**Equatorial source of oblique electromagnetic ion cyclotron waves: peculiarities in the ion distribution function**  
  
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Electromagnetic ion cyclotron (EMIC) waves are important for Earth’s inner magnetosphere as they can effectively drive relativistic electron losses to the atmosphere and energetic (ring current) ion scattering and isotropization. EMIC waves are generated by transversely anisotropic ion populations around the equatorial source region, and for typical magnetospheric conditions this almost always produces field-aligned waves. For many specific occasions, however, oblique EMIC waves are observed, and such obliquity has been commonly attributed to the wave off-equatorial propagation in curved dipole magnetic fields. In this study, we report that very oblique EMIC waves can be directly generated at the equatorial source region. Using THEMIS spacecraft observations at the dawn flank, we show that such oblique wave generation is possible in the presence of a field-aligned thermal ion population, likely of ionospheric origin, which can reduce Landau damping of oblique EMIC waves and cyclotron generation of field-aligned waves. This generation mechanism underlines the importance of magnetosphere-ionosphere coupling processes in controlling wave characteristics in the inner magnetosphere.