EPSC Abstracts,
Vol. 2, EPSC2007-A-00148, 2007
European Planetary Science Congress 2007

Intrinsic Magnetic Field of Titan and Ganymede

H. Y. Wei1, C. T. Russell1, M. K. Dougherty2, F. M. Neubauer3

1Institute of Geophysics, University of California, Los Angeles, CA 90095, USA

2Imperial College, Dept of Physics, London SW7 2BZ, UK

3Institute of Geophysics, University of Koln, 50923. Germany

Cassini magnetic measurements on low altitude flybys of Titan have been used to estimate the strength of Titan's intrinsic magnetic field. The resultant upper limit is 1.6nT R_{Ti}^3 which is much smaller than the magnetic moment of Ganymede that is

750 nT R_G^3 These two bodies orbit at similar distances from their primaries but differ greatly in their eccentricities and their external magnetic field environment. The eccentricity of the Titan orbit is 0.029 and of the Ganymede orbit is 0.002. The average external field along the rotation axis of Titan is about 1nT and of Ganymede is about 100nT. The differences in the intrinsic fields of these two bodies suggests that their interiors must be very different. Tidal heating would not be too dissimilar, if both had electrically conducting fluid interiors. So we might a priori expect similar dynamo action. Even if the source of Ganymede's field were simply an amplification of Jupiter's field we might expect a detectable amplified Saturnian field at Titan if the two bodies were similar internally. Thus the data suggest that the interiors of Titan and Ganymede are much different with the Titan interior possibly solid. This would also explain the ability of Titan to remain in its elliptical orbit without circularizing.