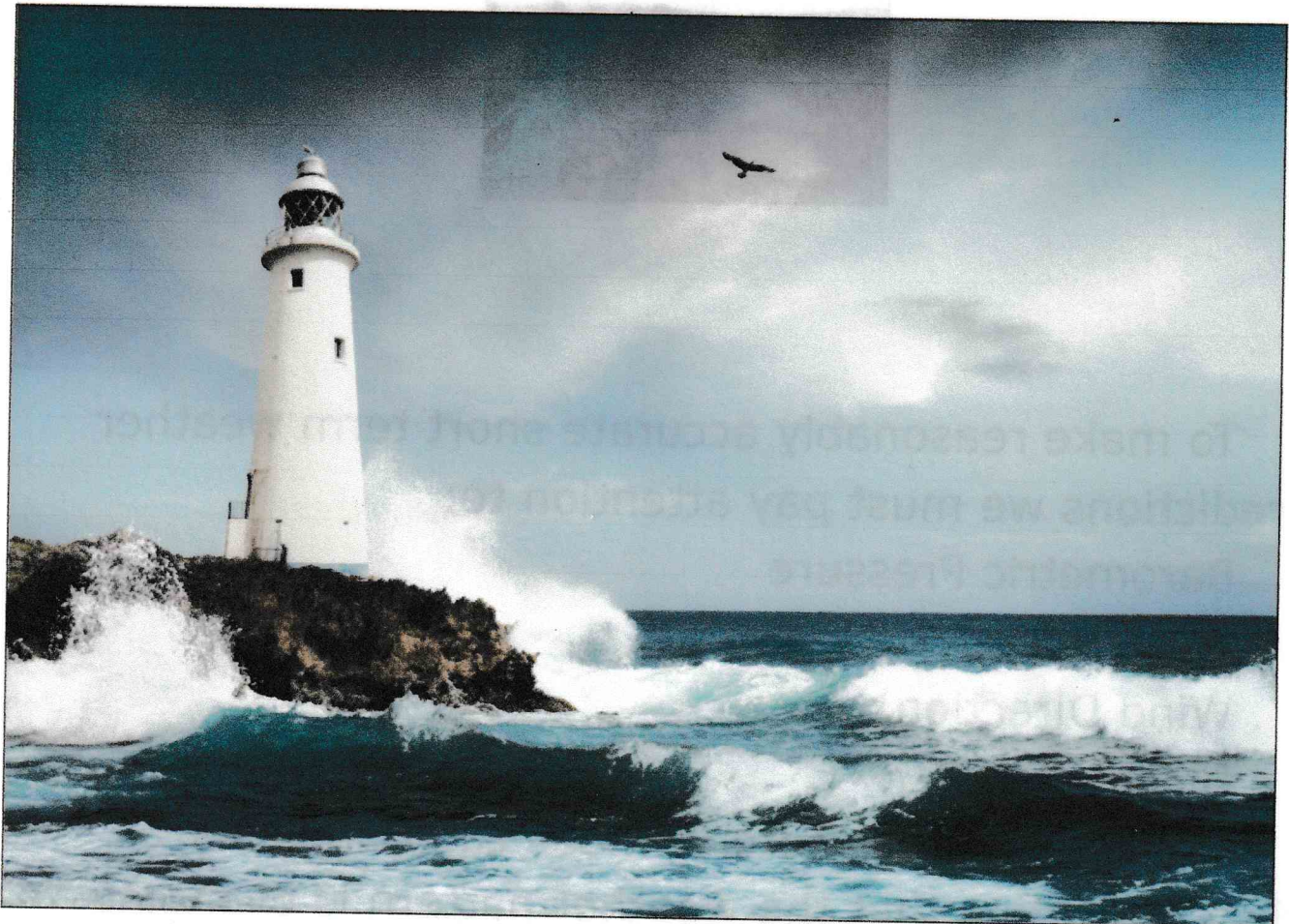

Weather

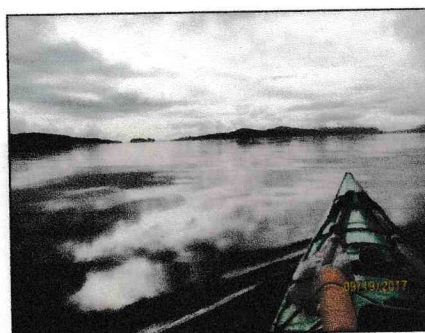
How it affects us as kayakers

Jeff Burdison March 13, 2019



Introduction

Weather is the result of the earth trying to even out the sun's energy. If the Earth's atmosphere and oceans didn't redistribute this energy, the equatorial region would overheat and the poles would get colder. As sea kayakers we are concerned with what the next 24-48 hours holds in store for us. We need to know what the forecast is, what the reports say and what our observations tell us. This presentation on types of weather should give more information to help make decisions that could be critical!



