

3rd
Interim Report

ESPON Project 3.1
Integrated Tools for European Spatial
Development

Annex B
Europe in the World

Tuesday, 30 September 2003

The content of this report does not necessarily reflect
the opinion of the ESPON Monitoring Committee

European Spatial Planning Observatory Network
Espo 3.1 / Workpackage « Europe in the World »

TWELVE MAPS

TOWARD AN ESPON VISION OF “EUROPE IN THE WORLD”
2nd Version, October 2003



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Authors

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Databases

The databases used in this report were elaborated jointly by the authors and by research engineers from the UMR Espace – Montpellier: **Patrick Brossier, Patricia Cicille and Guerino Sillère**. These research engineers have previously carried out most databases of the research group RECLUS and insured for example the achievement of the *Geographie Universelle Reclus* or the *Atlas de France*.

Documentation and correction

The documentation used for the preparation of this report on “Europe in the world” was prepared by **Bernard Corminboeuf**, research engineer of the UMS RIATE, French ESPON Contact Point. Some corrections to the map and manuscript were also added by other members of the UMS RIATE like **Gregory Hamez** and **Liliane Lizzi**.

Statistical analysis and mapping tools

Statistical analysis was performed with the softwares SAS© and XLSTAT©. Maps were elaborated with Arcview 3.1 © or Philcarto © and revised with Adobe® Illustrator®.

INTRODUCTION

The ESPON Programme 2006 focuses mainly on the European territory, but Europe is not a self contained system. It is important to have a look at external connections of the EU to get a complete picture of the status quo and possible future developments of the EU. Most studies developed in the framework of the ESPON Programme are based on databases limited to the EU and the candidate and neighbouring countries (EU27+CH+N) and do not take into account the relations between European territories and the rest of the world. However, many aspects of the internal differentiation of Europe are related to existing and potential flows between Europe and the rest of the world. This is especially true for the identification of gateway cities, polycentrism, spatial and social integration, etc.

According to its terms of reference, the TPG ESPON 3.1 is not in charge of the realisation of a complete study on "Europe in the world". But it has established a small work package on this subject because one of its mission is to "*fill the gaps*" of the ESPON programme and to propose new directions for further research. In its comment to the Second Interim Report of ESPON 3.1., the Coordination Unit indicated that "*The basic outcome [of the work package "Europe in the World of ESPON 3.1] should be the elaboration of a precise and thorough concept of the continuation of "Europe in the World" in the future ESPON work.*" With a very limited allocation of funds¹, it was not possible to explore all directions of the concept of "Europe in the World" and the author of this preliminary study decided to focus their research on the three following topics.

- 1- Toward an ESPON vision of Europe in the World** : The realisation of maps presenting the situation of Europe in the world is related to many technical questions (projection, framework, aggregation level, ...) which are of crucial importance from scientific and political points of view. We discuss some of those problems through the example of the demographic situation of Europe.
- 2- Europe in a World without boundaries** proposes a set of new representation of the World where the border of states are removed and where the potential effects of spatial proximity can be more easily evaluated. Of course, borders still exist but such maps help to understand the growing importance of trans-national flows of migration, investments, ideas, ...
- 3- The functional influence of Europe** is an attempt to define the territories of the World which are the most connected to Europe, according to air and trade flows. It is a crucial question for the ESPON programme which should extend the statistical coverage of his research to all the territories which are functionally integrated to Europe, whatever their political situation as candidate or non-candidate to join the EU.

¹ The work package « Europe in the World » has received an allocation of 10 000 Euros in the framework of ESPON 3.1.

PART 1

**TOWARD AN ESPON VISION OF
EUROPE IN THE WORLD**

1.1 WHICH CARTOGRAPHICAL PROJECTION OF THE WORLD ?

1.2 WHICH DIVISIONS OF THE WORLD ?

1.3 WHICH SCALE OF ANALYSIS ?

1.4 WHICH POLITICAL MESSAGE ?

1.1 WHICH CARTOGRAPHIC PROJECTION OF THE WORLD?

The ESPON programme has recently decided to harmonize the maps which are produced in the network and the TPG 3.1 has proposed precise templates for the realisation of map of the European territory (projection, shape, design, ...). In the future, it will certainly be necessary to propose equivalent rules for the realisation of maps of Europe in the world, which implies many choices which are not obvious and should be discussed at both scientific and political levels.

❖ A map of the World can get no satisfaction

The right planisphere does not exist. The transformation from sphere to plan implies necessarily a deformation of areas and/or angles and/or global shapes. Furthermore, a map of the World can get no satisfaction because the global world is economically organised as a ring around the earth (see. part C) when a map is a plane representation with edges defining a single center. The more traditional projections (*projections 1 and 2*), directed toward the north and centered on Europe, express rather well the world's organisation of the XIXth century when the Old Continent ruled the other regions of the Earth.

❖ A polycentric Europe...

But today we live in a polycentric world. And pictures which try to provide evidences of multiple centralities and competitive influence areas should not induce biases related to false polarisation introduced by the choice of map projections. It is the reason why we propose ESPON to choose a polar projection, setting Northern Hemisphere at the center, simply because it is the place where 90% of the human beings are living. Such a map can easily be revolved in order to emphasize the various centralities (*projections 6, 7 and 8*). Finally, it appears useful to keep the continuity of the earth surface, avoiding aphyllactic maps where continents are floating in an unspecified mixture of ocean and "nothing" (*projections 3, 4 and 5*).

❖ ...in a polycentric world

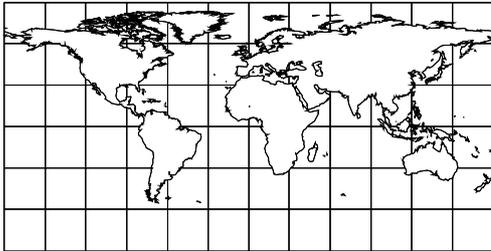
In the ESPON context, it is important to bring to the fore a map projection which gives the opportunity of a polycentric, but also universal, representation. Of course, Southern Hemisphere is badly treated (the disparition of Antartica), which proves that any planisphere introduces an implicit subjectivity. But, when looking at the maps of the second part of this report, we can verify that not only rich people but also the majority of poors are fairly represented with this map projection. Finally, none of the world economic centers is advantaged, as far as the user of such map can turned it in any directions. This impicite message is essential for the analysis of a polycentric Europe in a polycentric world.

In the rest of this annex, we have used the same projection of the World in order to evaluate its advantages or limits on various cartographic topics (territorial maps, continuous maps, flows, ...).

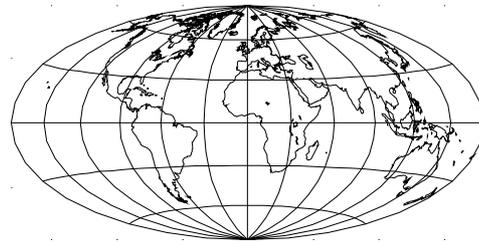
MAP 1

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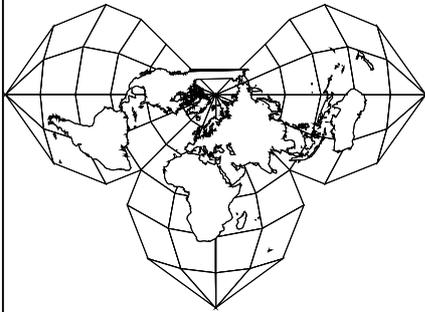
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ESPON 3.1 / Workpackage "Europe in the World"
AN ESPON PROJECTION OF THE WORLD



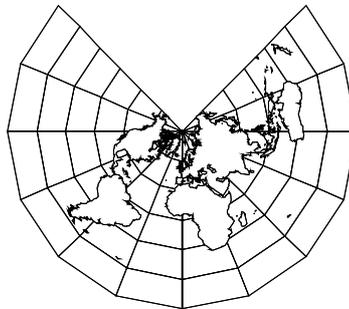
1 - Mercator



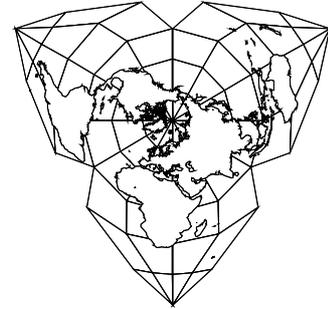
2- Hammer-Aitof



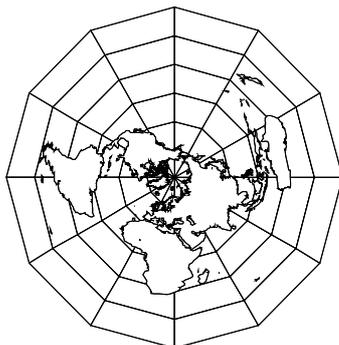
3. Aphylactic I



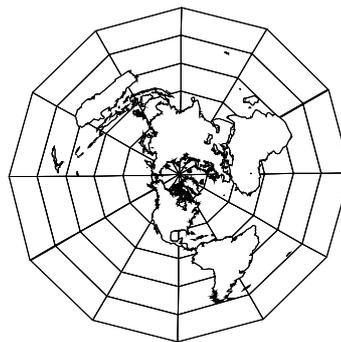
4. Aphylactic II



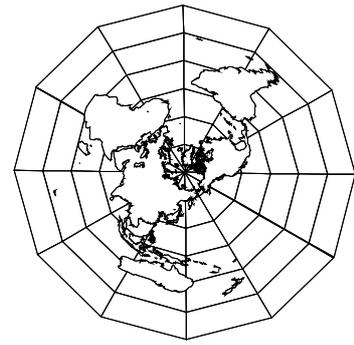
5- Aphylactic III



6. Polar / Europe



7- Polar / America



8- Polar / Eastern Asia

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1.2 WHICH DIVISIONS OF THE WORLD?

The European Union as any international organisation should produce geographical divisions of the world adapted to their statistical, scientific and political needs.

❖ The national level

The list of states that should be included in the ESPON database “Europe in the world” is not a trivial question. For example, it is well known that Tai-Wan is never present in the statistical databases of the United Nations because China does not recognise its existence as an independent state. But, on the other hand, the CIA has introduced Tai-Wan in its “World Factbook”² which presents the official position of US Government. An ESPON Atlas of the world would necessarily lead to difficult political questions because, as in the case of the World Factbook, it could be considered as a form of official position of the European Union.

