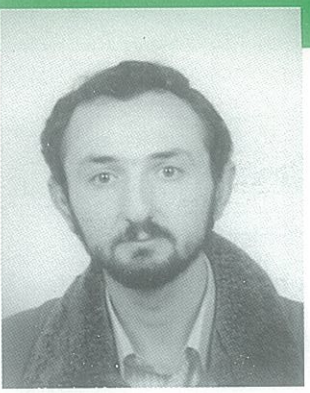

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STANDARDIZATION OF SYNOPTIC SITUATIONS AS A SUPPORT FOR ATMOSPHERIC DISPERSION

J. I. IBARRA

INTRODUCTION

The purpose of this article is to establish a methodology for standardizing synoptic situations by classifying them and obtaining characteristic rates for each of them in the area of the Levante.

These rates, together with the adopted cataloguing scheme, will be used to establish a meteorological data bank for defining synoptic-local correlations.

The correlations algorithms and criteria for using them can be incorporated in an atmospheric dispersion model to more accurately define the dispersion characteristics and pollutant distribution.

This data bank will also be used for meteorological forecasting analysis that will also be codified and included in the dispersion model. These analyses will make it possible to realistically project the evaluations for several hours after, taking into account possible changes in wind intensity and direction that would otherwise be impossible to forecast without a technical base to back them up.

STANDARDIZATION OF SYNOPTIC SITUATIONS

The basic standardization criteria are as follows, in order of cause- effect consideration:

— Characteristic of the air mass that flows over the Peninsula, which in general is very related to the direction of this flow in an extensive area that includes the Peninsula. Therefore, to define it, it is necessary to refer to the situation of anticyclonic and cyclonic regions on a synoptic scale. Due to their greater persistance, description of the situation of anticyclonic regions

would precede that of the cyclonic areas, even though the latter have a more tangible physical entity.

— Situation of the cyclonic, anticyclonic or intermediate vorticity, preferentially referred to the East and Southeast of the Peninsula (Levante). The following letters will be used: V (valley); C (wedge); P (barometric no mains land or "saddle"); I (wind of some intensity with almost rectilinear isobars). 850 mb and 700 mb surface maps will be considered, and the situation will be codified by writing these letters in the indicated ascending order, using a subindex (zero) if the situation is not well defined.

For example:
P_o C_o C means: little defined barometric saddle on surface, little defined cyclonic wedge at 850 mb, well defined wedge at 700 mb.

SYNOPTIC STANDARDIZATION SCHEME

I. Humid Polar Mass

Winds of the fourth quadrant over the Peninsula. Maximum rainfall to the N and W of the mountain ranges of Galicia, Cantabria and Pyrenees.
Anticyclon at Azores or between Azores and Iceland.
Depression toward Iceland, North of Great Britain or Scandinavia.
Vorticity: preferably V-V-V.

II. Warm Atlantic Mass

Westerly wind, with extensive rainfall, highest maximum on Atlantic versant.
Anticyclonic regions to the South of the Azores and between Yugoslavia, Finland and Southern Norway. Depression between Southern Great Britain and latitudes above 42° and 52° (i.e., approximately between 42° and 52°). It can evolve to situation III if the polar mass moves toward the South.
Vorticity: preferably V-V-C.

IIIa. Atlantic Mass with Polar Incursion in Low Latitudes

Winds from the third quadrant on the Peninsula that can be from the second quadrant in the S.E.
Maximu precipitation in the S.W. of Spain.
Anticyclon between Ireland, Scandinavia and Poland.
Area of depression between Azores and the Western coast of Morroco and Portugal, without its nucleus significantly going beyond the 42° latitude.
It can evolve or become associated with "gota fría" situations.
Vorticity: V-C-C, V-P-C and V-P-P preferably.

IIIb. Mediterranean Mass Reacting on Polar Atlantic Incursion

Anticyclonic regions with nuclei at high latitudes that extend toward the Balkans and Eastern Mediterranean. Anticyclon between Azores and America.
Cyclonic nuclei near the Peninsula or over it with little depth and below the 40th parallel.
Prevailing easterly winds that transport Mediterranean air, and if the sea is warm (months of September, October and November) they can cause very intense rainfall in Levante. These are "gota fría" situations.
Vorticity: Symbols C and P in very variable order and proportion and rapidly evolving.

