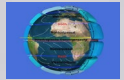


DSV METEO – SPEZIAL - SEMINAR BARFUSSROUTE, TROPEN, KARIBIK

Bernd Richter, Deutscher Wetterdienst
bernd.richter@web.de <http://www.vorticity.de>



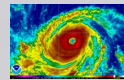
➤ **Allgemeines**



➤ **(Zirkulation und Idealzyklone)**



➤ **Gewitter, Tornados et al.**



➤ **Tropische Stürme, Hurricanes**



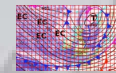
➤ **Strömungen, Gezeiten**



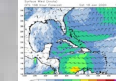
➤ **Regionale Windsysteme**



➤ **PILOT – Charts NAT Nordatlantik**



➤ **Wetter im Internet (GRIB)**



➤ **www.passageweather.com**



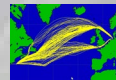
➤ **(Satellit / Radar)**



➤ **((Gross-) Wetterlagen)**



➤ **(Aktuelle Wetterlage)**



➤ **(Törnplanung)**



Praktiker erfahren oft sehr schmerzlich, dass ihnen die Theorie gefehlt hat.

DER GRÜNE STRAHL – THE GREEN FLASH



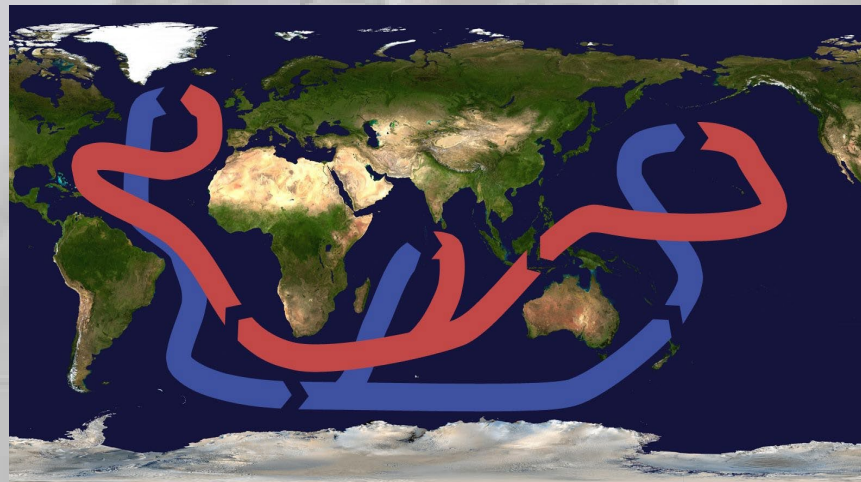
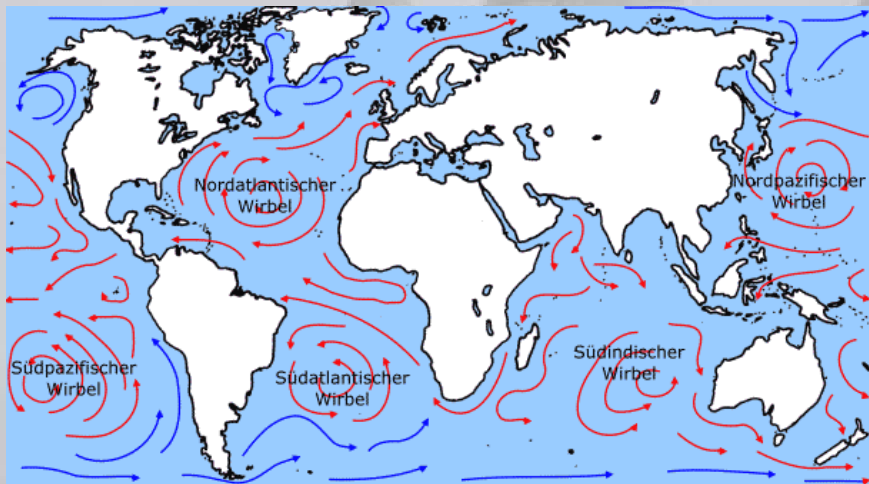
MEERESSTRÖMUNGEN

Oberflächenströmungen

- Windangetrieben (Drift) durch globale Zirkulation
- Gezeiten

Tiefenströmungen

- Dichteunterschiede Temperatur / Salzgehalt
- Topographische Faktoren Meeresgrund,-becken



**Bezeichnung der Strömung i.Ggs. zur Meteorologie nach der Zielrichtung:
Weststrom strömt nach West, Westwind kommt aus West**

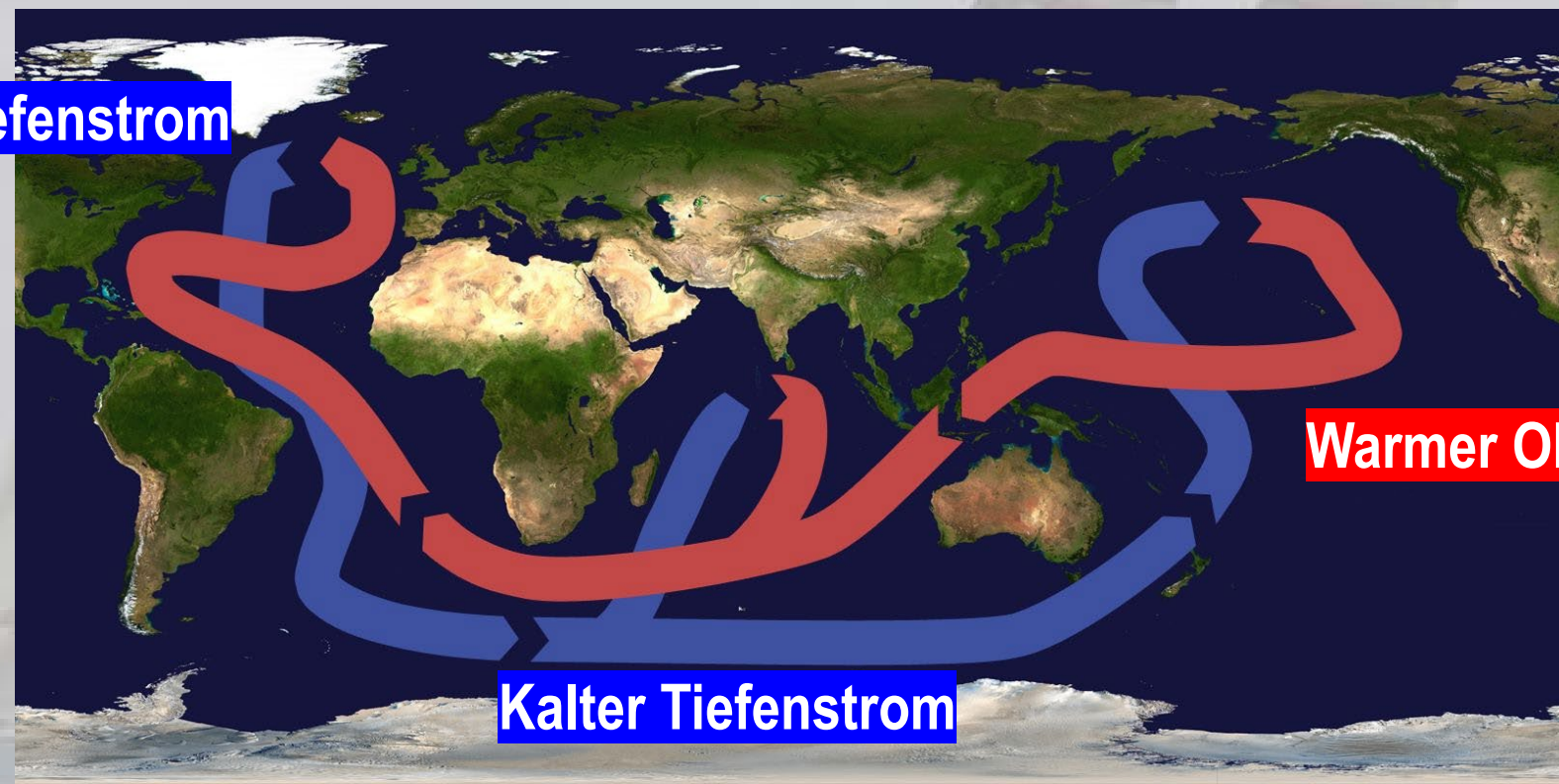
TIEFENSTRÖMUNGEN 'GLOBALES TRANSPORTBAND'

Antrieb sind Dichteunterschiede "Thermohaline Zirkulation"

Bildung durch Absinken schwereren (dichteren) Wassers in den Polargebieten wegen

- niedriger Temperatur
- hohen Salzgehaltes (Salzlake bei Eisbildung)
- Dauer für eine Erdumrundung: 1000 Jahre

Kalter Tiefenstrom



Warmer Oberflächenstrom

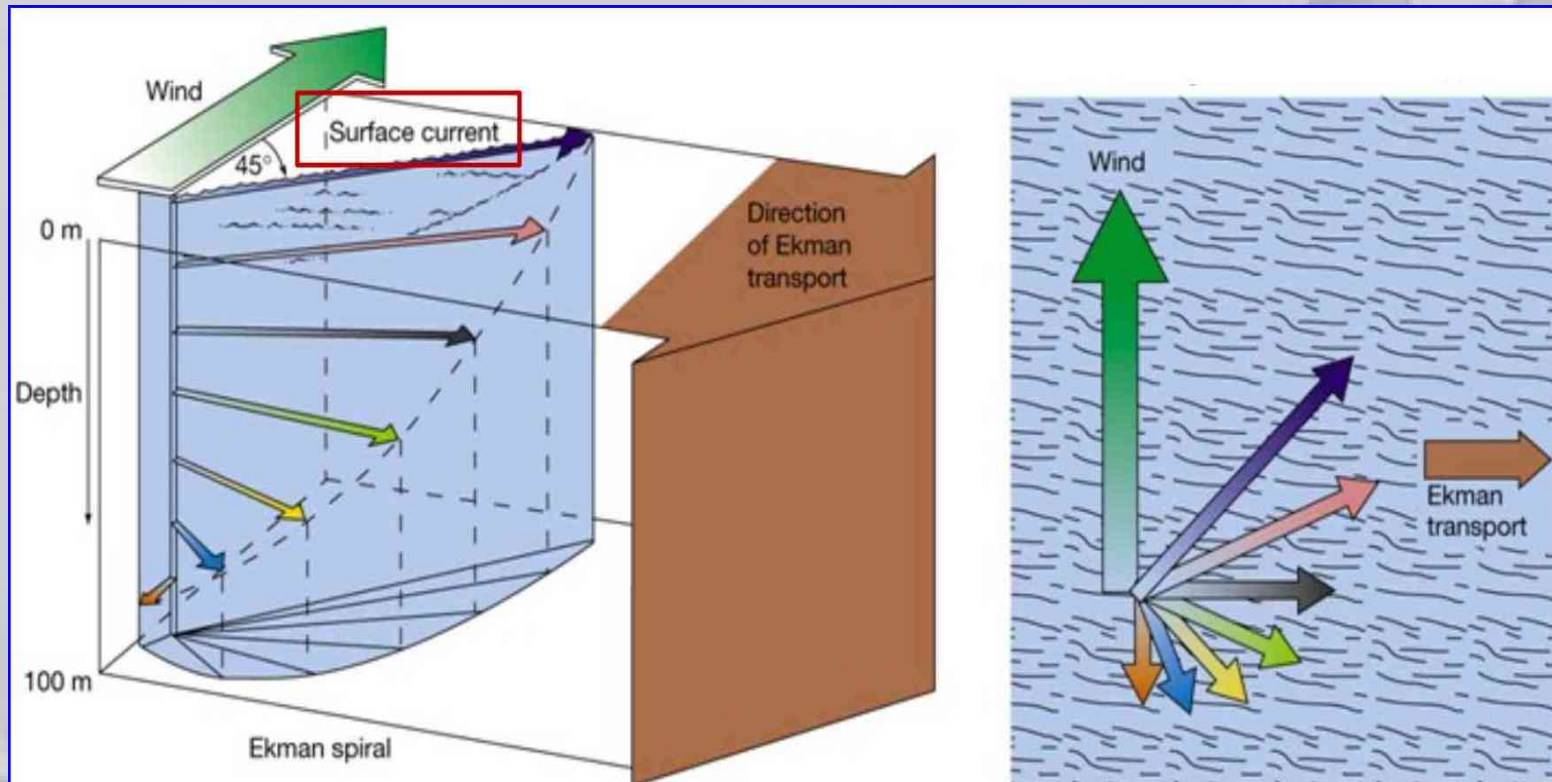
Kalter Tiefenstrom

OBERFLÄCHENSTRÖMUNGEN EKMAN-TRANSPORT

Antrieb ist der Wind

Richtung des Oberflächenstromes wegen Coriolis
Richtung des Massentransportes (0 – 50 m Tiefe)

45° zur Windrichtung (NH: rechts)
90° zur Windrichtung (NH: rechts)



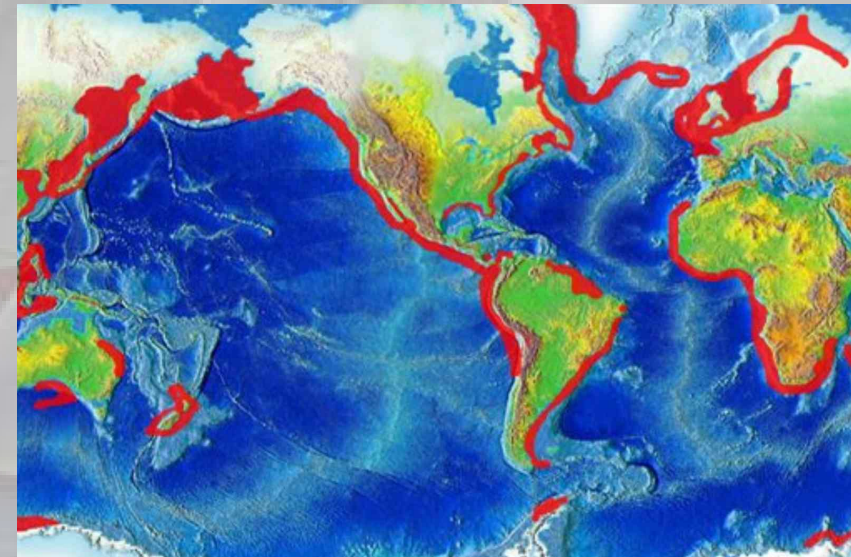
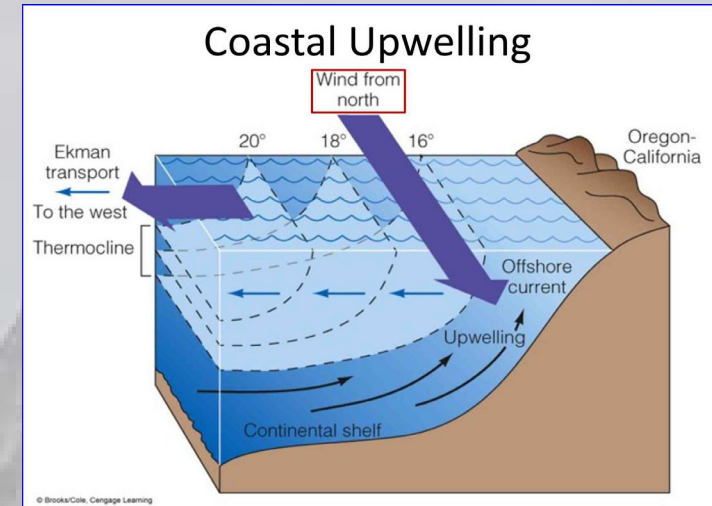
MEERESSTRÖMUNGEN UPWELLING

Upwelling: Ursachen / Folgen

- küstenparallele Winde, Land an Bb-Seite
- ablandigen Strom wegen Ekman
- Nachfließen kalten Tiefenwassers
- Kaltes, nährstoffreiches Oberflächenwasser
- Gut für Tiere und Fischer

Upwelling ist die Ursache der klassischen Auftriebswassergebiete (kaltes Wasser)

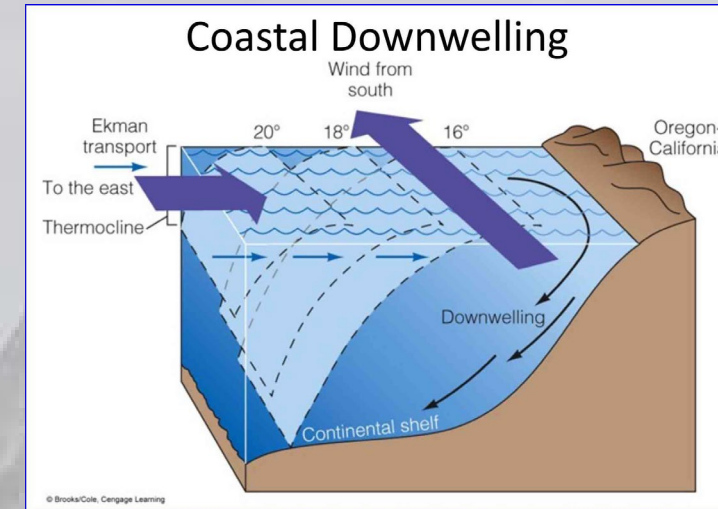
- W-Afrika Kanarenstrom
- S-Afrika Benguelastrom
- S-Amerika Humboldtstrom
- N-Amerika Kalifornienstrom



MEERESSTRÖMUNGEN DOWNWELLING

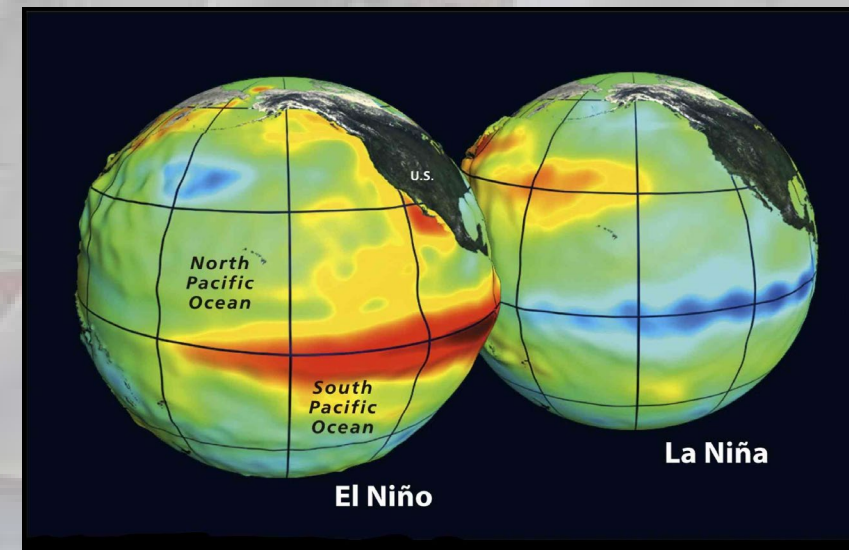
Downwelling: Ursachen / Folgen

- küstenparallele Winde, Land an Stb-Seite
- auflandigen Strom wegen Ekman
- Ausbleiben nährstoffreichen Tiefenwassers
- Nachfließen warmen Oberflächenwassers
- Schlecht für Tiere und Fischer: nährstoffarm