❖ The “regional” level

More complicated but more important is the question of the delineation of “regions” of the world because it implies necessarily a mixture of ideological, scientific and political constraints. The 17 ESPON regions presented in **Map. 2** are a provisional typology which will be further improved by the results of the analysis of air and trade flows. The table 2 presents the main characteristics of those initial ESPON Regions of the World.

ESPON REGIONS	SUP	POP	URB	RUR	GDP1	GDP2	CO2
Western Europe	3.0	6.4	10.9	2.5	26.7	21.1	13.9
Central Europe	1.0	2.2	2.8	1.6	1.3	2.4	3.4
Eastern Europe	13.5	3.7	5.6	2.1	1.1	3.5	8.4
South and East Mediteranea	5.1	3.9	5.1	2.8	1.8	2.8	2.9
Western Africa	4.6	3.9	3.4	4.4	0.2	0.6	0.5
Central Africa	4.0	1.4	1.0	1.7	0.1	0.1	0.0
Eastern Africa	4.4	3.2	1.6	4.6	0.2	0.5	0.1
Southern Africa	5.2	2.4	2.0	2.8	0.6	1.2	1.7
Central Asia	3.0	0.9	0.8	1.0	0.1	0.4	1.2
Persian Gulf	3.8	2.2	3.1	1.5	1.1	1.5	3.9
Southern Asia	3.8	22.5	13.6	30.3	1.9	6.8	5.3
Northern America	16.1	6.8	11.1	3.0	36.0	25.8	27.8
Central America	4.4	3.1	4.4	1.9	1.3	1.9	2.0
Southern America	9.5	3.8	6.7	1.3	3.2	4.5	2.2
Eastern Asia	8.8	24.3	20.0	28.2	21.2	21.4	21.6
South-Eastern Asia	3.3	8.6	6.9	10.0	1.8	4.1	3.4
Oceania	6.4	0.5	0.8	0.3	1.5	1.4	1.6
World	100.0						

Criteria : SUP= area (km²) ; POP= Population (inhabitants) ; URB = Urban Population; RUR= Rural population ; GDP1=Gross Domestic Product (\$); GDP2= Gross Domestic Product (pps); CO2=Carbon Dioxide emissions (t.)
Source : ESPON 3.1 - “Europe in the World” / World Development Indicator 2002

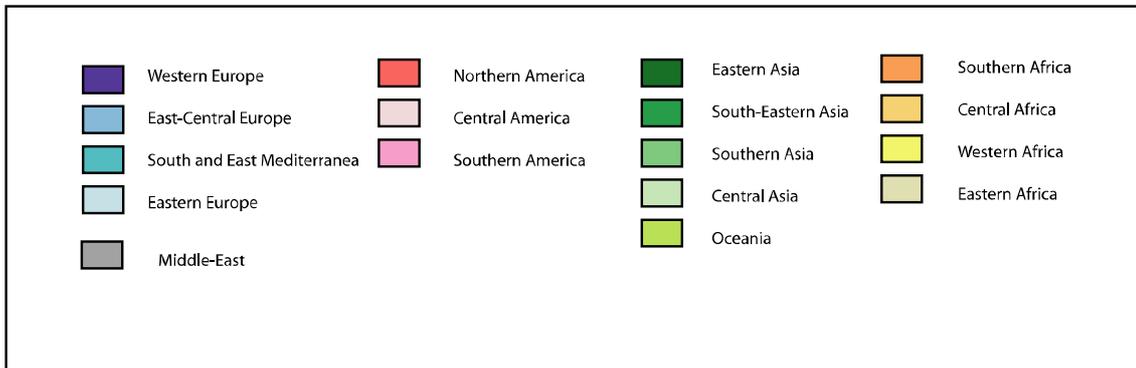
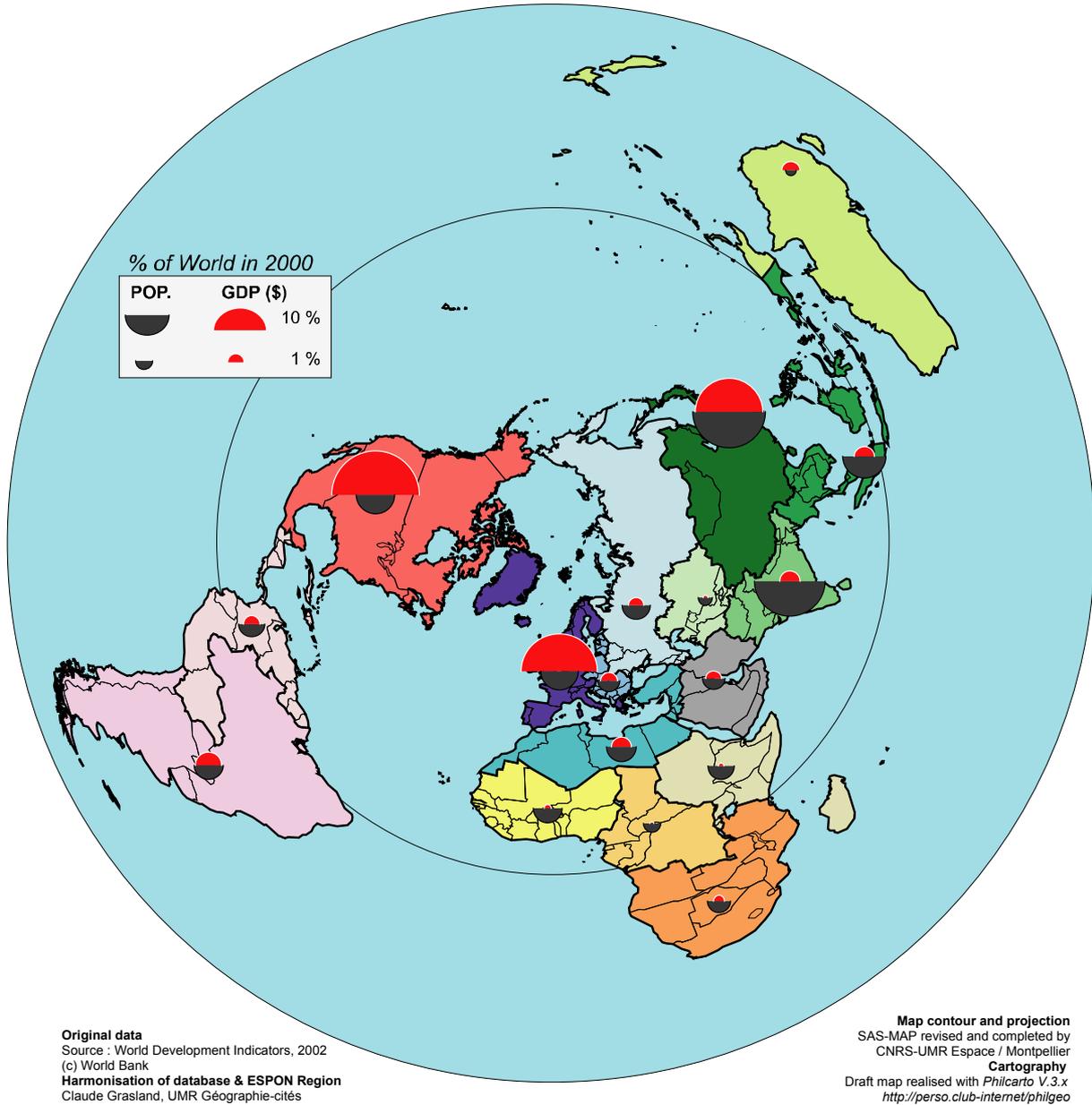
² <http://www.cia.gov/cia/publications/factbook/geos/tw.html>

MAP. 2

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THE WORLD IN 17 ESPON REGIONS



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1.3 WHICH GEOGRAPHICAL FRAMEWORK?

The fact to limit the research of the ESPON programme to EU27 or EU29 can produce illusions and mistakes in the analysis of main trends shaping the European territory. In many cases, the perception of inequalities, potentialities, polarisations ... will be fully transformed according to the geographical shape and the basic territorial units used by the observers. As an example, we propose to consider how the map of the percentage of young (0-14 years) in 2000 is modified when the geographical framework is modified (**Map. 3**).

❖ A Global View

With a global view, the reader of the map will perceive a major opposition between Europe and Africa. Indeed, at the scale of the world divided in 17 ESPON regions, the lowest proportion of young are observed in Western, Central or Eastern Europe (less than 20%) and the highest in Africa and Middle East (more than 40%). The South and East Mediterranean countries appear in an intermediate situation with a proportion of young which is equal to the mean of the world (30-35 % of young).

❖ A Pan European View

With a restricted view on the pan-European area and a more precise territorial unit (the state level), the reader of the map will perceive a major opposition between North and South of the Mediterranean Sea. At this scale of analysis, we can indeed observe a discontinuity in the statistical distribution of the percentage of young with very few states characterised by the intermediate situation of 20-30% of young.

❖ An Espon View

With a restriction of the analysis to the ESPON space at NUTS 2 level, the reader of the map will perceive a completely different spatial opposition, with relatively low proportion of young in Central and Southern Europe and relatively high proportion in Northern, Western and Eastern Europe. From a global view, this internal differentiation of Europe would appear very limited, but for European policies it is important to deal with it because they produce an important differential of growth.

The problem is not to decide what is the best point of view between the previous ones but to be aware that they are absolutely complementary and that, whatever the target of the analysis, it is important to combine several scales of analysis. In concrete terms, the ESPON view is certainly the most interesting in a short term perspective. But the pan-European view and the global view should be taken into account when European policy makers try to elaborate strategies in a long term perspective.

