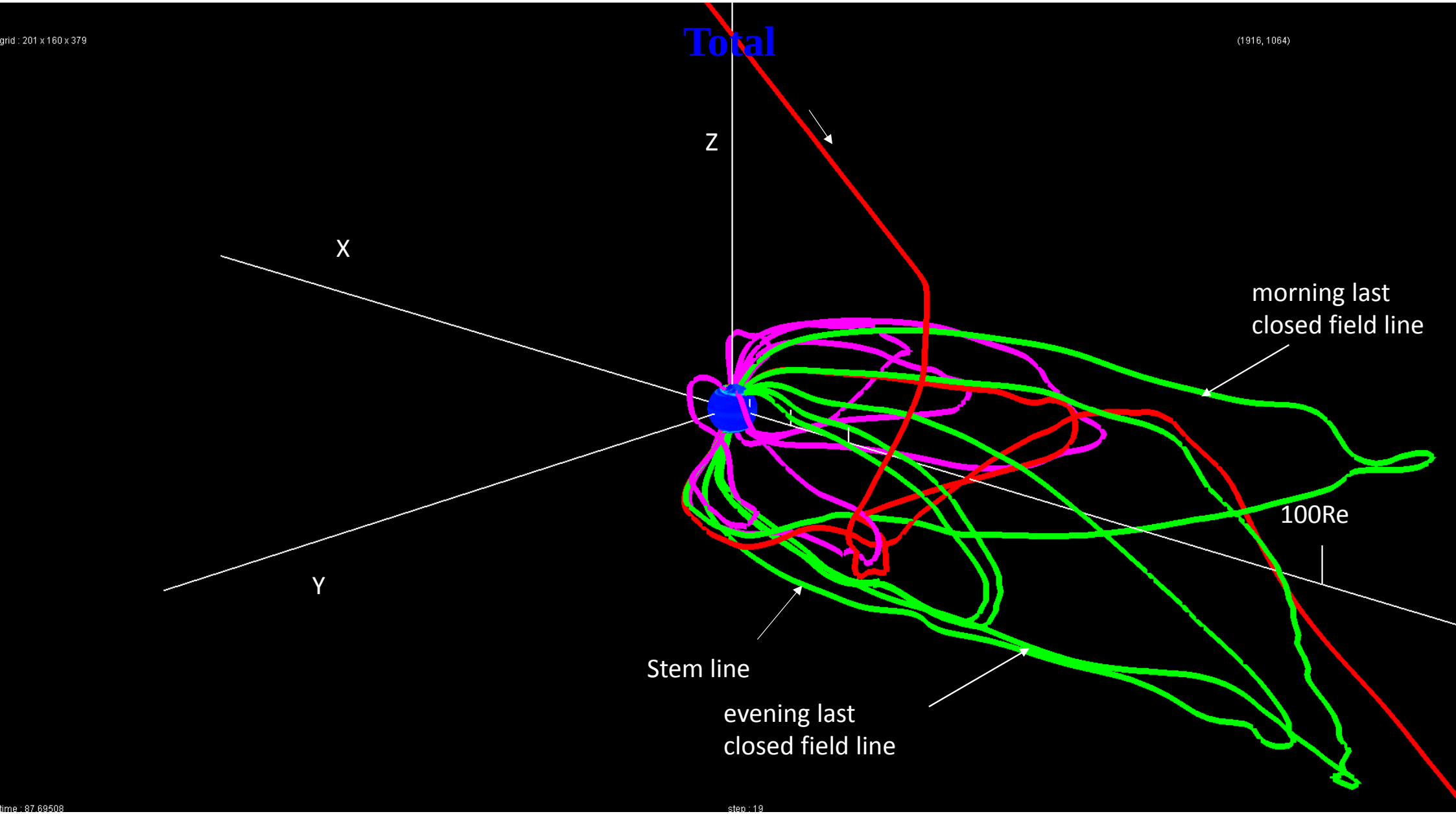
Figure

Last closed field for northward IMF



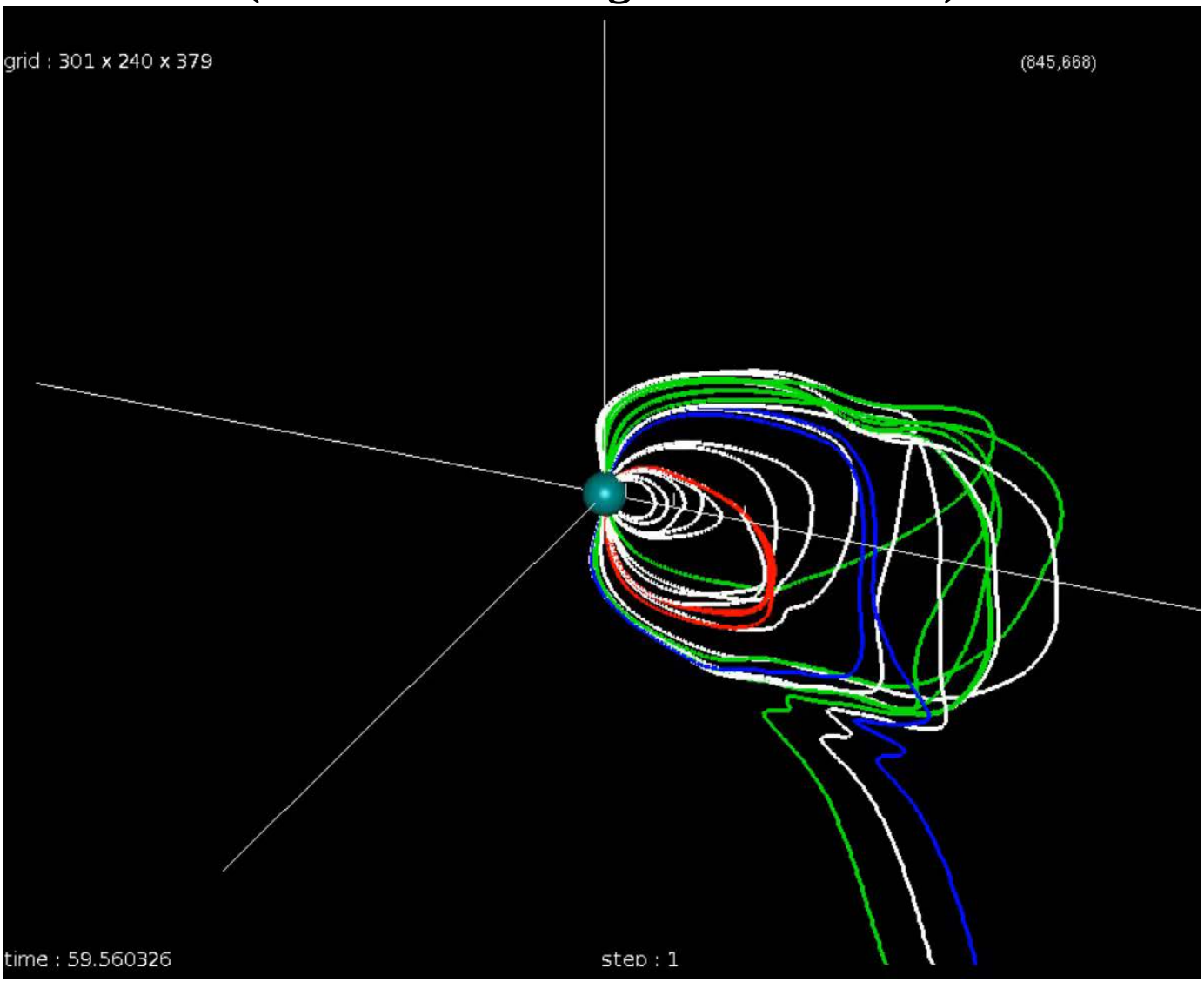

grid : 201 x 160 x 379
(1916, 1064)
Last closed field for southward IMF
(along X line)
Z
X
Morning side
100Re
Y
Evening side
time : 87.69508
step : 19


grid : 201 x 160 x 379
Last closed field for southward IMF + core By
(1916, 1064)
Z
X
Y
Morning side
100Re
Evening side
Core By
time : 87.69508
step : 19


grid : 201 x 160 x 379
Total
(1916, 1064)
Z
X
Y
morning last
closed field line
100Re
Stem line
evening last
closed field line
time : 87.69508
step : 19

