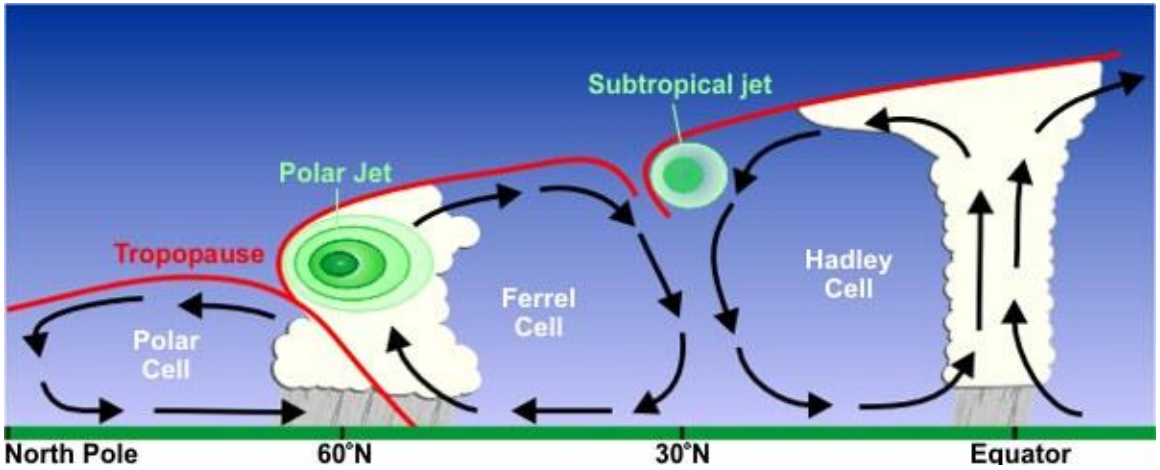
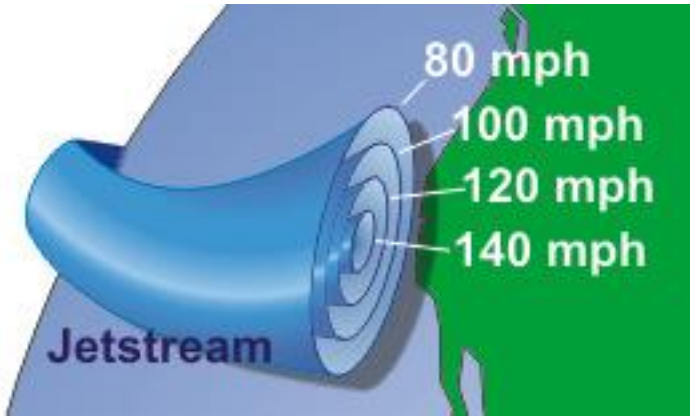
Jet Streaks

Meteorology 3110


Subtropical jet
Polar Jet
Tropopause
Polar Cell
Ferrel Cell
Hadley Cell
North Pole
60°N
30°N
Equator