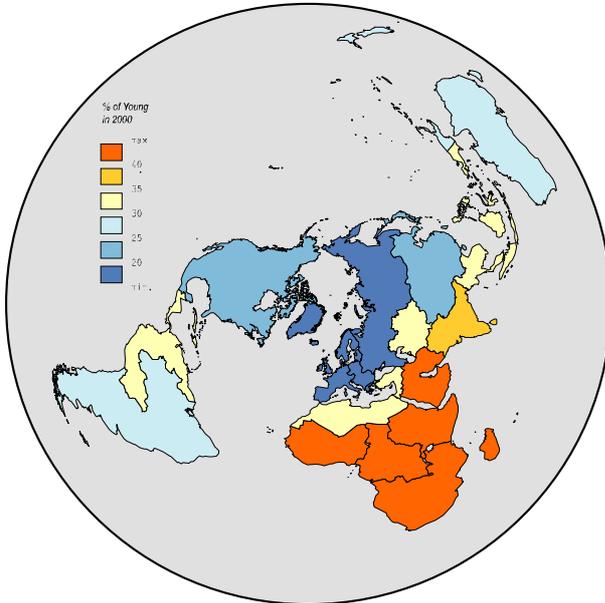
MAP 3

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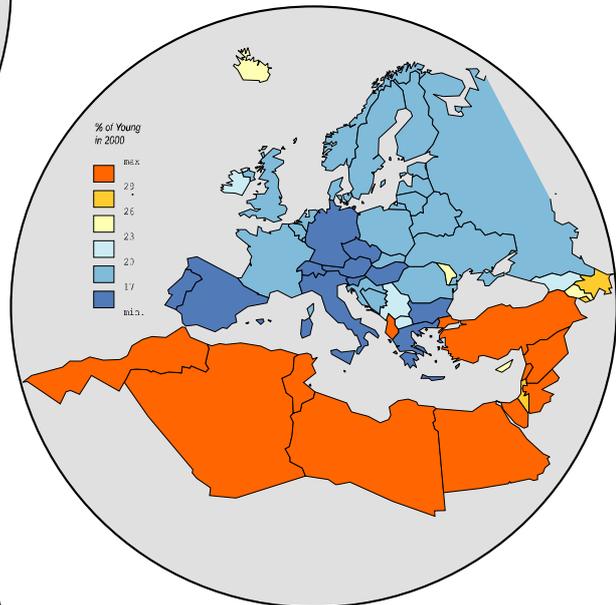
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THE INFLUENCE OF THE SPATIAL FRAMEWORK

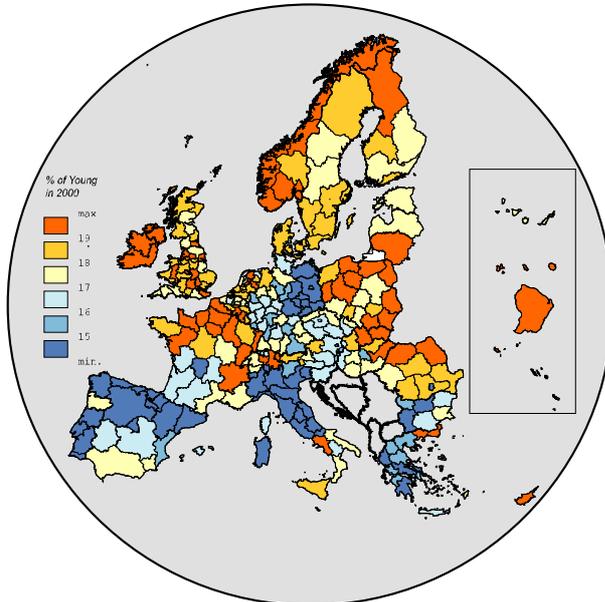
A GLOBAL VIEW



A PAN-EUROPEAN VIEW



AN ESPON VIEW



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N.B. The partition of the statistical distribution in the three maps is different because the spatial framework is not the same. In each case, the spatial units in orange and yellow are located above the mean value of the reference area and the regions in blue are located under this mean value.

1.4 WHICH POLITICAL MESSAGE?

The maps are very powerful tools of communication and they can transmit implicit or explicit political message. As an example, consider the typology of age structure presented on **Map 4** and examine which political messages could be delivered by such a map if it was included in the Third Cohesion Report or the new version of the European Spatial Development Perspective.

❖ An “old” Europe ...

This map indicates that the demographic structure of the world at the beginning of the 21st century is characterised by a very high level of heterogeneity. According to the timetable of their demographic transition, some states are characterised by over/under representations of young, adult, or old as compared to the world structure (**Map. 4**). The figures clearly indicate that Western, Central or Eastern Europe are all characterised by a deficit of young population (less than 20%) and an excedent of old (more than 12%) as compared to the rest of the world and especially to the Triade's challengers : Northern America or Eastern Asia.

❖ ... with “young” neighbours.

But the map explains also that the regions of “Northern America” and “Eastern Asia” include economic peripheries with high demographic potential like Mexico for NAFTA and China for Japan. It is obvious that the situation of Europe would appear very different if the future scenarios include peripheral areas which are strongly related to Europe like S.E. Mediterranean countries, Africa, Central Asia or even Southern Asia.

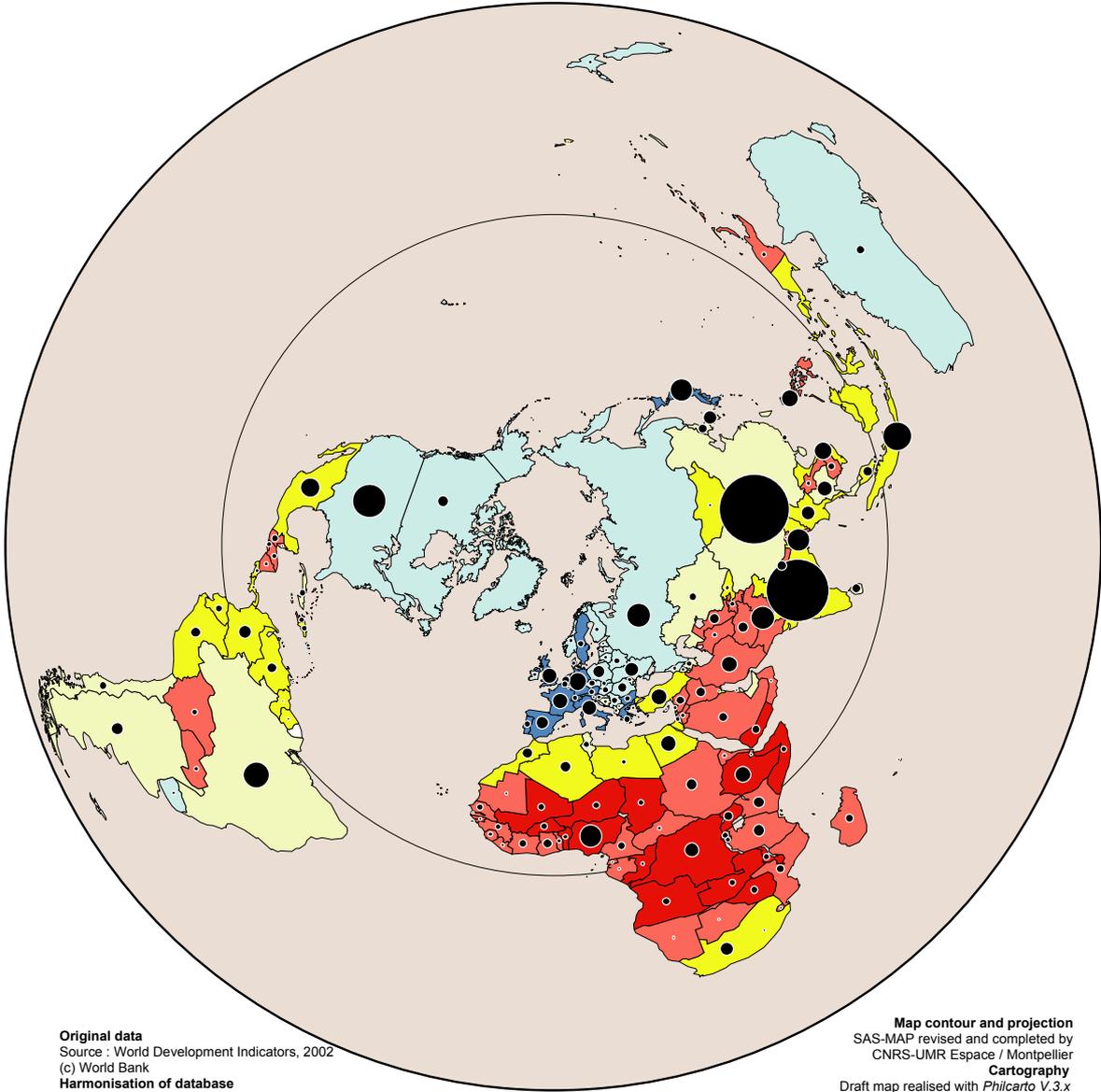
ESPON REGIONS	Age structure (%)			Population (millions)
	0-14	15-64	65+	
Western Europe	17%	67%	16%	389
Eastern Europe	19%	69%	12%	226
Central Europe	19%	68%	13%	130
S.E. Mediterranean	34%	62%	5%	235
Western Africa	45%	52%	3%	237
Central Africa	47%	50%	3%	82
Eastern Africa	45%	53%	3%	194
Southern Africa	42%	55%	3%	147
Central Asia	34%	61%	5%	56
Persian Gulf	40%	57%	3%	134
Southern Asia	35%	60%	5%	1355
Northern America	24%	65%	11%	410
Central America	34%	61%	5%	187
Southern America	29%	65%	6%	231
Eastern Asia	24%	68%	8%	1469
South-Eastern Asia	32%	63%	5%	518
Oceania	25%	65%	10%	30
World	30%	63%	7%	6029