IV. Normal Zonal Flow

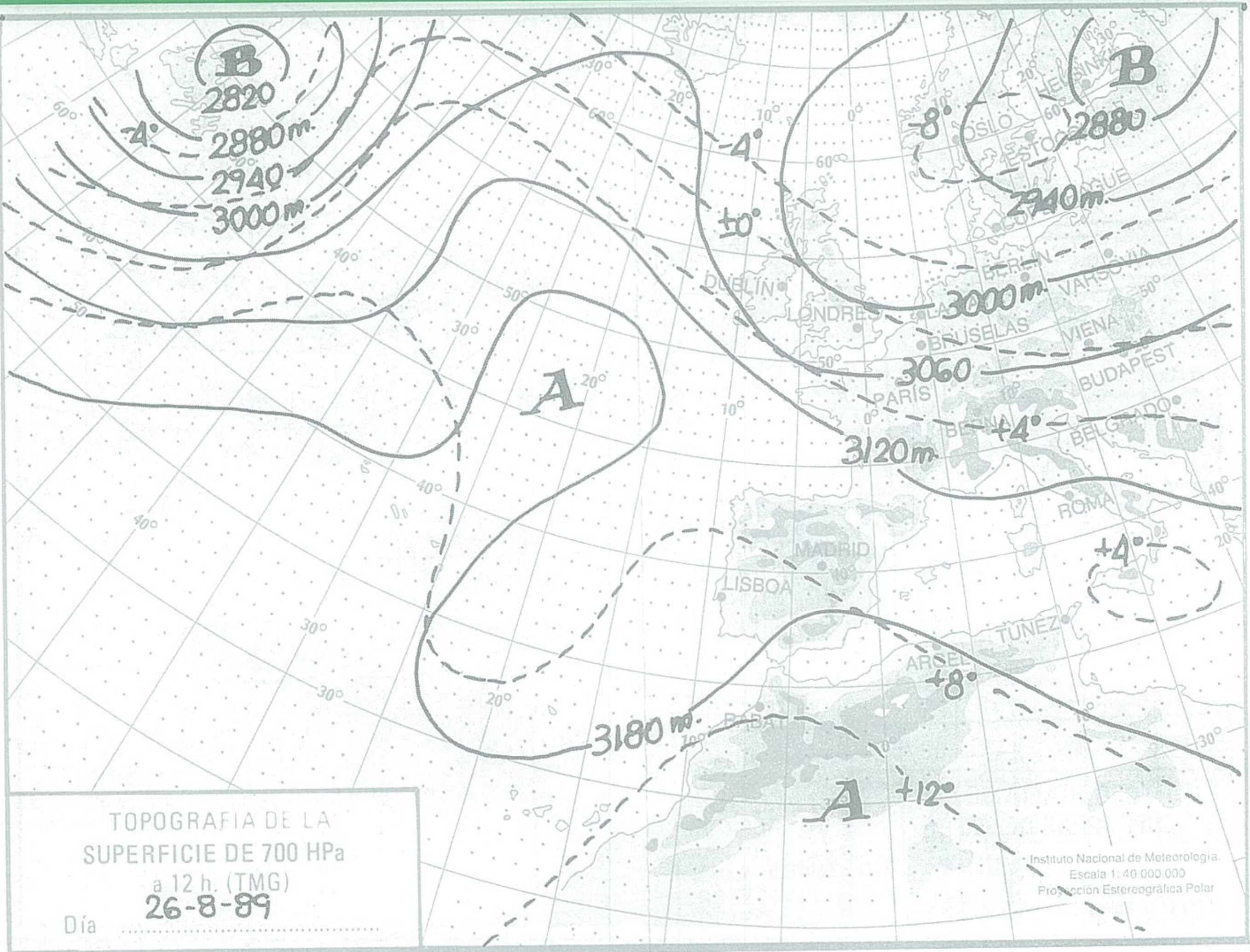
Extensive anticyclonic region that extends from the Azores to Russia through France and Central Europe. Depression in the vicinity of Iceland.
Barometric saddle or very weak, narrow flow from the East over the Peninsula, since the winds at 700 mb are already westerly and can reach the Peninsula at 850 mb.
Many periods of calm correspond to this situation.
Vorticity: P can be encoded in at least one level, more frequently in two levels.

