

VFR NAVIGATION - 1

ANDREA -
NPV1208



napulevola.it

AVVERTENZA



Le informazioni contenute in questa presentazione
sono semplificate e per uso esclusivo nell'ambito
della simulazione di volo.

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INTRODUZIONE

COSA INTENDIAMO
PER NAVIGAZIONE
VFR?



AIR LAW

Normativa che stabilisce le regole
del volo VFR. Esempio: minime
metereologiche o di quota.

La normativa VFR non fa
riferimento a nessun particolare
metodo di navigazione



NAVIGAZIONE AEREA

Qualsiasi metodo di navigazione
può essere adoperato in VFR,
purché si resti nei limiti imposti
dalla normativa.

LA NAVIGAZIONE

PROBLEMI FONDAMENTALI

- Determinare la posizione attuale
- Come arrivare a destinazione

PARTICOLARITÀ DELLA NAVIGAZIONE AEREA

- Impossibilità a fermarsi
- Autonomia limitata
- Velocità molto elevate
- Notevole influenza di fattori meteorologici
- Operazioni *single-pilot*

As all experienced navigators know, it is extremely easy to get lost."

—Philip Van Horn Weems, Air Navigation, 1931

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PROGRAMMA



NAVIGAZIONE AEREA



- Sistema di coordinate globali e locali
- Declinazione magnetica
- Miglio nautico
- Tipi di rotte
- Cenni di cartografia
- Litte Navmap



ULTRA semplificazione

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LA TERRA



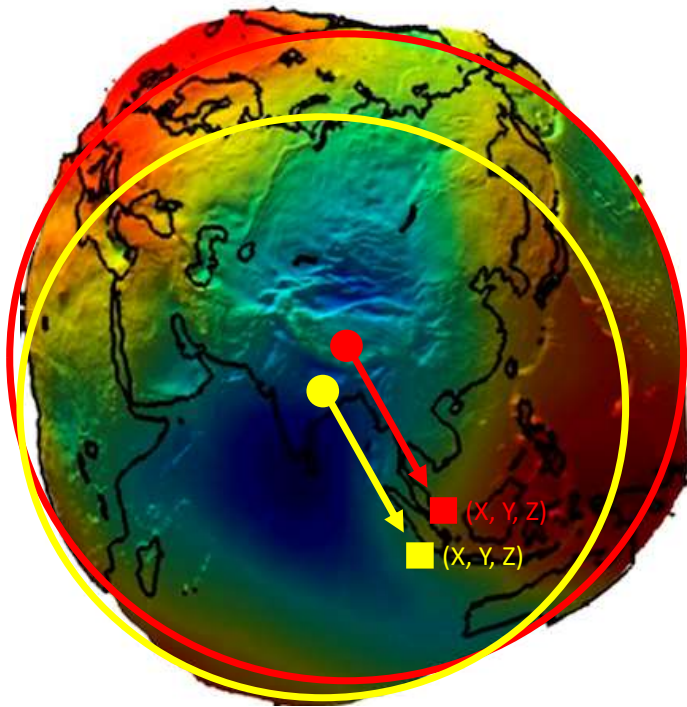
?



LA TERRA E' UN GEOIDE

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DATUM GEODETICO



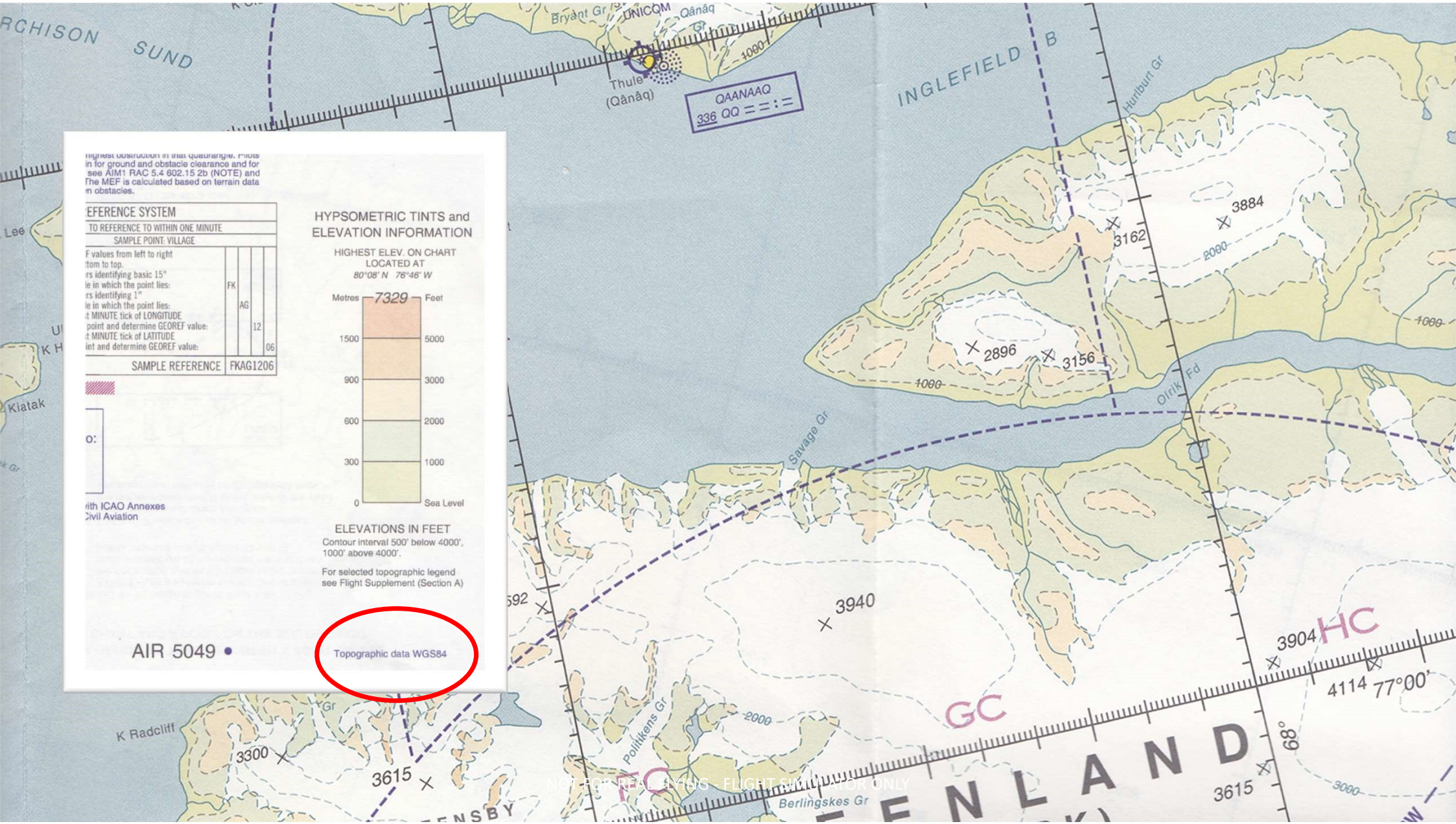
Per usare un sistema di coordinate globale
abbiamo bisogno di un datum geodetico
comune

Dall'anno 2000 l'ICAO ha imposto a tutti i
paesi membri l'uso di un *datum* comune
conosciuto come WGS-84.

Il GPS usa WGS-84.



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highest obstruction in that quadrangle. minus
in for ground and obstacle clearance and for
see AIM1 RAC 5.4 602.15 2b (NOTE) and
The MEF is calculated based on terrain data
in obstacles.

REFERENCE SYSTEM

TO REFERENCE TO WITHIN ONE MINUTE

SAMPLE POINT: VILLAGE

F values from left to right
from top to bottom:
rs identifying basic 15°
le in which the point lies:
rs identifying 1°
le in which the point lies:
t MINUTE tick of LONGITUDE
point and determine GEOREF value:
t MINUTE tick of LATITUDE
int and determine GEOREF value:

FK	AG	12	06
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SAMPLE REFERENCE FKAG1206

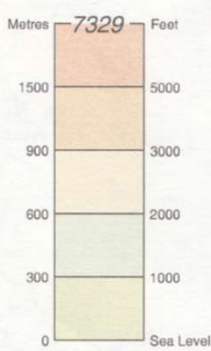


0:

with ICAO Annexes
Civil Aviation

HYPSONETRIC TINTS and ELEVATION INFORMATION

HIGHEST ELEV. ON CHART
LOCATED AT
80°08' N 76°46' W



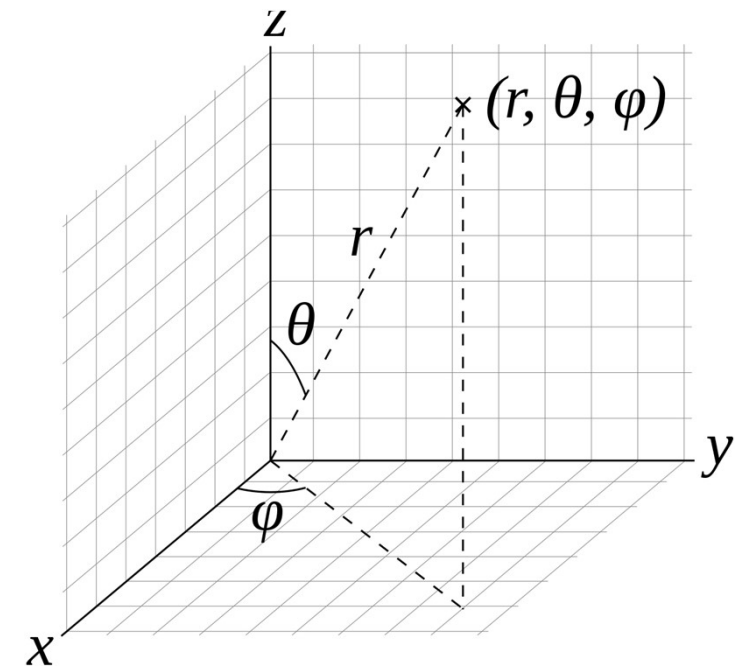
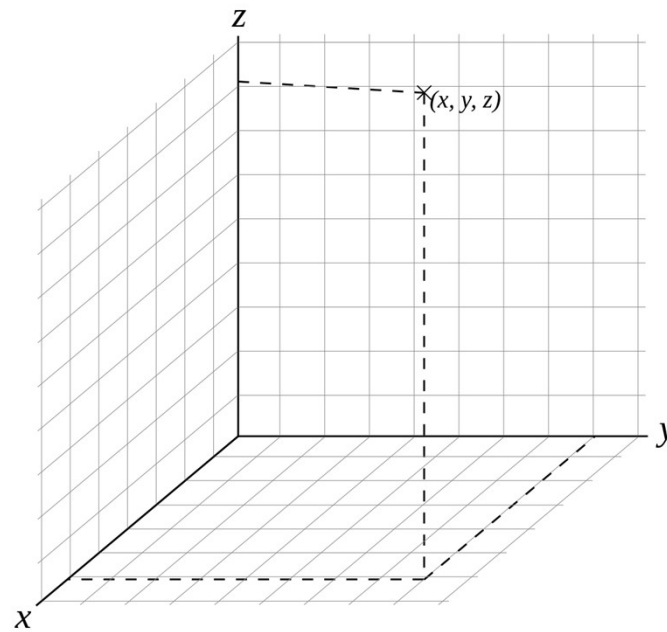
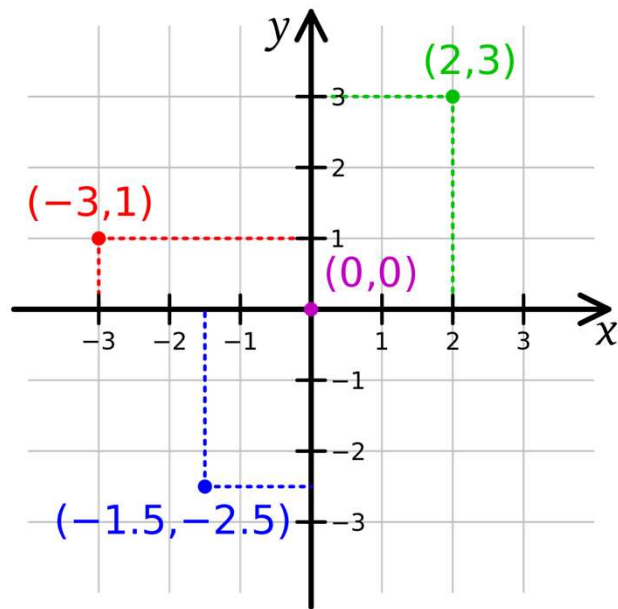
ELEVATIONS IN FEET
Contour interval 500' below 4000',
1000' above 4000'.