Source : ESPON 3.1 - “Europe in the World” / World Development Indicator 2002

MAP. 4

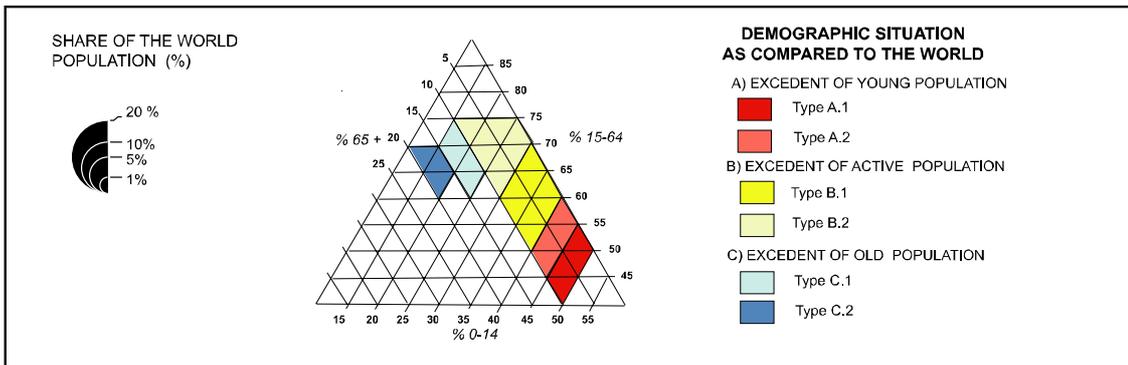
EIW0307_1

European Spatial Planning Observatory Network
 ESPON 3.1 / Workpackage "Europe in the World"
POPULATION AND AGE STRUCTURE 2000 / STATES



Original data
 Source : World Development Indicators, 2002
 (c) World Bank
Harmonisation of database
 Claude Grasland, UMR Géographie-cités

Map contour and projection
 SAS-MAP revised and completed by
 CNRS-UMR Espace / Montpellier
Cartography
 Draft map realised with *Philcarto V.3.x*
<http://perso.club-internet/philgeo>



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PART 2

**EUROPE
IN A WORLD WITHOUT BOUNDARIES**

2.1. "GEOGRAPHIC" POTENTIAL

2.2 DEMOGRAPHIC POTENTIAL

2.3 ECONOMIC POTENTIAL

2.4 POLLUTION POTENTIAL

2.1 “GEOGRAPHIC” POTENTIAL

The researchers of the Hypercarte Project have proposed new cartographic representations of the world which were first published in a CD-ROM on World population³ and have received the 1st Price of Cartography at the International Festival of Géography from Saint-Dié-des-Vosges in 2000. Those maps which are based on a new smoothing method propose a vision of a world “without boundaries”.

With a sample of those results, we propose to examine for which criteria (geographic, demographic, economic, ...) is it possible to observe something that could be called “Europe” when we do not take into account the political division of the world between states ?

❖ Five continents ...

Europe is commonly defined as one of the five continents. And a continent is usually defined as a kind of very large island. If we try to propose a neutral representation of the distribution of emerged lands we can note the existence of 4 to 5 large sets, of different sizes, apparently clearly distinct. But in fact, their degree of spatial separation is variable. If the two Americas are clearly distinct, as Australia and Antarctica (which is not mapped according to the chosen map projection), Africa and Asia remain very closely joined together. A massive “Old World” is opposed to an archipelago of new worlds.

❖ ...without Europe !

But the most significant fact is that this “geographical” approach of the world does not reveal any part of the world which could be assumed to be a European continent. Europe is not a natural fact but a social fact, a historical construction. It is funny to observe that the non-continent of Europe has been the place of the definition of continents for the entire world. According to this observation we don't use continents as an *a priori* operational tool for the regionalisation of the world. The ESPON programme should be free to use any other partition of the world which would be more relevant for its own objectives. If Europeans want to measure their current influence in the World, they are obliged to free from their own inheritance, from the *Weltanschauung* produced by their ancestors.

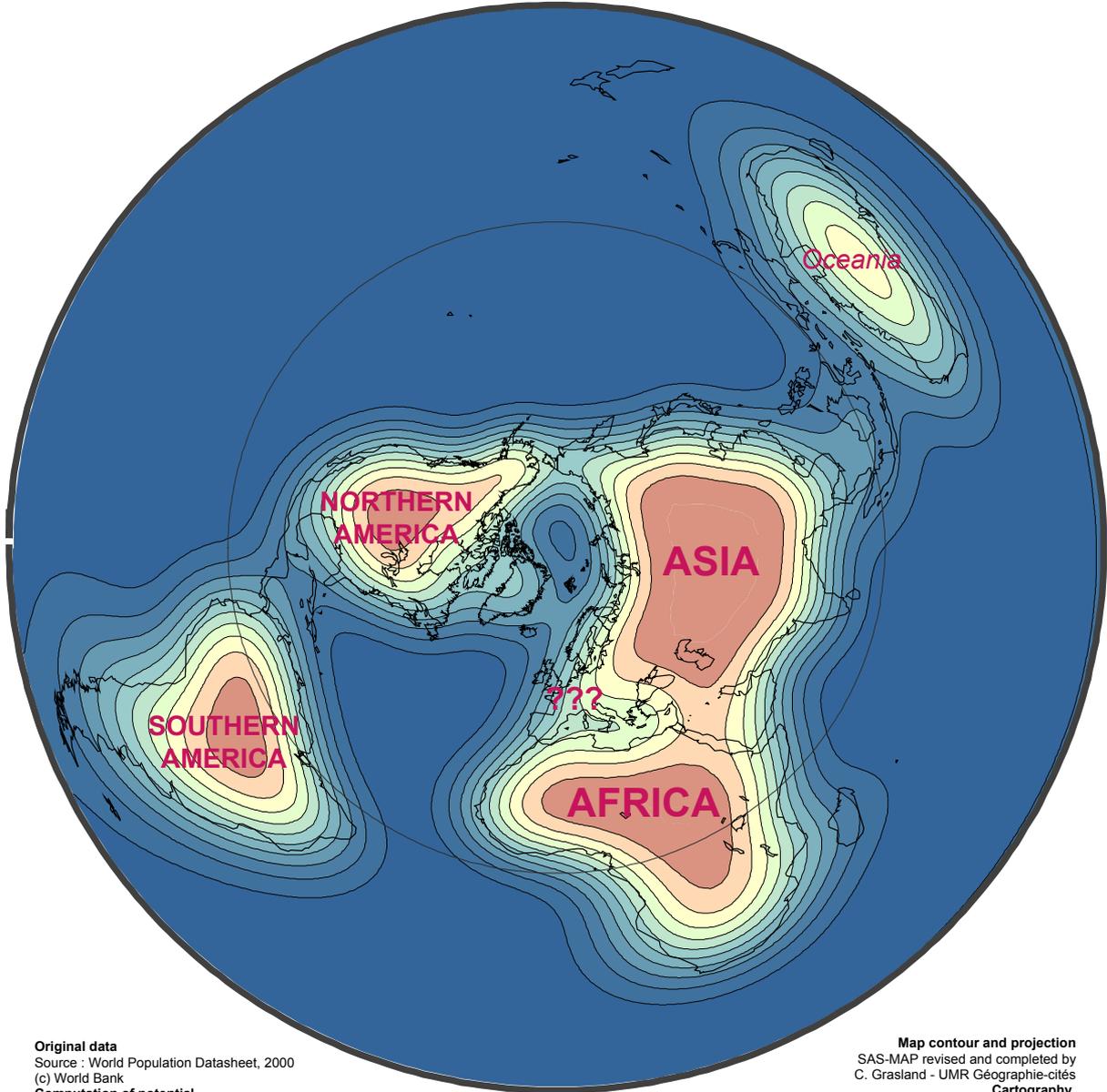
³ Pison G., Chesnais J.C., Grasland C., al. (1999), *6 milliards d'hommes et moi*, CD-ROM, Syrinx, Paris.

MAP 5

EIW0307_11

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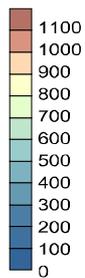
WORLD "GEOGRAPHIC" POTENTIAL



Original data
 Source : World Population Datasheet, 2000
 (c) World Bank
Computation of potential
 ID-IMAG / The Hypercarte Project

Map contour and projection
 SAS-MAP revised and completed by
 C. Grasland - UMR Géographie-cités
Cartography
 Map realised with Surfer

Area located in a gaussian neighbourhood span 1000 km



Thousands
 of km2

The areal potential of a point at the surface of the earth is a sum of all points of the World not covered by sea weighted by a decreasing function of distance. The function used in this analysis is a gaussian function $f(d) = \exp(-a \cdot d^2)$ where $f(1000 \text{ km}) = 0.5$

For more details , see.

Grasland C., Madelin M., 2001, The unequal distribution of population and wealth in the World , Population et Société, INED, 4 p. (http://www.ined.fr/englishversion/publications/pop_et_soc/pesa368.pdf)

(c) Grasland C., Grataloup C., 2003, CNRS-UMR Géographie-cités-GDR Libergeo

2.2 DEMOGRAPHIC POTENTIAL

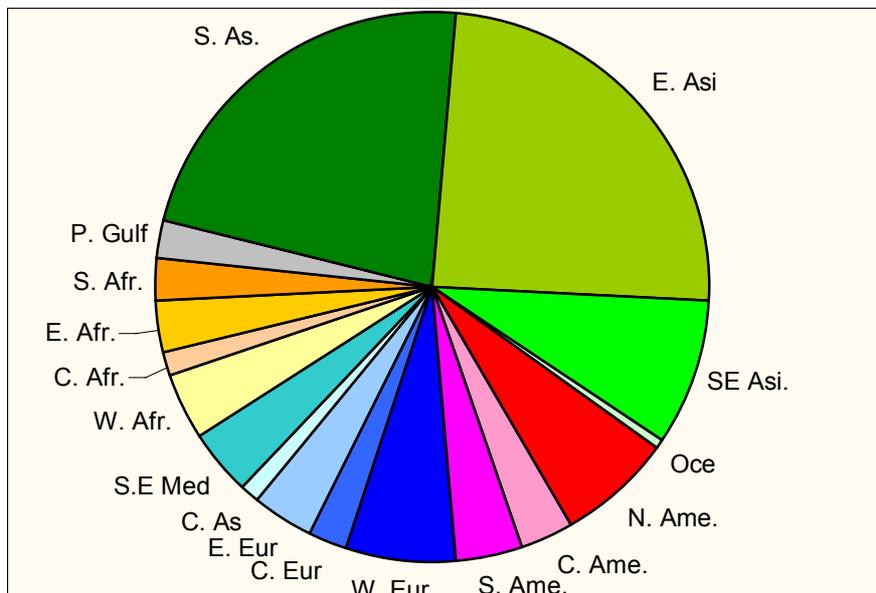
❖ The 3rd demographic centre of the World.

