

### **Solar Subsurface Characteristics and Solar Activity**

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We study the evolution and properties of the solar magnetic field by investigating the linkage of flows in the upper solar convection zone with magnetic fields in the solar photosphere. We derive solar subsurface flows from GONG and SDO/HMI Dopplergrams using the ring-diagram analysis. We derive photospheric and subphotospheric flows in active regions to validate the subsurface dynamics and plan to extend the analysis to explore precursors of solar activity. Helicity, a measure of topological complexity, plays an important role in a broad range of solar phenomena from the dynamo to flares and coronal mass ejections (CMEs). The kinetic helicity of subsurface flows can be used as a proxy of magnetic/current helicity. Flare-productive active regions are associated with subsurface flows with large values of kinetic helicity density. We will discuss recent results as well as data products that are available now or are under development.