

## Notes on Coriolis Force

The Coriolis force is an apparent force that results from using a rotating coordinate system. Coriolis acceleration results from an imbalance between gravity and centrifugal force and from conservation of angular momentum.

### *Balance at rest:*

The rotation of the earth causes the geopotential to rise above a true spherical surface towards the equator. For a parcel at rest relative to the rotating earth the outward centrifugal force pushes up the slope of the geopotential towards the equator. This exactly balances the true gravity force pulling the parcel down the geopotential slope towards the pole.

### *Poleward velocity:*

Air parcels moving poleward decrease their radius of rotation. Conservation of angular momentum requires their angular velocity to increase. Since their angular velocity is now faster than the rotation of the earth, the air parcels accelerate towards the east.

### *Eastward velocity:*

Air parcels moving eastward are rotating faster than the earth. This causes their outward centrifugal acceleration to be stronger than the true gravity force pulling them inward towards the pole. The air parcels accelerate towards the equator.

### *Equatorward velocity:*

Air parcels moving equatorward increase their radius of rotation. Conservation of angular momentum requires their angular velocity to decrease. Since their angular velocity is now slower than the rotation of the earth, the air parcels accelerate towards the west.

### *Westward velocity:*

Air parcels moving westward are rotating slower than the earth. This causes their outward centrifugal acceleration to be weaker than the true gravity force pulling them inward towards the pole. The air parcels accelerate towards the pole.