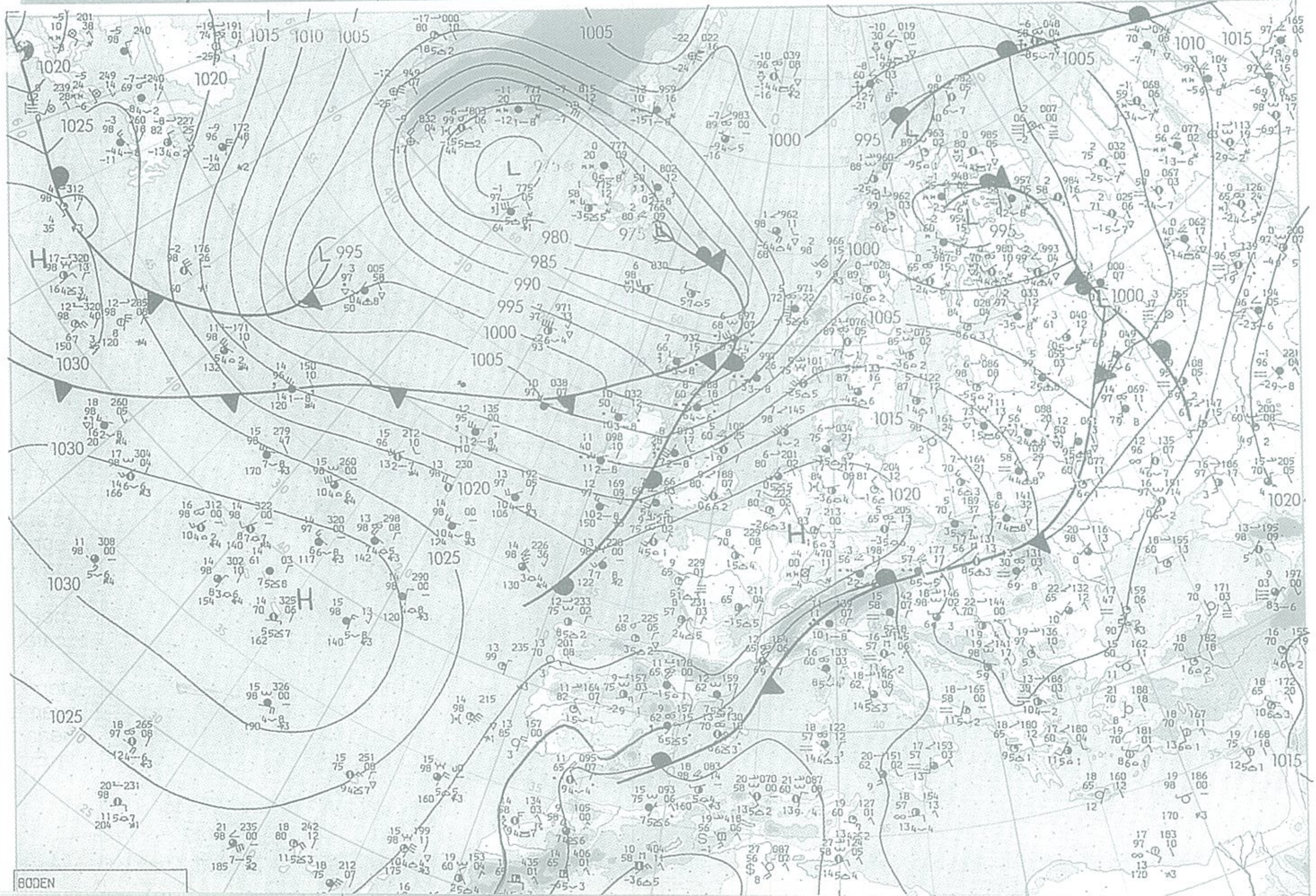
V. Dry, Cold Air Mass

Variant of IV where the zonal flow has decreased (tending toward VII) due to absence of high pressures in Azores and migration of continental high pressures toward the North (N. Russia, Scandinavia, Scotland).
Depressions over the E. Mediterranean, the most notable one frequently located at the Gulf of León.
This is a typical situation of intense freezes in Catalunya, Aragon and Levante due to entry of air that may be of Siberian origin modified by its path through Europe.