To make reasonably accurate short term weather predictions we must pay attention to:

Barometric Pressure

Wind Speed

Wind Direction

Clouds, *Precipitation and fog*

Changes in 3 or more of these categories are a clear indication that the weather pattern is changing. Will this affect your paddling plans? Use the tools available to you!

Weather Prediction Table			
Indicator	Deteriorating	Stable	Improving
Barometric Pressure	Falling	Stable	Rising
Wind Speed	Increasing Strongest winds near centre of low pressure	Stable	Increasing then decreasing. Strongest winds near edge of high pressure
Wind Direction	Moving counter clockwise (backing) south, southeast, east	Stable	Moving Clockwise (veering), northwest, west
Clouds and precipitation	Building cloud cover Increase in precipitation Halo around sun and/or moon	Stable	Clearing cloud cover Decrease in precipitation

BAROMETRIC PRESSURE CLUES	
<i>If Pressure Falls By...</i>	<i>Then...</i>
.6 to 1.2 mb in 3 hours	Don't worry about it, but keep on monitoring the situation
1.3 to 1.8 mb in 3 hours	Watch for lowering and thickening clouds. If these appear, check pressure hourly; weather is deteriorating; winds likely to increase to 18-25 knots
1.9 to 2.4 mb in 3 hours	Winds likely to rise to 25-33 (near gale, gale); consider less exposed location, set up capsite and get off the water.
2.5 and greater in 3 hours	Winds likely to rise to gale and storm force; get off the water and find a sheltered campsite.

Barometric Pressure

As kayakers we usually talk about pressure in millibars because Environment Canada uses this metric scale. 1013 millibars is considered standard pressure. Any pressure above this is high, below is low pressure. The most important thing to remember about barometric pressure is the direction and speed of change. Always record your weather in a weather proof journal so you can keep track of the trends!

Wind Speed

Wind Speed is directly related to the steepness of the fall from high to low pressure. This is called the pressure slope on an isometric weather map. The closer the pressure lines are together the steeper the pressure slope and the higher the wind speed. An isometric weather map is much like a topographical map in that each contour line represents a pressure reading instead of an elevation. What is your groups safe wind speed? Are you paddling with it? Against? Broadside? This is something that needs serious consideration when transitioning from one zone to another!!!

Buys Ballot's Law

- States that if an observer in the Northern Hemisphere faces the surface wind, the center of the low pressure is toward his right and somewhat behind him
- And the center of High pressure is on his left and some what in front of him
- In the Southern hemisphere its vice versa

Wind Direction

There are 3 factors that affect wind direction:

Gravity- Humpty Dumpty?

The Coriolis Effect - the spinning of the earth

Friction- the earth's surface - water has less friction than land

In the northern hemisphere- wind flows clockwise and outward when associated with a high pressure cell. When it's associated with a low pressure system it flows counter clockwise and inward towards the centre of low pressure.

Clouds

Using clouds to understand and predict weather involves understanding what causes clouds to form and dissipate.

Cells- The sun makes different parts of the earth heat up and cool at different rates. Land heats up and cools faster than water. Air near the equator heats up faster than at higher latitudes. Hot air from the equator rises and cools then falls back to earth. This cycle repeats itself twice more towards the poles. This is what causes cells to form. These cells are roughly between the equator and 30 degrees north and south and between 30 degrees north and south to 60 degrees

CLOUD COVER CLUES		
<i>If You See...</i>	<i>Then...</i>	<i>Watch For...</i>
High cirrus clouds forming loose halo around the sun/moon	Precipitation possible within the next 24-48 hours	Lowering, thickening clouds
High cirrus clouds forming tight halo around the sun/moon	Precipitation possible within the next 24 hours	Lowering, thickening clouds
Lenticular clouds forming	Precipitation possible within the next 24-48 hours; strong winds possible	Lowering, thickening clouds
Thickening, lowering layered (flat) clouds	Warm or occluded front likely approaching within 24-48 hours	Wind shifts; air pressure dropping
Breaks in cloud cover closing up	Cold front likely within 12 hours	Wind shifts; air pressure dropping

north and south.

