P150a The magnetic field strength and energy balance of OMC 1

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We present a Chandrasekhar-Fermi analysis of the OMC 1 region of the Orion A filament, using polarimetric data taken with POL-2 on the JCMT as part of the BISTRO (B-Fields in Star-Forming Region Observations) survey and archival SCUBA-2 and HARP data. We estimate a plane-of-sky magnetic field strength in OMC 1 of $B = 6.6 \pm 4.7\,\mathrm{mG}$ (where $\delta B_{pos} = \pm 4.7\,\mathrm{mG}$ represents a predominantly systematic uncertainty), using a novel method analogous to unsharp masking to account for the large-scale variation in magnetic field direction across the region. We find that OMC 1 is in approximate equipartition between gravitational and magnetic energy, with both terms having an energy density $\sim 10^{-7}\,\mathrm{J\,m^{-3}}$. We demonstrate that these energy densities are comparable to the energy density in the explosive Orion BN/KL outflow, suggesting that the outflow may have sufficient energy to significantly alter the global energy balance of OMC 1 . However, we find that neither the local Alfvén velocity nor the velocity of the super-Alfvénic outflow ejecta is sufficiently large for the BN/KL outflow to have caused large-scale distortion of the local magnetic field in the ~500-year lifetime of the outflow. Hence, we propose that the hour-glass magnetic field morphology in OMC 1 is caused by the distortion of an initially cylindrically-symmetric magnetic field by the gravitational fragmentation of the filament and/or the gravitational interaction of the BN/KL and S clumps. We find that OMC 1 is currently in or near magnetically-supported equilibrium, and that the current large-scale morphology of the BN/KL outflow is regulated by the geometry of the magnetic field in OMC 1, and not vice versa.