SYNOPTIC STANDARDIZATION SUMMARY

Type	Description	Vorticity	Typical Flow	Characteristics
I	Humid polar mass	V-V-V	Not intense	Depression N. Great Britain or Scandinavia
II	Warm Atlantic mass	V-V-C	Intense W.	Depression S. of Great Britain and latitude X 42°. Anticyclon S. of Azores and N. of Yugoslavia.
III.a	Atlantic mass w/ polar incursion at low latitudes	V-C-C; V-P-C; V-P-P	Moderate S.W.	Depression btwn. Azores & Morocco-Portugal. Anticyclon between Ireland & Scandinavia-Poland.
III.b	Mediterranean mass over polar atlantic incursion	C;P	Moderate E.	Depression over or near Peninsula (L<40°). Anticyclon in Azores & E. Mediterranean.
IV	Normal zonal flow	P	Weak or variable E.	Depression near Iceland Anticyclon from Azores to Russia through Central Europe. Barometric hiatus over Peninsula.
V	Dry, cold air mass	V	Weak N.-N.E.	Depression in E. Mediterranean-Gulf of León. High pressures in Azores and N. of continent.
VI	Humid Mediterranean mass	V	E.	Depression over N. Africa. Anticyclon over Central Europe.
VII	Meridian flow	Variable	Variable	High pressures from high latitudes (Iceland, Scandinavia...) to latitude 40° -45°.
VIII	Summer thermal low	V;P	Moderate E.	Thermal depression over the Peninsula and/or N. Africa. Anticyclon in Azores or vicinity.
IX	Anticyclonic situation over the Peninsula	C;P	Weak-calms	High pressures over the Peninsula, breaking away from IV or VII.