For selected topographic legend
see Flight Supplement (Section A)

AIR 5049 •

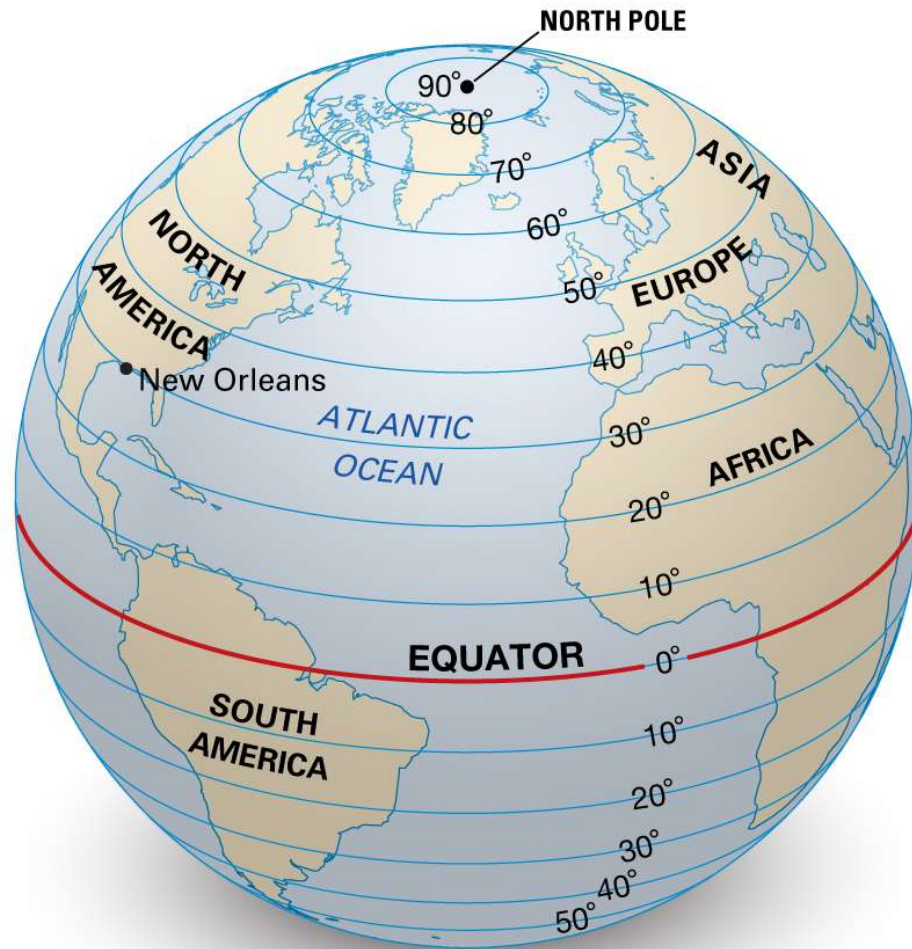
Topographic data WGS84

SISTEMA DI COORDINATE



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COORDINATE GLOBALI

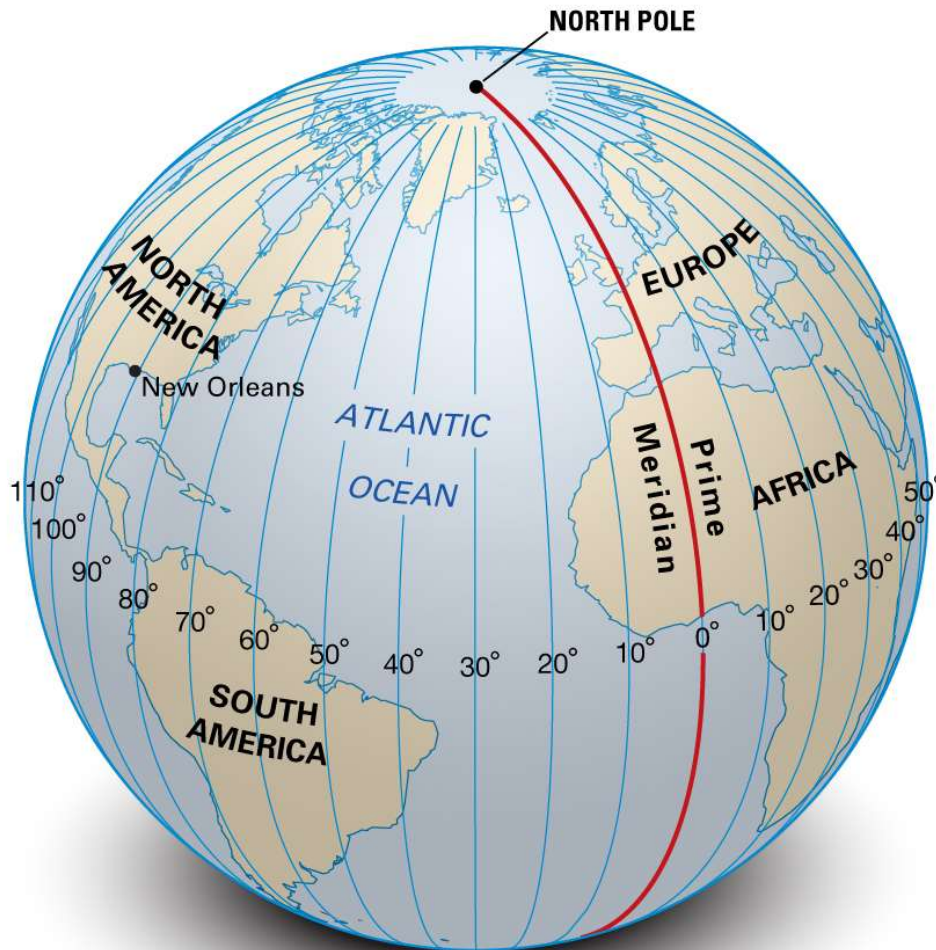


FACTS ABOUT LINES OF LATITUDE

- Are known as parallels.
- Run in an east-west direction.
- Measure distance north or south from the Equator.
- Are parallel to one another and never meet.
- Cross the prime meridian at right angles.
- Lie in planes that cross the Earth's axis at right angles.
- Get shorter toward the poles, with only the Equator, the longest, a great circle.

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COORDINATE GLOBALI



FACTS ABOUT LINES OF LONGITUDE

- Are known as meridians.
- Run in a north-south direction.
- Measure distance east or west of the prime meridian.
- Are farthest apart at the Equator and meet at the poles.
- Cross the Equator at right angles.
- Lie in planes that pass through the Earth's axis.
- Are equal in length.
- Are halves of great circles.

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COORDINATE GLOBALI

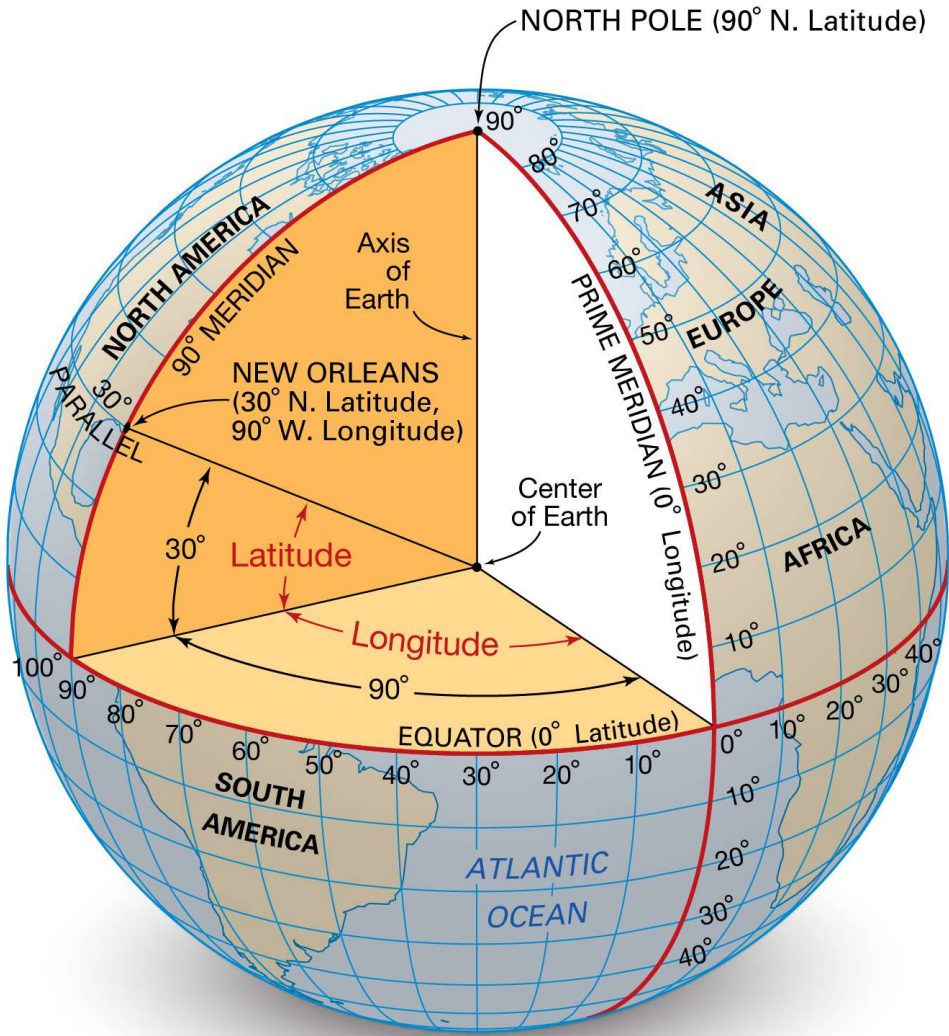
30° N090° W

29° 57' 00" N090° 04' 00" WGRADI SESSAGESIMALI (DMS)

1° grado = 60' primi
1' primo = 60" secondi

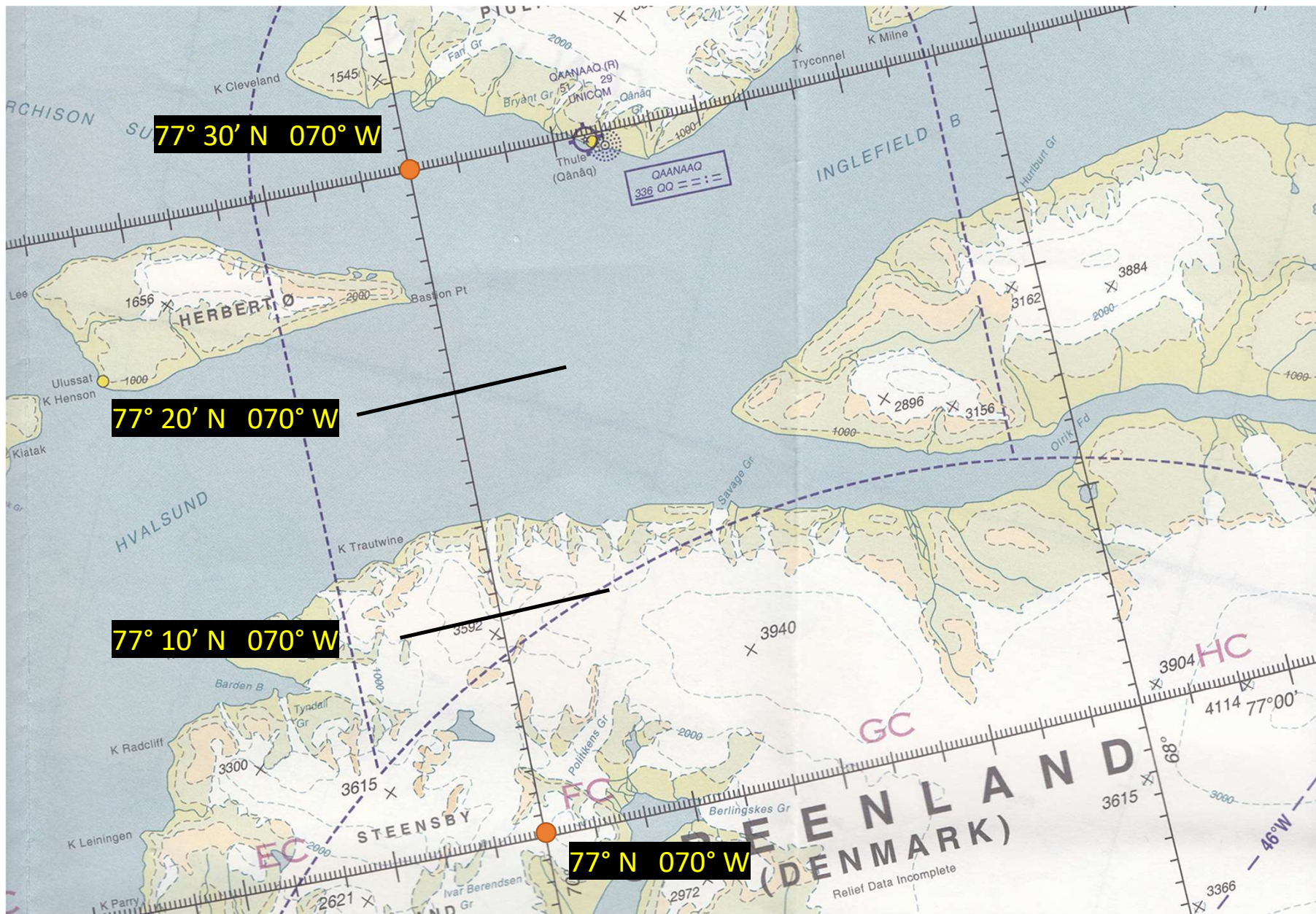
29°.95 N090°.08 WGRADI SESSADECIMALI (DD)

How Written	Level of Accuracy	Typical Application
5321N	1 NM = 6080 feet	En route navigation
5321.3N	600 feet or 185 m	INS, IRS, FMS, GPS displays
53°21'17"N	100 feet or 30 m	Airfield diagram chart
53°21'17.3"N	10 feet or 3 metres	Location of precision navaid (ILS)
53°21'17.32"N	1 foot or 30 cm	Calibration of precision navaid

