OSCILLATING OCEAN CURRENTS

INTRODUCTION

Oscillating ocean currents have a significant effect on the World's weather. Their natural effects on the weather/climate have only recently been discovered and measured. In Australia, the El Nino and La Nina are well known to the layman.

Unfortunately, in the emotive and irrational discourse on man-made catastrophic global warming discussions, far too many people believe Man's CO_2 drives ocean currents – which is nonsense.

As a result, the Green movement will correctly identify record warm temperatures being caused by a strong El Nino event then shortly afterwards attribute the effect to Man's CO_2.

This Reading provides some information about several natural oscillating ocean currents that affect our weather.

SOME EXAMPLES

El Nino Southern Oscillation (ENSO) – 12-18 months cycle

El Niño is a warming of surface waters in the eastern tropical Pacific Ocean. Together with, La Niña, these make up two of the three states (the third being a neutral state) of the constantly changing El Niño/Southern Oscillation (ENSO) that can affect weather patterns around the globe.

Once it has begun, an El Niño or La Niña event usually lasts about 12 to 18 months. The return to ENSO-neutral conditions begins in the south eastern tropical Pacific Ocean and gradually spreads westward. A La Niña event occasionally (but not always) follows an El Niño, and vice versa.

In a "normal," or ENSO-neutral year, a low atmospheric pressure centre forms over northern Australia and Indonesia and a high pressure centre forms on the other side of the Pacific over Peru. At the same time, the trade winds blow steadily east to west along both sides of the equator to move warm surface waters from the eastern to the western Pacific and cause cold, nutrient-rich bottom water to well up off the coast of South America.

La Niña, is Spanish for "the little girl." As the name suggests, conditions of this phase of ENSO are generally the reverse of El Niño. Where eastern tropical Pacific waters are warmer than normal during El Niño, they are much colder during a La Niña phase.

In an El Niño year, the high-pressure centre over the western Pacific weakens, which diminishes or reverses the trade winds and permits the relatively weak east-flowing equatorial counter current to transport warm surface water towards South America. This reduces the cold upwelling along the coast, which can also diminish high-pressure over Peru and further weaken the trade winds.

Pacific Decadal Oscillation (PDO) – 2 - 3 decade cycle

The Pacific Decadal Oscillation (PDO) is a long-term fluctuation that occurs in the Pacific Ocean every 20 to 30 years that is characterized by variable sea-surface temperatures in the north-central Pacific and near the Gulf of Alaska. The PDO mainly affects weather patterns in the U.S. Pacific Northwest.

During its positive, or “warm” phase, a warm wedge of surface water forms in the eastern equatorial Pacific Ocean and a cool wedge forms in the north western Pacific. Its negative “cool” phase is characterized by a cold wedge in the eastern equatorial Pacific and a horseshoe pattern of warmer water connecting the northern, western, and southern Pacific.

Most scientists agree that we are presently in a negative phase of the PDO. The most recent “positive phase appears to have lasted from 1977 to 1999.

North Pacific Oscillation (NPO) – a multi-decade cycle

The North Pacific Oscillation (NPO) is a fluctuation of atmospheric pressure and sea-surface temperatures in the north Pacific Ocean that affects, among other things, winter temperatures over most of North America. The NPO is similar to the NAO in having a low-index state and a high-index state.

A low NPO index is associated with southerly airflow along the west coast of North America, which tends to bring warmer air into the region. A high NPO index brings a northerly airflow, with the corresponding movement into the region of colder, sub-polar air.

North Pacific Gyre Oscillation (NPGO) – a multi-decade cycle

One of the most recent oscillations to be described, the North Pacific Gyre Oscillation (**NPGO**) affects the height of the sea surface in the Northeast Pacific. This, in turn, affects the intensity of the central and eastern branches of the North Pacific gyre—a major ocean circulation pattern in the North Pacific.

Scientists have correlated the NPGO with previously unexplained fluctuations of *salinity, nutrients* and *chlorophyll-a* (algae) seen in long-term observations of the California Current and Gulf of Alaska.

