Thermohaline Circulation

- Thermo - temp.; Haline - salt
- The Density Driven Circulation
  - Formation of Water Masses
  - Spreading & Movement
  - Mixing
  - ID & Classification
- Water Mass - unique combination of physical & chemical properties acquired at a common origin at the surface. Properties are conservative.
- NADW
- T = 2 - 4° C
- S = 34.8 - 35

- Formation Rate: ~ 12-15 Sv
Formation Rate:
\[ \sim 15-25 \text{ Sv} \]

AABW
\[ T = -.4 - .3^\circ \text{ C} \]
\[ S = 34.6 - 34.8 \]
Intermediate Waters

- AIW $T = 3 - 4^\circ$ C, $S = 34.5 - 34.8$

LSW – same properties as AIW

Mediterranean Outflow

- MSW
  - $T = 6 - 12^\circ$ C, $S = 35.3 - 36.5$
Antarctic Waters

- AAIW – $T = 3 – 7^\circ$ C, $S = 33.7 – 34.7$

Intermediate Waters

- NPIW – $3 – 7^\circ$ C, $S = 33 – 34.4$. North Pacific is freshest ocean basin.
- RSW – Same properties as MSW
• Common Water
• $T = 1.5 - 4\,^\circ\,C$
• $S = 34.4 - 34.7$

Atlantic Circulation

Atlantic Salinity

Pacific Salinity

Indian Ocean

| NADW | 2 - 4\,^\circ\,C | 34.8 - 35.0 | LITTLE FRESHER |
| AABW | 2 - 4\,^\circ\,C | 34.8 - 35.0 | COOLEST |
| AIW | 3 - 4\,^\circ\,C | 34.7 - 35.0 | LITTLE FRESHER |
| LSW | 3 - 4\,^\circ\,C | 34.7 - 35.0 | LITTLE FRESHER |
| MSW | 3 - 4\,^\circ\,C | 34.7 - 35.0 | LITTLE FRESHER |
| AAIW | 3 - 4\,^\circ\,C | 34.7 - 35.0 | LITTLE FRESHER |
| CW | 3 - 4\,^\circ\,C | 34.7 - 35.0 | TOTALLY AVERAGE |
| NPIW | 3 - 4\,^\circ\,C | 34.7 - 35.0 | TOTALLY AVERAGE |
| RSW | 6 - 12\,^\circ\,C, | 33 - 34.4 | FRESHEST IN NH |
| S > 35.3 | | | SALTIEST |
Why no deep water formation in the Pacific?

Conveyor Belt

Warm surface currents
Cold, deep currents
Areas of deep water formation