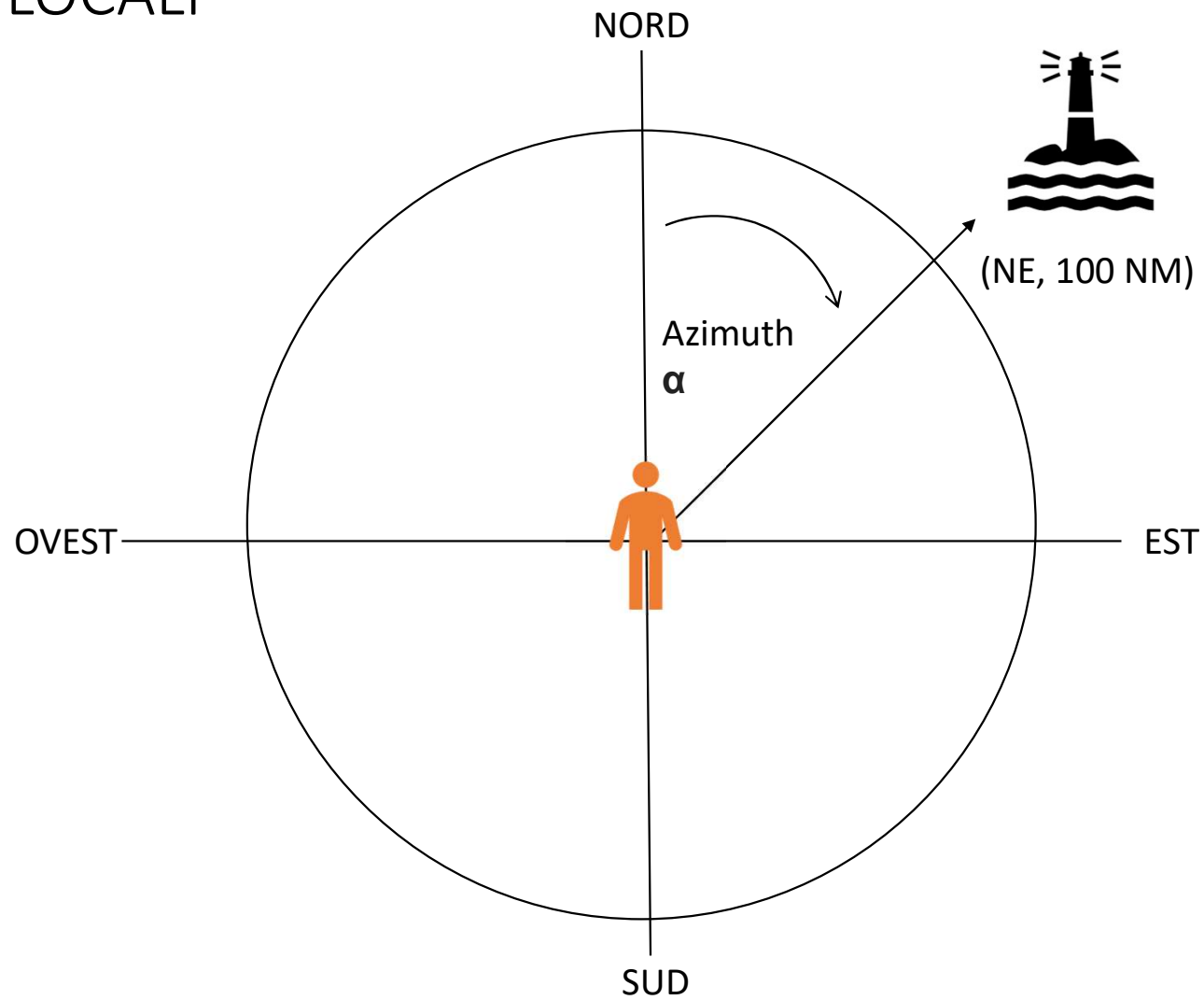


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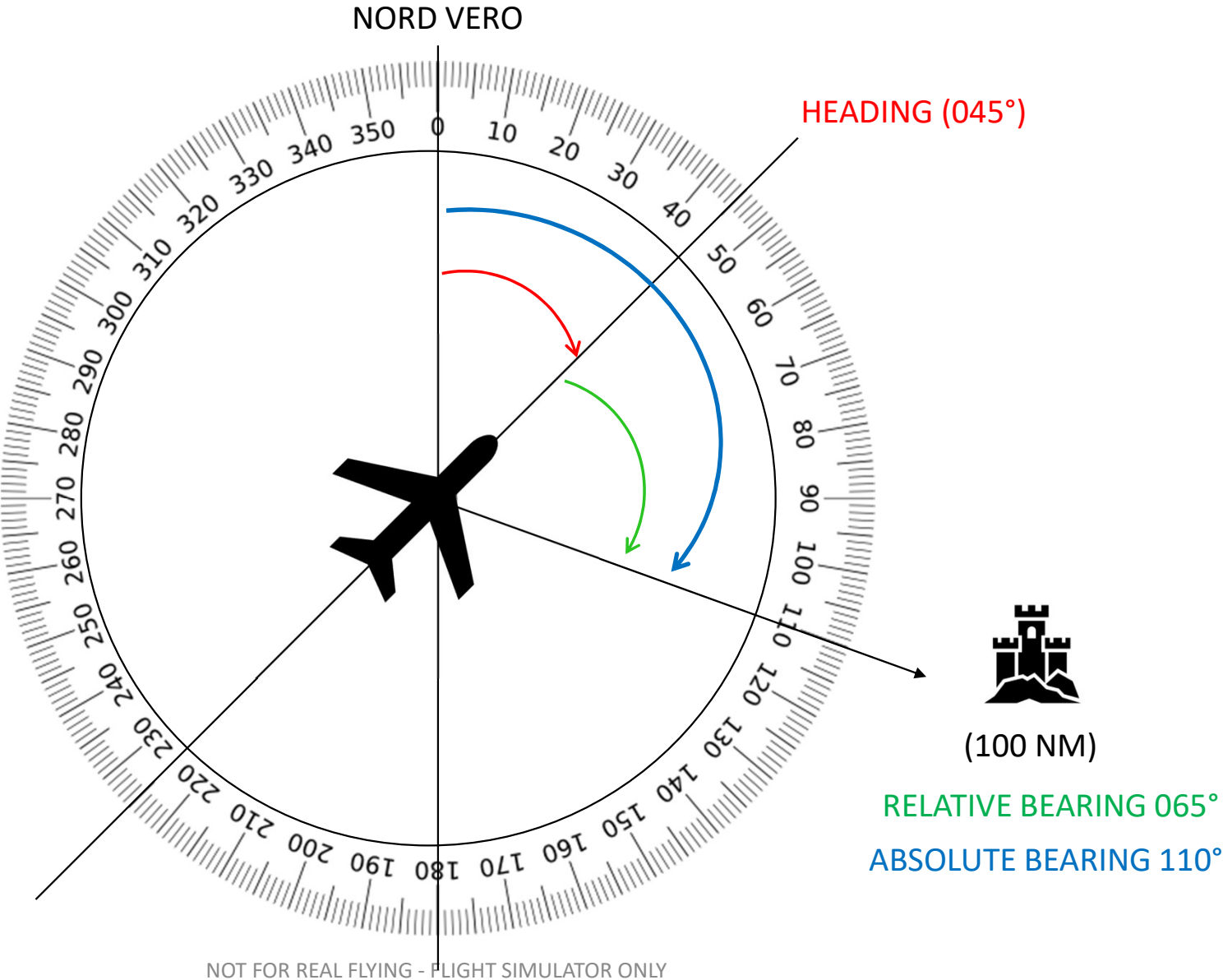


COORDINATE LOCALI

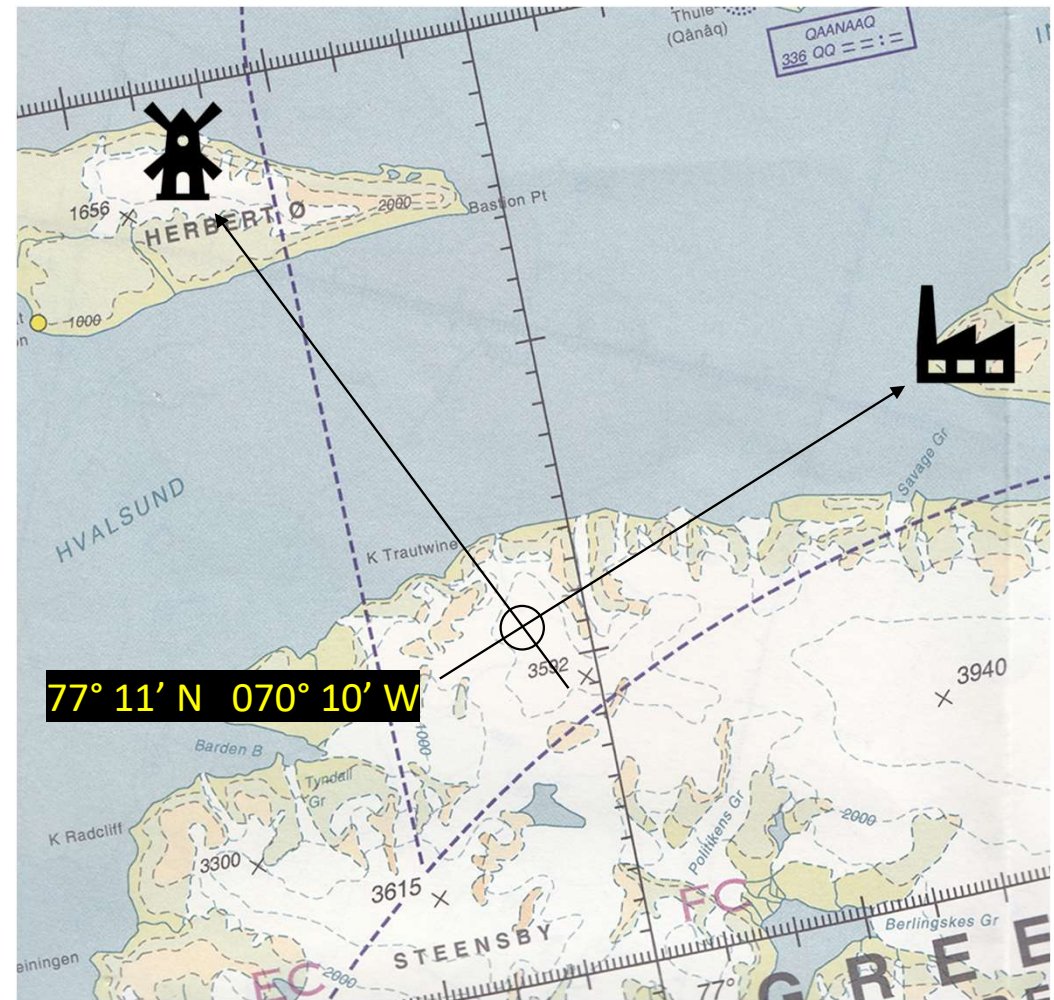
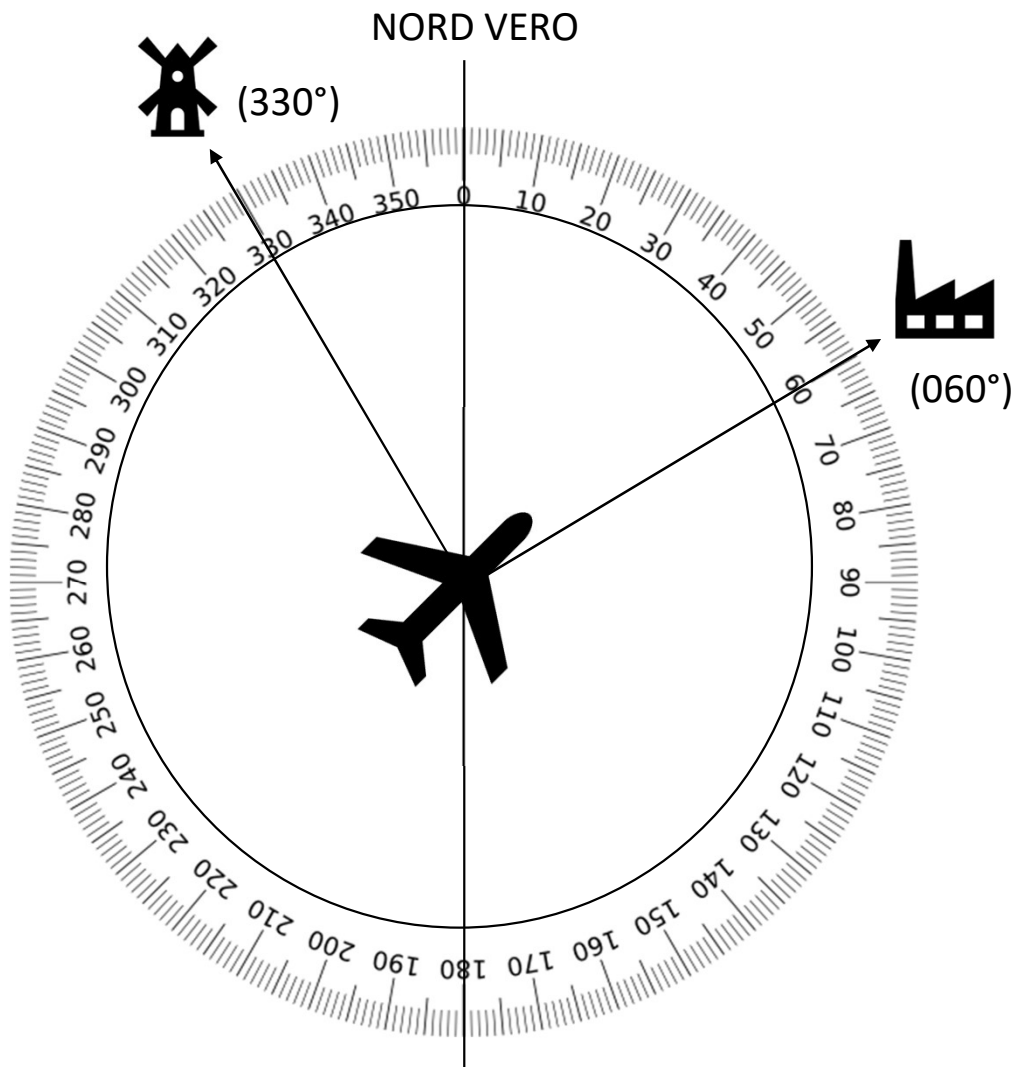