As a result, the NPGO may help scientists understand the mechanisms of primary production in the North Pacific Ocean that has a strong influence on the dynamics of the entire marine ecosystem in the region. Like the Pacific Decadal Oscillation (PDO), the NPGO fluctuates on the order of decades.

Pacific-North American (PNA) Pattern – a multi-decade cycle

The Pacific-North American (PNA) Pattern relates the atmospheric circulation pattern over the north Pacific Ocean with the one over the North American continent through the height of the sea surface in the northern Pacific. By affecting sea-surface heights, the PNA causes strong fluctuations in air pressure and temperature in the region and beyond.

Like other oscillations, it has two modes, positive and negative. The positive mode is associated with changes in the strength and location of the East Asian jet stream, above-average temperatures over western Canada and the western U.S., and below-average temperatures and drought conditions across the south-central and south eastern U.S.

During the negative mode of the PNA pattern, there is a westward retraction of the East Asian jet stream, and a strong split-flow configuration over the central North Pacific. The western U.S. may experience relatively cold and wet conditions, while the eastern U.S. remains warm and dry during these negative modes.

When ocean and atmospheric conditions in one part of the world change because of ENSO or any other oscillation, the effects are often felt around the world. The rearrangement of atmospheric pressure, which governs wind patterns, and sea-surface temperature, which affects both atmospheric pressure and precipitation patterns, can drastically rearrange regional weather patterns, occasionally with devastating results.

Because it affects ocean circulation and weather, an El Niño or La Niña event can potentially lead to economic hardships and disaster. The potential is made worse when these combine with another, often overlooked environmental problem. For example, overfishing combined with the cessation of upwelling during an El Niño event in 1972 led to the collapse of the Peruvian anchovy fishery.

Extreme climate events are often associated with positive and negative ENSO events. Severe storms and flooding have been known to ravage areas of South America and Africa, while intense droughts and fires have occurred in Australia and Indonesia during El Niño events.

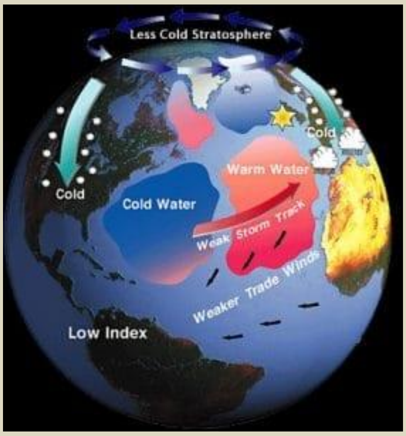
Atlantic Multidecadal Oscillation (AMO) 2 - 4 decade cycle

The Atlantic Multidecadal Oscillation (AMO) includes a series of long-duration changes in the sea-surface temperature in the North Atlantic Ocean. Like the Pacific

Decadal Oscillation, it has warm and cool phases that may last for 20 to 40 years at a time, with a difference of about 1°F between extremes.

These seemingly small changes can affect the air temperature and rainfall over most of the Northern Hemisphere, particularly in the Atlantic region between the equator and Greenland, although some areas of the North Pacific may also be affected. Evidence suggests that Earth has been in a warm phase of the AMO since the mid-1990s.

North Atlantic Oscillation (NAO) – a multi-decade cycle



The Indian Ocean has its own seesaw behaviour, the Indian Ocean Dipole. During a so-called positive phase, warmer than usual water temperatures in the western Indian Ocean bring heavy rains to East Africa and India and colder-than-usual waters bring drought to Southeast Asia. In the negative phase, ocean and monsoonal conditions reverse. (Illustration by E. Paul Oberlander, Woods Hole Oceanographic Institution)

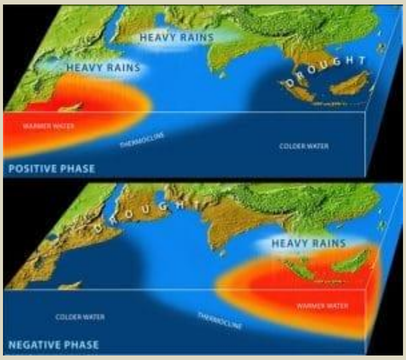
Many climate scientists consider the North Atlantic Oscillation (NAO) to be a regional manifestation of the Arctic Oscillation because both refer to similar climate phenomena. The NAO is a periodic change in atmospheric pressure between Iceland and Portugal that affects the strength of prevailing winds - the westerlies - over the North Atlantic Ocean, producing the strongest influence on weather patterns over the Northeast U.S. of any of the oscillations.