Downwelling ist eher die Ausnahme aufgrund atmosphärischer Schwingungen

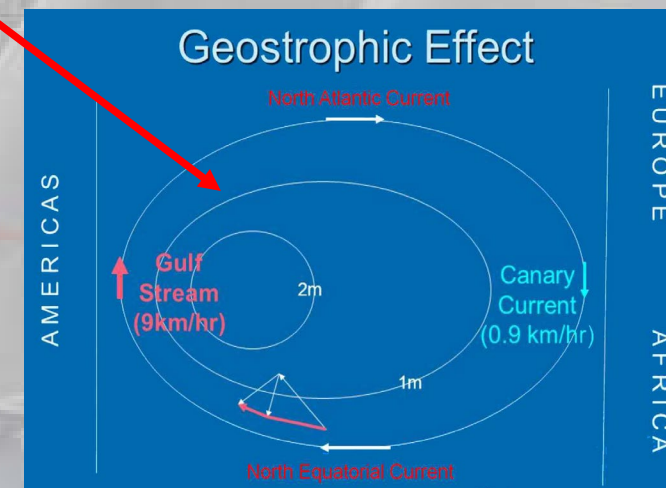
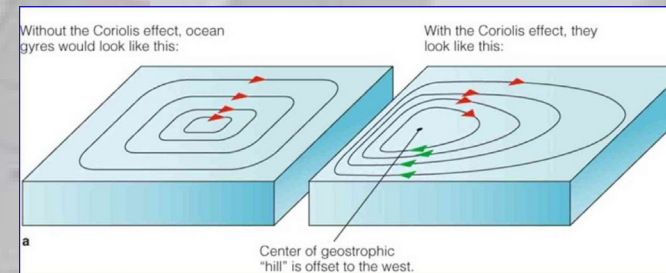
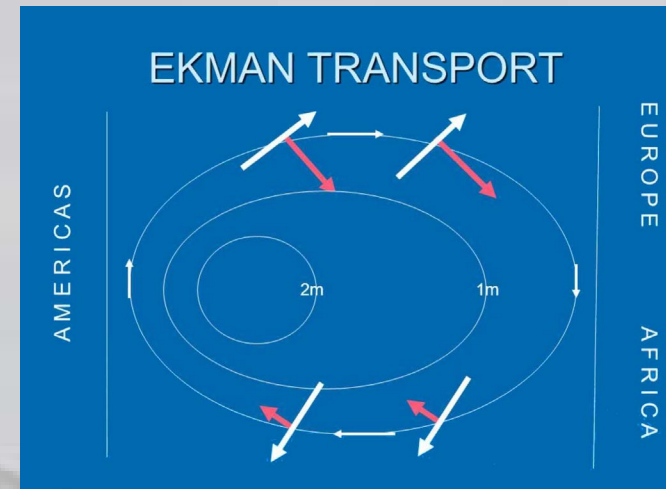
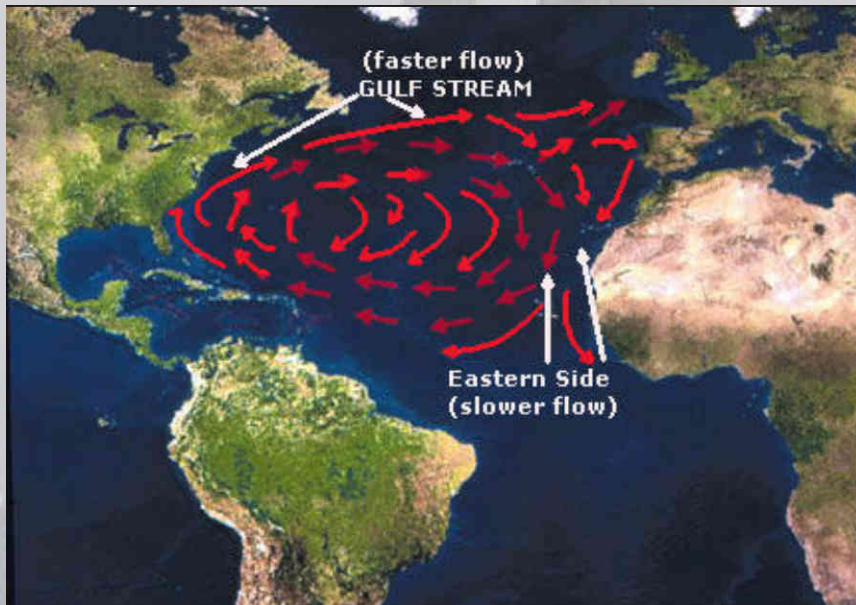
- ENSO El Niño Southern Oscillation
- Mehr Regen Peru (gut)
- Teil des Globalen Förderbandes



ATLANTISCHER WIRBEL (EDDY)

Atlantischer Wirbel (Eddy) entsteht durch ...

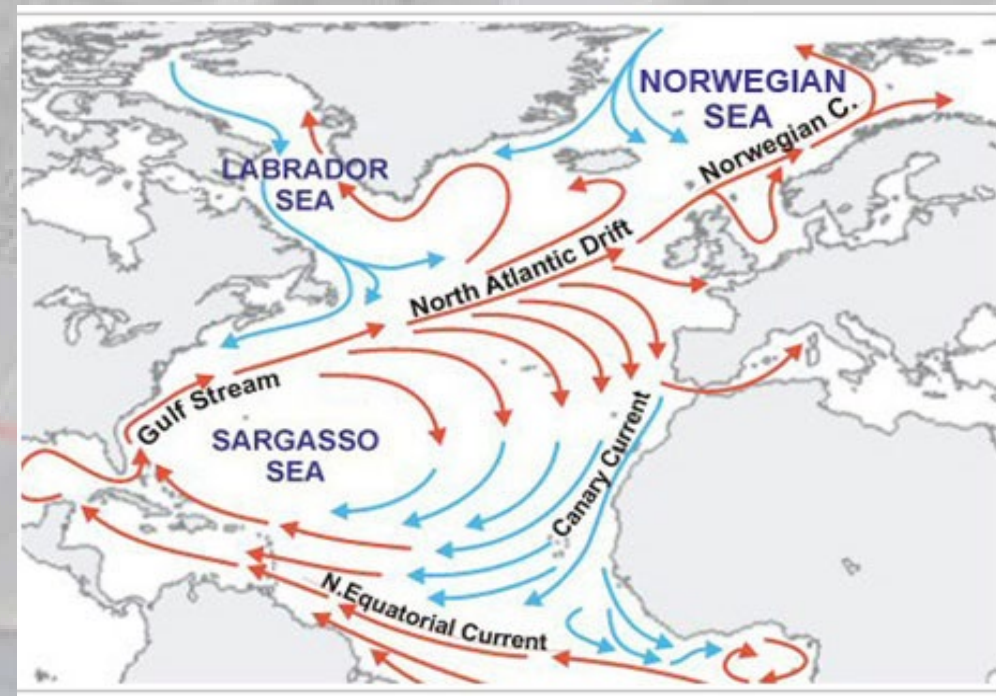
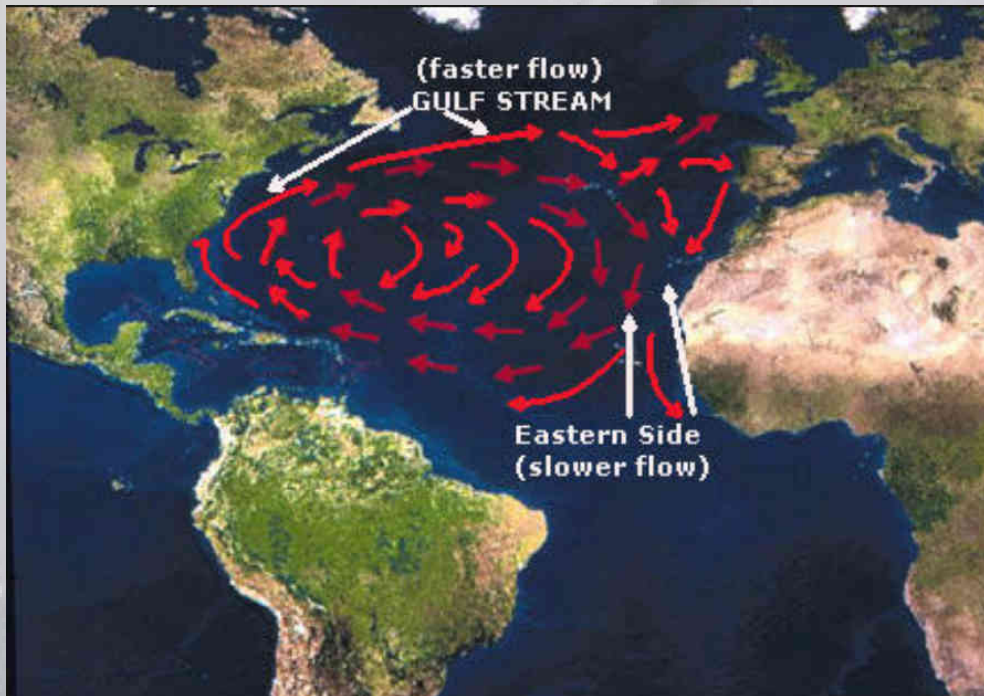
- Globale Zirkulation (Passat, Westwindzone)
- Anfachung Ekman-Transport 90° nach rechts
- Ausbildung Atlantischer Wirbel
- Ausbildung eines asymmetrischen 'Wasserberges'
- Dadurch höhere Stromgradienten im Westen
- 'Westward Intensification' (auch Kuro Shio, Pazifik)



ATLANTISCHER WIRBEL

Atlantischer Wirbel thermisch charakterisiert durch

- Kaltwasserproduktion Labrador- / Norwegische See
- Kaltwassertransport durch Auftriebsgebiete bei den Kanaren
- Warmwassertransport in den Golf von Mexico (Äquatorialstrom)
- Warmwassertransport aus dem Golf von Mexico (Golfstrom)
- Starkes Mäandrieren des Golfstroms durch Kontinentalsockelnähe und Sekundärströmungen



GOLFSTROM

Der westliche Ast des Atlantischen Wirbels

Windgetrieben (Globale Zirkulation),
verstärkt durch Westward Intensification und
die nordwärts zunehmende Corioliskraft

30 Mill. m³/ sec (100 * alle Flüsse weltweit)

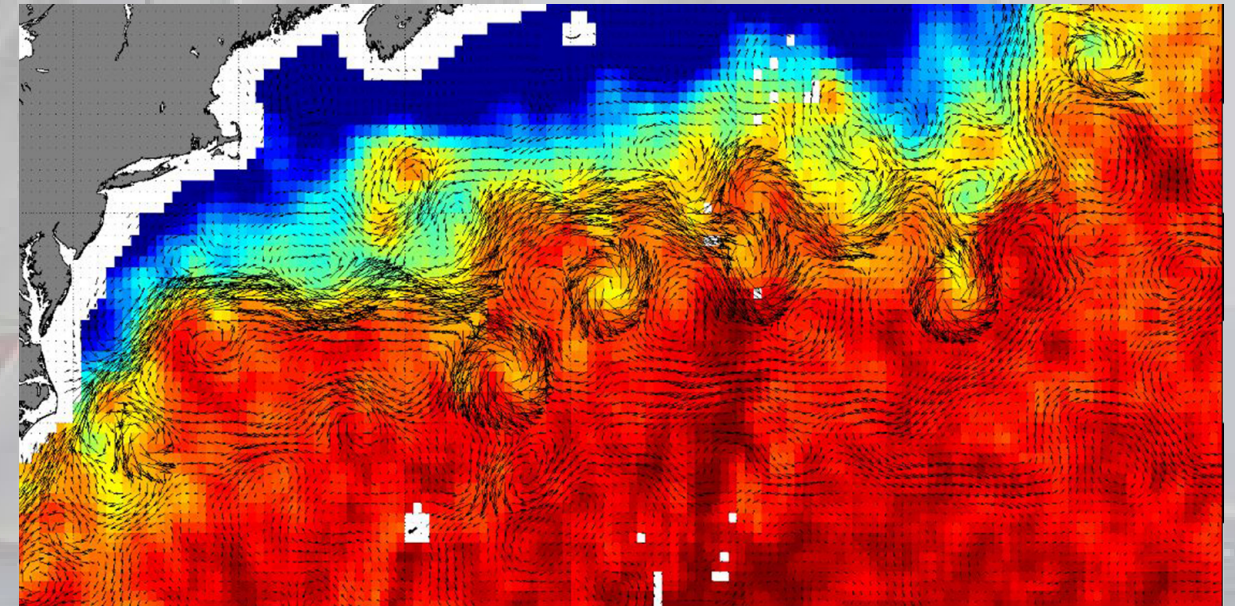
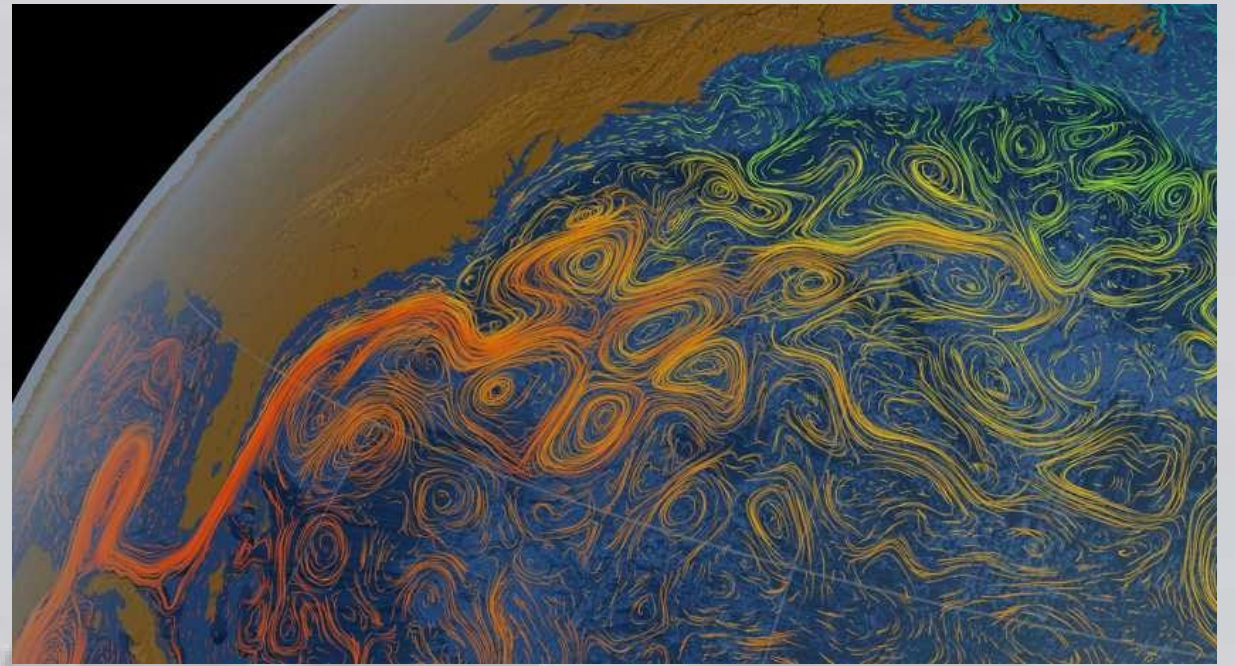
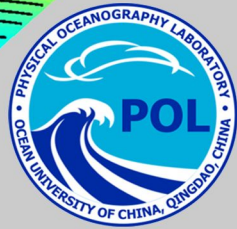
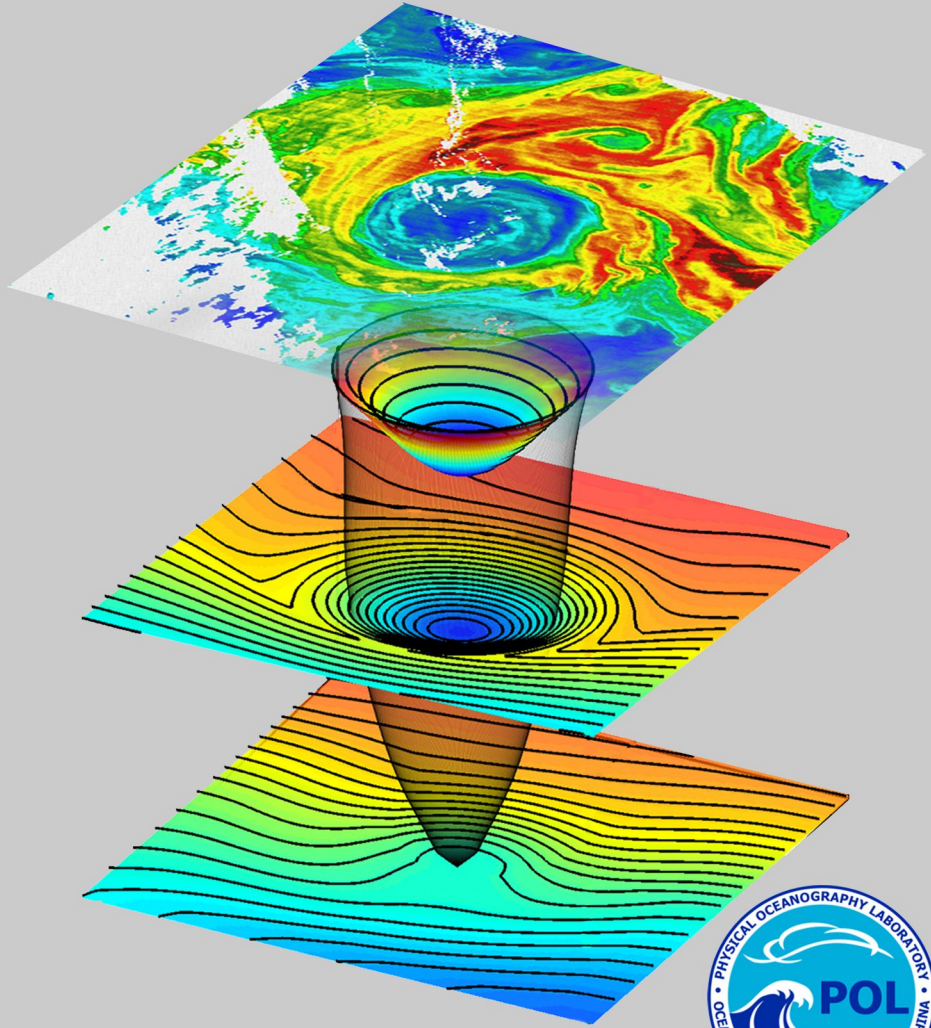
Leistungstransport 1.5 Petawatt (10¹⁵ Billiarde)
Entspricht 1.000.000 KKW Blöcken