The most significant part of the world population is concentrated in three peaks of population located in “Eurasia”. The peaks of population located in the rest of the world appear clearly of secondary importance (NE. of Northern America, Atlantic coast of Southern America, Western Africa, Eastern Africa, SE. of Australia). The major node of population is composed of two major neighbouring peaks (Eastern Asia and Southern Asia). Europe is clearly separated from the twinning demographic giants of Asia by a clear discontinuity which follows more or less the Ural.

❖ With wider extension than usual definition of Europe.

Accordingly, it appears that Europe which was a “geographic” fiction is a demographic reality. But the demographic concentration of population which has its centre in Europe is not limited to the classical boundaries of EU15 or EU27. Europe is “potentially” the 3rd concentration of population in the World as far as it develops relations and exchange with neighbouring areas. Western Europe only represents 6.4% of the world population which is less than the NAFTA. With the addition of Central Europe, we obtain an amount of 8.6% of the world population which is just equivalent to South-Eastern Asia. It is only with the addition of wider peripheries that Europe can reach a potential of population equivalent to the one of China or India.

World population by ESPON region in 2000



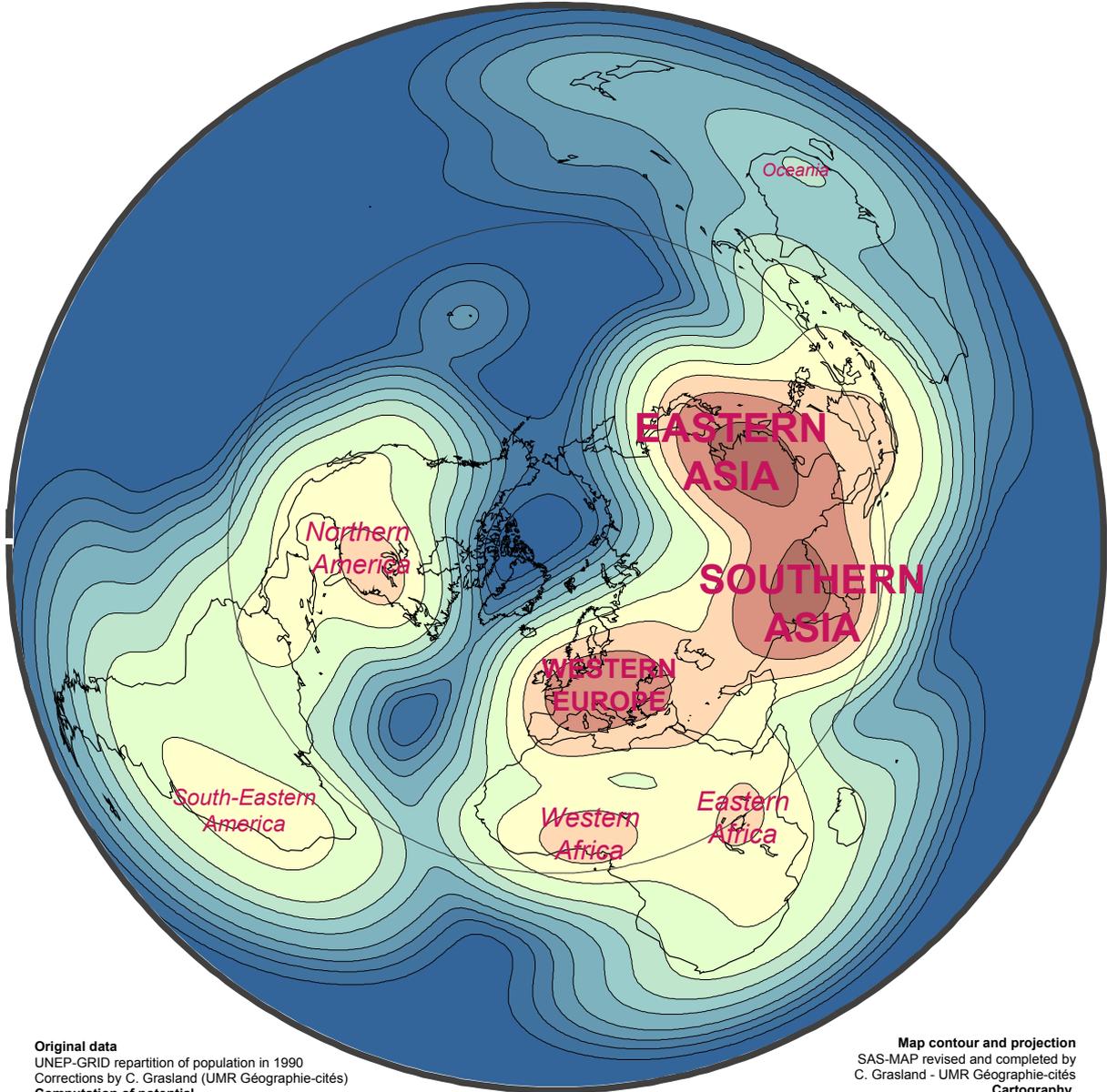
Source : ESPON 3.1 - “Europe in the World” / World Development Indicator 2002

MAP 6

EIW0307_10

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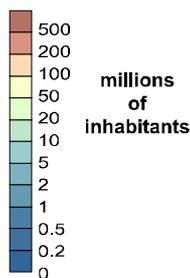
WORLD DEMOGRAPHIC POTENTIAL



Original data
UNEP-GRID repartition of population in 1990
Corrections by C. Grasland (UMR Géographie-cités)
Computation of potential
ID-IMAG / The Hypercarte Project

Map contour and projection
SAS-MAP revised and completed by
C. Grasland - UMR Géographie-cités
Cartography
Map realised with Surfer

Population 1990 located in a gaussian neighbourhood span 1000 km



The demographic potential of a point at the surface of the earth is a sum of all population of the World weighted by a decreasing function of distance. The function used in this analysis is a gaussian function $f(d) = \exp(-a \cdot d^2)$ where $f(1000 \text{ km}) = 0.5$

For more details , see.

Grasland C., Madelin M., 2001, The unequal distribution of population and wealth in the World , Population et Société, INED, 4 p. (http://www.ined.fr/englishversion/publications/pop_et_soc/pesa368.pdf)

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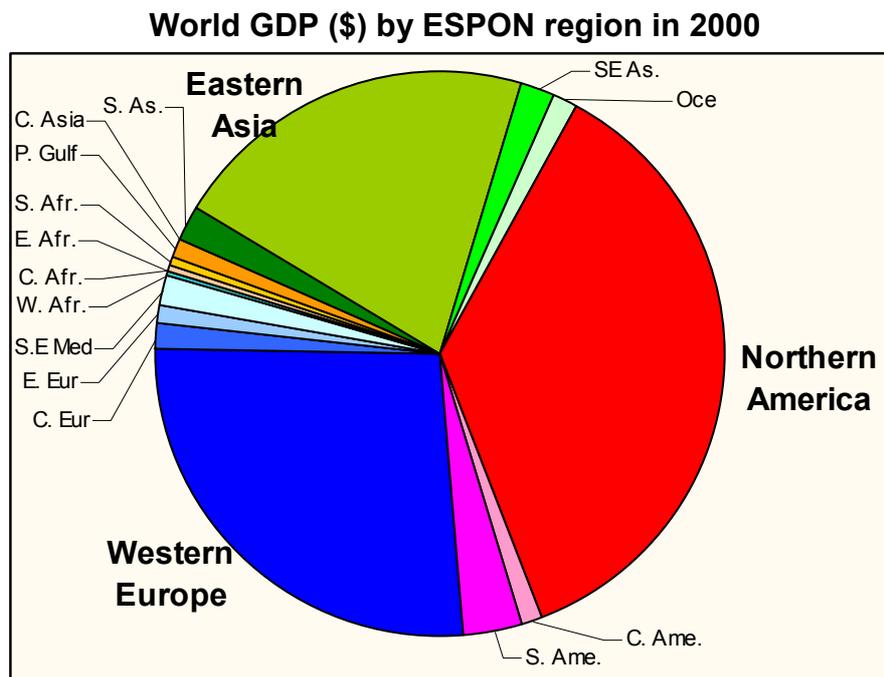
2.3 ECONOMIC POTENTIAL

❖ World economy and the Triad

As concerns wealth, measured here in terms of GNP in US dollars in 1995 (see map 7), the peaks of concentration are distributed in a simpler fashion, roughly a large northern triad (United States and Canada, Europe and Near-East, East Asia), and a small Southern triad (Brazil-Argentina, South Africa, Australia-New Zealand). Minor concentrations of wealth can be observed in Nigeria and in isolated peaks in the Pacific (Hawaii, French Polynesia).

❖ Scale parameter and polycentrism

However, this new point of view also raises a host of theoretical and methodological potential variations which will be discussed in our final report. Indeed, a change in the choice of radius of smoothing (250, 500, 2,000 km) would modify the location and relative importance of the main hubs of population and wealth⁴. It would also give more information on the internal spatial structure of each peak of concentration: monocentric for Western Europe, polycentric for Northern America, axial for Eastern Asia.