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DIREZIONE

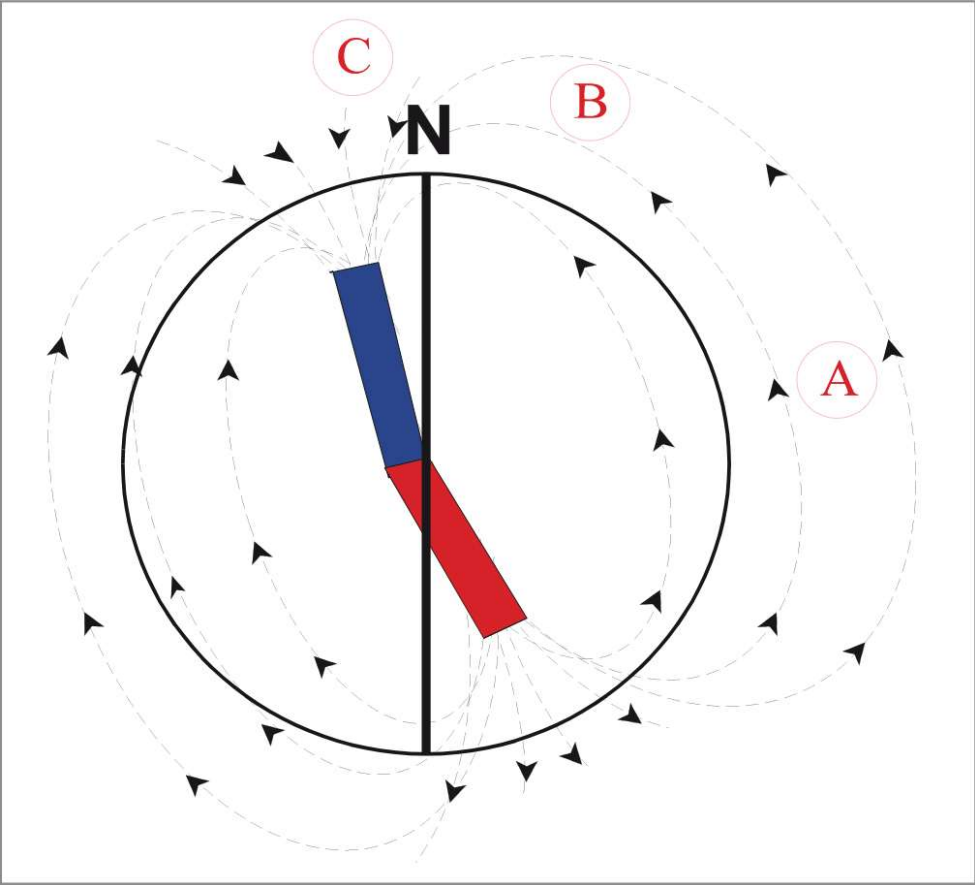
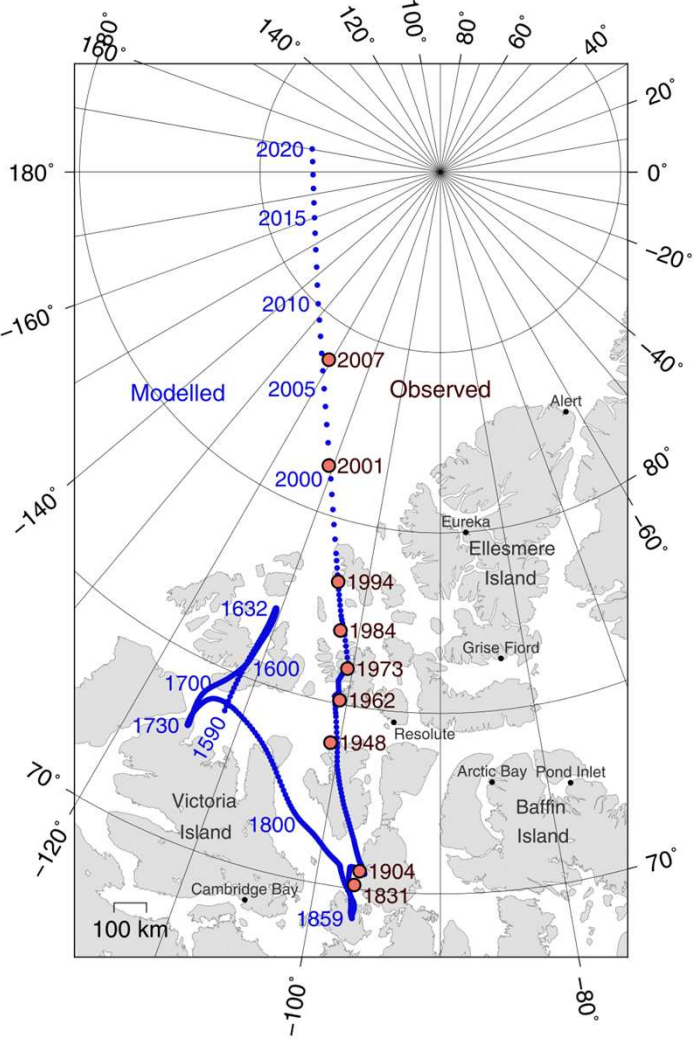


DA LOCALE A GLOBALE



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CAMPO MAGNETICO



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(VARIATION)



DECLINAZIONE EST = NORD VERO - DECLINAZIONE



NORD VERO
000°

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Liquid Filled Magnetic Compass



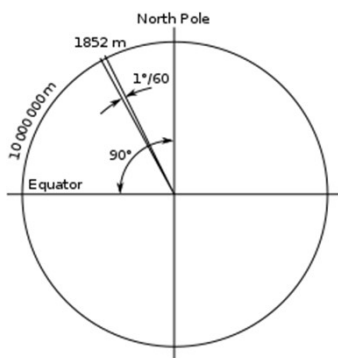
200 – 250 \$

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MIGLIO NAUTICO (NM)

1 NM = 1852 metri

Un miglio nautico è pari alla lunghezza dell'arco di meridiano sotteso da un angolo di un primo sul parallelo medio di 44° 20'

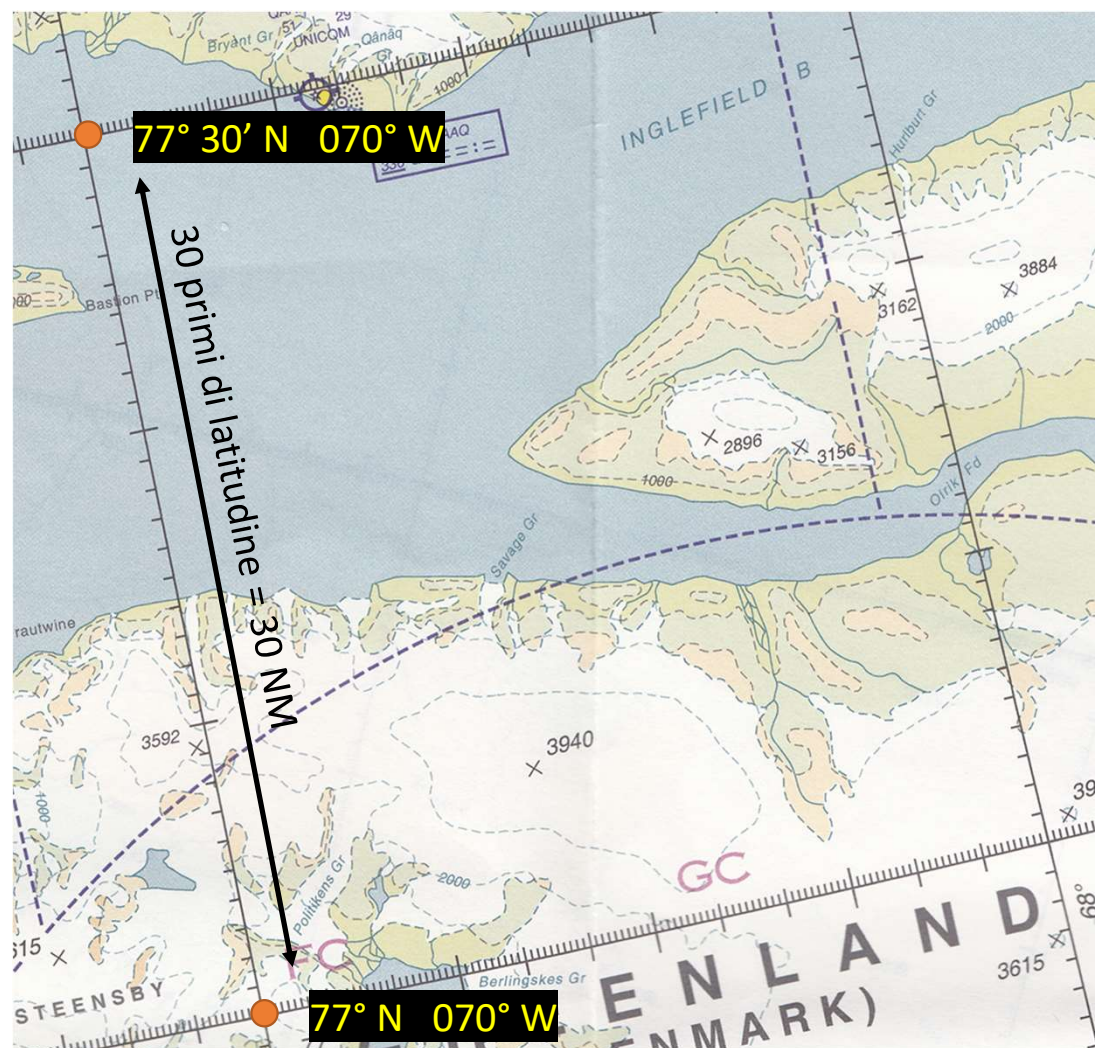


Semplificazione



Un miglio nautico è pari ad un primo di latitudine

La velocità si misura in nodi (kt) ovvero 1 NM l'ora



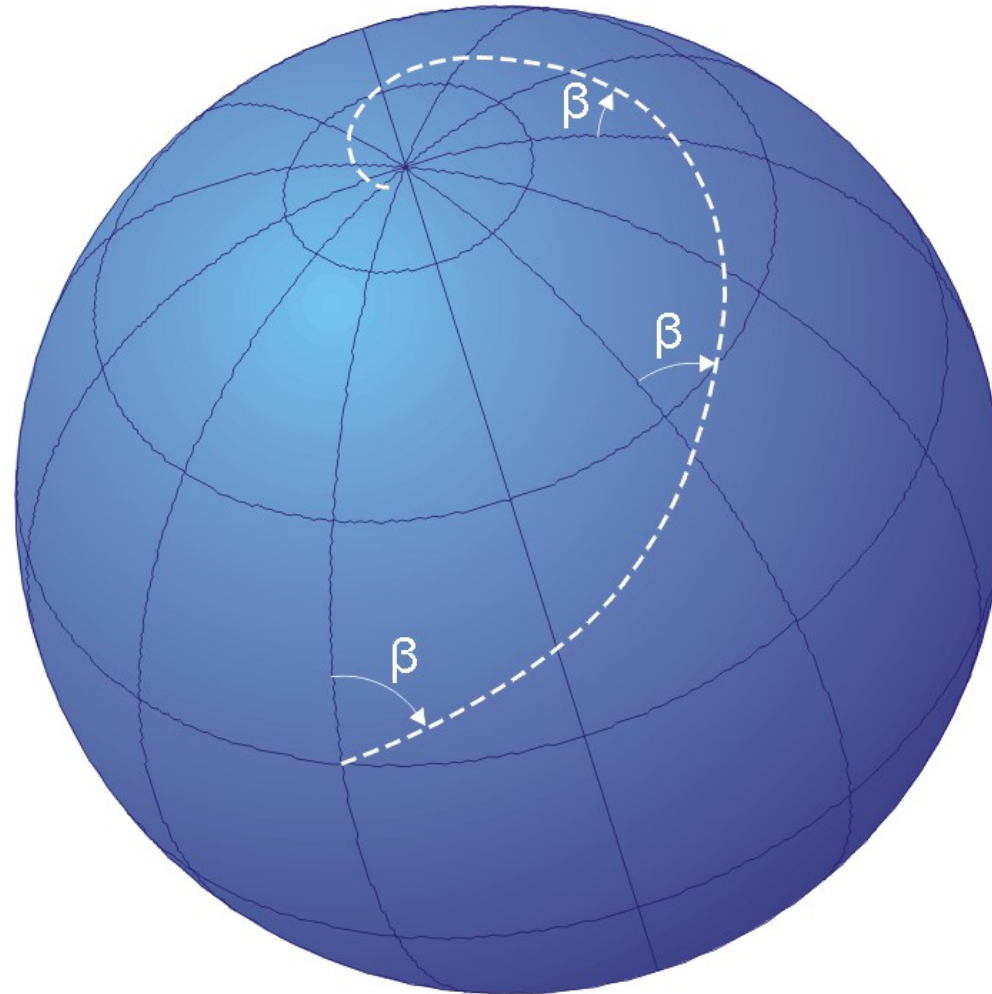
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ROTTA LOSSODROMIA (RHUMB LINE)