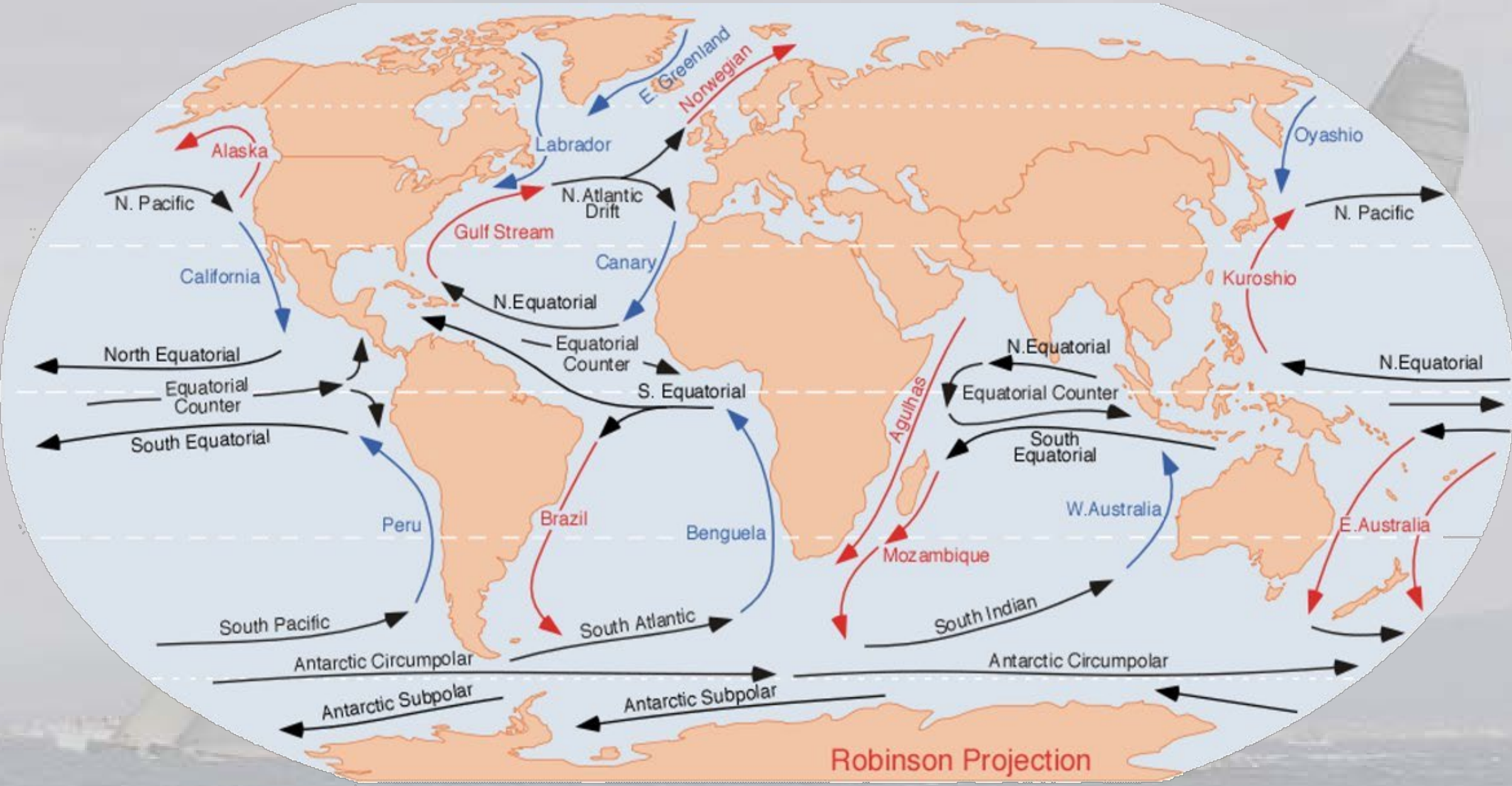
Stark mäandrierend mit ablösenden Wirbeln

Die Wirbel sind als Änderung der FÜG zu beachten



GOLFSTROM RINGE (EDDIES)





Robinson Projection

USE OF CHART

This chart is not intended to be used alone but in conjunction with other navigational aids. The chart presents, in graphic form, averages obtained from data gathered over many years in meteorology and oceanography to aid the navigator in selecting the quickest and safest routes. Included are explanations of how to use each type of information depicted on the chart.

LOCAL WEATHER: For extended remarks on the marine climate along foreign coasts, see the appropriate Sailing Directions (Explanatory Planning Guides) prepared and published by the Meteorological and Mapping Agency. For the coasts of the United States and its possessions, see the appropriate Coast Pilot prepared and published by the National Ocean Survey. The latest publication "Marine Weather Log," prepared and published by the National Oceanic and Atmospheric Administration, Environmental Data and Information Service, carries information on marine climatic conditions.

MAGNETIC VARIATION: The lines of equal magnetic variation for the Epoch 2023 are shown by gray lines on the main body of the chart and the Mediterranean inset chart. The annual rate of change is shown by gray lines on the uppermost inset chart.

GREAT CIRCLE ROUTES: The courses shown on this chart are drawn to represent the shortest distance normally available during the month represented. Abnormal or severe low or weather conditions may require alternate or other courses for a shorter or longer distance. The latitude and longitude of the land, water or spring Pilot charts, ice and weather reports should be consulted carefully when proceeding south of Cap Race, as these waters are subject to irregular hazards.

WAVE HEIGHTS: The red lines on the main body of the chart indicate the percentage of cycles whose heights equal to or greater than 12 feet. In analysis, when both sea and swell are reported, the higher value is used in the summation. Wave heights of 12 feet or more are encountered more than 10 percent of the time over most of the open ocean north of 32° and east of the Davis Strait. Frequencies of 10 percent are also found in the Mediterranean Sea between the Balearic islands and Sicily. The region south of Iceland between Greenland and Ireland shows wave heights of at least 12 feet 40 percent of the time, and of at least 20 feet 10 percent of the time. Within this region, a small area centered near 57°N, 20°W, experiences wave heights of 12 feet or more 50 percent of the time, and 20 feet or more 15 percent of the time.

GALES: Winds of force 8 or greater have increased from the previous month with nearly all unreported seas north of 30°N reaching a frequency of 5 percent. Most of the central Atlantic north of 40°N reaches 10 percent with the highest frequency being off the southeast tip of Greenland, where it approaches 20 percent.

EXTRATROPICAL CYCLONES: Major areas of cyclogenesis include an area that extends along the coast from the southeastern United States to Nova Scotia, an eddial area approximately 14 degrees by 9 degrees centered near 30°N, 40°W, and an area extending from southeast Greenland to near 60°W. Leading from the Great Lakes, the majority of extratropical lows cross the Gulf of St. Lawrence and head for southwest Greenland. Other primary tracks lead from near 30°N, 60°W across Iceland into the Norwegian Sea, and across Hudson Bay. Secondary tracks lead from Lake Michigan across Ontario, across the British Isles and southern Scandinavia into northern Europe, and across the northwestern Mediterranean from northern Spain to Yugoslavia.

AIR TEMPERATURE: A marked difference in mean air temperature is noted from the previous month as temperatures continue to drop. November means range from -4°C in Baffin Bay to 28°C in a small region of the Caribbean Sea. The mean temperatures along the 47°N parallel range from a low of 13°C off the New Jersey coast to a high of 18°C at 40°W to 15°C off the Portuguese coast. Along the northeast coast of South America 80 percent of the observations fall between 24°C and 32°C, while over Baffin Bay 80 percent fall between -13°C and 4°C.

TROPICAL CYCLONES: Tropical disturbances have decreased substantially since the warmer months. On the average, only 7 storms in 10 years will reach force 8 or greater, with only 2 of these reaching hurricane strength (force 12). Most of these storms develop over the Caribbean Sea with the preferred tracks either crossing the Yucatan Peninsula bound for the western Gulf States or crossing Cuba and heading northeast into open water.

NOTE: It should be kept in mind that most ships tend to avoid areas of inclement weather. The frequency of gales and high waves is generally greater than that which is actually reported due to climatological observations being biased toward favorable weather conditions.

EXPLANATION OF WIND ROSES: The wind roses in blue color are used in the areas of each 7° square. Each rose shows the distribution of the winds that have prevailed in the area over a considerable period of time. The wind percentages are summarized for calm and the Cardinal and Inter-cardinal compass points. The arrows fit with the wind, indicating the direction from which the wind blew. The length of the shaft, measured from the outside of the circle to the end of the arrow shaft (not including the end of the rose itself), using the scale below, gives the percentage of the total number of observations in which the wind has blown from that direction. The number of shafts shows the average force of the wind on the Beaufort scale. The figure in the center of the circle gives the percentage of calms. When the arrow has less than 20 percent to fit conveniently in the 7° square, the percentage is indicated numerically on the shaft.

FOR EXAMPLE: The sample wind rose should be read thus: In the reported observations the wind has averaged as follows: From N, 40 percent, force 7; from N.E., 13 percent, force 7; from E., 6 percent, force 5; from S.E., 5 percent, force 5; from S, 5 percent, force 5; from S.W., 3 percent, force 5; from W., 8 percent, force 5; from N.W., 5 percent, force 4; calms 2 percent.

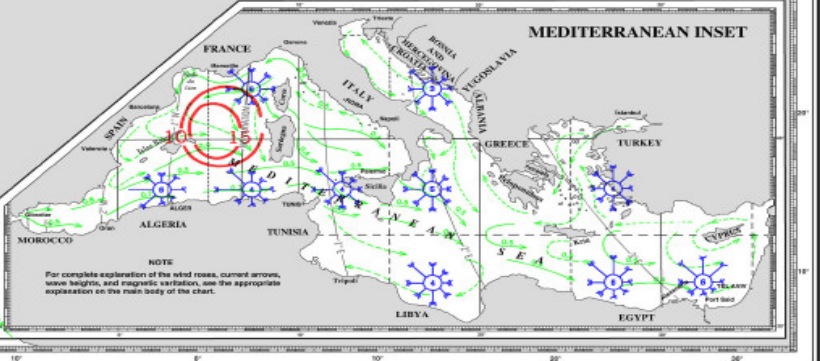
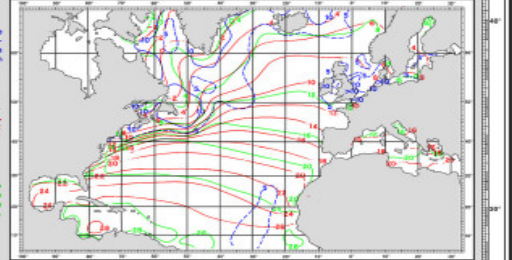
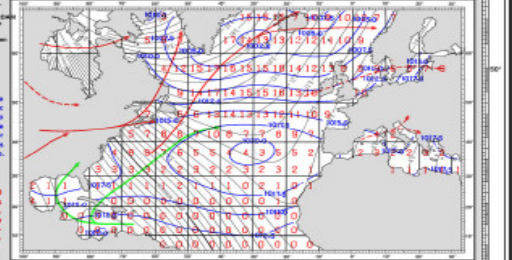
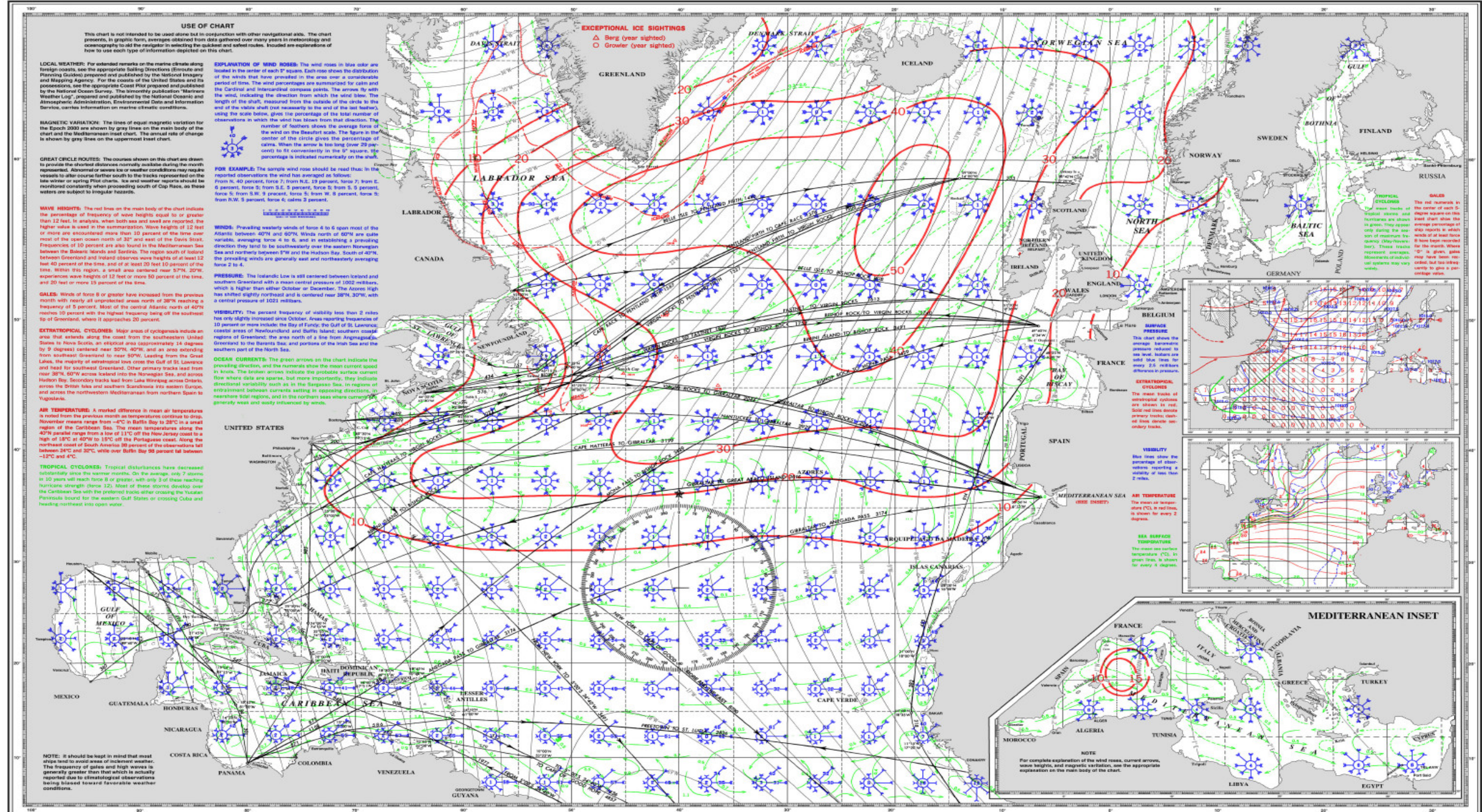
WINDS: Prevailing westerly winds of force 4 to 6 span most of the Atlantic between 40°N and 60°N. Winds north of 60°N are more variable, averaging force 4 to 6, and in establishing a prevailing direction they tend to be southwesterly over the eastern Norwegian Sea and northerly between 70°W and Hudson Bay. South of 40°N, the prevailing winds are generally east and northeasterly averaging force 2 to 4.

PRESSURE: The Icelandic Low is still centered between Iceland and southern Greenland with a mean central pressure of 1022 millibars, which is higher than either October or December. The Azores High has shifted slightly northeastward and is centered near 30°N, 30°W, with a central pressure of 1021 millibars.

VISIBILITY: The percent frequency of visibility less than 2 miles has only slightly increased since October. Areas reporting frequency of 10 percent or more include the Bay of Fundy, the Gulf of St. Lawrence, coastal areas of Newfoundland and Baffin Island; southern coastal regions of Greenland; the area north of a line from Annapolis, Greenland to the Barents Sea; and portions of the Irish Sea and the northern part of the North Sea.

OCEAN CURRENTS: The green arrows on the chart indicate the prevailing direction, and the numbers show the mean current speed in knots. The broken arrows indicate the probable surface current flow where data are sparse, but more importantly, they indicate directional variability such as in the Sargasso Sea. In regions of entrainment between currents setting in opposing directions, in nearshore Gulf regions, and in the northern seas where currents are generally weak and easily influenced by wind.

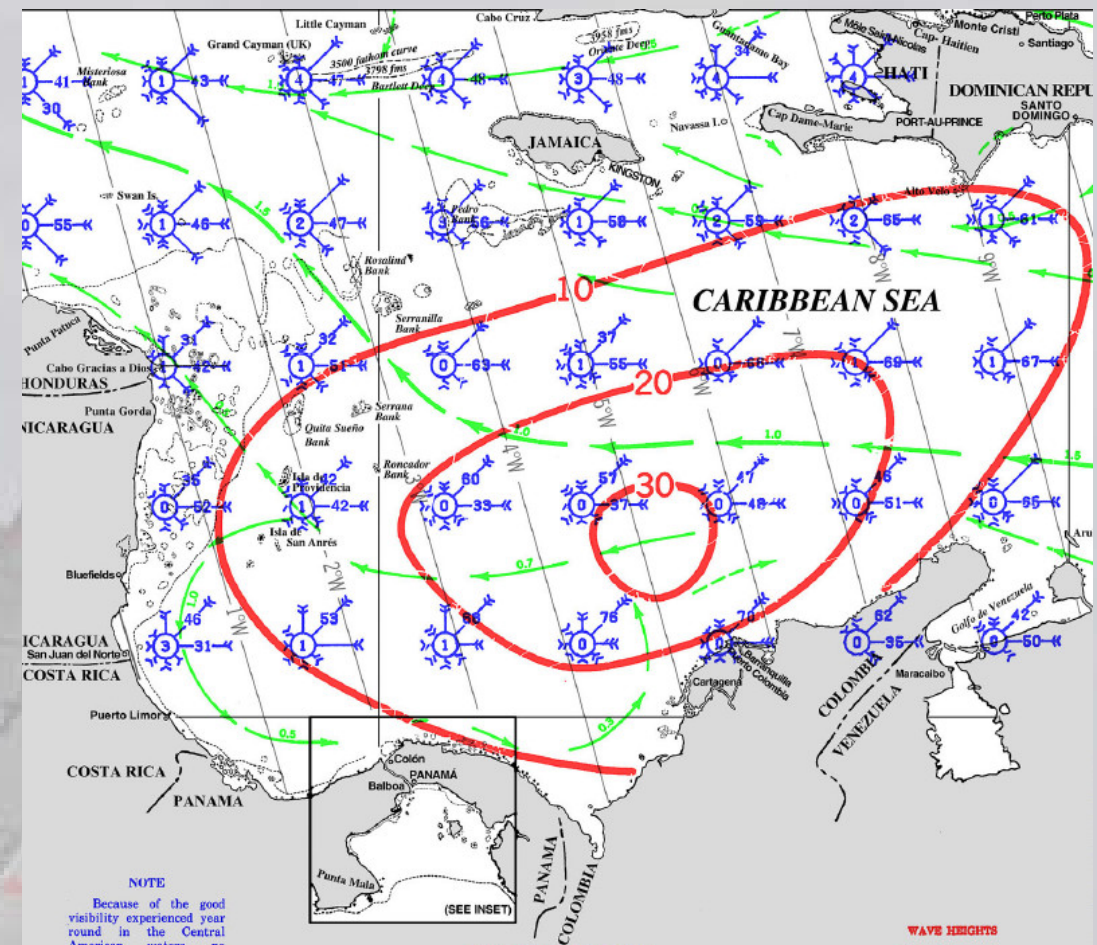
EXCEPTIONAL ICE SIGHTINGS
▲ Berg (year sighted)
○ Growler (year sighted)



PILOT CHARTS SEEGANG

WAVE HEIGHTS

Solid red lines on the main body of the chart indicate the percent frequency of wave heights equal to or greater than 8 feet. In analysis, when both sea and swell are reported, the higher value is used in the summarization.