These winds, in turn, affect the strength and direction of surface currents in the North Atlantic. During its "high-index" state, high atmospheric pressure develops over the Azores, and an intense low over Iceland. When the NAO index is high, ocean winds are stronger and winters milder in the eastern U.S. When the index is low, ocean winds are weaker and U.S. winters tend to be more severe.

Indian Ocean Dipole (IOD) – a multi-decade cycle

The Indian Ocean has its own seesaw behaviour, the Indian Ocean Dipole.

During a so-called positive phase, warmer-than-usual water temperatures in the western Indian Ocean bring heavy rains to East Africa and India and colder-than-usual waters bring drought to Southeast Asia. In the negative phase, ocean and monsoonal conditions reverse. (Illustration by E. Paul Oberlander, Woods Hole Oceanographic Institution)



The Indian Ocean Dipole (IOD) is characterized by an irregular oscillation of sea-surface temperatures in the eastern and western Indian Ocean. A positive or “warm” phase brings about greater-than-average sea-surface temperatures and greater precipitation in the western Indian Ocean region, along with a corresponding cooling of waters in the eastern Indian Ocean that tends to bring reduce precipitation in Indonesia and Australia.

The negative or “cool” phase of the IOD brings about the opposite conditions, with warmer water and greater precipitation in the eastern Indian Ocean, and cooler and drier conditions in the west. The IOD also affects the strength of monsoons over the Indian subcontinent, with a negative phase corresponding to an increase in monsoon rains.

Madden-Julian Oscillation (MJO) – a 30 – 60 day cycle

Named after Roland Madden and Paul Julian, who first described it, the Madden-Julian Oscillation (MJO) is a tropical disturbance that spreads eastward around the globe with a cycle of about 30 to 60 days and is the main oscillation behind weather variations in the tropics and subtropics.

The MJO is most evident in the Indian and western Pacific Oceans, where it includes variations in wind, sea-surface temperature, cloudiness, and rainfall that, in turn, affect the intensity and break periods of the Asian and Australian monsoons. It can also interact with the Southern Oscillation, contributing to the intensity of an El Niño or La Niña event.

Antarctic Oscillation (AAO or SAM)

The Antarctic Oscillation (AAO) is a ring of variability that encircles the South Pole and extends as far north as New Zealand. It is characterized by a seesaw pattern in atmospheric pressure between the Antarctic region and middle latitudes between 40ºS and 50ºS.

This results in alternating changes in wind and storm activity between these middle latitudes and higher latitudes near the southern oceans and Antarctic sea ice zone.

In its positive (warm) phase, the AAO brings relatively light winds and more settled weather to middle latitudes, together with enhanced westerly winds over the southern oceans. In its negative (cool) phase, the westerlies are stronger over middle latitudes, with more unsettled weather, while windiness and storm activity ease over the southern oceans. The AAO is also referred to as the Southern Annular Mode (SAM).

Arctic Oscillation (AO)

The Arctic Oscillation (AO) is the Northern Hemisphere analog to the AAO and involves a similar seesaw pattern in atmospheric pressure between the North Pole and middle northern latitudes.

Its negative (cool) phase brings higher-than-normal air pressure over the Arctic region and lower-than-normal pressure over the central Atlantic Ocean. These pressure differences lead to weaker westerly winds north and south of the equator. North of the equator, the weak westerlies allow cold Arctic air to reach farther south.

During the cool phase, much of the U.S., as well as Northern Europe and Asia, experience cold and stormy winters. More storms develop over the Mediterranean region. The AO's positive (warm) phase brings about the opposite conditions, with much of the U.S. and Northern Europe experiencing mild winter weather, and drought conditions prevailing in the Mediterranean.

The AO and the North Atlantic Oscillation are collectively referred to as the Northern Annular Mode (NAM).