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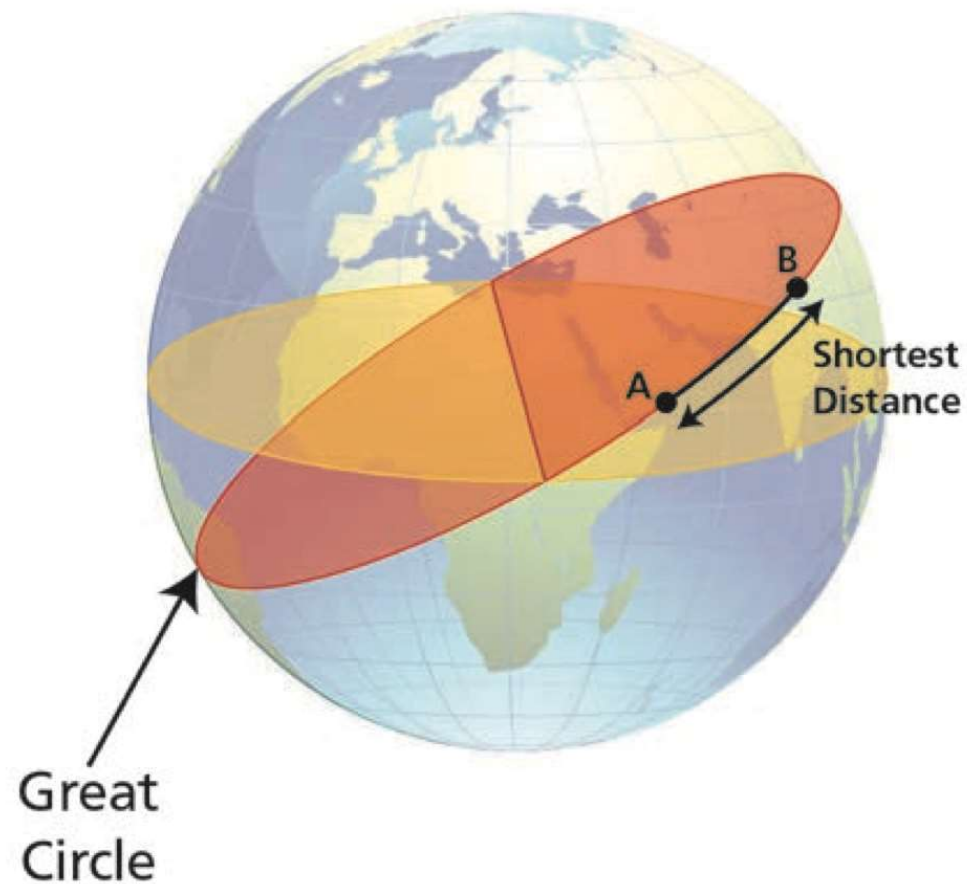
ROTTA LOSSODROMIA (RHUMB LINE)



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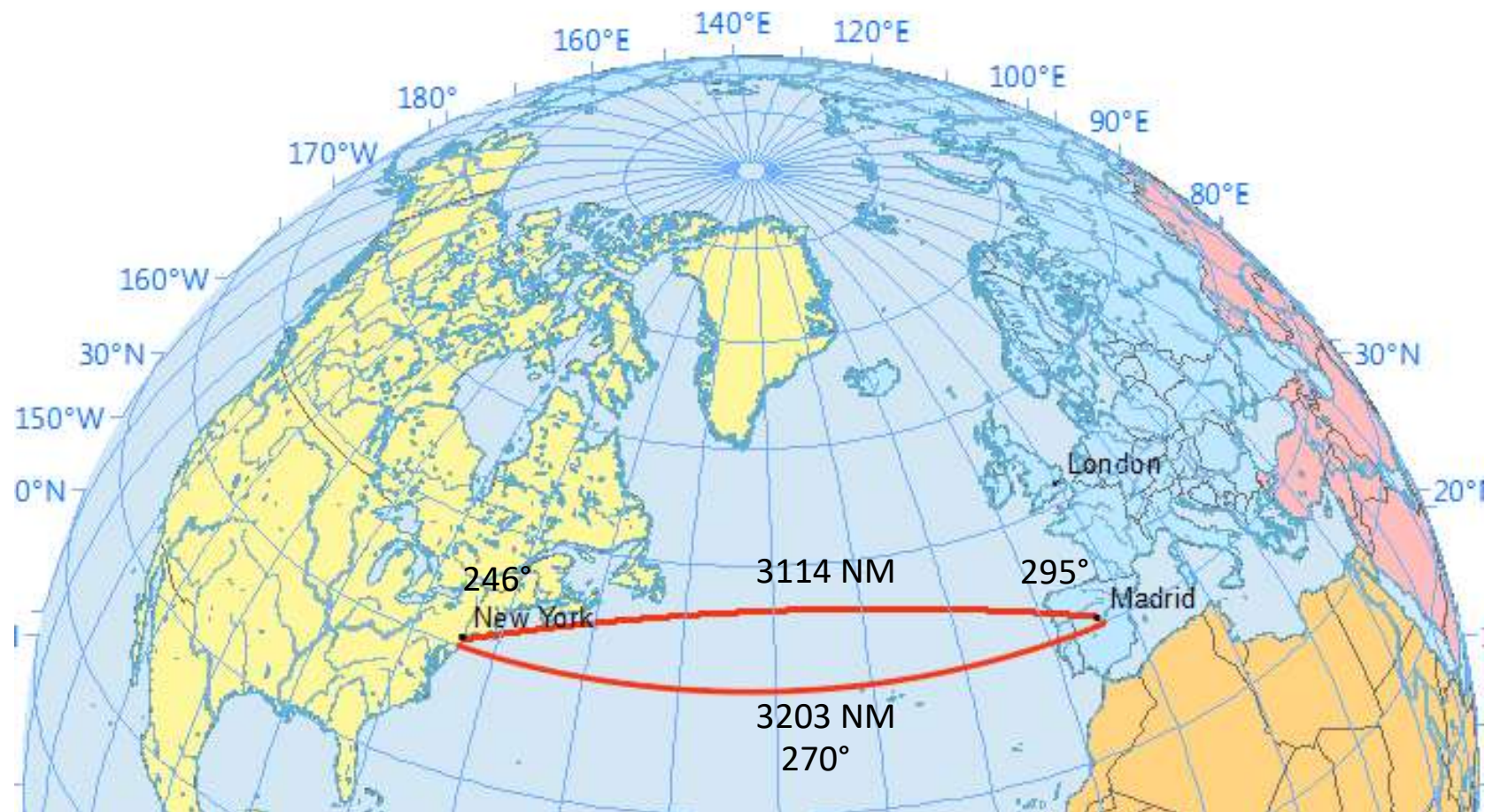
ROTTA ORTODROMIA (GREAT CIRCLE)

L'ortodromia è la linea più breve per congiungere
due punti sulla terra



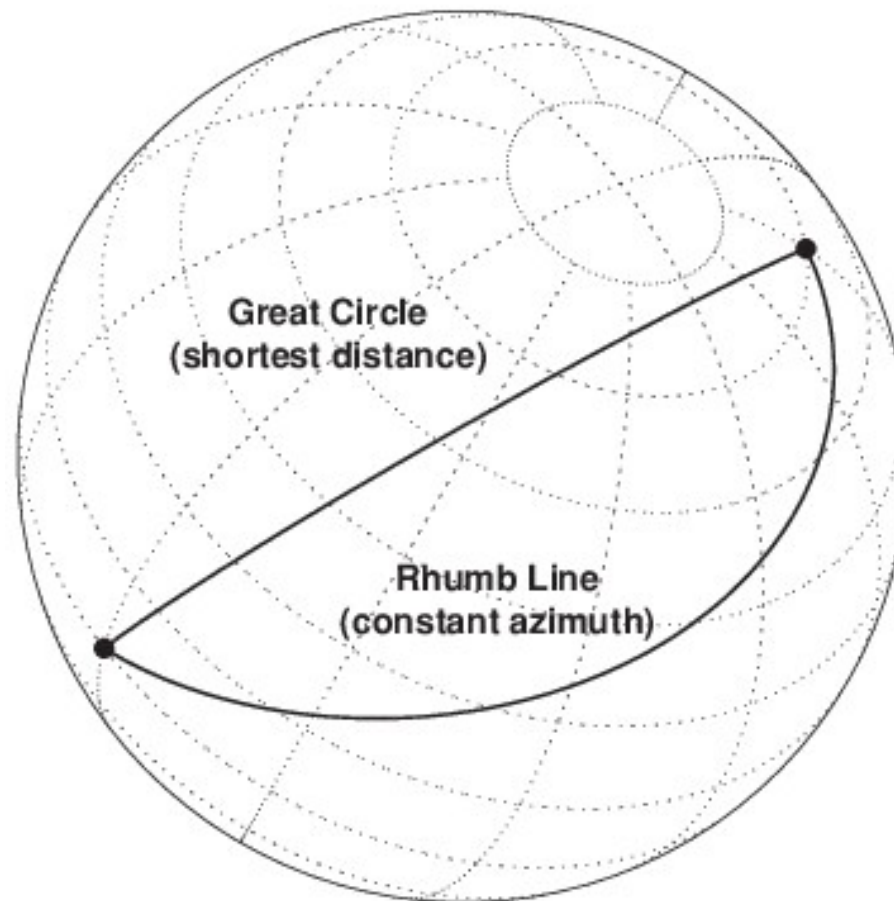
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ROTTA ORTODROMIA (GREAT CIRCLE)

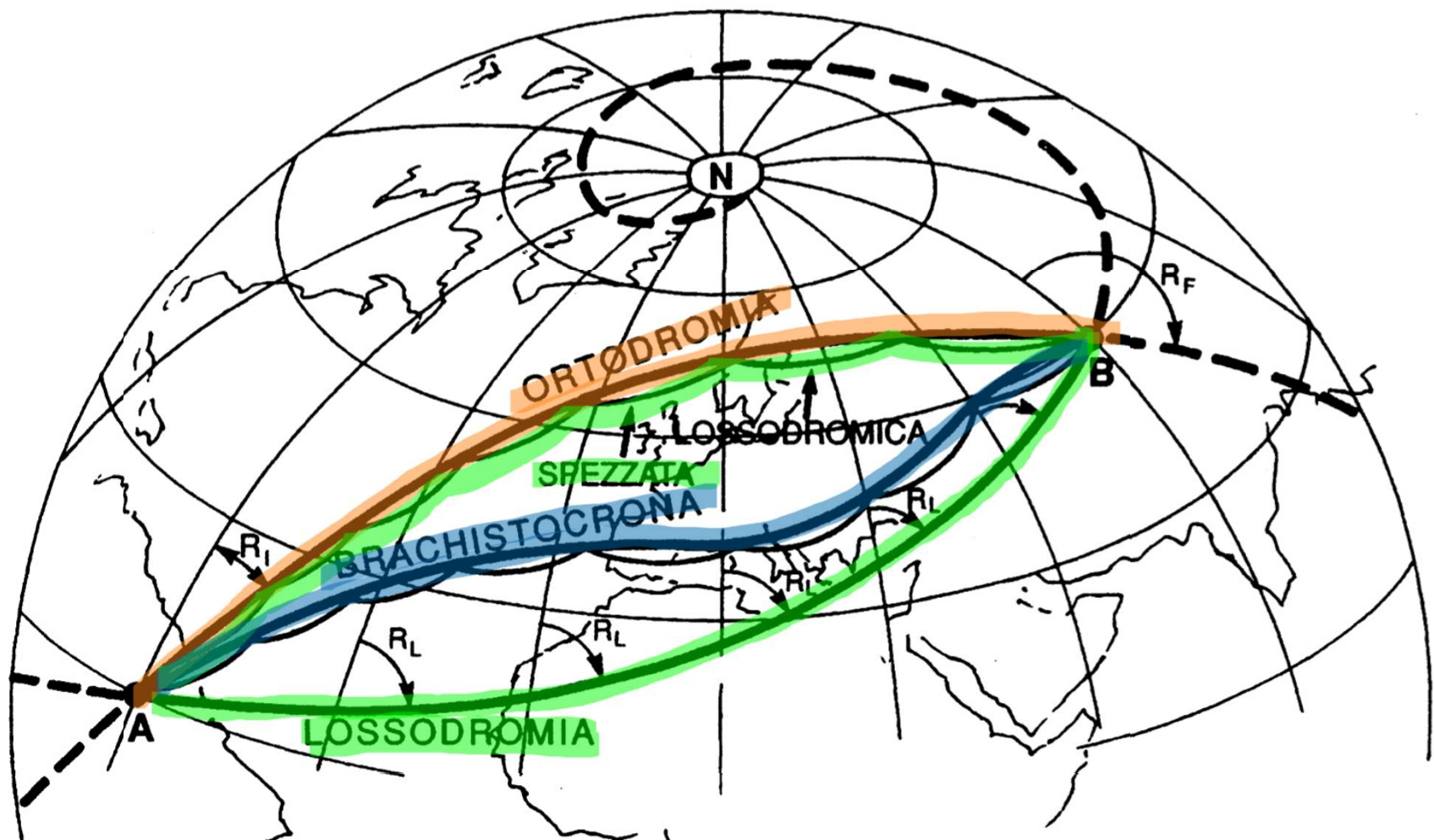


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ROTTA ORTODROMIA (GREAT CIRCLE)