Polar Jet
Subtropical Jet


80 mph
100 mph
120 mph
140 mph
Jetstream

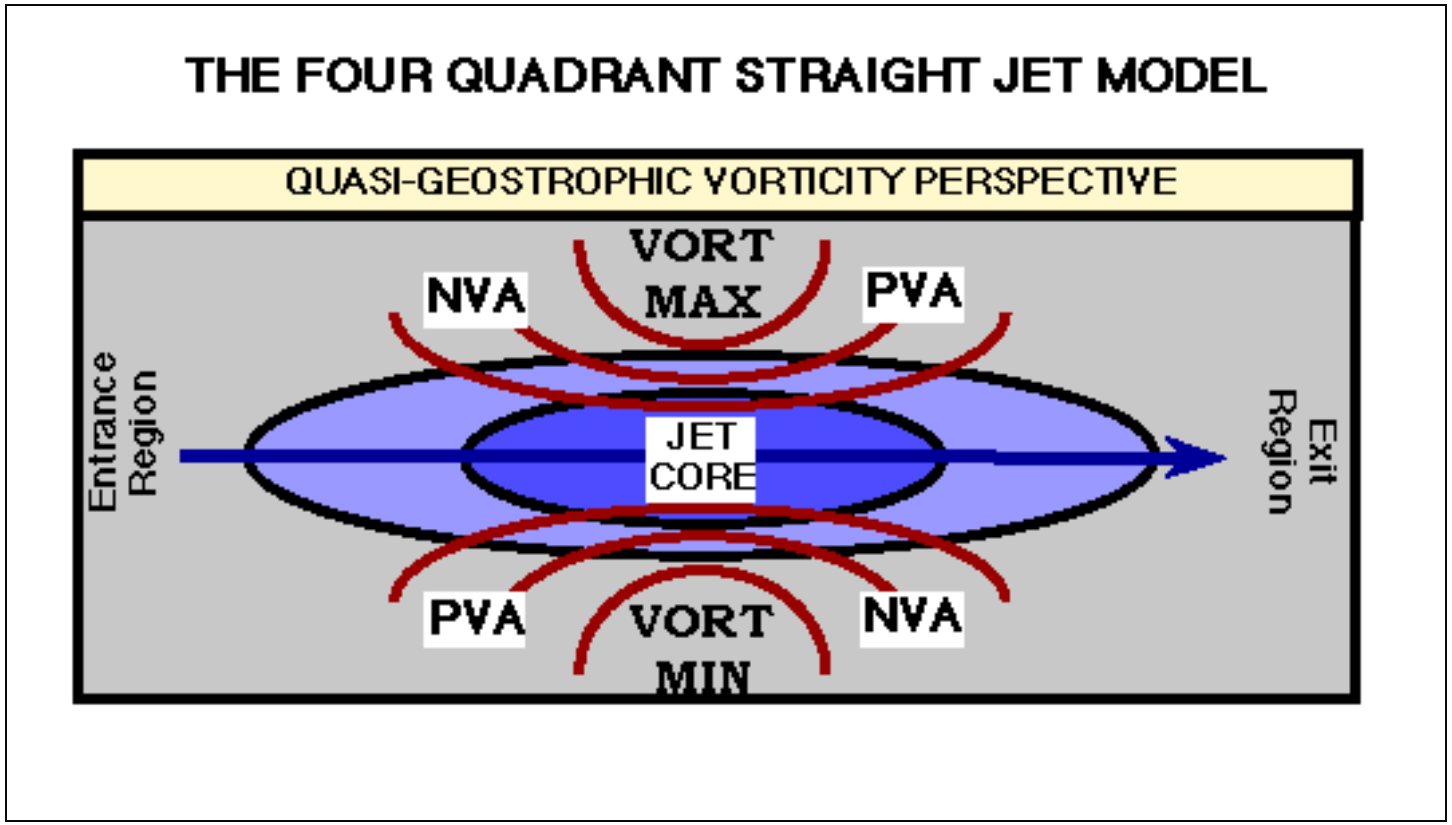
Jet Stream/Jet Streak

- Jet stream: an intense, narrow, quasi-horizontal current of wind that is associated with strong vertical shear.
  - Found at or near the tropopause.
- Intense: at least 30 m/s (~60 kts) for upper troposphere.
- Narrow: ~1/2 to 1 order of magnitude less in width than its length.
- Strong vertical wind shear: At least 5-10 m/s per km; At least ½ to 1 order of magnitude greater than synoptic scale shear.
- Jet streak: an isotach maximum embedded within a jet stream.