OCEAN CURRENTS-APRIL
The arrows on the chart are approximations of the prevailing direction and the figures are approximations of the average speed expressed in knots. The values given may be regarded as the probable drift which a ship might experience in a particular area. They do not represent the maximum speed which may occur in the area.

Steadiness
Over 50 Percent 25-50 Percent Under 25 Percent
Drift of current expressed in knots.

Recent investigations of the Gulf Stream-Equatorial System have shown that it is a relatively narrow swift stream. Its position is not rigidly fixed but appears to meander. The extent to which it penetrates the Gulf of Mexico has not been determined.

Permanent currents in the Gulf of Panama move in a counterclockwise direction. Superimposed upon these permanent currents are tidal currents. During the flood tide the northerly current will be increased in the eastern portion of the gulf and the southerly current reduced in the western portion. During ebb tides the northerly water movement will be reduced in the eastern portion of the gulf and the southerly water movement will be increased in the western part. These influences will be most conspicuous during spring tides.

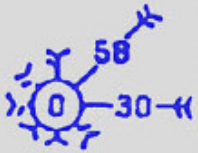
WAVE HEIGHTS
Solid red lines on the main body of the chart indicate the percent frequency of wave heights equal to or greater than 8 feet. In analysis, when both sea and swell are reported, the higher value is used in the summarization.

PILOT CHARTS WINDROSE

WIND ROSES

EXPLANATION OF WIND ROSES:—The wind roses in blue color are located in the center of each 2° square (1° square in the Panama inset). Each rose shows the distribution of the winds that have prevailed in the area over a considerable period of time. The wind percentages are summarized for calm and for the Cardinal and Intercardinal compass points. The arrows fly with the wind indicating the direction from which the wind blew. The length of the shaft, measured from the outside of the circle to the end of the visible shaft (not necessarily to the end of the last feather), using the appropriate scale below, gives the percentage of the total number of observations in which the wind has blown from that direction. The number of feathers shows the average force of the wind on the

Beaufort scale. The figure in the center of the circle gives the percentage of calms. When the arrow is too long (over 29 percent) to fit conveniently in the 1° or 2° square, the percentage is indicated numerically on the shaft.



FOR EXAMPLE:—The sample wind rose should be read thus: In the reported observations the wind has averaged as follows: From N.—6 percent, force 3; from N.E.—58 percent, force 4; from E.—30 percent, force 4; from S.E.—2 percent, force 3; from S.—1 percent, force 2; from S.W.—1 percent, force 2; from W.—1 percent, force 3; from N.W.—1 percent, force 3; calms—0 percent.

0 10 20 30 40 50 60 70 80 90 100



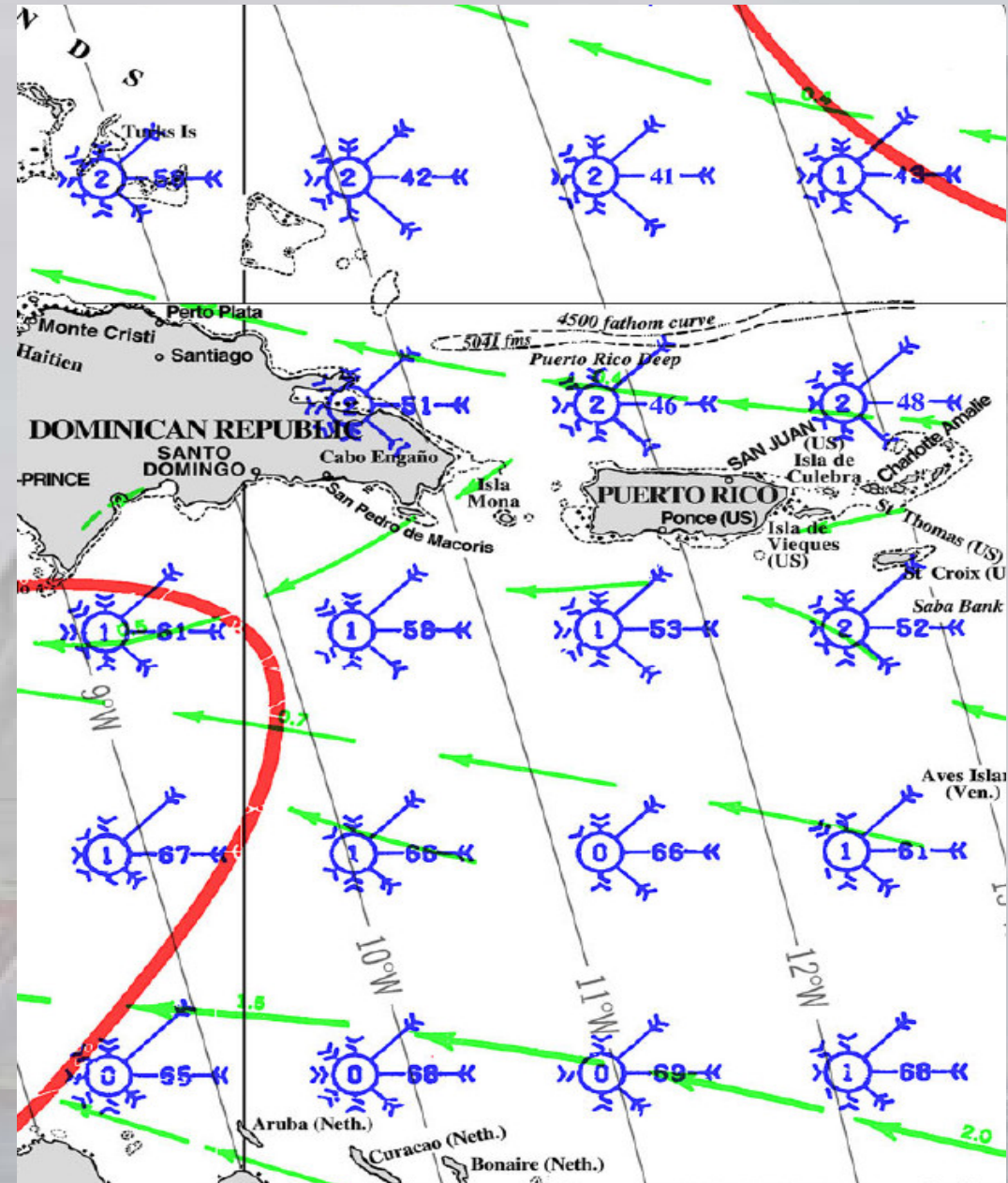
SCALE OF WIND PERCENTAGES

2° square

0 10 20 30 40 50 60 70 80 90 100



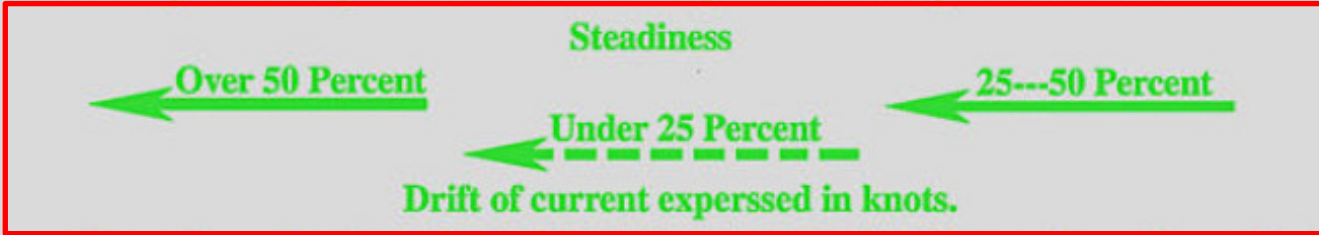
Wind percentages (1° square)



PILOT CHARTS STRÖMUNG

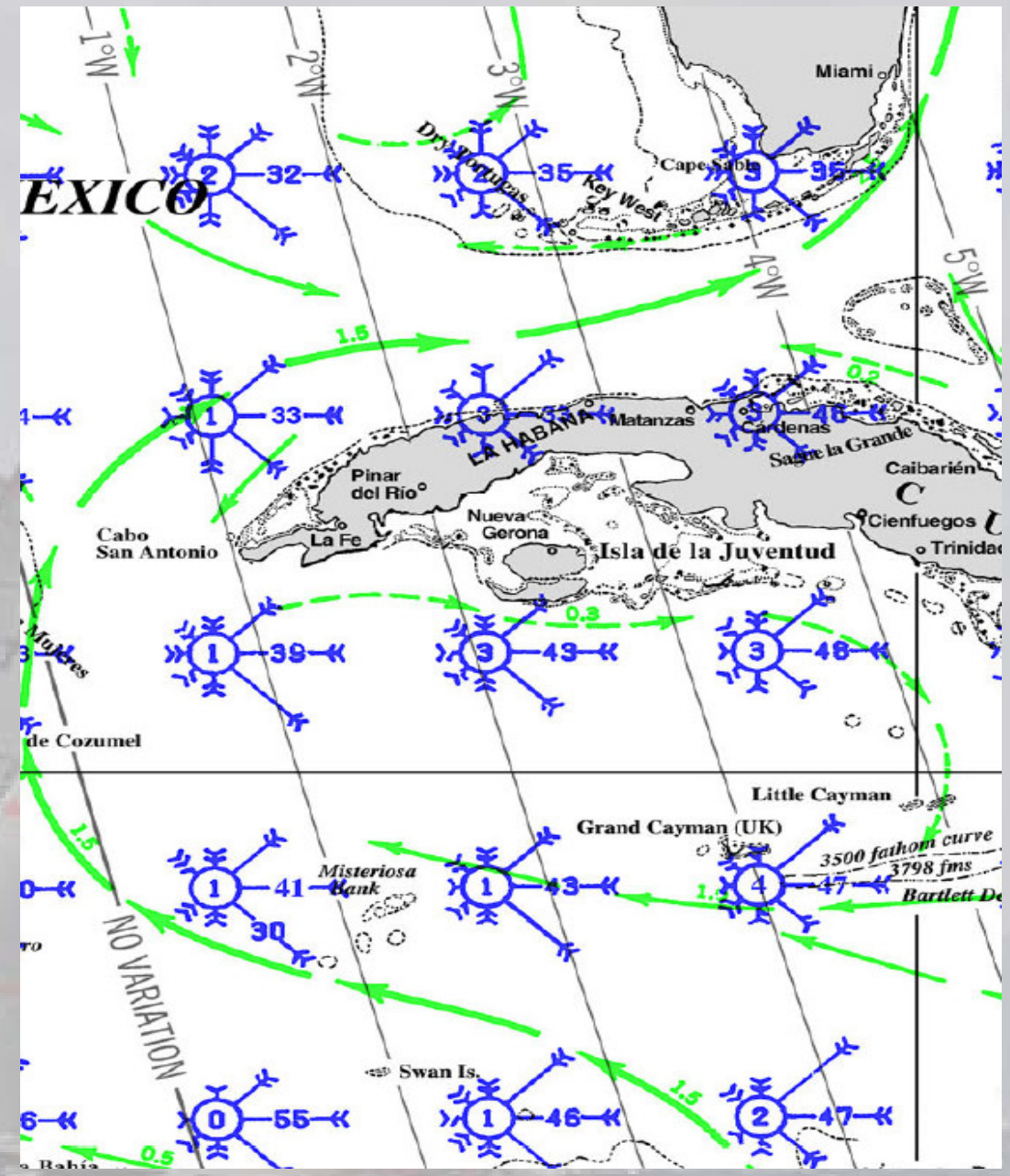
OCEAN CURRENTS-APRIL

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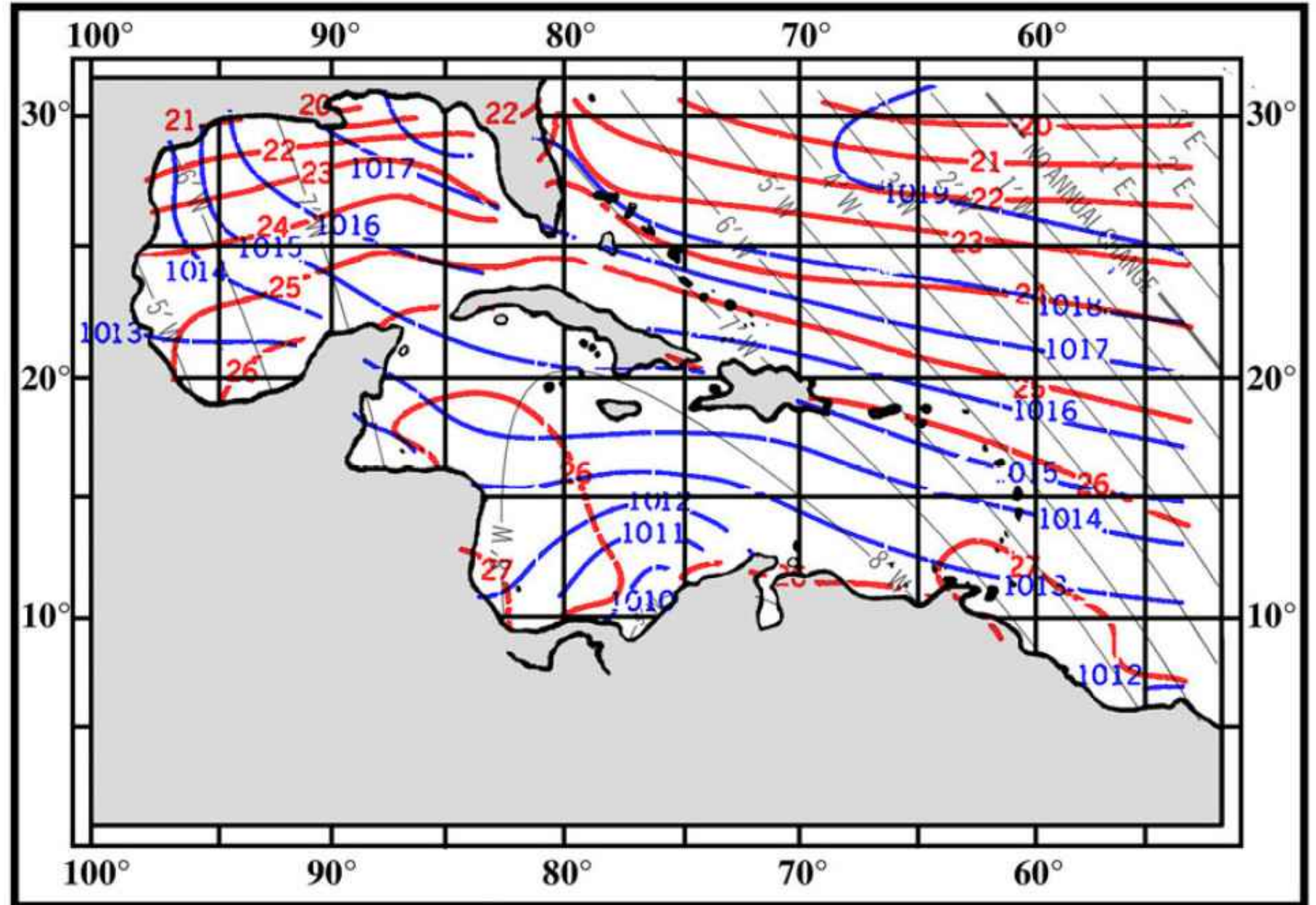
PILOT CHARTS LUFTDRUCK UND LUFTTEMPERATUR

SURFACE PRESSURE

This chart shows average sea level pressure. Solid blue contour lines (isobars) are presented for every one millibar of pressure difference.