Jet Streams - flow of air in the upper atmosphere, in gaps between cells. Play key role in steering storms and where they form.

In BC in summer the Jet Stream moves northward, allowing the California High Pressure System to be stable over our coast providing

long periods of sunny dry weather. In winter the Jet Stream moves southward allowing the Gulf of Alaska Low to move southward giving strong winter storms and precipitation.

Air Masses - The building blocks of weather features. The Pacific Northwest coast has 2 types of air masses:

Maritime Tropical - form over the ocean in the tropics. Example The Pineapple Express

Continental Polar

High Pressure Systems

Air has weight and when there is a lot on top of us we have a high pressure system. In general high pressure systems bring clear weather. High winds are associated with high pressure systems and are found on the outside edge of the high pressure cell. During summer in coastal BC the prevailing winds are NW and mean good weather. For kayakers when there is a strong high pressure system you can almost count on wind increasing by 1100 hrs to noon. It would be a good idea to be up early and get your paddling done by noon- especially on the exposed west coast of Vancouver Island.

Low Pressure Systems

Low pressure systems are valleys in the air mass and because pressure flows from high to low, the air flows into the low pressure cell. The center of a low pressure system moves counterclockwise and upwards.

Warm Fronts

A warm front usually precedes rain. As warm air approaches a mass of colder air it rises up and condenses to form clouds and if there's enough moisture, rain. Warm fronts usually form high cirrus clouds which are precursors to stratus and cumulus clouds (rain clouds)

Cold Fronts

Cold fronts usually pass quickly. They are associated with large updrafts that can form cumulonimbus (anvil shaped) clouds and thunderstorms and heavy downpours or hail. Cold fronts are always preceded by warm fronts. Thunder and lightning are also a possibility. At the first sign of lightning GET OFF THE WATER TO A SAFE PLACE ON SHORE!

Gap Winds

Caused by the Venturi effect. Particles accelerate when forced through a narrow opening. As it accelerates the wind changes direction to conform to the shape of the geography. The Qualicum is a well known Gap wind that funnels up Alberni inlet and through Lewis and Alberni passes creating dangerous conditions on the Strait of Georgia.

Corner Winds

The net wind speed can be 25% stronger when deflected over a point of land and back on to the water joining the dominant wind. Brooks peninsula is known for corner winds.

Sea Breeze and Land Breeze

During the day land heats up more quickly than water. The warm air over the land rises, the cooler air over the ocean rushes in. This is called a sea breeze. At night the land cools faster than the ocean reversing the flow of air. This is a land breeze. Crossing inlets can be particularly dangerous for paddlers as strong winds can develop quite quickly.

Katabatic and Anabatic Winds (over)

Very similar to sea breeze and land breeze but can be more dangerous due to funnelling and gravity and also glacial ice may affect the outflow (katabatic) Winds. Be careful on inner water ways

that are fjord like in the afternoons. Can be very dangerous and misleading.

Precipitation

Precipitation in itself isn't of particular concern to paddlers (other than the obvious environmental related issues - hypothermia?) but could be an indicator of things to come. Precipitation is a function of air temperature and the amount of moisture in the atmosphere. Early indicators are halos around the moon and sun, high altitude cirrus clouds (mackerel sky). West coast of Vancouver Island receives much more rain than the east coast because of the central island mountain range. As the warm moist air comes inland from the ocean it is forced upwards, cools condenses and falls as rain.

Fog

Fog is just low lying cloud. Fog is a definite hazard for sea kayakers. Kayakers should always be prepared and equipped to deal with navigating in fog. This is almost a certainty in August on the west coast of Vancouver Island. (Also known as Fogust) Chart and compass, gps, vhf radio and sound signalling devices are necessary equipment. If fog starts to roll in- take a bearing to nearest point of land and consider hand railing to your destination. Types of fog:

Radiation Fog- forms on land in the early morning as land cools and condenses the water vapour in the air.

Sea fog - also called advection fog forms over the ocean when warm air moves out over cold water and condenses. Sea fog persists with wind and is a real hazard because visibility is reduced as sea state develops. Often forms offshore then moves closer to land.

As I can attest , getting to know weather can take a long time ,it is well worth revisiting often because of the profound effect it can have on safety.