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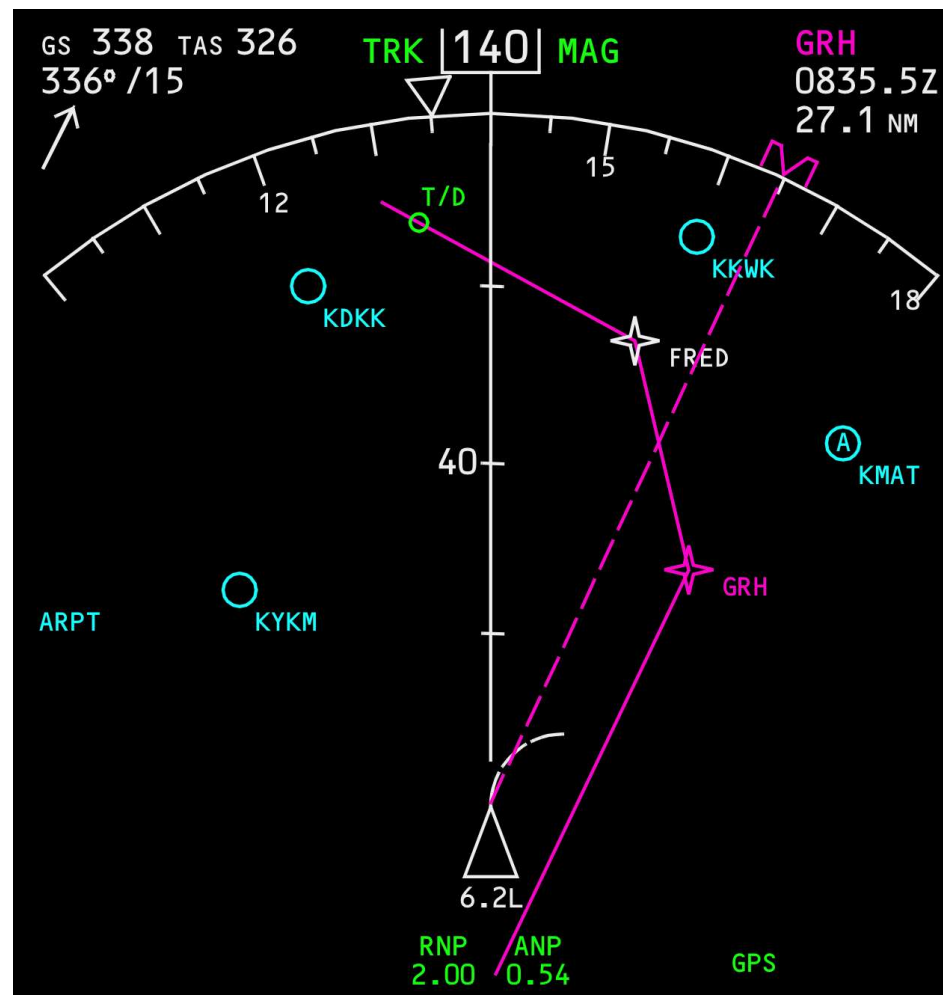


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Lateral Navigation (LNAV)

LNAV provides steering commands to the next waypoint or the selected route intercept point. When armed on takeoff, LNAV engages at or above 50 feet, when laterally within 2.5 nautical miles of the active route leg. FMC LNAV guidance normally provides great circle courses between waypoints. However, when an arrival or approach from the FMC data base is entered into the active route, the FMC commands a heading, track, or a DME arc to comply with the procedure.

The FMC creates a path allowing the airplane to turn before reaching a "fly-by" waypoint. When a waypoint is defined as a "fly-over", the FMC directs the airplane to fly directly over the waypoint before turning. The flight path shows on the ND using reduced range.



CENNI DI CARTOGRAFIA



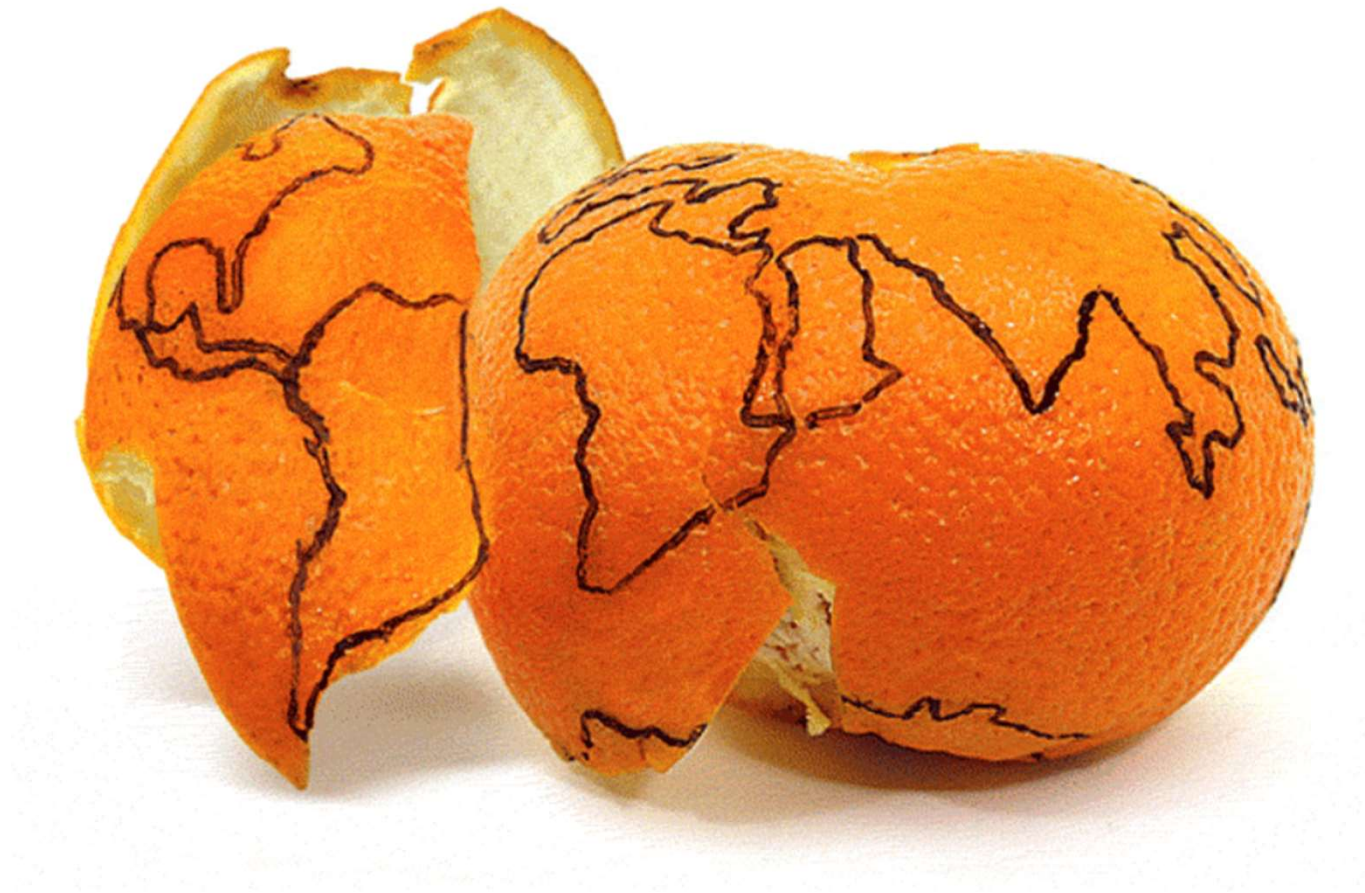
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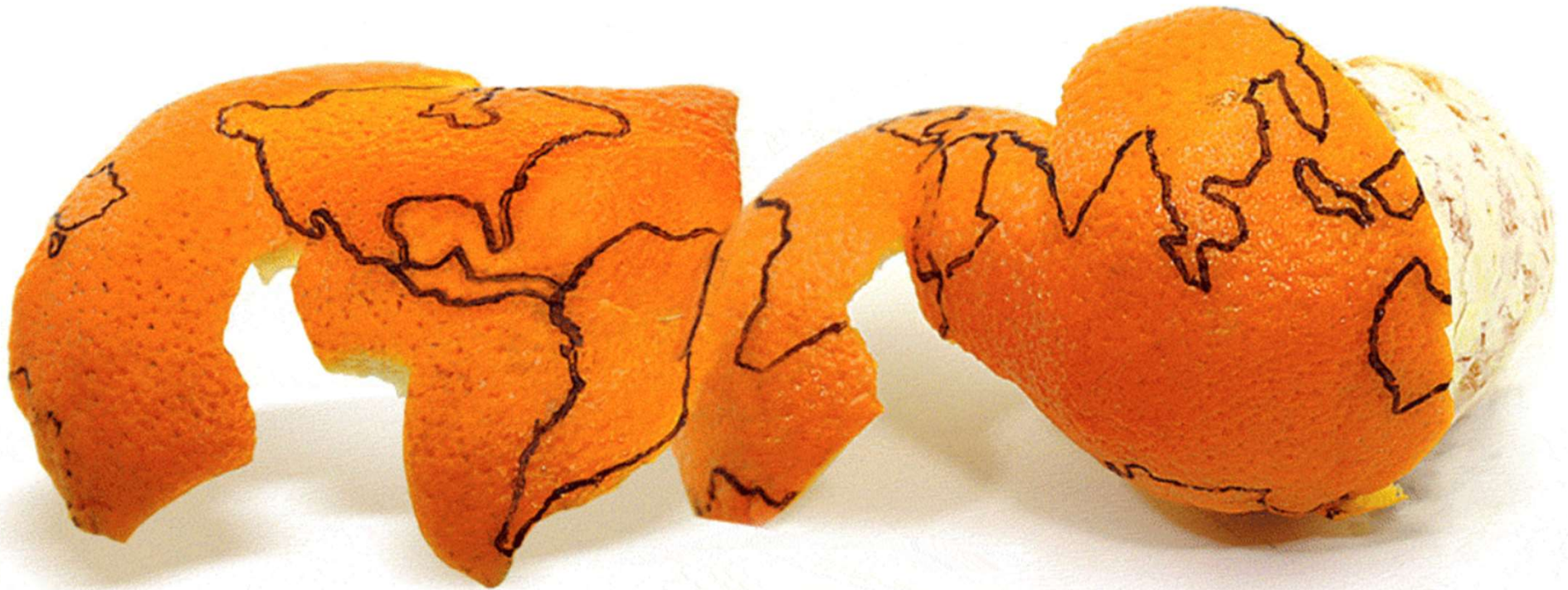
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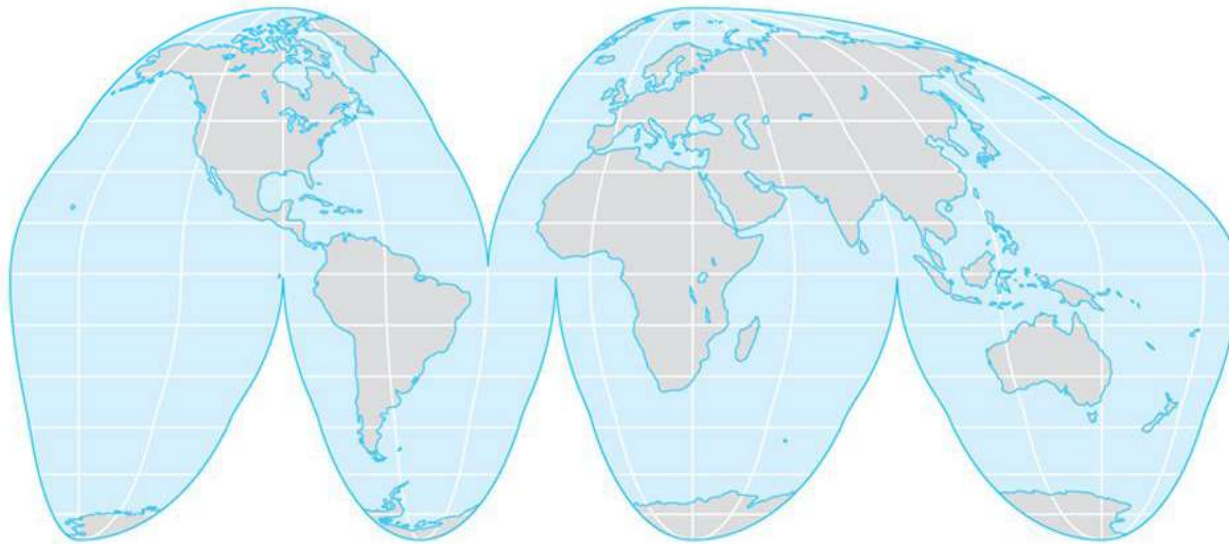
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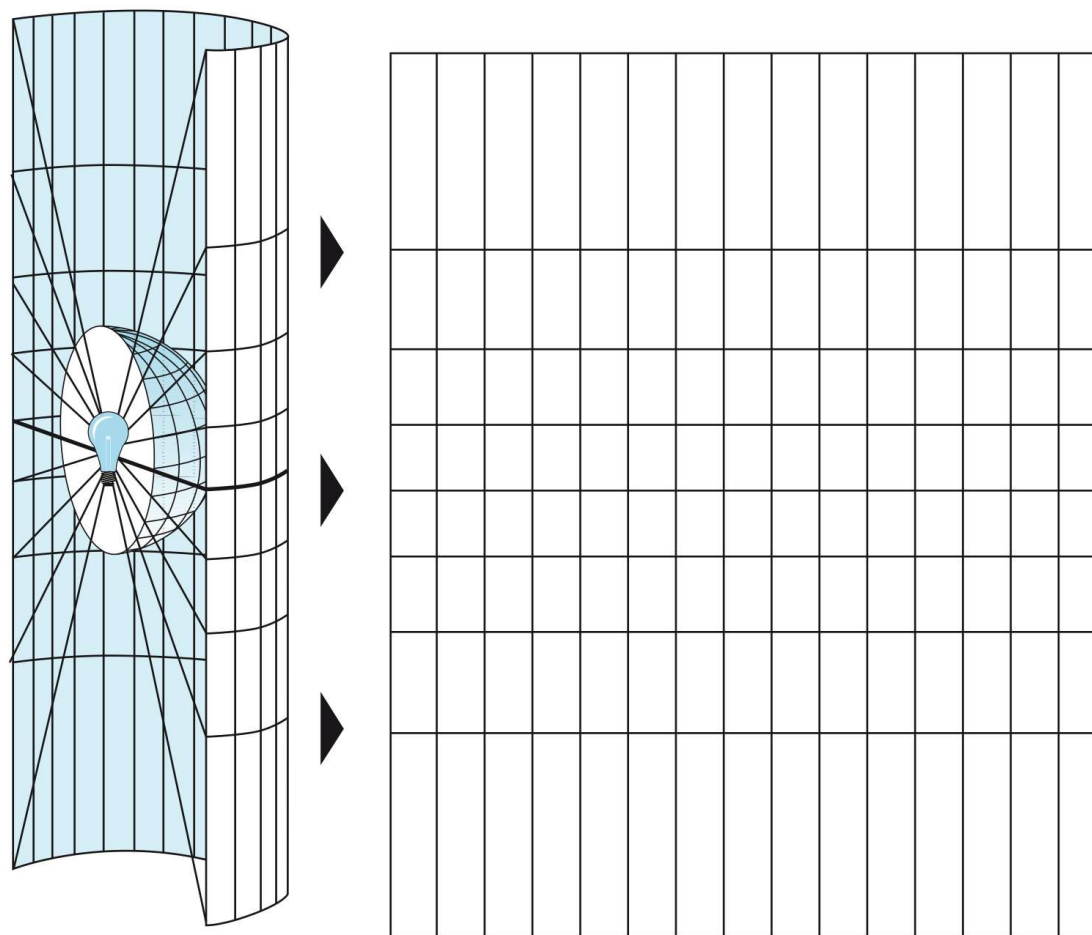
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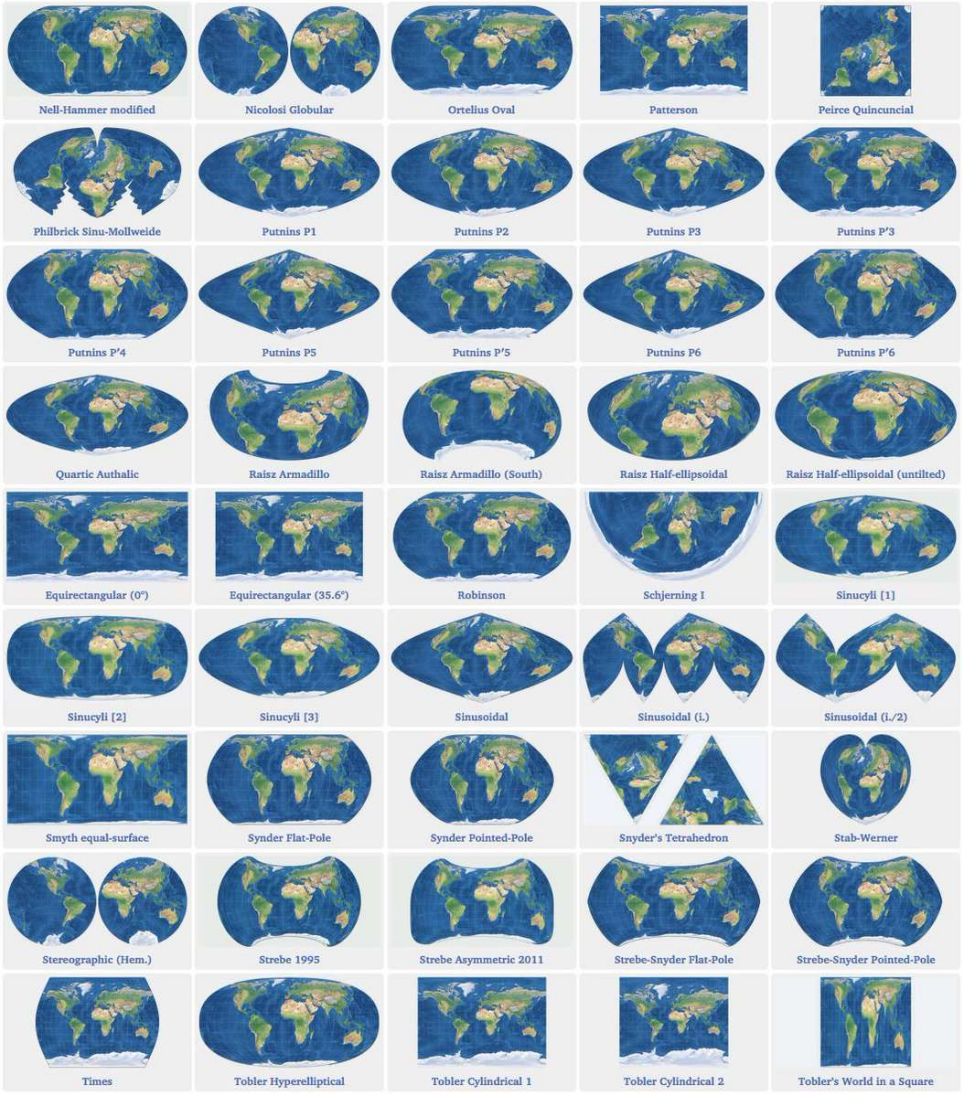
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CENNI DI CARTOGRAFIA