AIR TEMPERATURE

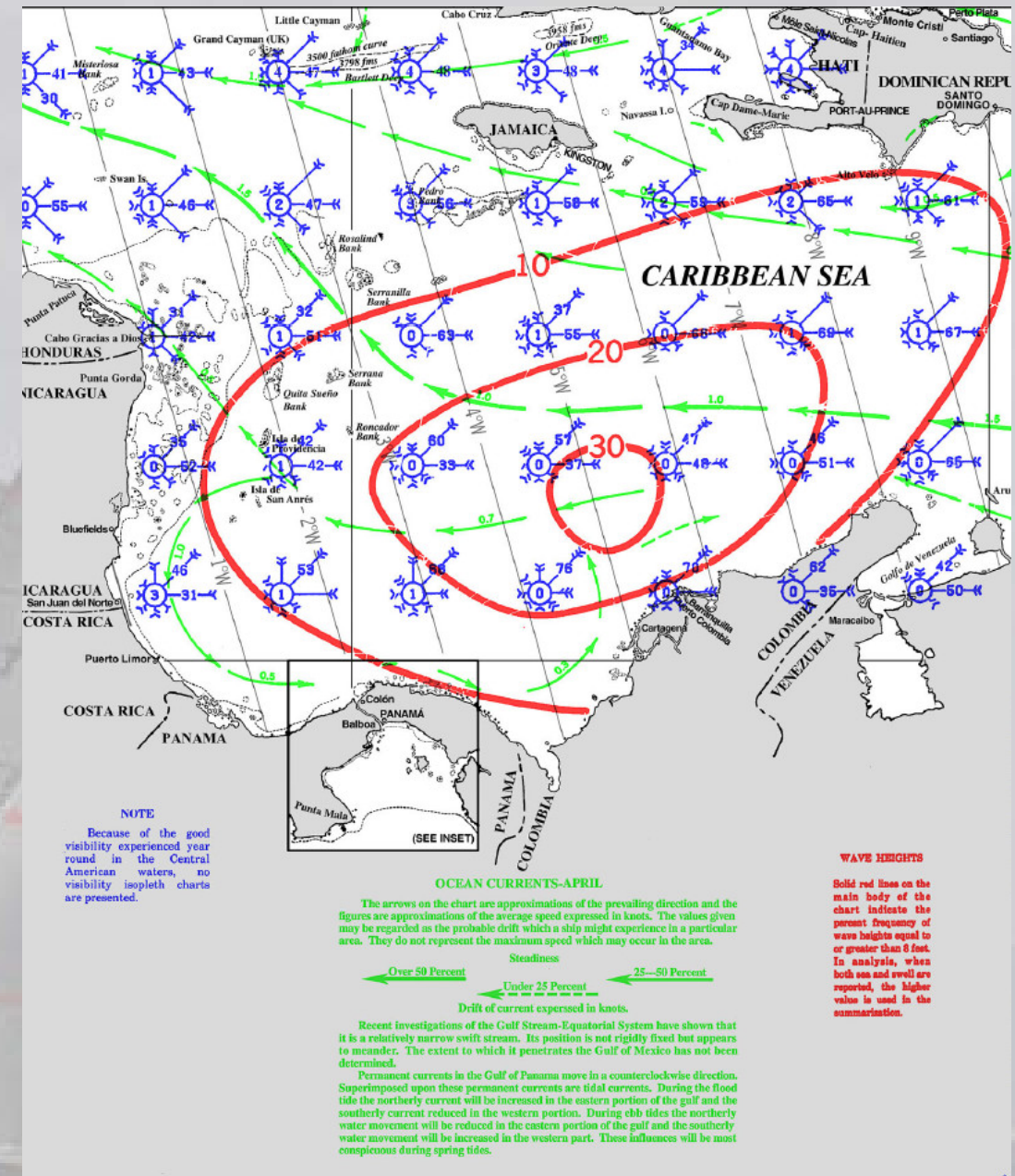
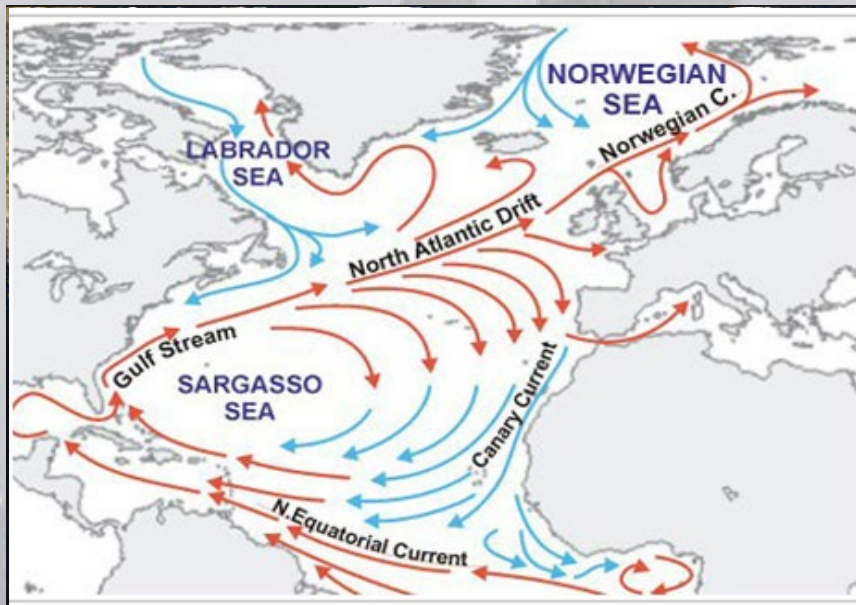
Mean air temperature (°C), in red lines, is shown for every one degree. All weather narratives refer to air temperature.



PILOT CHARTS

Pilot-Charts Jahrgang wichtiger Parameter

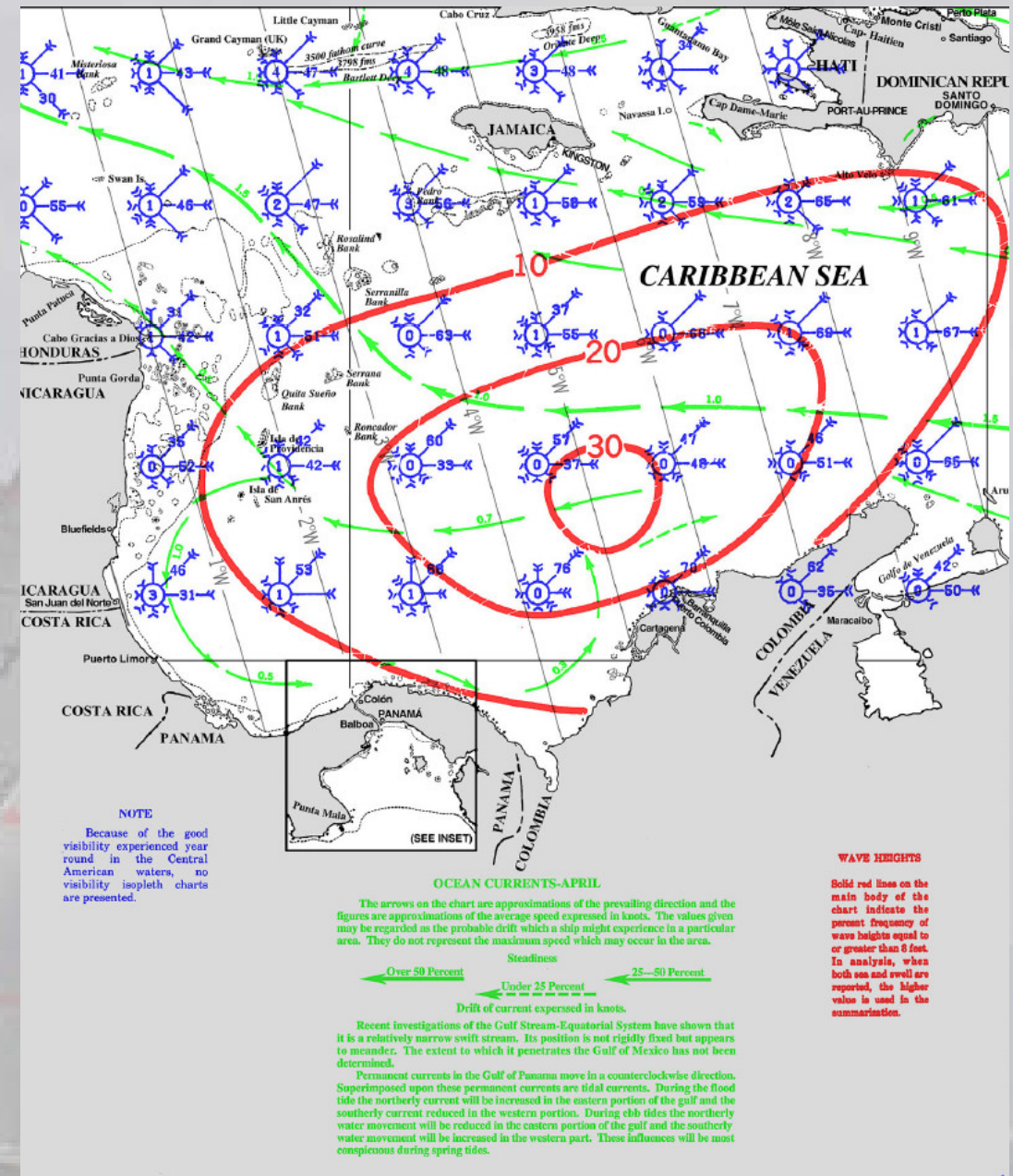
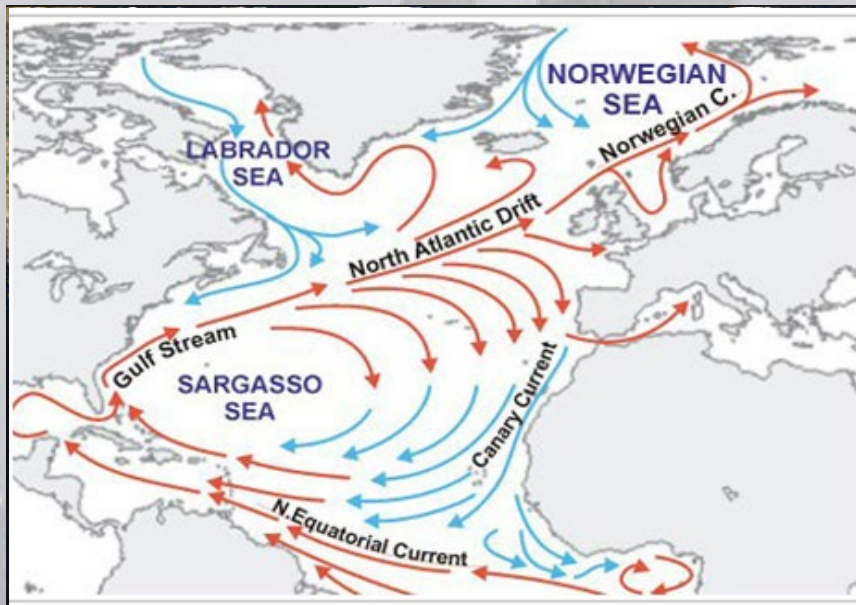
- Pilot Charts
- Monatliche Mittelwerte von Wind, Temperatur, Sicht, Druck
- Stärke und Beständigkeit des Stroms
- Häufigkeit von Seegangshöher grösser 3.5m
- Häufigkeit von Böen grösser Bft.8 (34kt)
- Zugbahnen aussertropischer Zyklonen
- Wassertemperatur



PILOT CHARTS

Pilot-Charts Jahresgang wichtiger Parameter

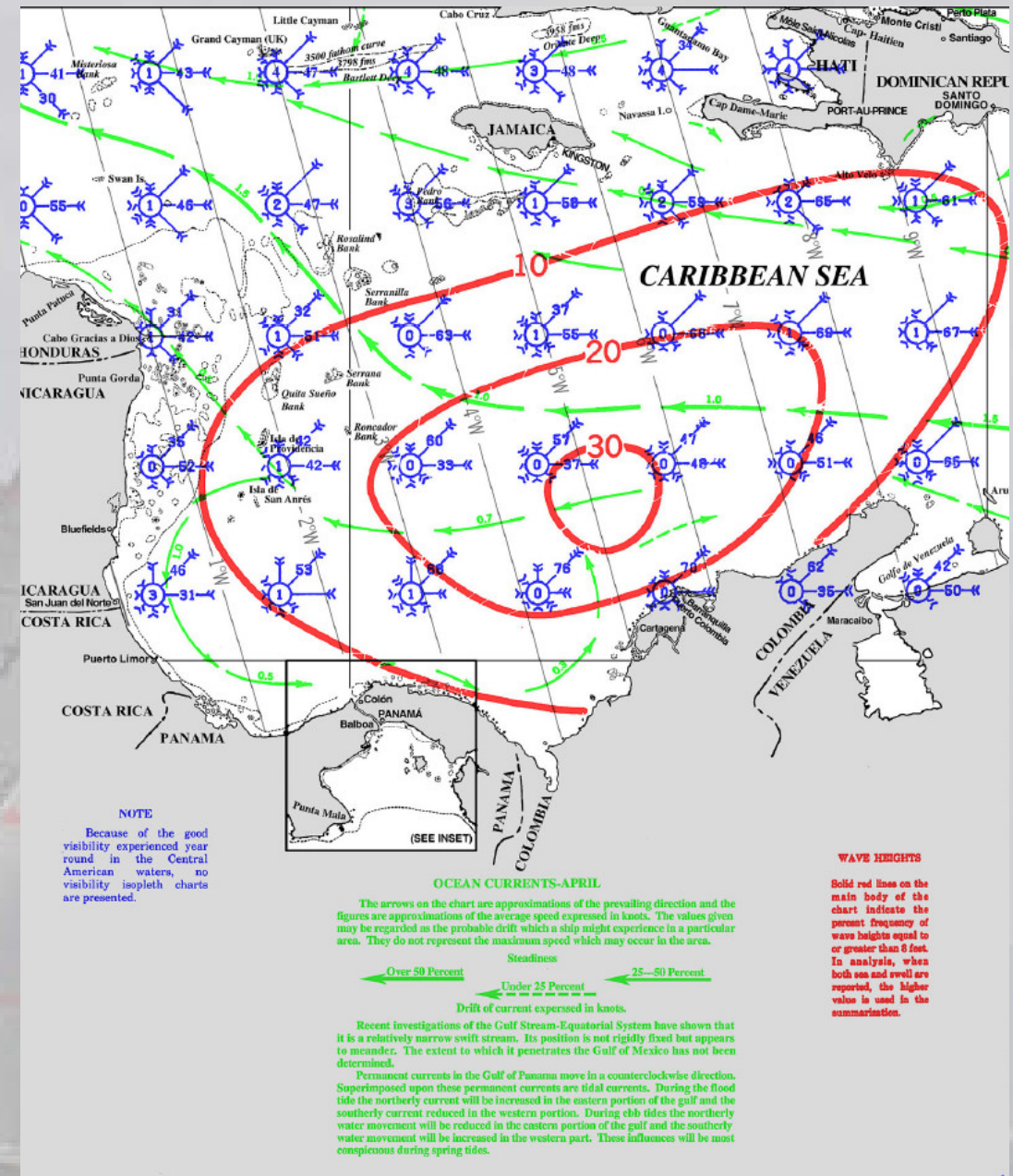
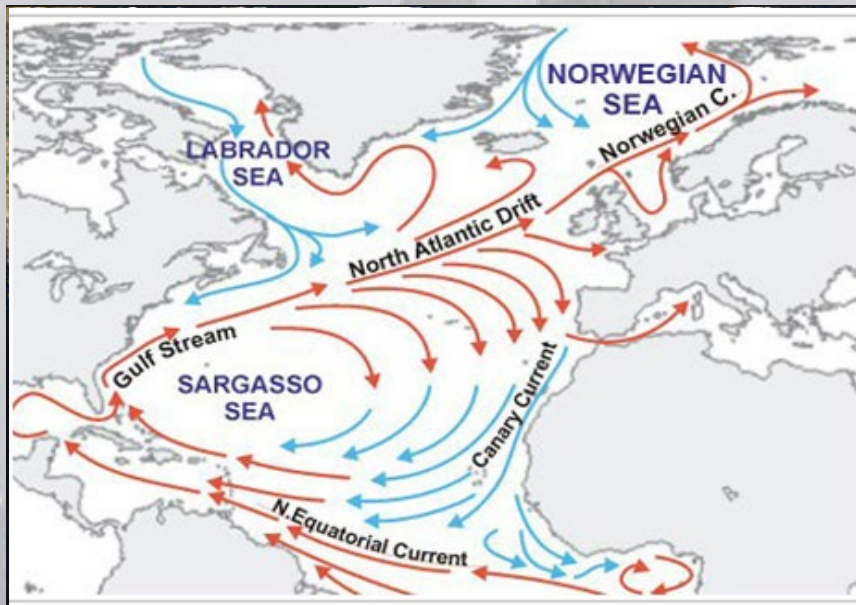
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- Zugbahnen aussertropischer Zyklonen
- Wassertemperatur



PILOT CHARTS

Pilot-Charts Jahresgang wichtiger Parameter

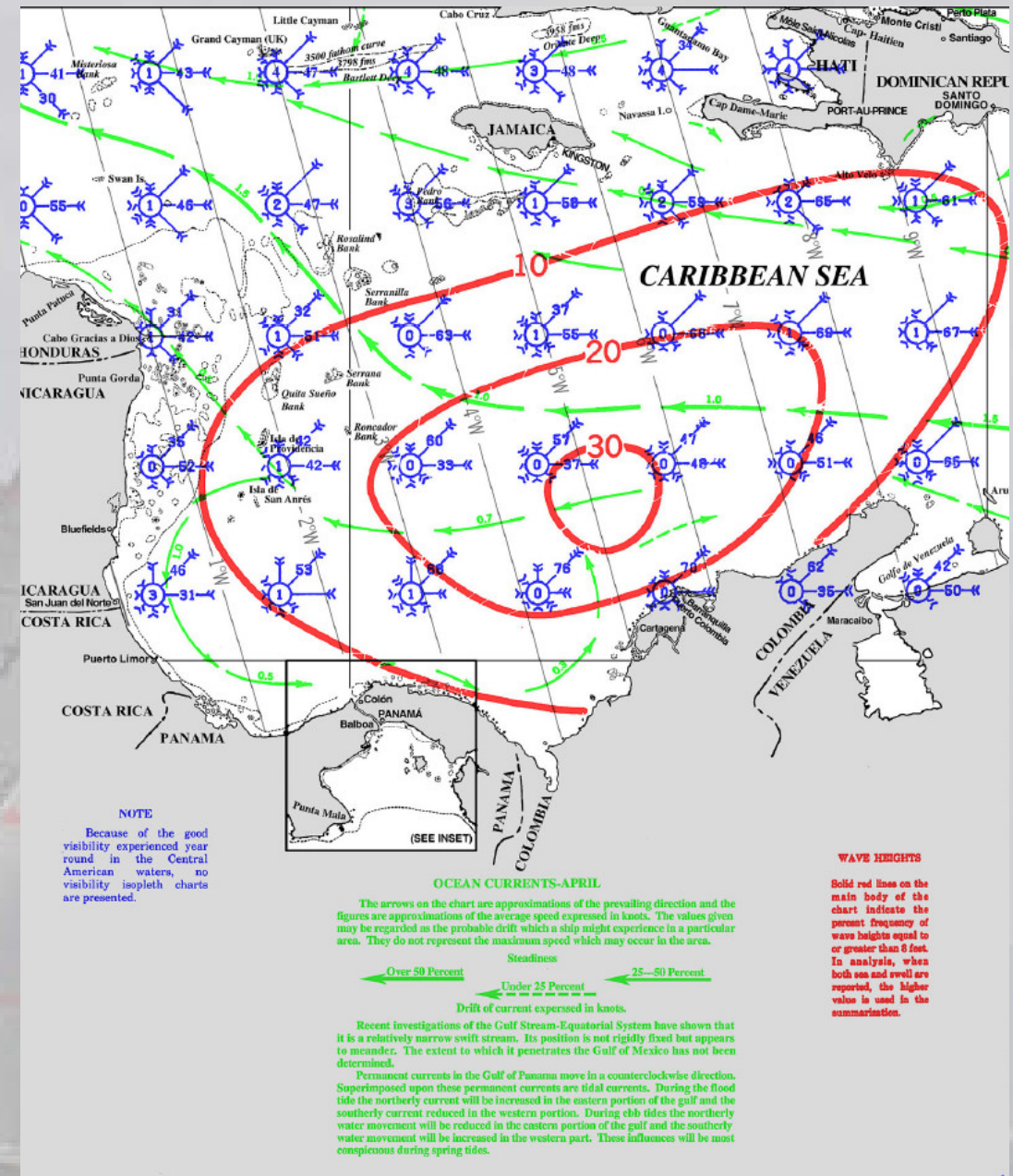
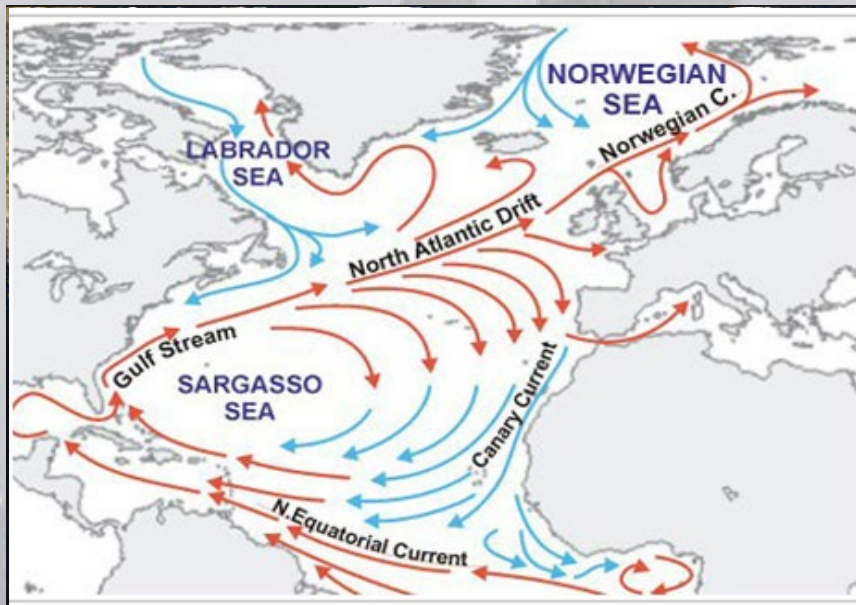
- Pilot Charts
- Monatliche Mittelwerte von Wind, Temperatur, Sicht, Druck
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- Häufigkeit von Böen grösser Bft.8 (34kt)
- Zugbahnen ausertropischer Zyklonen
- Wassertemperatur