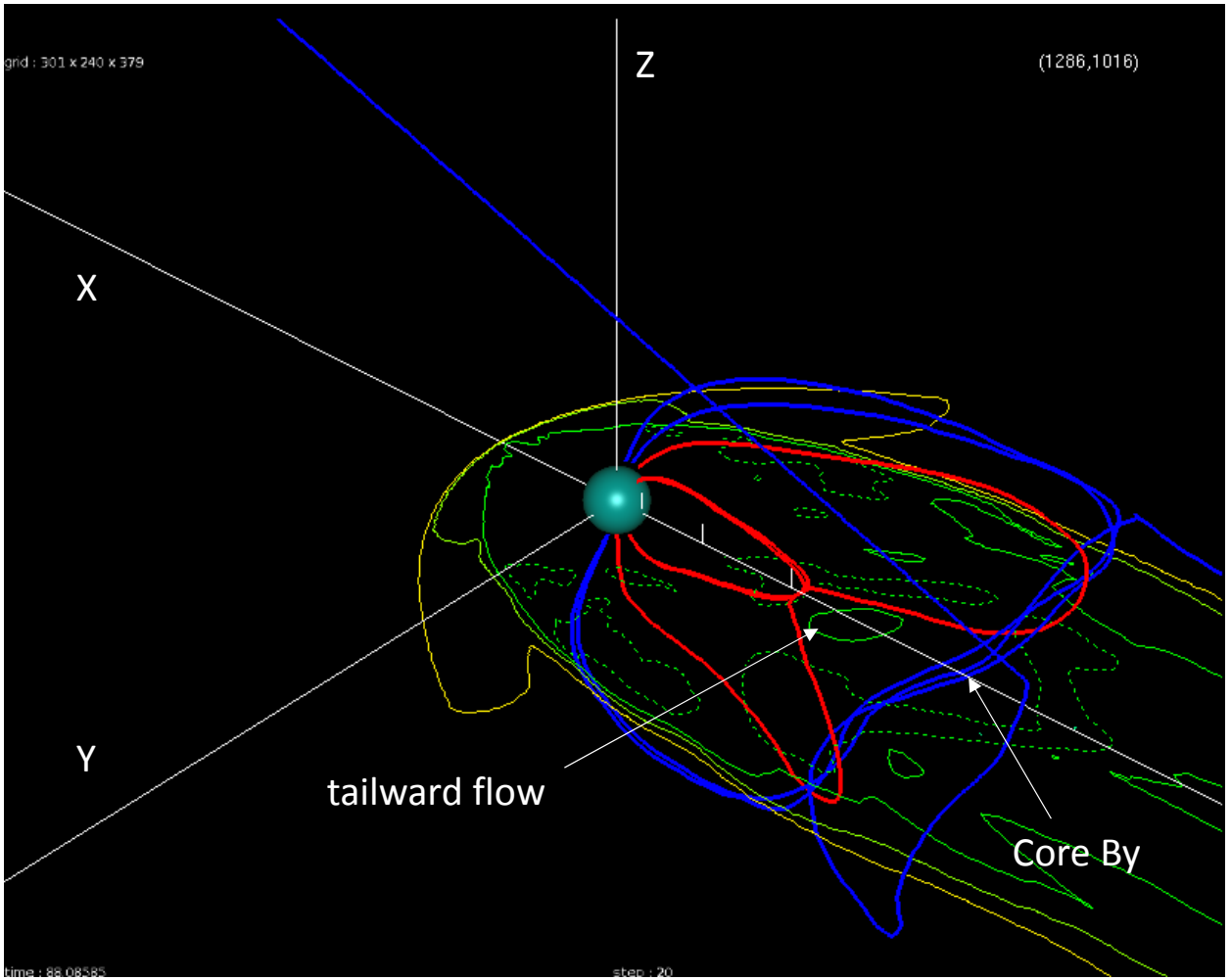
Development of 3-D nulls resulting in formation of the NENL

(Plasma sheet magnetic field lines)