TOPOGRAFIA DE LA
SUPERFICIE DE 700 HPa
a 12 h. (TMG)
Día 26-8-89
Instituto Nacional de Meteorología.
Escala 1:40.000.000
Proyección Estereográfica Polar
B
2820
2880 m.
2940
3000 m.
A
3060
3120 m.
3180 m.
DUBLIN
LONDRES
BRUSELAS
PARIS
MADRID
LISBOA
ROMA
BUDAPEST
VIENA
VARSOVIA
BERLIN
OSLO
ARGEL
TUNEZ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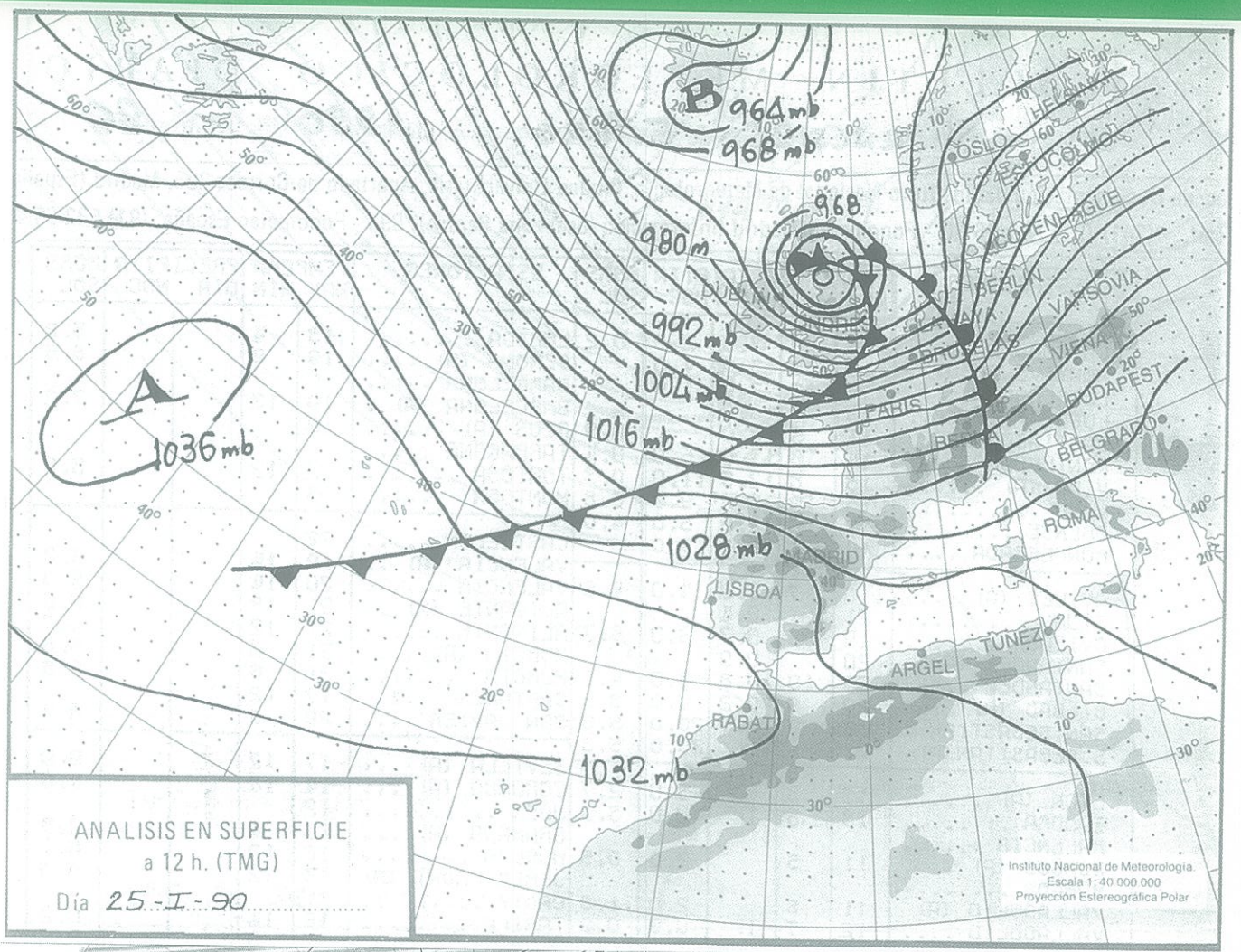

