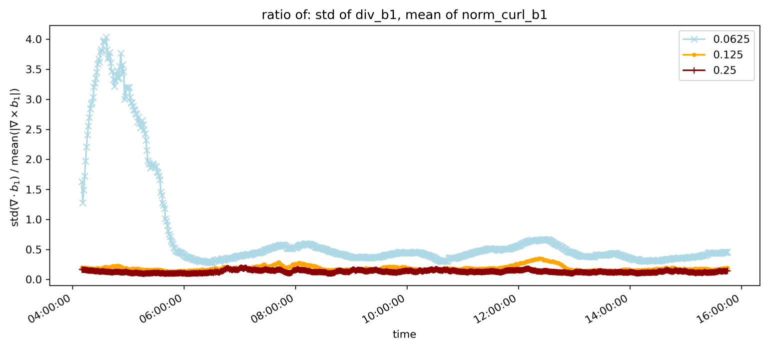
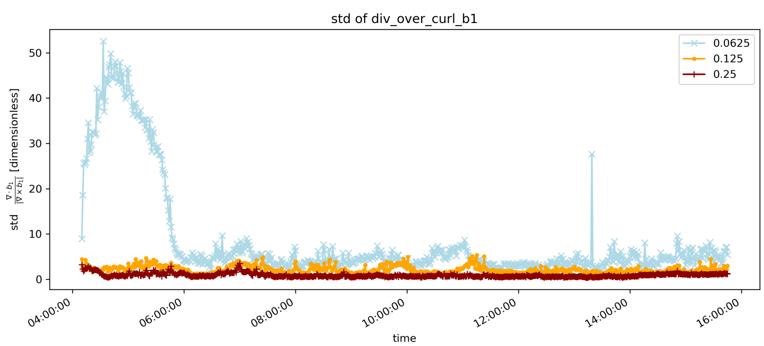
DIPTSUR2

The divergence of b1 and the curl of b1 represent the magnetic monopole density and electric current density respectively, up to a factor of mu0 (which we will ignore). Note that divergence of b1 and the curl of b1 have the same units.

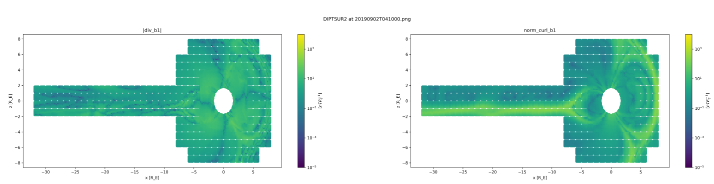
Lets plot the relative strength of each over the time of the simulation.



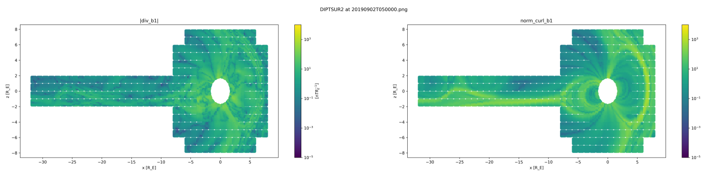


lets plot the spatial distribution of the divergence (on the left) and curl (on the right) of b1 during the start (4:10) at the peak magnetopause compression (6:30) and somewhere inbetween (5:00).