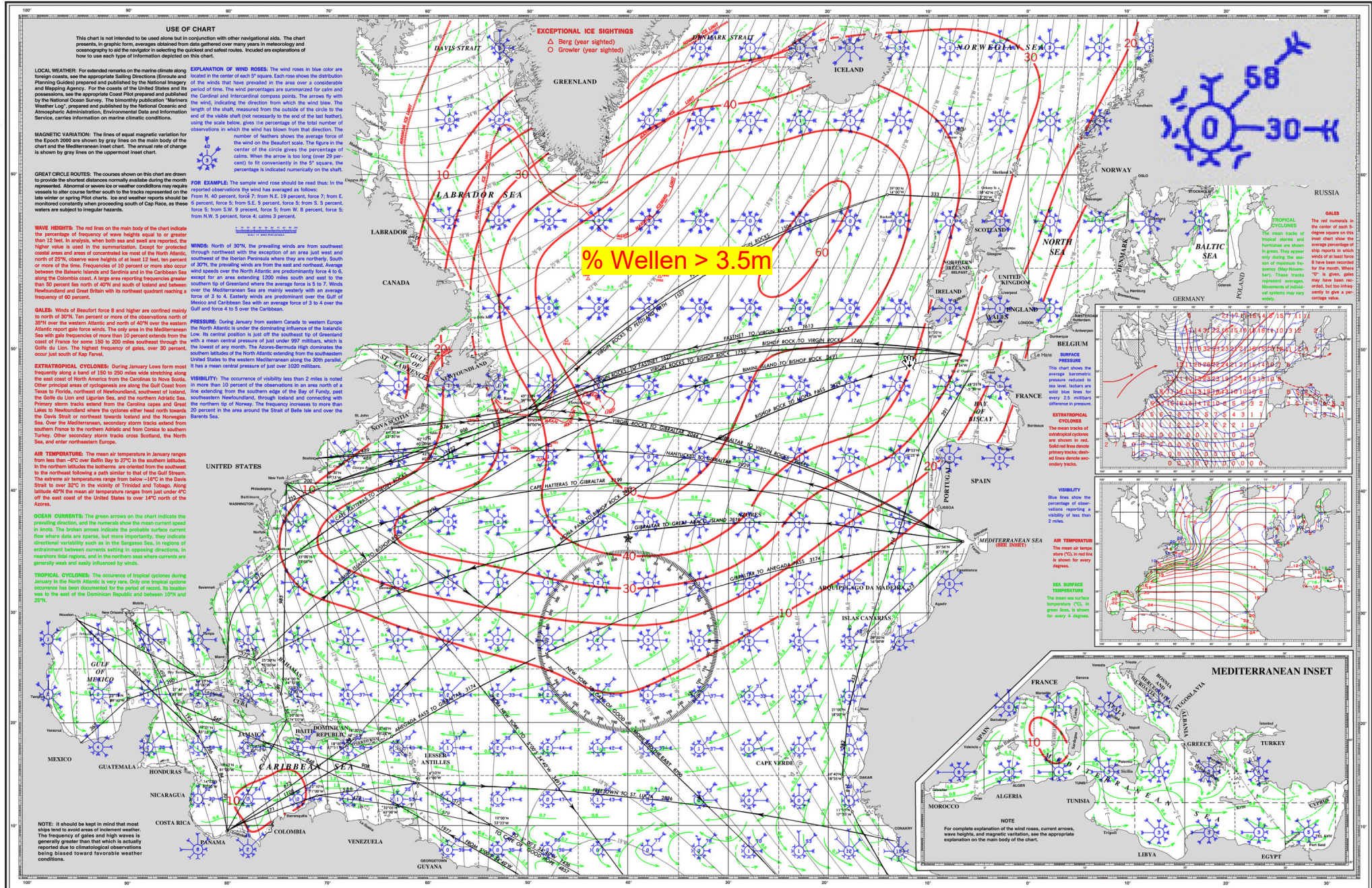


PILOT CHARTS

Pilot-Charts Jahrgang wichtiger Parameter

- Pilot Charts
- Monatliche Mittelwerte von Wind, Temperatur, Sicht, Druck
- Stärke und Beständigkeit des Stroms
- Häufigkeit von Seegangshöhen grösser 3.5m
- Häufigkeit von Böen grösser Bft.8 (34kt)
- Zugbahnen aussertropischer Zyklonen
- Wassertemperatur





USE OF CHART
This chart is not intended to be used alone but in conjunction with other navigational aids. The chart presents, in graphic form, averages obtained from data gathered over many years in meteorology and oceanography to aid the navigator in selecting the quickest and safest routes. Keel-edge explanations of how to use each type of information depicted on this chart.

LOCAL WEATHER: For extended remarks on the marine climate along foreign coasts, see the appropriate Directions (Blue and Planning Guides) prepared and published by the National Imagery and Mapping Agency. For the coasts of the United States and possessions, see the appropriate Coast Pilot prepared and published by the National Ocean Survey. The bimonthly publication "Mariner's Weather Log," prepared and published by the National Oceanic and Atmospheric Administration, Environmental Data and Information Service, carries information on marine climatic conditions.

MAGNETIC VARIATION: The lines of equal magnetic variation for the Epoch 2003 are shown by gray lines on the main body of the chart and the Mediterranean inset chart. The annual rate of change is shown by gray lines on the uppermost inset chart.

GREAT CIRCLE ROUTES: The courses shown on this chart are drawn to provide the shortest distance normally available during the month represented. Abnormal or severe ice or weather conditions may require vessels to alter course further south to the tracks represented on the late winter or spring Pilot charts. Ice and weather reports should be monitored constantly when proceeding south of Cape Race, as these waters are subject to irregular hazards.

WAVE HEIGHTS: The red lines on the main body of the chart indicate the percentage of frequency of wave heights equal to or greater than 12 feet. In analysis, when both sea and swell are reported, the higher value is used in the summation. Areas of predicted coastal areas and areas of concentrated ice most of the North Atlantic north of 25°N. Obvious wave heights are reported. Sea, swell, or more of the same. Frequencies of 10 percent or more also occur between the Baltic Islands and Sardinia and in the Caribbean Sea along the Colombia coast. A large wave reporting frequency greater than 50 percent lies north of 40°N and south of Iceland and between Newfoundland and Great Britain with its northeast tracking reaching a frequency of 60 percent.

GALES: Winds of Beaufort force 8 and higher are confined mainly to north of 30°N. Ten percent or more of the observations north of 30°N over the western Atlantic and the eastern Mediterranean report gale force winds. The only area in the Mediterranean Sea with gale frequencies of more than 10 percent extends from the coast of France for some 150 to 200 miles southeast through the Golfe du Lion. The highest frequency of gales, over 30 percent, occur just south of Cape Verde.

EXTRATROPICAL CYCLONES: During January lows form most frequently along a band of 150 to 250 miles wide stretching along the east coast of North America from the Carolinas to Nova Scotia. Other principal areas of cyclogenesis are along the Gulf Coast from Texas to Florida, northeast of Newfoundland, southeast of Iceland, the Golfe du Lion and Ligurian Sea, and the northern Atlantic Sea. Primary storm tracks extend from the Carolina capes and Great Lakes to Newfoundland when the system either head north toward the Davis Strait or northeast towards Iceland and the Norwegian Sea. Over the Mediterranean, secondary storm tracks extend from southern France to the northern Atlantic and from Crete to southern Turkey. Other secondary storm tracks cross Scotland, the North Sea, and enter northeastern Europe.

AIR TEMPERATURES: The mean air temperature in January ranges from less than -6°C over Baffin Bay to 22°C in the southern latitudes in the northern latitudes the isotherms are oriented from the north to the northeast following a path similar to that of the Gulf Stream. The extreme air temperatures range from below -18°C in the Davis Strait to over 32°C in the vicinity of Trinidad and Tobago. Along latitude 40°N the mean air temperature ranges from just under 4°C off the east coast of the United States to over 14°C north of the Azores.

OCEAN CURRENTS: The green arrows on the chart indicate the prevailing direction, and the numerals show the mean current speed in knots. The broken arrows indicate the probable surface current flow where data are sparse, but more importantly, they indicate directional variability such as in the Sargasso Sea, in regions of entrainment between currents setting in opposing directions, in nearshore tidal regions, and in the northern seas where currents are generally weak and easily influenced by winds.

TROPICAL CYCLONES: The occurrence of tropical cyclones during January in the North Atlantic is very rare. Only one tropical cyclone occurrence has been documented for the period of record, its location was to the east of the Dominican Republic and between 10°N and 22°N.

NOTE: It should be kept in mind that most ships and to a lesser extent, weather. The frequency of gales and high waves is generally greater during the winter months, but actuality reported due to climatological observations being biased toward favorable weather conditions.

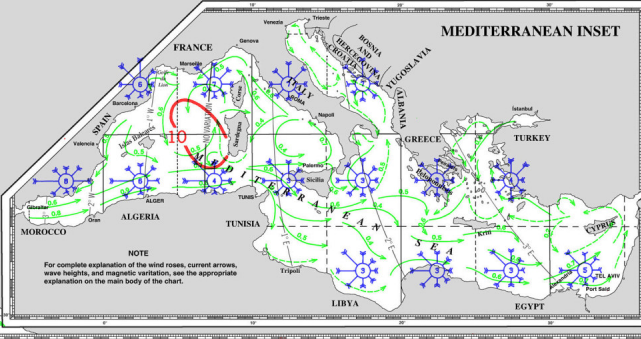
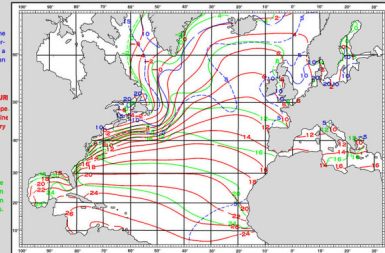
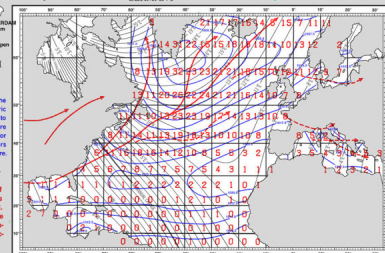
EXPLANATION OF WIND ROSES: The wind roses in blue color are those that have prevailed in the area over a considerable period of time. The wind percentages are summarized for calm and Cardinal and Intercardinal compass points. The arrows fly with the wind, indicating the direction from which the wind blew. The length of the shaft, measured from the outside of the circle to the end of the visible shaft (not necessarily to the end of the last feather), using the scale below, gives the percentage of the total number of observations in which the wind has blown from that direction. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the center of the circle gives the percentage of calms. When the arrow is too long (over 25 percent) to fit conveniently in the 5° square, the percentage is indicated numerically on the shaft.

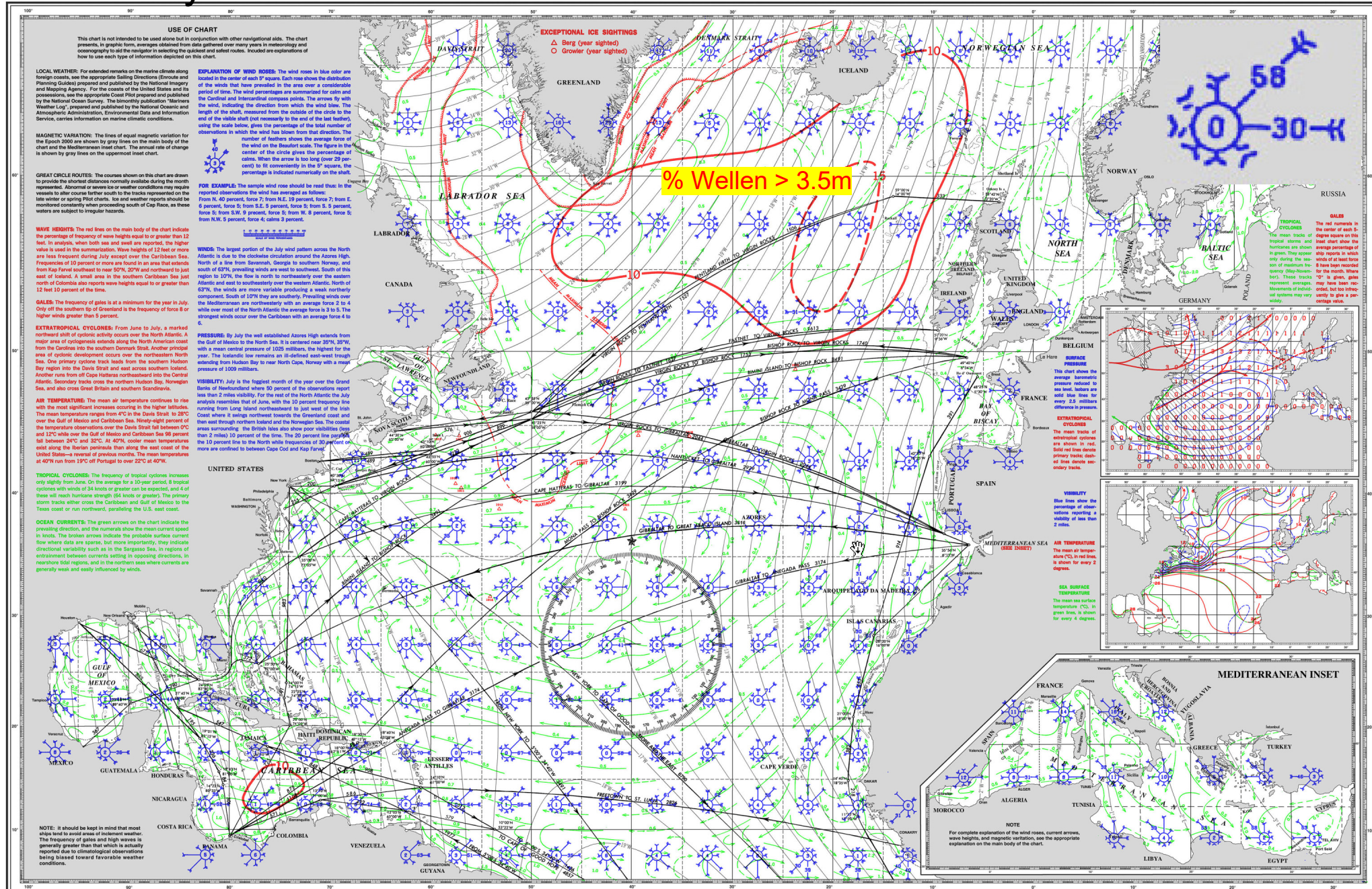
FOR EXAMPLE: The sample wind rose should be read thus: In the reported observations the wind has averaged as follows: From N. 40 percent; force 7; from N.E. 18 percent; force 7; from E. 6 percent; force 5; from S.E. 3 percent; force 5; from S. 3 percent; force 5; from S.W. 9 percent; force 5; from W. 8 percent; force 5; from N.W. 5 percent; force 4; calms 3 percent.

EXCEPTIONAL ICE SIGHTINGS
 ▲ Berg (year sighted)
 ○ Growler (year sighted)

% Wellen > 3.5m

TROPICAL CYCLONES
The red numbers in the center of each 5-degree square on this chart show the average percentage of ship reports in which winds of at least force 8 have been recorded for the month. Where "0" in green, gales may have been recorded, but no ships were on hand to give a coverage value.





USE OF CHART
 This chart is not intended to be used alone but in conjunction with other navigational aids. The chart presents in graphic form data gathered over many years in meteorology and oceanography to aid the navigator in selecting the quickest and safest routes. Included are explanations of how to use each type of information depicted on this chart.

LOCAL WEATHER: For extended remarks on the marine climate along foreign coasts, see the appropriate Sailing Directions (Pilotage and Planning Guides) prepared and published by the National Seavoyage and Mapping Agency. For the coastwise Pilot prepared and published by the National Ocean Survey. The bimonthly publication "Mariners Weather Log," prepared and published by the National Oceanic and Atmospheric Administration, Environmental Data and Information Service, carries information on marine climatic conditions.

MAGNETIC VARIATION: The lines of equal magnetic variation for the Epoch 2000 are shown by gray lines on the chart. The annual rate of change is shown by gray lines on the uppermost inset chart.

GREAT CIRCLE ROUTES: The courses shown on this chart are drawn to provide the shortest distances normally available during the month represented. Abnormal or severe ice or weather conditions may require vessels to alter course further south to the tracks represented on the late winter or spring Pilot charts. Ice and weather reports should be monitored constantly when proceeding south of Cape Race, as these waters are subject to irregular hazards.

WAVE HEIGHTS: The red lines on the main body of the chart indicate the percentage of frequency of wave heights equal to or greater than 12 feet. In analysis, when both sea and swell are reported, the higher value is used in the summation. Wave heights of 12 feet or more are less frequent during July except over the Caribbean Sea. Frequencies of 10 percent or more are found in an area that extends from Cape Fear to southeast to near 20°N, 20°W and northeast to just east of Iceland. A small area in the southern Caribbean Sea just north of Colombia also reports wave heights equal to or greater than 12 feet 10 percent of the time.

GALES: The frequency of gales is at a minimum for the year in July. Only off the southern tip of Greenland is the frequency of force 8 or higher winds greater than 5 percent.