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CENNI DI CARTOGRAFIA



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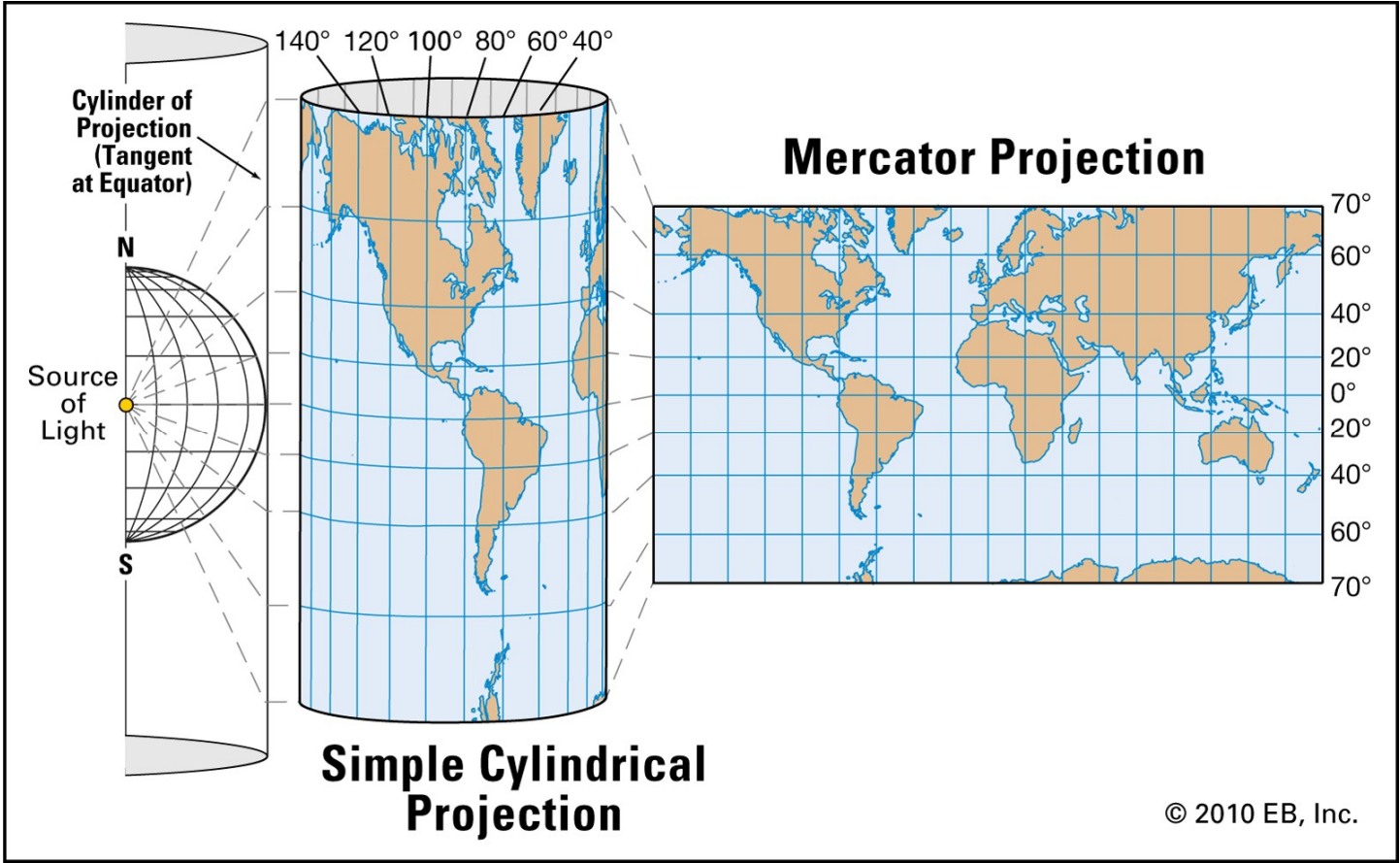
PROIEZIONE DI MERCATORE



Geert de Kremer (1512 - 1594)

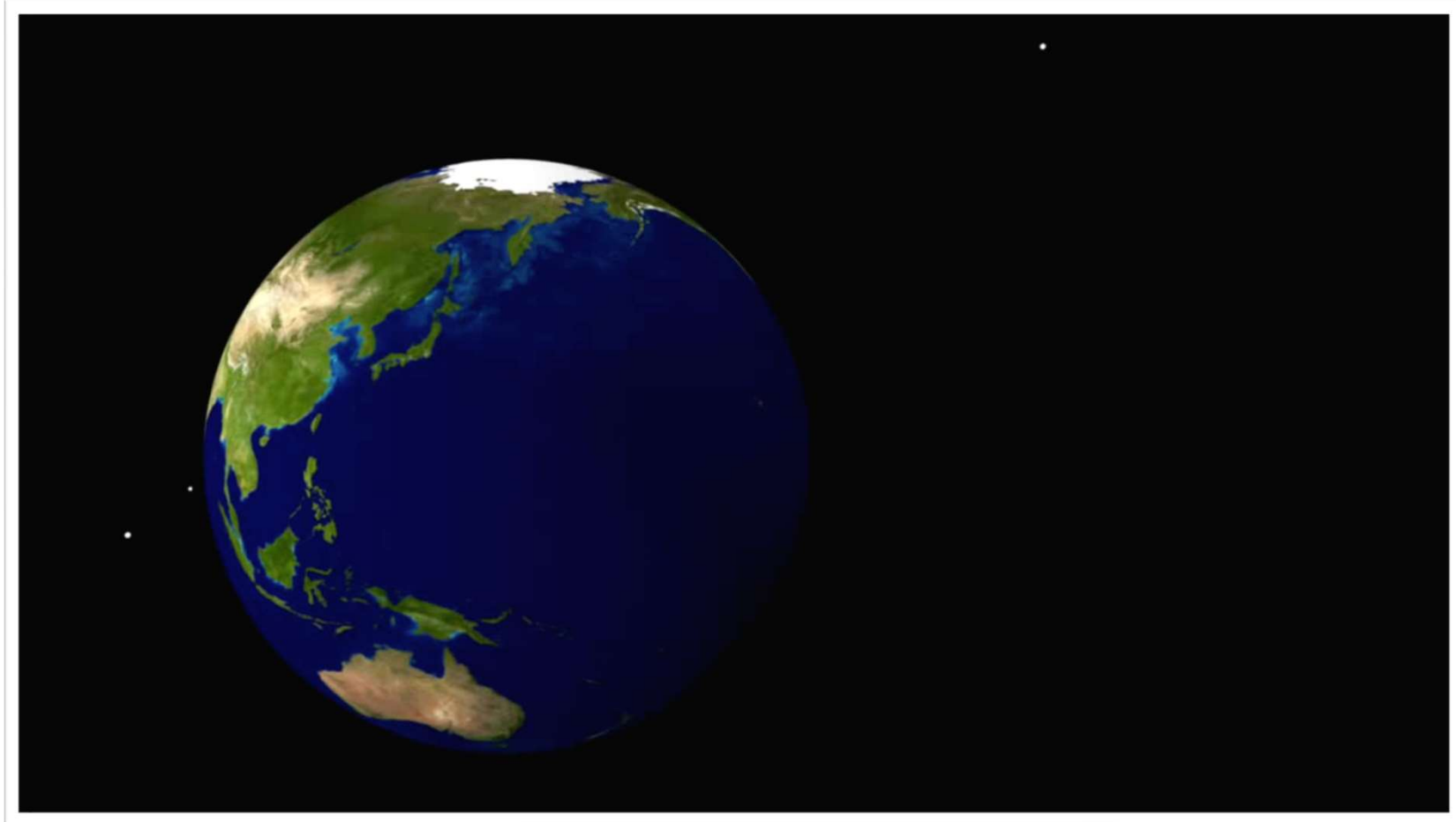
A.K.A.