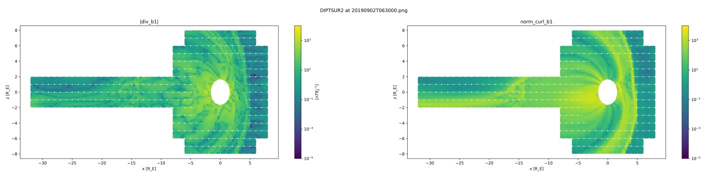
4:10



5:00



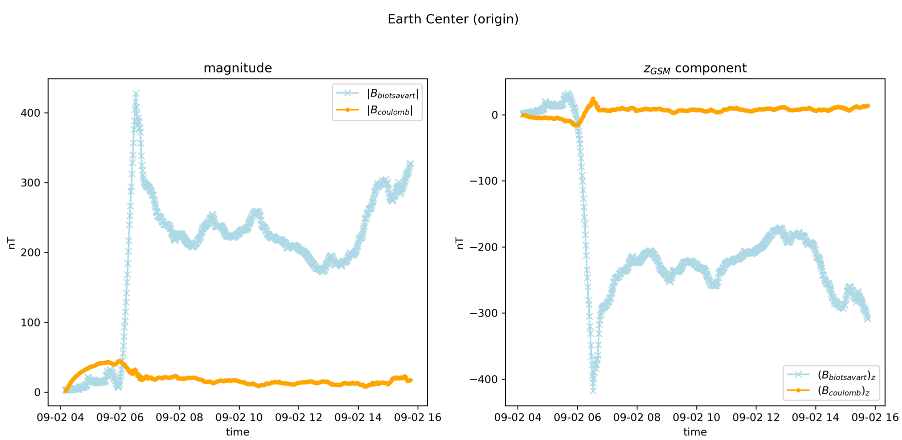
6:30

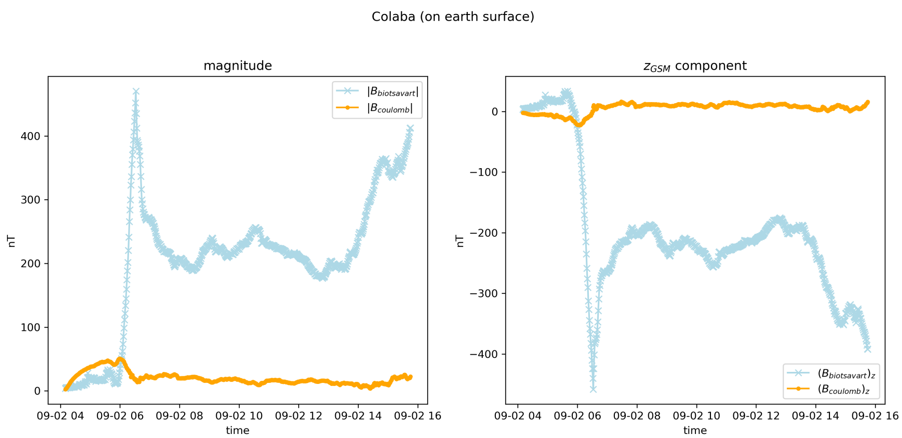


all color bars range logarithmically from 10^{-5} to $10^{4}\frac{nT}{R_E}$ These plots seem to show the curl is much more concentrated, and following a typical magnetosphere pattern. For most locations the magnitudes of div b1 and curl b1 are comparable, except in thoses concentrated regions, where curl b1 is roughly an order of magnitude larger.

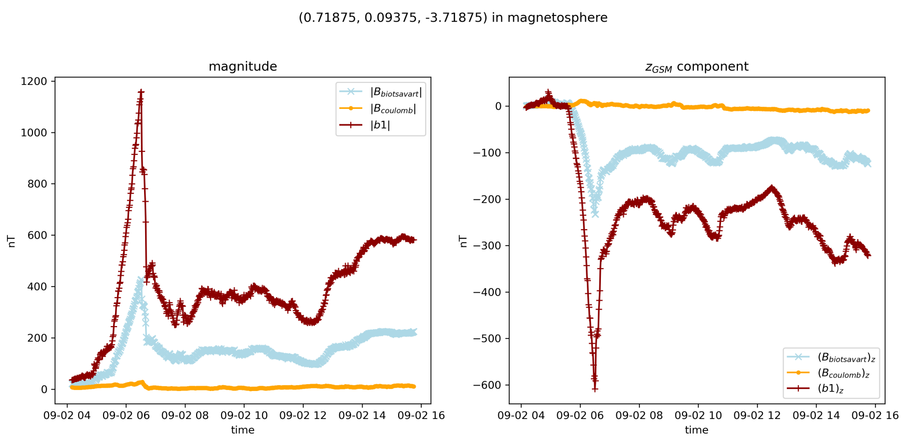
The Question then becomes how does this affect integrals for the magnetic field. In particular, we normally do a biot savart integral over curl b1 (through using j) in order to calculate the magnetic perturbations at the earths surface or center.

Lets plot how a coulomb integral over the divergence of b1 would compare.





Also, lets look at these integrals for some points within the magnetosphere and compare it to the value of b1 at the same point.



(-146., -14., -14.) in magnetosphere