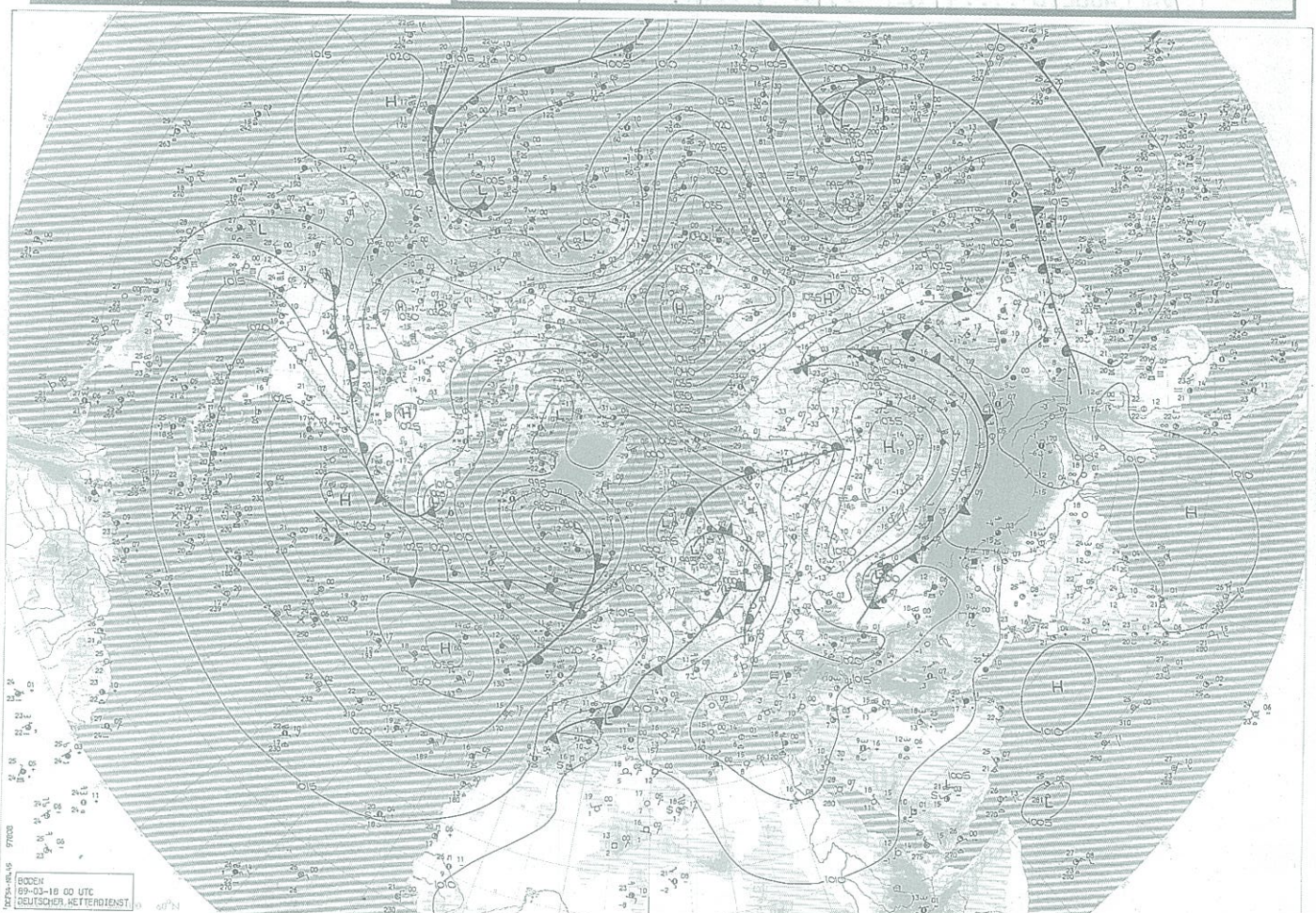

Surface chart 00 UTC

18.03.1989

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Vorticity: Valley in at least the two lowest levels.

VI. Humid Mediterranean Mass

It also has similarities with IV, although the important anticyclon can be reduced to Central Europe, and the pressure zones, which are not very intense, are located over North Africa, producing a flow from the East that pushes warm or hot humid Mediterranean air, depending on the season of the year. The depth of the East winds does not usually reach 700 mb.
Vorticity: Generally cyclonic on the surface.

VII. Meridian Flow

Anticyclonic region, extending from some high latitude area (Scandinavia, Scotland, Iceland, Greenland) to a latitude between 40 and 45° between Italy and the NW of the Peninsula. If it is diverted to the East, affecting Galicia or farther West, it can become associated with northerly winds over the Peninsula. In another case, the winds can be westerly or south.wesrterly.
Vorticity: Very dependent on the position of the anticyclon's axis.

VIII. Summer Thermal Low

Its formation is associated with intense heating of the layers near the ground in summer (mainly in July and August, although this can happen in June and the first half of September). Anticyclon in Azores or vicinity. At times, it joins up with thermal depressions in Morocco, causing an incursion of Saharan air accompanied by poor wisibility and high temperatures that can mainly affect the Eastern half of the Peninsula. Other times this air's route is over the Mediterranean, which limits its extreme characteristics.
Vorticity: Symbols V and P will appear (preferentially the latter).

IX. Anticyclonic Situation over the Peninsula

This may appear as an extension and breaking-up of the Azores anticyclon, of a continental anticyclon in a situation stemming from the normal zonal flow (type IV), or due to displacement toward the South of the meridian flow described in type VII. Weak winds and calms predominate. Remember that situations IV and VIII can also frequently be the source of calm and weak wind situations.
Vorticity: C and P, with the latter prevailing.

X. Situations not considered in the Current Classification

Frequently, the situation on a specific day may not resemble those classified above. In this case, the standardized situation that is closest in time to the one considered, within a maximum interval of 2 days, will be indicated, putting the number of days before the symbol of the standardized situation.
For example: 1-II means that the day before the situation was "II. Warm Atlantic Mass".
Classified photocopies of some characteristic examples of this standardization are attached at the end of this document.