Source : ESPON 3.1 - "Europe in the World" / World Development Indicator 2002

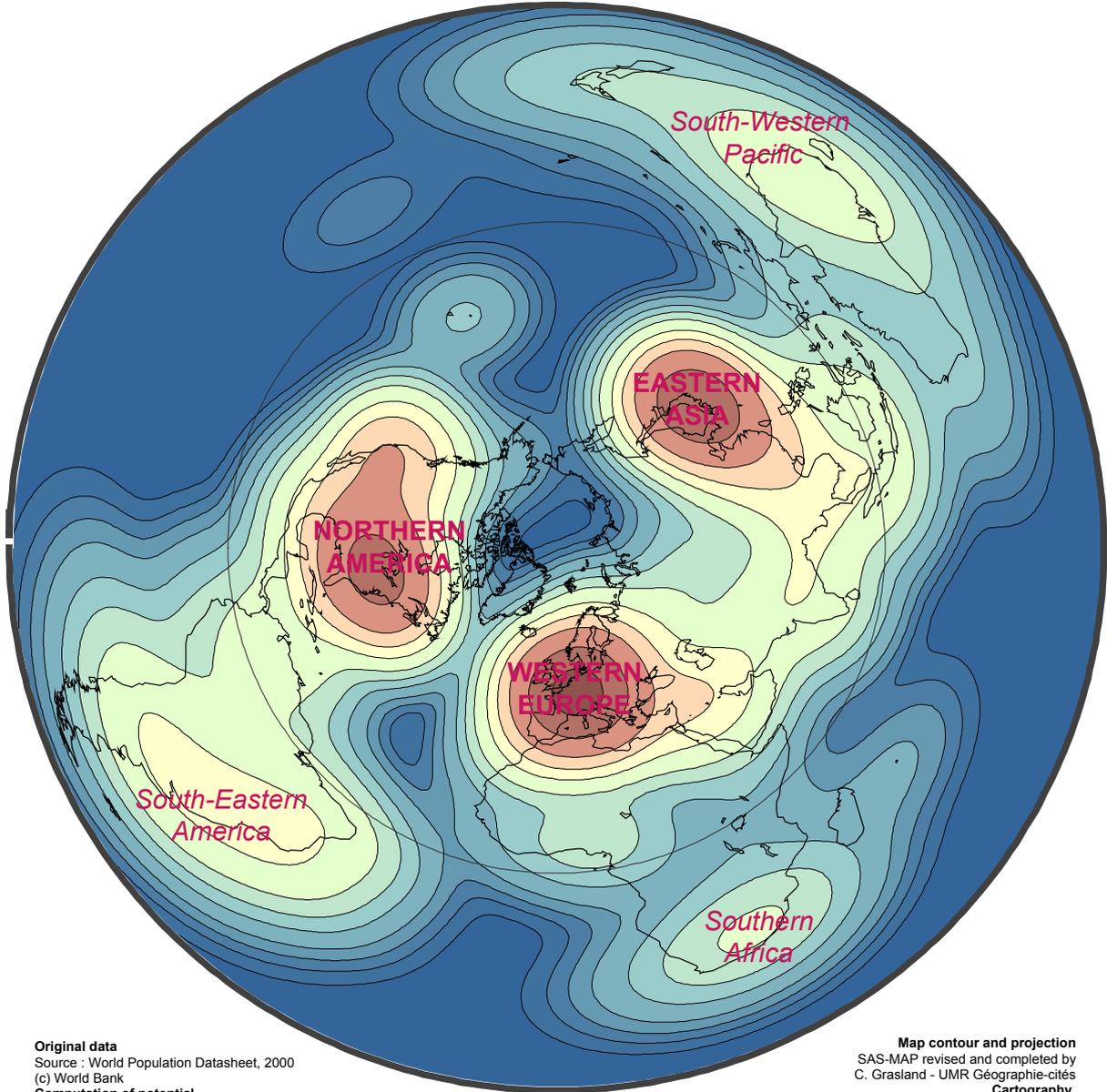
⁴ Gilles PISON (dir.), Jean-Claude CHESNAIS, Claude GRASLAND, al. – *6 milliards d'hommes ... et moi*, CD-Rom, Éditions Syrinx, 1999.

MAP 7

EIW0307_8

European Spatial Planning Observatory Network
ESPON 3.1 / Workpackage "Europe in the World"

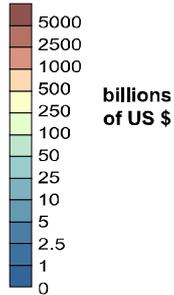
WORLD ECONOMIC POTENTIAL



Original data
Source : World Population Datasheet, 2000
(c) World Bank
Computation of potential
ID-IMAG / The Hypercarte Project

Map contour and projection
SAS-MAP revised and completed by
C. Grasland - UMR Géographie-cités
Cartography
Map realised with Surfer

GDP 1995 located in a gaussian neighbourhood span 1000 km



The economic potential of a point at the surface of the earth is a sum of all local economic concentrations of GDP weighted by a decreasing function of distance. The function used in this analysis is a gaussian function $f(d) = \exp(-a \cdot d^2)$ where $f(1000 \text{ km}) = 0.5$

For more details , see.

Grasland C., Madelin M., 2001, The unequal distribution of population and wealth in the World , Population et Société, INED, 4 p. (http://www.ined.fr/englishversion/publications/pop_et_soc/pesa368.pdf)

(c) Grasland C., Grataloup C., 2003, CNRS-UMR Géographie-cités-GDR Libergeo

2.4 POLLUTION (CO₂) POTENTIAL

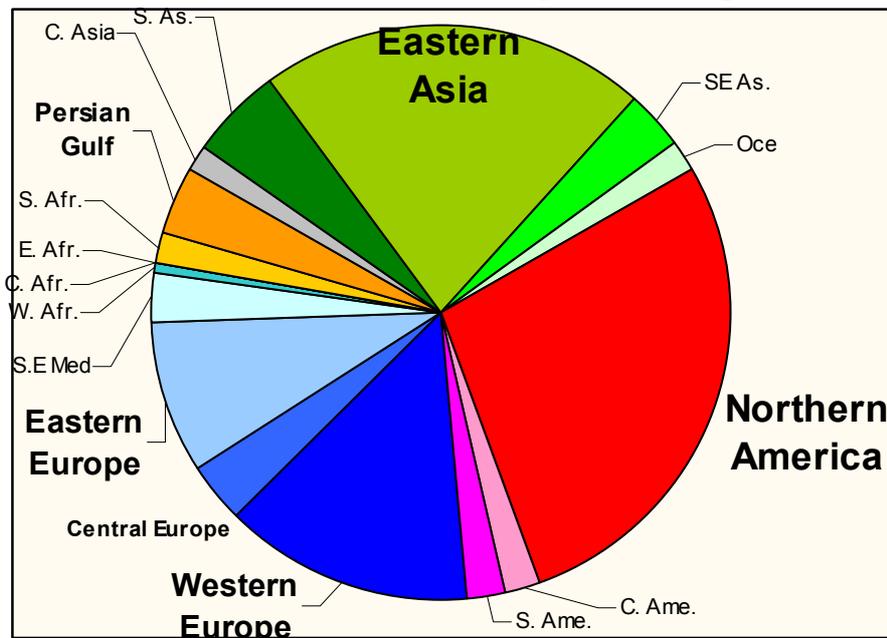
❖ World sustainability and the Triad

In usual publications, the distribution of CO₂ emissions is presented in the framework of territorial units which can be states or regions of the world. This territorial presentation of reality induces some implicit way of thinking which can influence the decision-maker. In particular, the use of territorial delimitation will favour the idea of a *market* of pollution with identified *actors* having rights to produce some quotas according to their size (economic, demographic) and being able to buy the rights of pollution of the other actors. The continuous approach of the reality presented in **Map 8** is more relevant because it reveals the direct correlation between world economic organisation and world distribution of pollution.

❖ The ecological responsibility of Europe.

The centres of the Triad have a tendency to export their pollution to neighbouring countries. It is especially true in the case of Europe where the model of industrial development of the XIXth century was adopted by socialist countries, but also in the case of Japan which exports its model toward China or Korea. A reduction of pollution in Western Europe will produce no real ecological effects if the CO₂ emissions are simply transferred toward Eastern Europe or Africa. A map without boundaries demonstrates that Europe is an economic and ecological reality and that both phenomena are clearly interrelated.

World Pollution (CO₂ emissions) by ESPON region in 2000



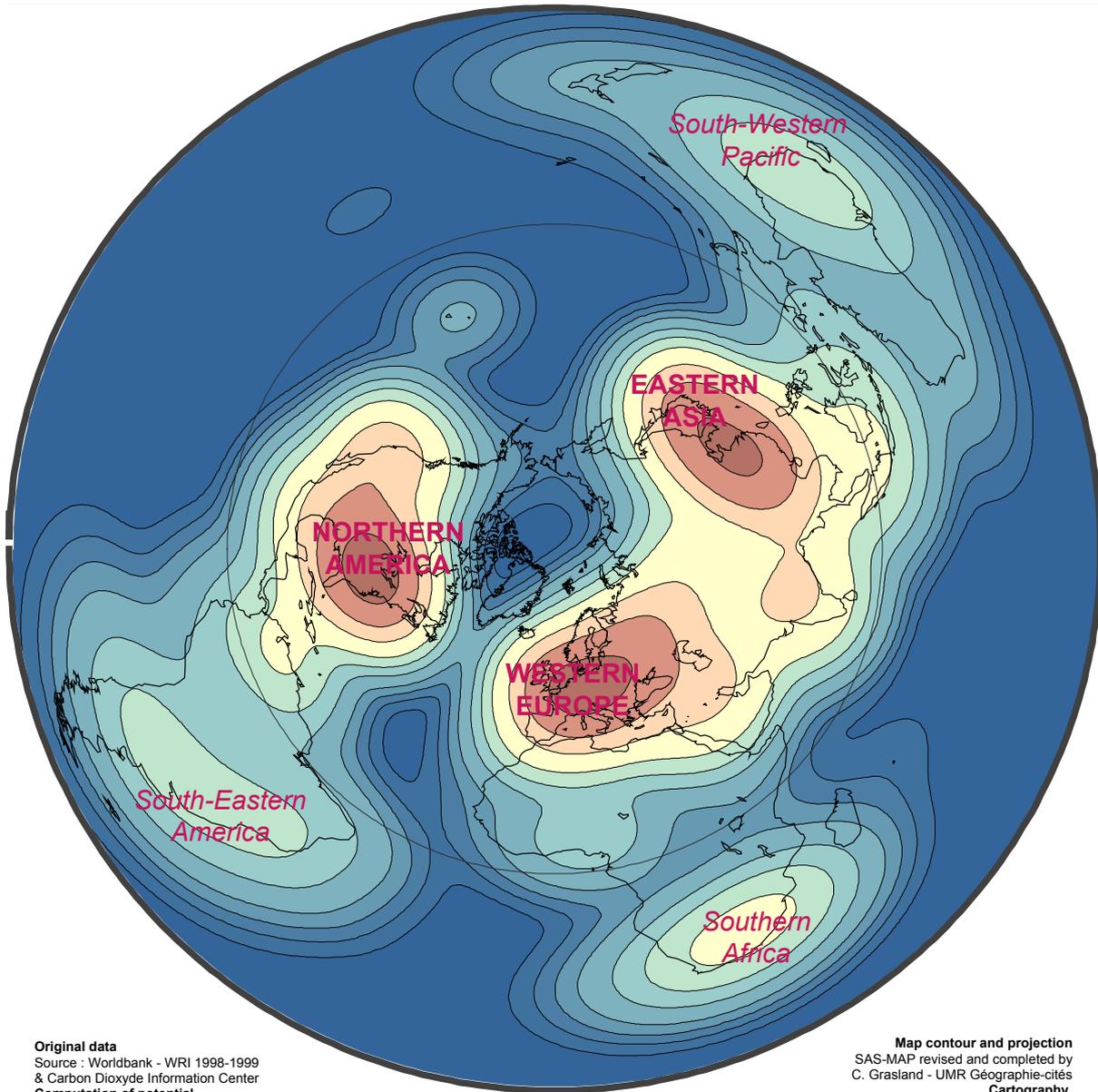
Source : ESPON 3.1 - "Europe in the World" / World Development Indicator 2002