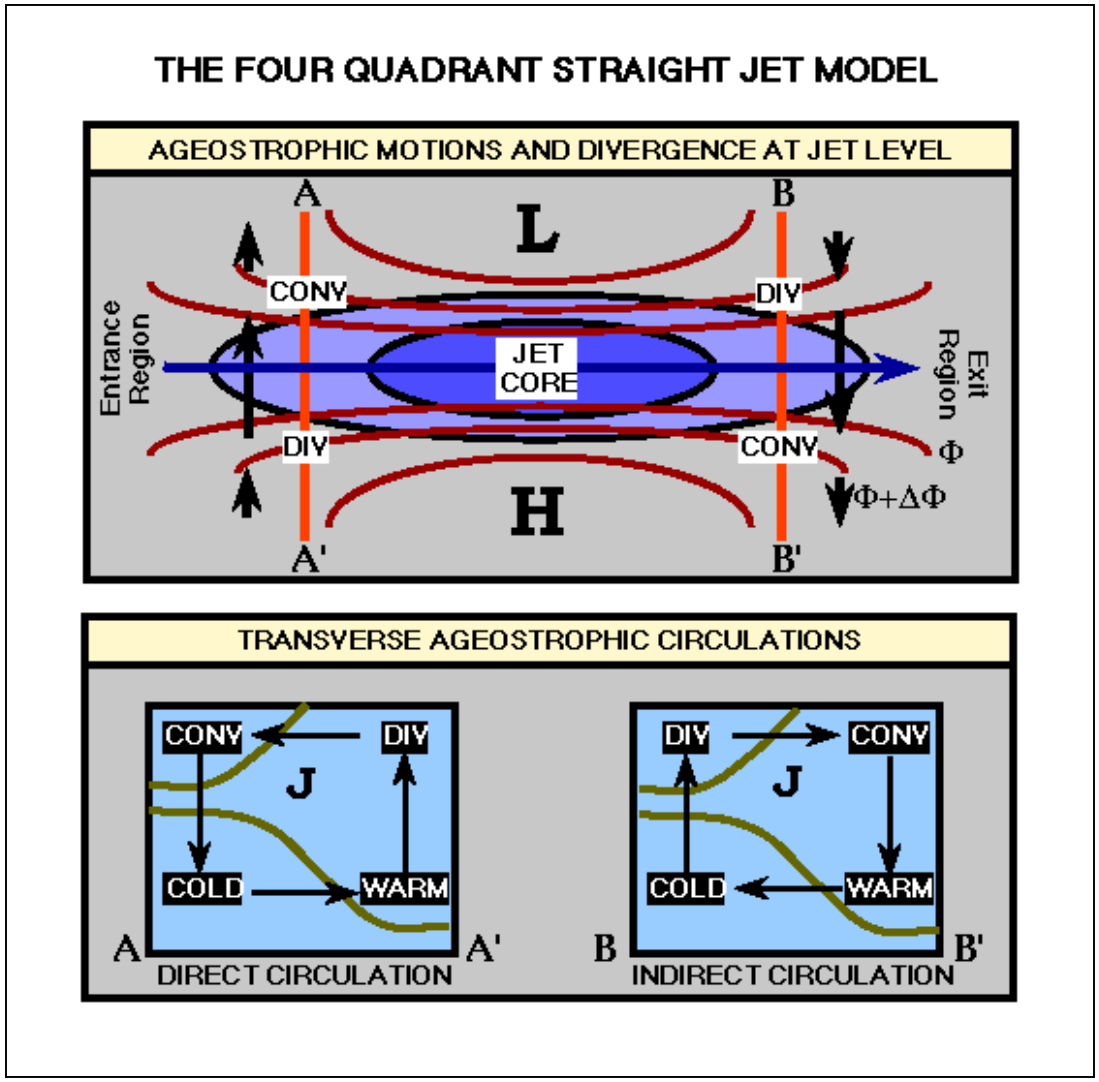
Methods of explanation

- Curvature
- PVA/NVA
- Ageostrophic wind

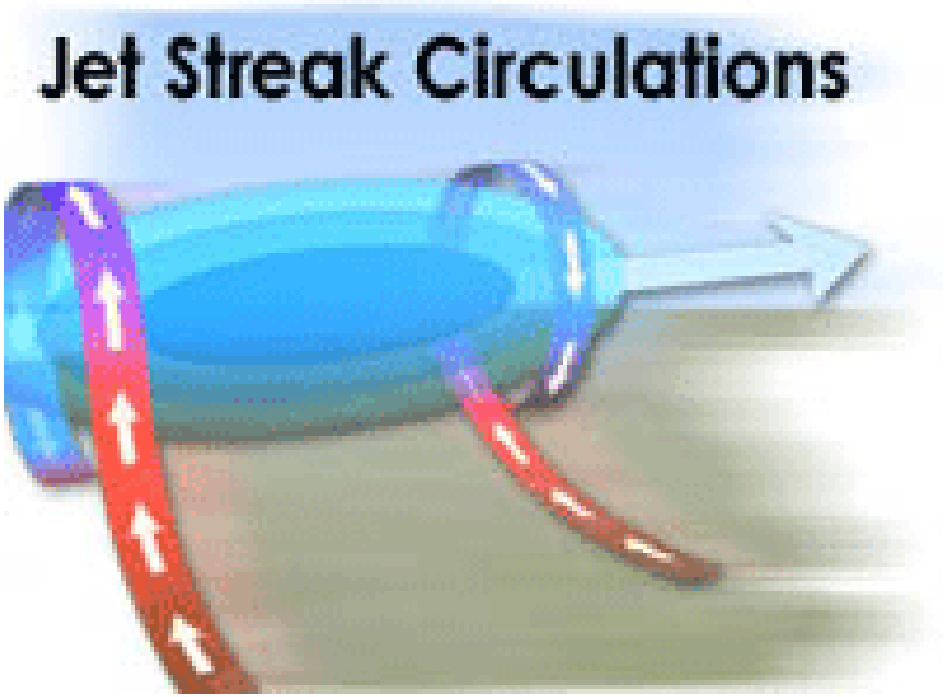
Pretty Picture 1



Pretty Picture 2



3D Circulations



Direct/Indirect Circulation

- Entrance region: direct thermal circulation

- Exit region: indirect thermal circulation
  - Creates temperature advections at the surface which provide positive feedback to upper level support in that region.

Jet Streaks characteristics

- Jet streak on left side of trough $\rightarrow$ Deepens and amplifies (digs) the trough.

- Jet streak on right side of trough $\rightarrow$ Weakens and de-amplifies (lifts) the trough.

- Jet streaks are caused by low level temperature gradients
  - Not necessarily surface temperature gradients, but low level gradients.

Banana/Curved Jets

- Most jets in nature are not linear.
- Motions are enhanced on the inside curve of the jet.
- Motions are suppressed on the outside curve.
  - At this point, one typically labels these areas undeterminable.

Ageostropic Explanation

- $V_a = V - V_g$

- Equation (in class)

- Entrance region: As parcel accelerates, an ageostropic wind blows perpendicular toward lower heights.
- Exit region: As parcel decelerates, an ageostropic wind blow perpendicular toward higher heights.