EXTRATROPICAL CYCLONES: From June to July, a marked northeast shift of cyclonic activity occurs over the North Atlantic. A major area of cyclonic development extends along the North American coast from the Carolines into the southern Denmark Strait. Another principal area of cyclonic development occurs over the northeastern North Sea. One primary cyclone track leads from the southern Hudson Bay region into the Davis Strait and east across southern Iceland. Another runs from off Cape Hatteras northeastward into the Central Atlantic. Secondary tracks over the northern Hudson Bay, Norwegian Sea, and also over the Great Britain and southern Scandinavia.

AIR TEMPERATURE: The mean air temperature continues to rise with the most significant increases occurring in the higher latitudes. The mean temperature ranges from 4°C in the Davis Strait to 28°C over the Gulf of Mexico and Caribbean Sea. Ninety-eight percent of the temperature observations over the Davis Strait fall between 0°C and 12°C while over the Gulf of Mexico and Caribbean Sea 98 percent fall between 24°C and 32°C. At 40°N, cooler mean temperatures exist along the Iberian peninsula than along the east coast of the United States—a reversal of previous months. The mean temperature at 40°N run from 19°C off Portugal to over 22°C at 40°W.

TROPICAL CYCLONES: The frequency of tropical cyclones increases only slightly from June. On the average for a 10-year period, 8 tropical cyclones with winds of 34 knots or greater can be expected, and 4 of them will reach hurricane strength (66 knots or greater). The primary storm tracks either cross the Caribbean and Gulf of Mexico to the Texas coast or run northward, paralleling the U.S. east coast.

OCEAN CURRENTS: The green arrows on the chart indicate the prevailing direction, and the numerals show the mean current speed in knots. The broken arrows indicate the probable surface current flow where data are sparse, but more importantly, they indicate directional variability such as in the Sargasso Sea, in regions of entrainment between currents setting in opposing directions, in nearshore tidal regions, and in the northern seas where currents are generally weak and easily influenced by winds.

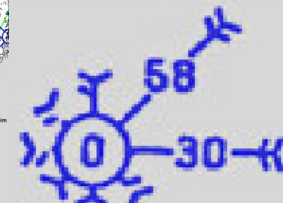
NOTE: It should be kept in mind that most ships tend to avoid areas of inclement weather. The frequency of gales and high waves is generally greater than that which is actually reported due to climatological observations being biased toward favorable weather conditions.

EXPLANATION OF WIND ROSES: The wind roses in blue color are located in the center of each 5° square. Each rose shows the distribution of the winds that have prevailed in the area over a considerable period of time. The wind percentages are summarized for calm and Cardinal and intercardinal compass points. The arrows, by with the wind, indicating the direction from which the wind blew. The length of the shaft, measured from the outside of the circle to the end of the visible shaft (not necessarily to the end of the last feather), using the scale below, gives the percentage of the total number of observations in which the wind has blown from that direction. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the center of the circle gives the percentage of calms. When the arrow is too long over 20 percent) to fit conveniently in the 5° square, the percentage is indicated numerically on the shaft.

FOR EXAMPLE: The sample wind rose should be read thus: In the reported observations the wind has averaged as follows:
 From N. 40 percent, force 7; from N.E. 19 percent, force 7; from E. 6 percent, force 5; from S.E. 5 percent, force 5; from S. 5 percent, force 5; from S.W. 9 percent, force 5; from W. 8 percent, force 5; from N.W. 5 percent, force 4; calms 3 percent.

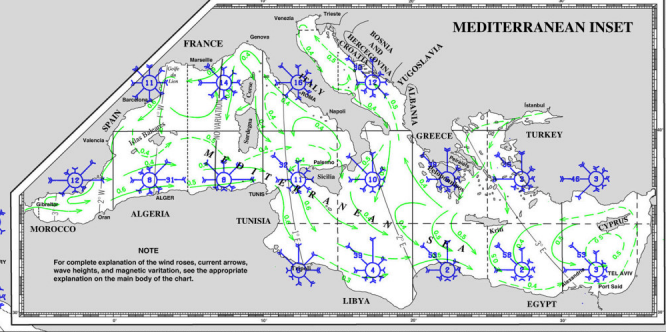
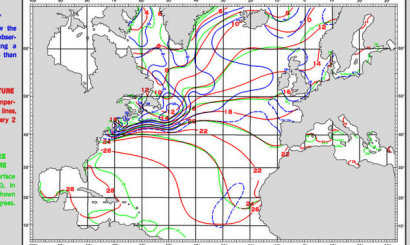
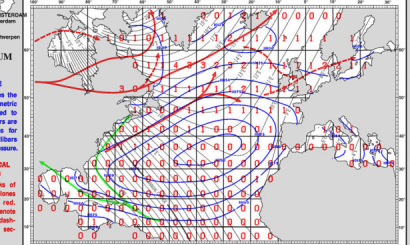
EXCEPTIONAL ICE SIGHTINGS
 ▲ Berg (year sighted)
 ○ Growler (year sighted)

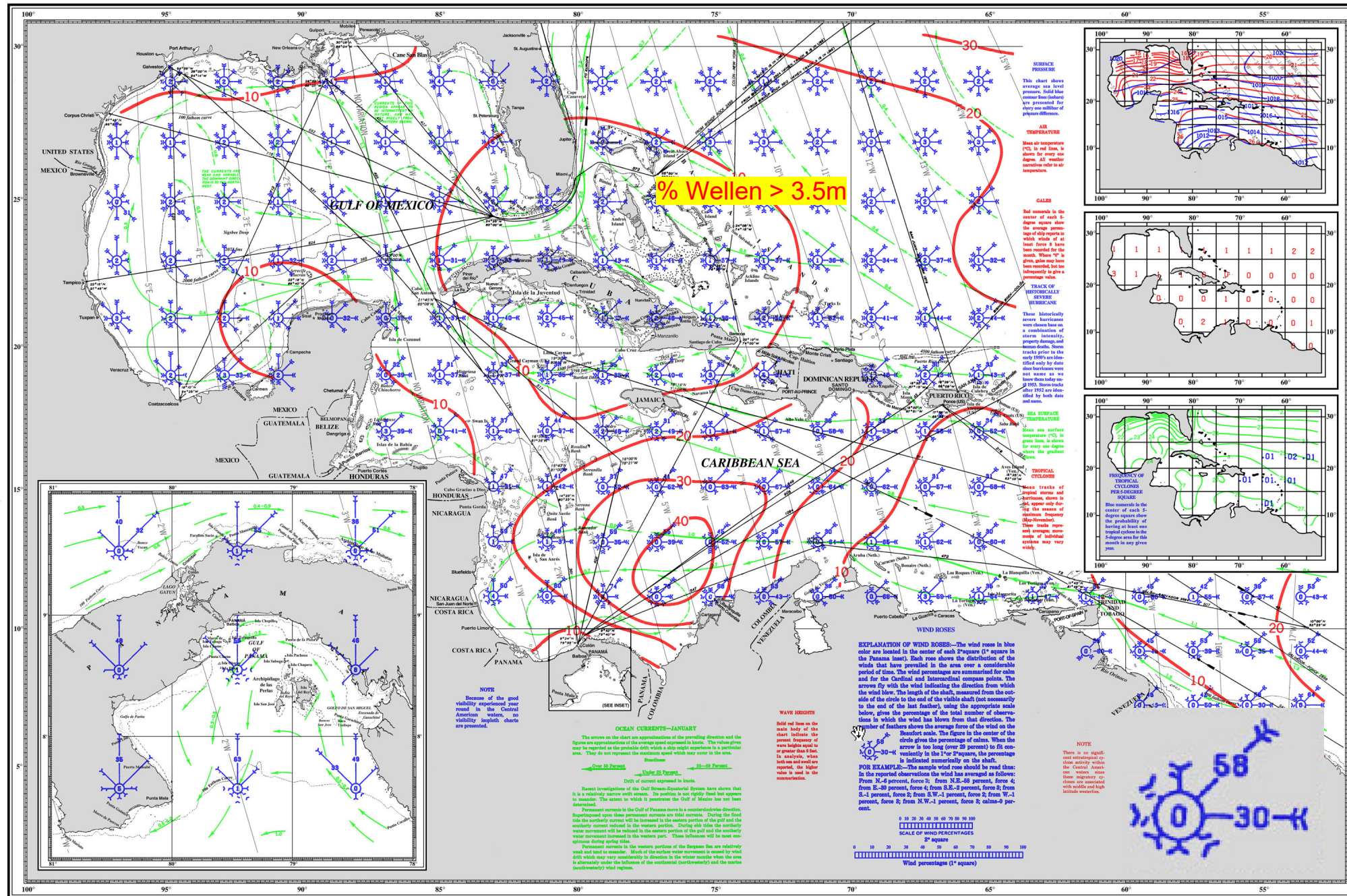
% Wellen > 3.5m



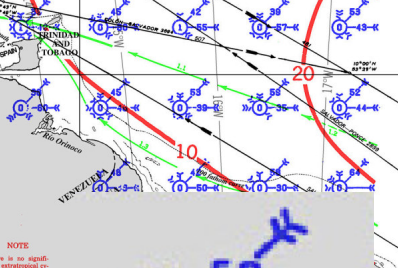
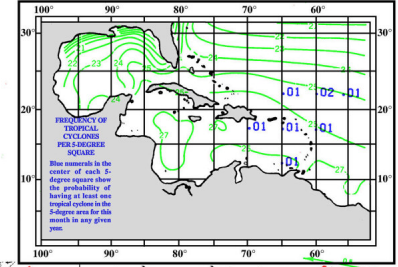
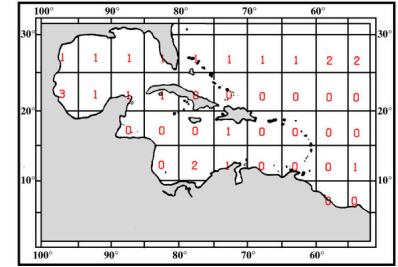
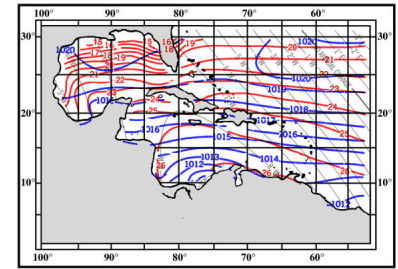
TROPICAL CYCLONES
 The mean tracks of tropical storms and hurricanes are shown in green. They appear only during the season of maximum frequency (May-November). These tracks represent average movements of individual systems may vary widely.

GALES
 The red numerals in the center of each 5-degree square on the inset chart show the average percentage of ship reports in which winds of at least force 8 have been recorded for the month (where "0" is gales, gales may have been recorded, but too infrequently to give a percentage value).



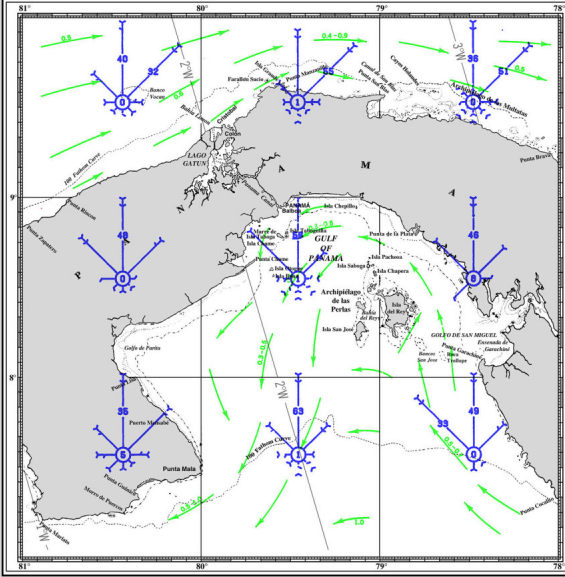
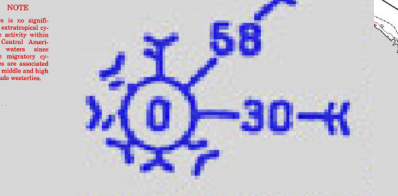
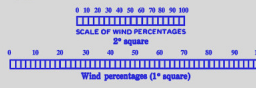


% Wellen > 3.5m



EXPLANATION OF WIND ROSES—The wind rose in blue color are located in the center of each 2° square (1° square in the Panama Canal). Each rose shows the distribution of the winds that have prevailed in the area over a considerable period of time. The wind percentages are summarized for calm and for the Cardinal and Intercardinal compass points. The arrows fly with the wind indicating the direction from which the wind blew. The length of the shaft, measured from the outside of the circle to the end of the viable shaft (not necessarily to the end of the last feather), using the appropriate scale below, gives the percentage of the total number of observations in which the wind has blown from that direction. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the center of the circle gives the percentage of calms. When the arrow is too long (over 20 percent) to fit conveniently in the 2° square, the percentage is indicated numerically on the shaft.

FOR EXAMPLE—The sample wind rose should be read thus: In the reported observations the wind has averaged as follows: From N.—5 percent; force 2; from N.E.—68 percent; force 4; from E.—40 percent; force 4; from E.S.—3 percent; force 2; from S.—1 percent; force 2; from S.W.—1 percent; force 2; from W.—1 percent; force 2; from W.—1 percent; force 2; calms—0 percent.



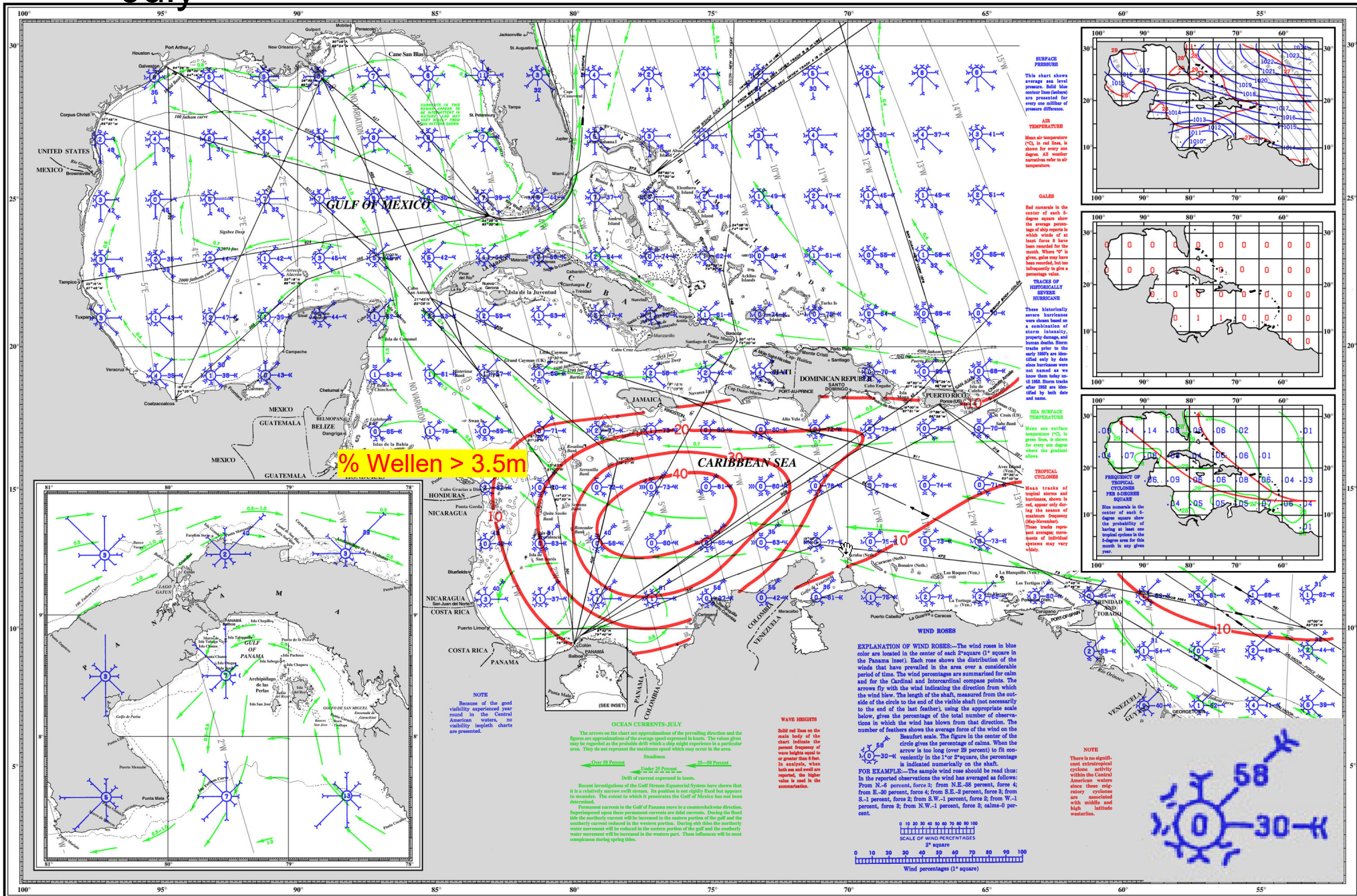
NOTE
Because of the good visibility experienced near round in the Central American waters, no visibility height charts are presented.

OCEAN CURRENTS—JANUARY
The arrows on the chart are approximations of the prevailing direction and the figure are approximations of the average speed expressed in knots. The values given may be regarded as the probable drift which a ship might experience in a particular area. They do not represent the maximum speed which may occur in the area.

NOTE
Recent investigations of the Gulf Stream-Florida Current System have shown that it is a relatively narrow swift stream. Its position is not rigidly fixed but appears to wander. The extent to which it penetrates the Gulf of Mexico has not been determined.

Permanent currents in the Gulf of Panama move in a counterclockwise direction. Superimposed upon these permanent currents are tidal currents. During the flood tide the northerly current will be increased in the eastern portion of the Gulf and the southerly current reduced in the western portion. During ebb tide the southerly water movement will be reduced in the eastern portion of the Gulf and the southerly water movement increased in the western part. These influences will be most conspicuous during spring tides.

Permanent currents in the western portion of the Sargasso Sea are relatively weak and tend to meander. Much of the surface water movement is caused by wind drift which may vary considerably in direction in the winter months when the area is alternately under the influence of the easterlies (northerly) and the trade (southerly) wind regions.



SURFACE PRESSURE
This chart shows average sea level pressures. Solid blue numbers show barometric pressure. All weather observations refer to air temperature.

AIR TEMPERATURE
Mean air temperature (°C) in red lines. It shows for every one degree. All weather observations refer to air temperature.

GALES
Red numbers in the center of each 5-degree square show the average percentage of observations in which winds of at least force 10 in gales, gales may have been recorded, but are not included in this percentage.

TRACKS OF HISTORICALLY SEVERE HURRICANES
These historically severe hurricanes were shown based on a classification of storm intensity, property damage and human deaths. Storm tracks only for the early 1900's are blue. Storm tracks after 1980 are blue. Storm tracks after 1980 are blue and some.

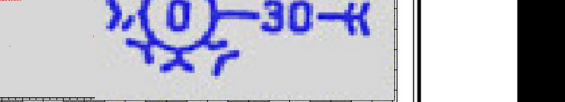
SEA SURFACE TEMPERATURE
Mean sea surface temperature (°C) in green lines. It shows for every one degree where the gradient lines.