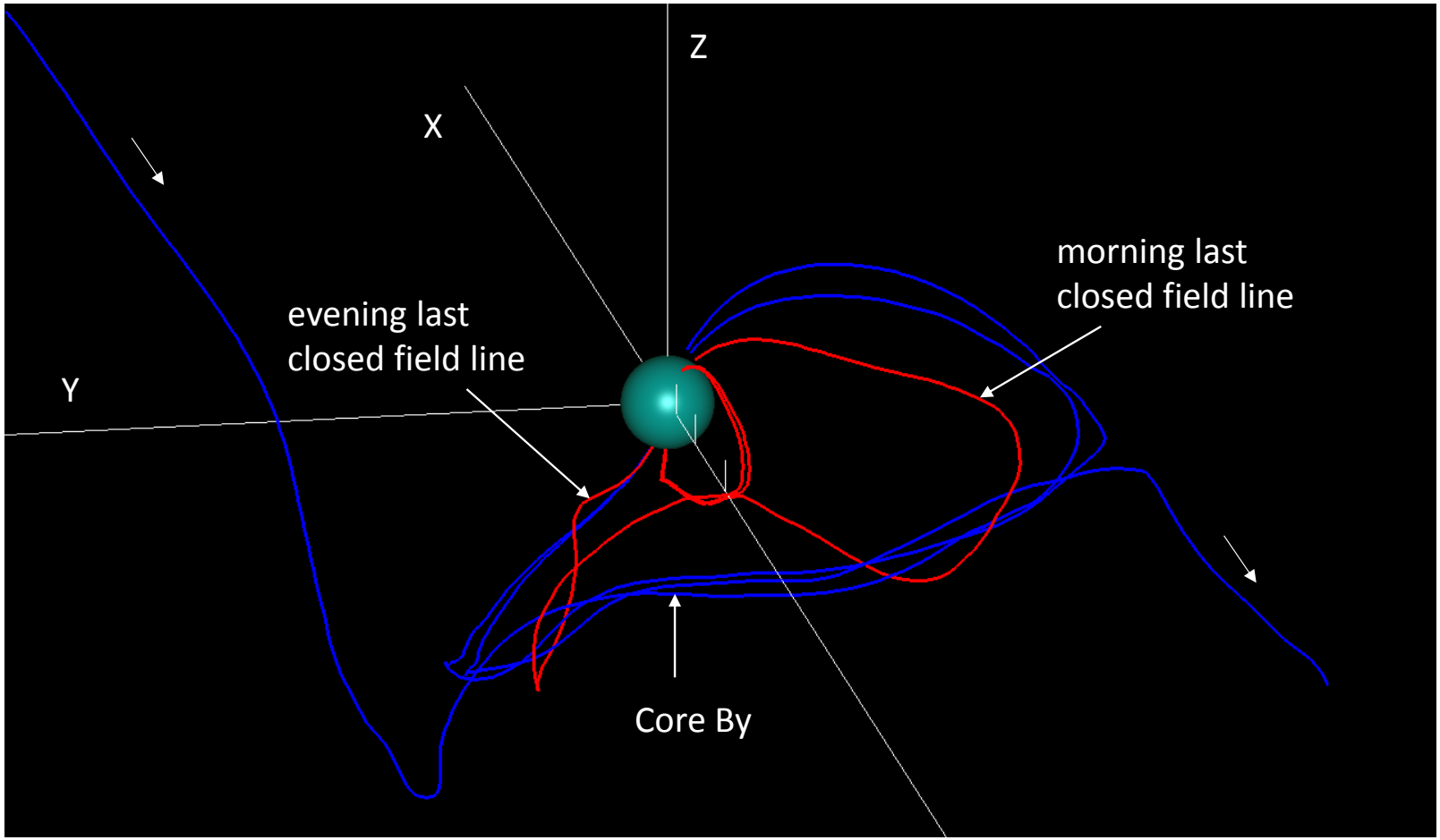
Convection flow and NENL just before the onset

Contour Vx, solid line tailward, dashed line sunward



Figure

Core By and NENL just before the onset



NENL sequence

Northward null state	2 nulls, last closed field, plasma sheet field
Southward turning split null	4 nulls, separated stems
Down-tail null state	long stem, connecting X line
X-line tail null merging	plasma sheet field, seed cross field
Core filed formation	core By, northward last closed field
Y merging configuration	near earth, northward last closed field
NENL state	tension

END