MAP 8

EIW0307_12

European Spatial Planning Observatory Network
ESPON 3.1 / Workpackage "Europe in the World"

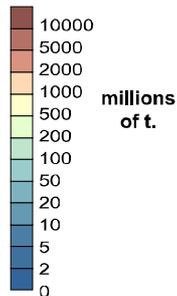
WORLD POLLUTION (CO₂) POTENTIAL



Original data
Source : Worldbank - WRI 1998-1999
& Carbon Dioxide Information Center
Computation of potential
ID-IMAG / The Hypercarte Project

Map contour and projection
SAS-MAP revised and completed by
C. Grasland - UMR Géographie-cités
Cartography
Map realised with Surfer

CO₂ Emissions 1998 located in a gaussian neighbourhood span 1000 km



The pollution potential of a point at the surface of the earth is a sum of all local emissions of carbon dioxide weighted by a decreasing function of distance. The function used in this analysis is a gaussian function $f(d) = \exp(-a \cdot d^2)$ where $f(1000 \text{ km}) = 0.5$

For more details, see.

Grasland C., Madelin M., 2001, The unequal distribution of population and wealth in the World, *Population et Société*, INED, 4 p. (http://www.ined.fr/englishversion/publications/pop_et_soc/pesa368.pdf)
Grasland C., 2001, Mapping CO₂ emissions on the earth (ca. 1995) : Cartographical problems and political issues, *Annales des Mines - Réalités Industrielles*, pp. 79-87 (ISSN 2.7472.0276.3)

(c) Grasland C., Grataloup C., 2003, CNRS-UMR Géographie-cités-GDR Libergeo

PART 3

THE FUNCTIONAL INFLUENCE AREA OF EUROPE

3.1. MAIN INTER-REGIONAL FLOWS / AIR 2000

3.2 MAIN INTER-REGIONAL FLOWS / TRADE 1996-2000

3.3 EUROPE INFLUENCE AREA / AIR FLOWS 2000

3.4 EUROPE INFLUENCE AREA / TRADE FLOWS 1996-2000

3.1. MAIN INTER-REGIONAL FLOWS / AIR 2000

❖ Western Europe represents 50% of international air flows ...

According to the database from the ITA, Western Europe is the origin or the destination of 50% of the international air flows of passengers in 2000. This important share is partly due to the importance of air traffic between Western European countries (70 % of intra-regional flows!) and the comparison with Northern America is biased because flows inside the United States are not taken into account. Western Europe presents the highest level of regional integration with 71% of international flows which are internal to the region⁵

❖ ...and 30% of interregional air flows.

If we consider only interregional flows, the comparison becomes possible and one can demonstrate that *Western Europe is the major centre of the world air traffic with 30% of interregional passenger flows in 2000*. It is equivalent to the sum of the interregional air traffic of the other members of the Triad: Northern America (19.8%) and Eastern Asia (11.6%). The main air traffic flows of passengers from Western Europe are directed to Northern America (62 millions), South and East Mediterranean (38 millions), and Central Europe (23 millions). Other important flows are directed to Eastern Asia (12 millions), South-Eastern Asia (9 millions) and Central America (9 millions) and at a less degree to Persian Gulf (5.5 millions), Eastern Europe (5 millions), Southern Asia (4 millions) and Southern America (4 millions each).

ESPON REGIONS	International		Intra-regional		Inter-regional		Regional integration
	Millions Pass.	%	Millions Pass.	%	Millions Pass.	%	
Western Europe	628.2	50.5%	443.9	70.1%	184.3	30.2%	0.71
Central Europe	26.9	2.2%	1.4	0.2%	25.5	4.2%	0.05
Eastern Europe	6.3	0.5%	0.0	0.0%	6.3	1.0%	0.00
South and East Mediterannea	47.7	3.8%	1.7	0.3%	46.0	7.5%	0.04
Western Africa	4.7	0.4%	1.1	0.2%	3.6	0.6%	0.23
Central Africa	0.9	0.1%	0.2	0.0%	0.8	0.1%	0.19
Eastern Africa	3.9	0.3%	0.2	0.0%	3.7	0.6%	0.05
Southern Africa	4.6	0.4%	0.0	0.0%	4.6	0.8%	0.00
Central Asia	0.8	0.1%	0.0	0.0%	0.8	0.1%	0.04
Persian Gulf	22.9	1.8%	5.9	0.9%	17.0	2.8%	0.26
Southern Asia	15.7	1.3%	2.3	0.4%	13.4	2.2%	0.15
Northern America	171.0	13.8%	50.4	8.0%	120.6	19.8%	0.29
Central America	36.9	3.0%	3.9	0.6%	33.0	5.4%	0.11
Southern America	16.7	1.3%	6.4	1.0%	10.3	1.7%	0.38
Eastern Asia	148.2	11.9%	77.6	12.2%	70.7	11.6%	0.52
South-Eastern Asia	79.4	6.4%	29.8	4.7%	49.6	8.1%	0.38
Oceania	28.1	2.3%	8.5	1.3%	19.6	3.2%	0.30
World	1243.3	100.0%	633.4	100.0%	609.9	100.0%	0.51

Original data : CD-ROM IT00.XLS (c) ITA - Institut du Transport Aerien
Harmonisation of database : Brossier P., Cicille P., Sillère G. CNRS - UMR Espace / Montpellier

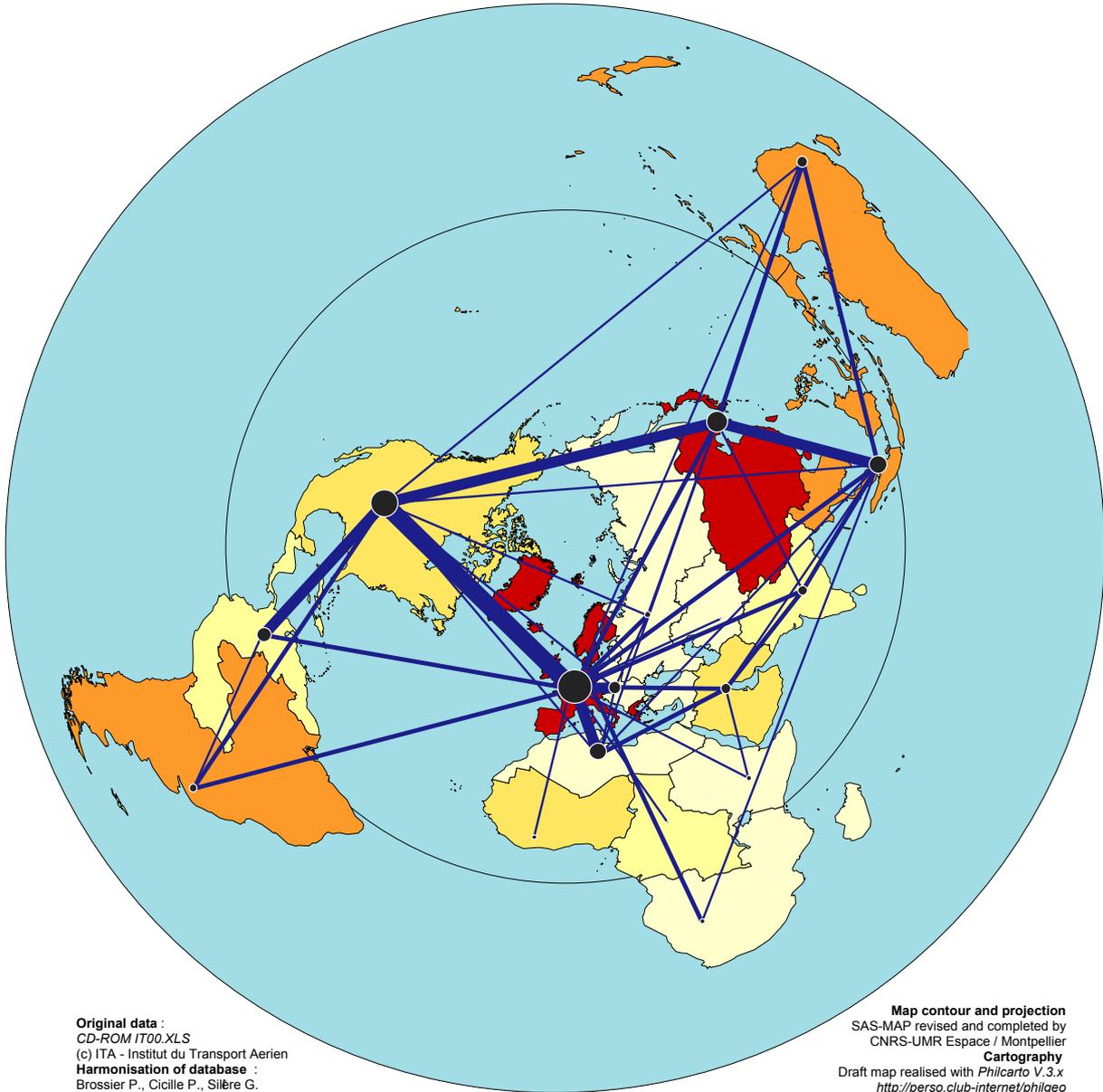
⁵ But this index is biased because it is related to internal political divisions which are higher in Europe. It is the reason why we will eliminate intra-regional traffic (flows between states of the same ESPON region) in further analyses.