Gerardus Mercator



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PROIEZIONE DI MERCATORE



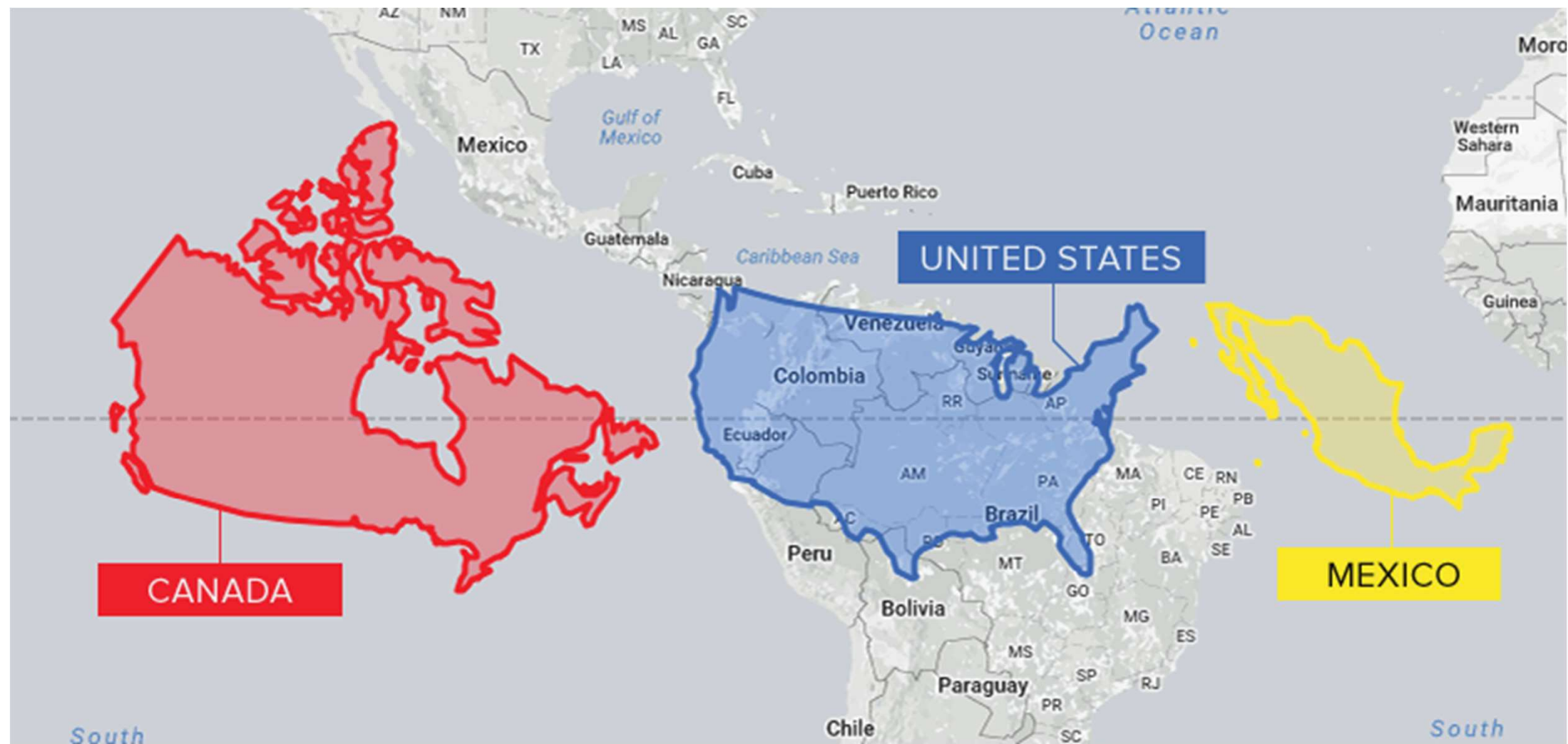
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CENNI DI CARTOGRAFIA



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CENNI DI CARTOGRAFIA

now draw in the great circle tracks for the same route.

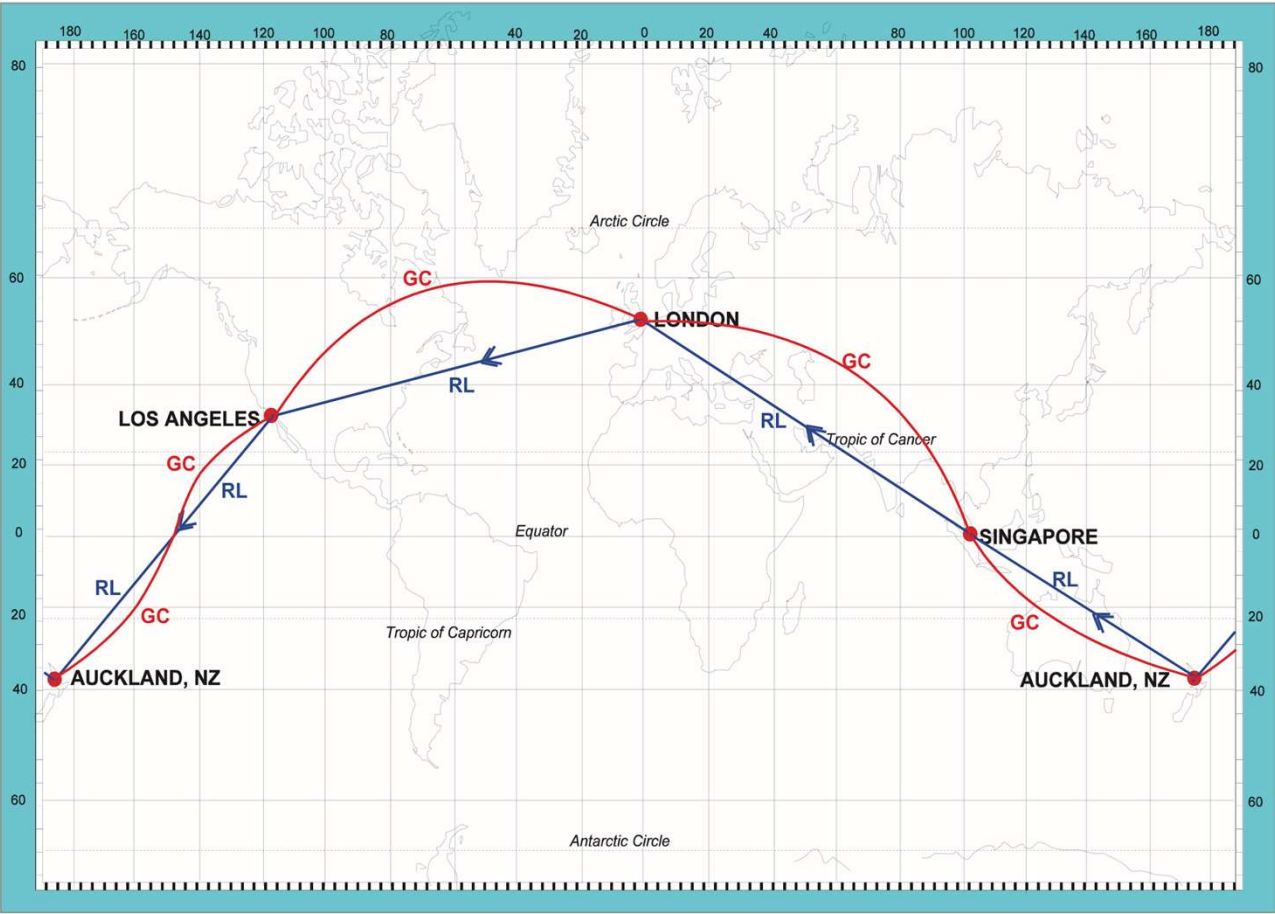
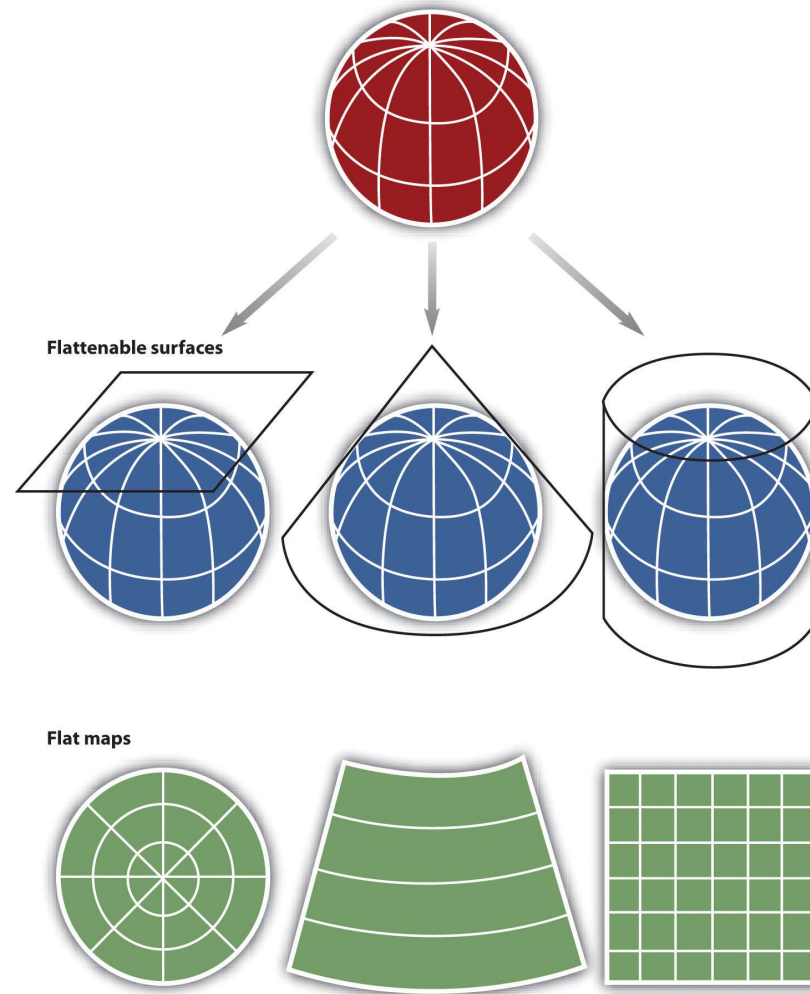


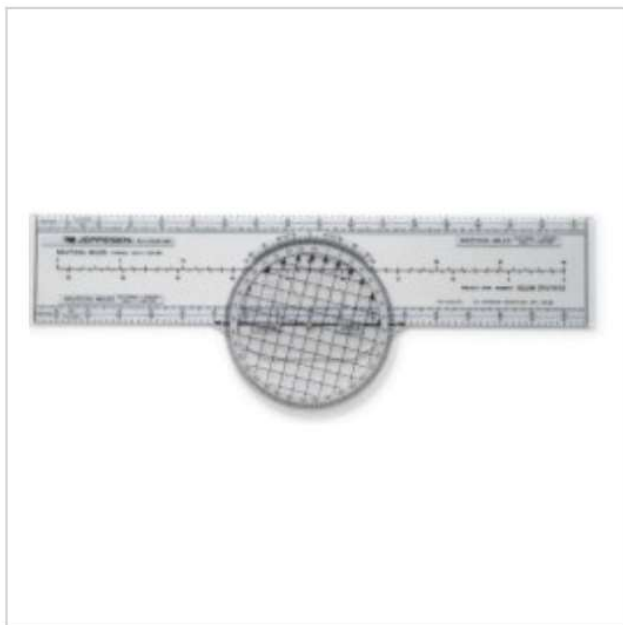
Figure 20.8 London/LA/Auckland/Singapore/London - Great circles

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CENNI DI CARTOGRAFIA



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(Plotter PJ-1 (Jeppesen

€ 20.50



Charts 2020

...AVIOPORTOLANO VFR LI-4

€ 15.90

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Avioportolano complete set 7
charts in 2020

€ 111.30 **€ 95.40**



Circular Computer CR-3
(Jeppesen)

€ 41.50

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