TROPICAL CYCLONES
Mean tracks of tropical storms and hurricanes shown in red, appear only during the season of maximum frequency. These tracks represent average, not individual systems may vary widely.

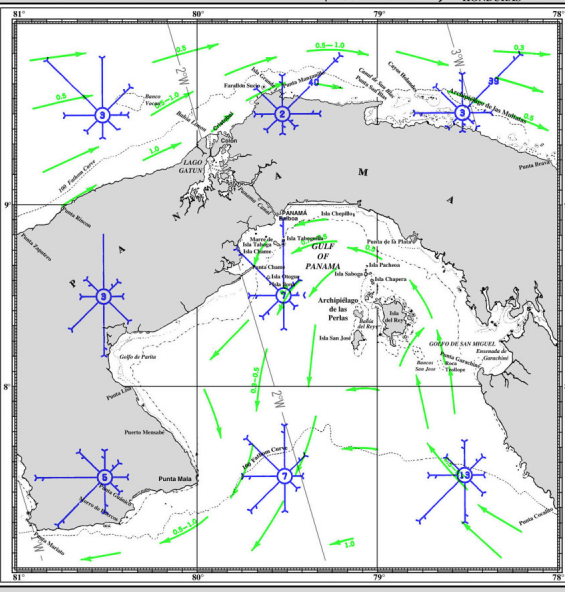
FREQUENCY OF TROPICAL CYCLONES PER 5-DIGREE SQUARES
This number in the center of each 5-degree square shows the probability of having at least one tropical cyclone in the 5-degree area for this month in any given year.

WIND ROSES
EXPLANATION OF WIND ROSES—The wind roses in blue color are located in the center of each 5° square (1° square in the Panama area). Each rose shows the distribution of the winds that have prevailed in the area over a considerable period of time. The wind percentages are summarized for calm and for the Cardinal and Inter-cardinal compass points. The arrows fly with the wind indicating the direction from which the wind blow. The length of the shaft, measured from the outside of the circle to the end of the visible shaft (not necessarily to the end of the last feather), using the appropriate scale below, gives the percentage of the total number of observations in which the wind has blown from that direction. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the center of the circle gives the percentage of calm. When the arrow is too long (over 20 percent) to fit conveniently in the 1° or 2° square, the percentage is indicated numerically on the shaft.

NOTE
There is no significant extratropical cyclonic activity within the Central American waters since these migratory cyclones are dissipated with middle and high latitudes westerlies.



% Wellen > 3.5m



OCEAN CURRENTS—JULY
The arrows on the chart are approximations of the prevailing direction and the figure are approximations of the average speed expressed in knots. The values given may be regarded as the probable depth which a ship might experience in a particular area. They do not represent the maximum speed which may occur in the area.

NOTE
Because of the great variability experienced year round in the Central American waters, no visibility length charts are presented.

Under 25 Percent
Steadiness 25-50 Percent

Under 25 Percent
Under 25 Percent

Recent investigations of the Gulf Stream-Sargassum System have shown that it is a relatively narrow swift stream. Its position is not rigidly fixed but appears to meander. The extent to which it penetrates the Gulf of Mexico has not been determined.

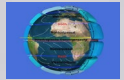
Permanent currents in the Gulf of Panama move in a counter-clockwise direction. Superimposed upon these permanent currents are tidal currents. During the flood tide the westerly current will be increased in the eastern portion of the gulf and the southerly current reduced in the western portion. During ebb tide the southerly water movement will be reduced in the eastern portion of the gulf and the southerly water movement will be increased in the western part. These influences will be most conspicuous during spring tides.

DSV METEO – SPEZIAL - SEMINAR BARFUSSROUTE, TROPEN, KARIBIK

Bernd Richter, Deutscher Wetterdienst
bernd.richter@web.de <http://www.vorticity.de>



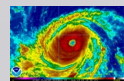
➤ **Allgemeines**



➤ **(Zirkulation und Idealzyklone)**



➤ **Gewitter, Tornados et al.**



➤ **Tropische Stürme, Hurricanes**



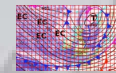
➤ **Strömungen, Gezeiten**



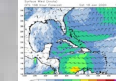
➤ **Regionale Windsysteme**



➤ **PILOT – Charts NAT Nordatlantik**



➤ **Wetter im Internet (GRIB)**



➤ **www.passageweather.com**



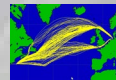
➤ **(Satellit / Radar)**



➤ **((Gross-) Wetterlagen)**



➤ **(Aktuelle Wetterlage)**

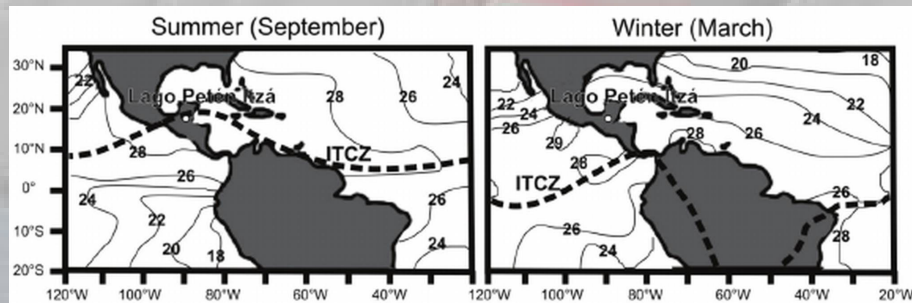


➤ **(Törnplanung)**

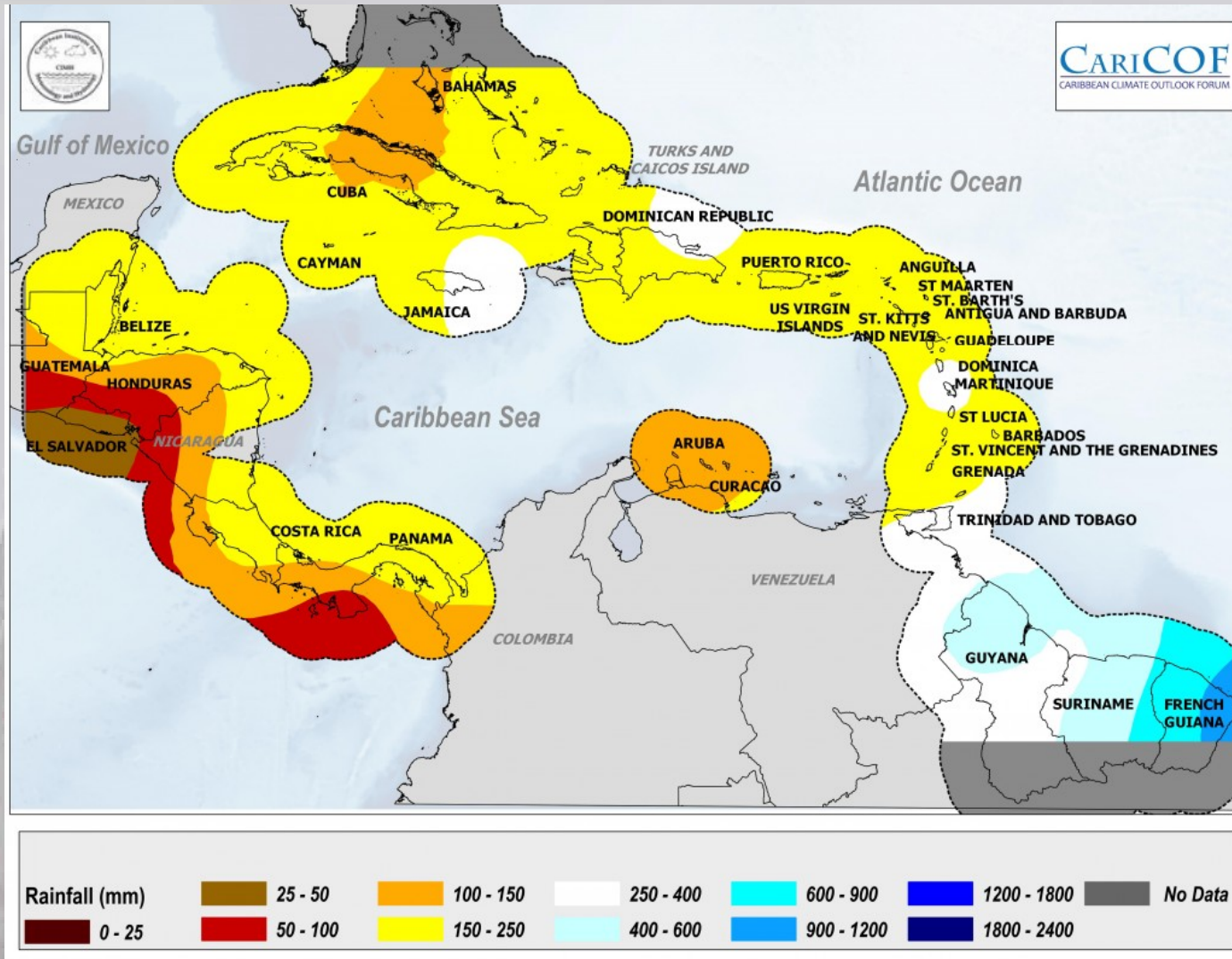


Praktiker erfahren oft sehr schmerzlich, dass ihnen die Theorie gefehlt hat.

REGIONALE WINDSYSTEME KARIBIK



REGIONALE WINDSYSTEME KARIBIK

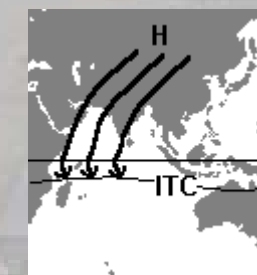
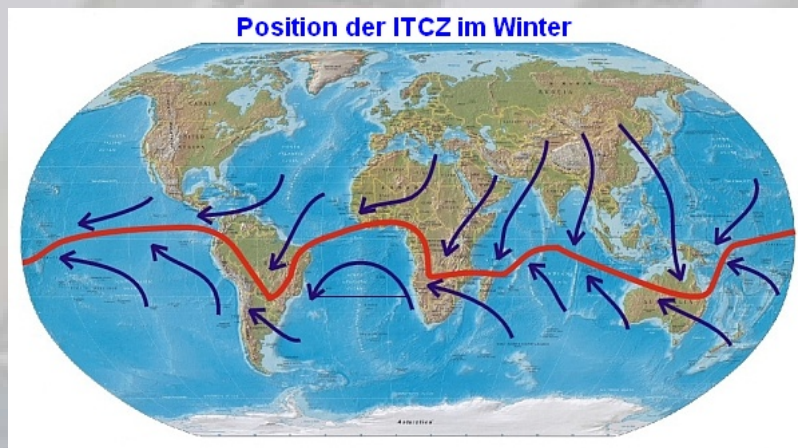
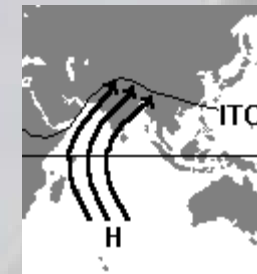
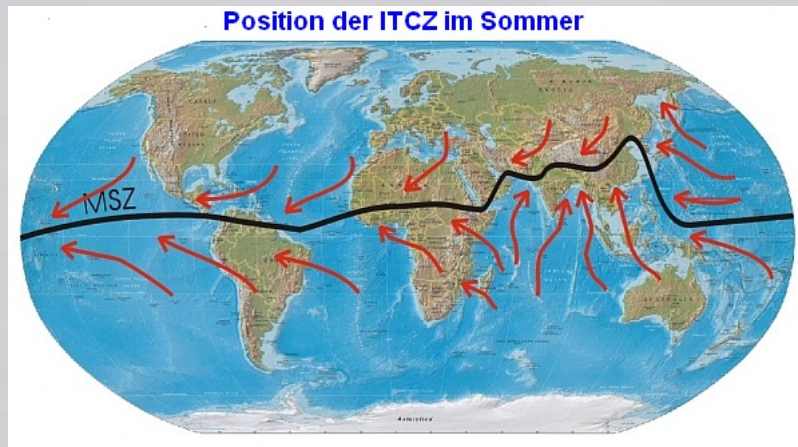


Windsysteme sind geprägt durch Passatzirkulation

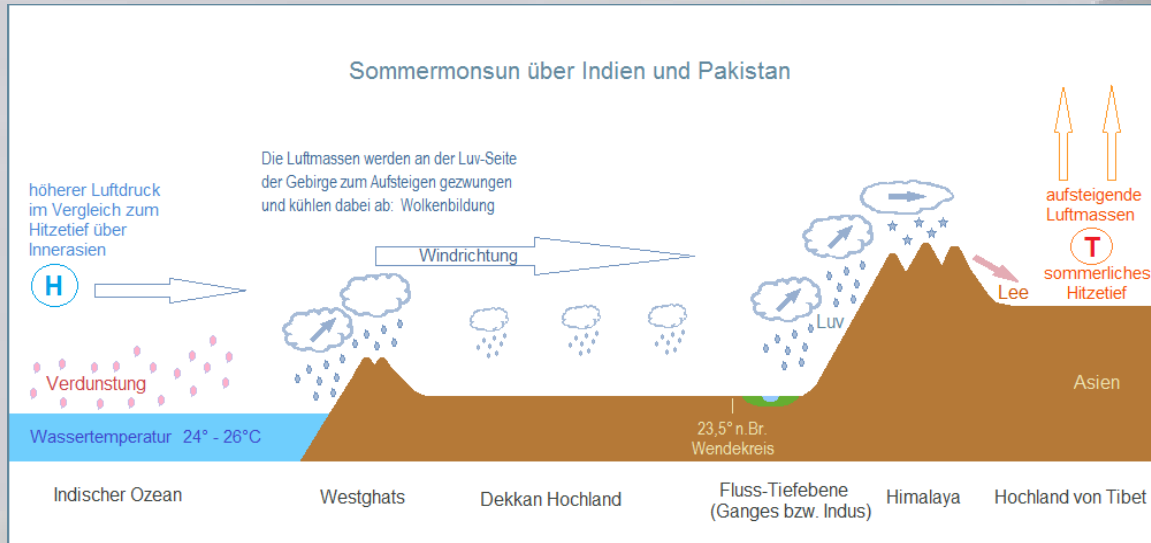
TROPISCHE WINDSYSTEME INDIEN MONSUN

ITCZ-Lage (Jahreszeit) abhängige Zirkulation, 'Gross-skalige Seewind-Zirkulation'

Sommer: Hitzetief Tibet SW - Monsun Jun-Sep Regenzeit
 Winter: Kältehoch Sibirien NE - Passat Wintermonsun Okt-Mai Trockenzeit



TROPISCHE WINDSYSTEME INDIEN MONSUN

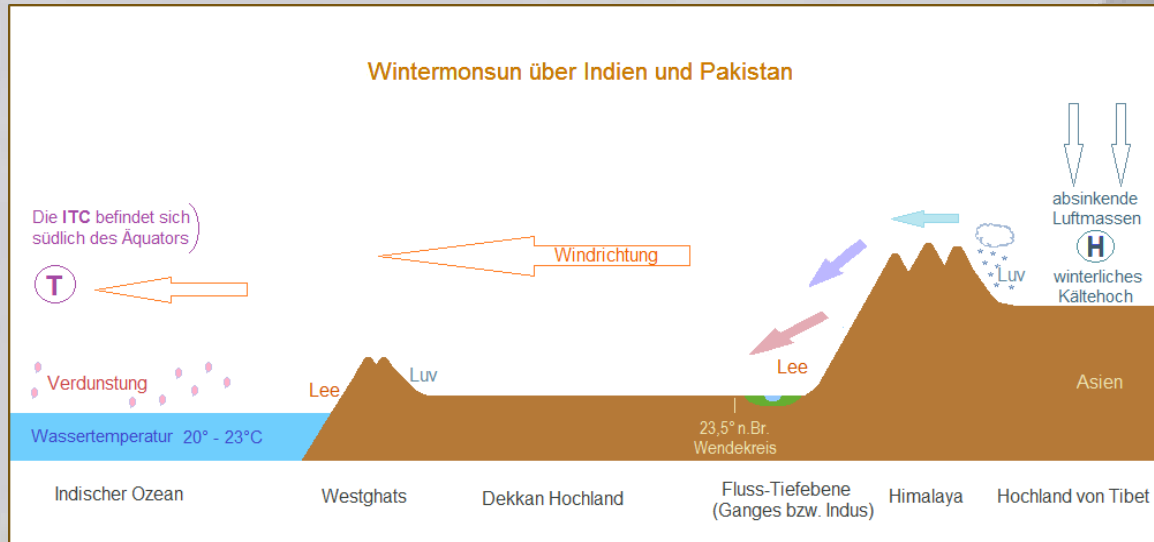


Sommermonsun, Regenzeit

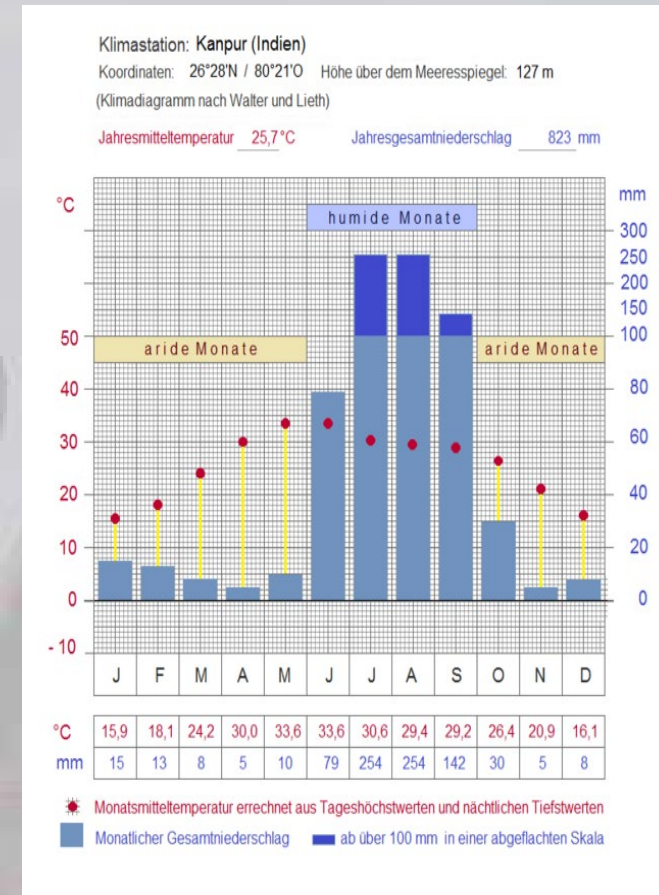


RR ~ 12000 mm / Jahr

TROPISCHE WINDSYSTEME – INDIEN MONSUN



Wintermonsun, Trockenzeit



Jahresgang Kanpur, Indien