MAP 9

European Spatial Planning Observatory Network
 ESPON 3.1 / Workpackage "Europe in the World"

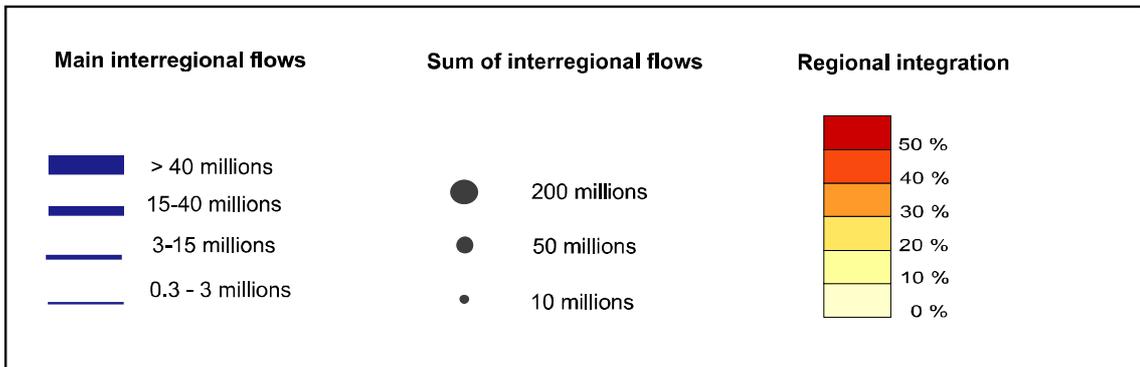
EIW0307_4

INTER-REGIONAL FLOWS / AIR TRAFFIC 2000



Original data :
 CD-ROM IT00.XLS
 (c) ITA - Institut du Transport Aerien
 Harmonisation of database :
 Brossier P., Cicille P., Silère G.
 CNRS - UMR Espace / Montpellier

Map contour and projection
 SAS-MAP revised and completed by
 CNRS-UMR Espace / Montpellier
 Cartography
 Draft map realised with *Philcarto V.3.x*
<http://perso.club-internet/philgeo>



(c) Grasland C., Grataloup C., 2003, CNRS-UMR Géographie-cités-GDR Libergeo

3.2 MAIN INTER-REGIONAL FLOWS / TRADE 1996-2000

❖ Western Europe represents 37 % of international trade flows ...

In order to obtain a structural evaluation of flows, independent from conjunctural yearly fluctuations, the GDR Libergeo (UMR Espace-Montpellier & UMR Géographie-cités) has established a matrix of the mean value of trade flows between states during the time period 1996-2000 without distinction of direction (mean of import and export⁶). According to this robust estimator, we can demonstrate that Western Europe has been the origin or the destination of more than 37% of trade flows during the last years⁷.

❖ ...and 24 % of interregional flows.

If we consider only interregional flows, Western Europe remains the main centre of world trade (24%) but its total of interregional flows appears slightly equivalent to the one of the other members of the Triad (22% for Northern America and 21% for Eastern Asia). The main bilateral trade flows of Western Europe are logically related to Northern America (210 billions of \$) and Eastern Asia (155) but very important flows can also be observed with the neighbouring regions of Central Europe (91) and S.E. Meditteranea (62) and with S.E. Asia (53). Important commercial relations take place also with Southern America (26), Eastern Europe (26) and Persian Gulf (23).

ESPON REGIONS	International		Intra-regional		Inter-regional		Regional integration
	Billions \$	%	Billions \$	%	Billions \$	%	
Western Europe	1990.8	37.1%	1268.1	54.7%	722.6	23.7%	0.64
Central Europe	145.4	2.7%	20.5	0.9%	124.9	4.1%	0.14
Eastern Europe	82.0	1.5%	18.8	0.8%	63.2	2.1%	0.23
South and East Meditteranea	110.4	2.1%	6.0	0.3%	104.3	3.4%	0.05
Western Africa	23.5	0.4%	1.8	0.1%	21.7	0.7%	0.08
Central Africa	6.1	0.1%	0.1	0.0%	6.1	0.2%	0.02
Eastern Africa	8.2	0.2%	0.6	0.0%	7.6	0.3%	0.07
Southern Africa	35.2	0.7%	2.9	0.1%	32.3	1.1%	0.08
Central Asia	10.1	0.2%	0.7	0.0%	9.4	0.3%	0.07
Persian Gulf	98.5	1.8%	3.9	0.2%	94.6	3.1%	0.04
Southern Asia	50.2	0.9%	1.6	0.1%	48.6	1.6%	0.03
Northern America	1203.1	22.4%	532.8	23.0%	670.2	22.0%	0.44
Central America	87.9	1.6%	15.5	0.7%	72.4	2.4%	0.18
Southern America	103.1	1.9%	23.6	1.0%	79.5	2.6%	0.23
Eastern Asia	979.3	18.3%	339.2	14.6%	640.1	21.0%	0.35
South-Eastern Asia	348.6	6.5%	74.6	3.2%	274.0	9.0%	0.21
Oceania	80.8	1.5%	8.3	0.4%	72.5	2.4%	0.10
World	5363.2	100.0%	2319.2	100.0%	3044.0	100.0%	0.43

Original data : CD-ROM PC-TAS (c) Trade Analysis System ITC-UNSD
Harmonisation of database : Brossier P., Cicille P., Sillère G. CNRS - UMR Espace / Montpellier

⁶ Distinction between import and export will be examined in the final report of « Europe in the World ».

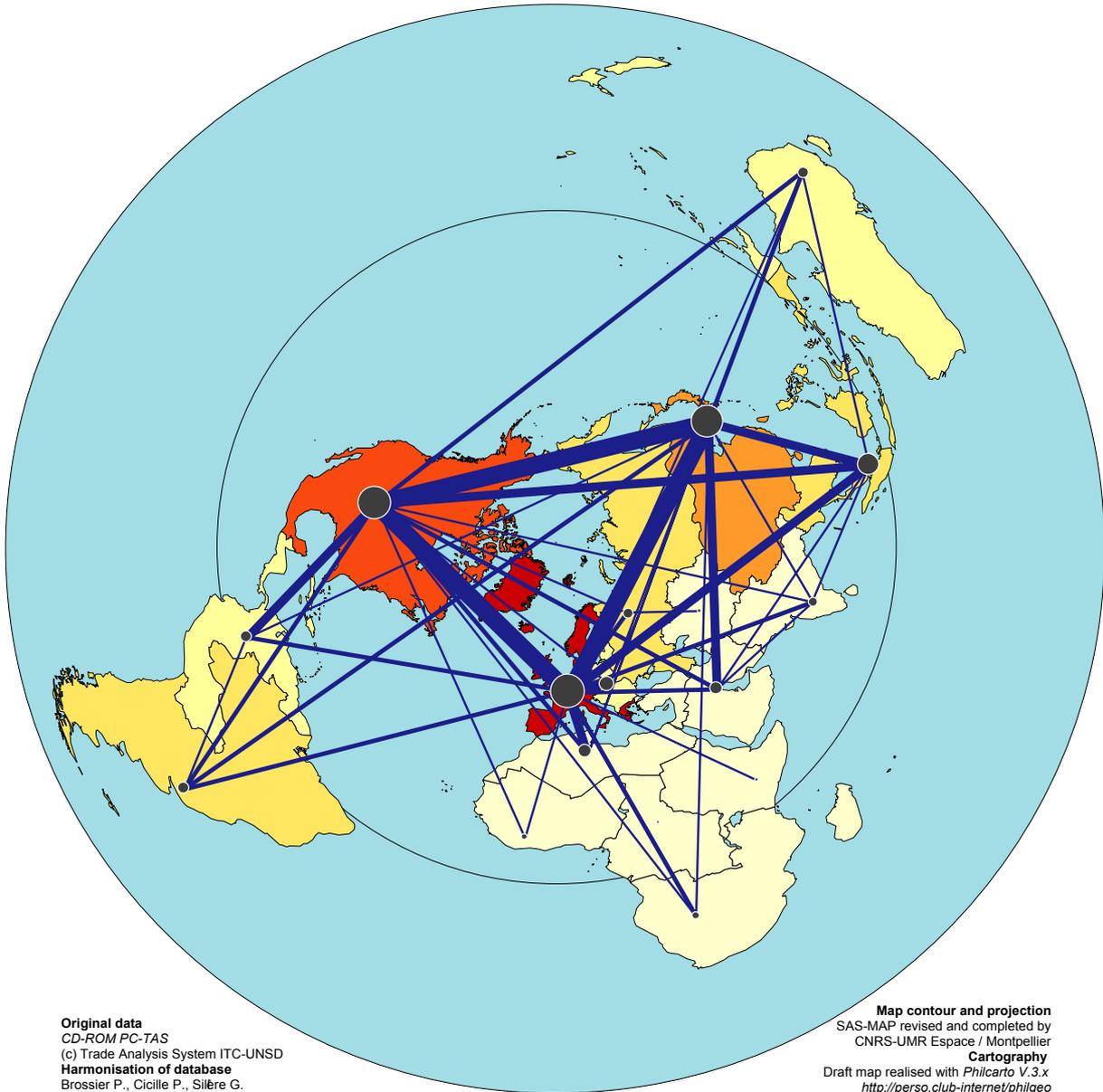
⁷ The level of regional economic integration of Western Europe (64% of international trade flows are internal) is much higher than for the NAFTA (44%) or the Eastern Asia (35%). But this index is not reliable as it has been explain previously.

MAP 10

EIW0307_5

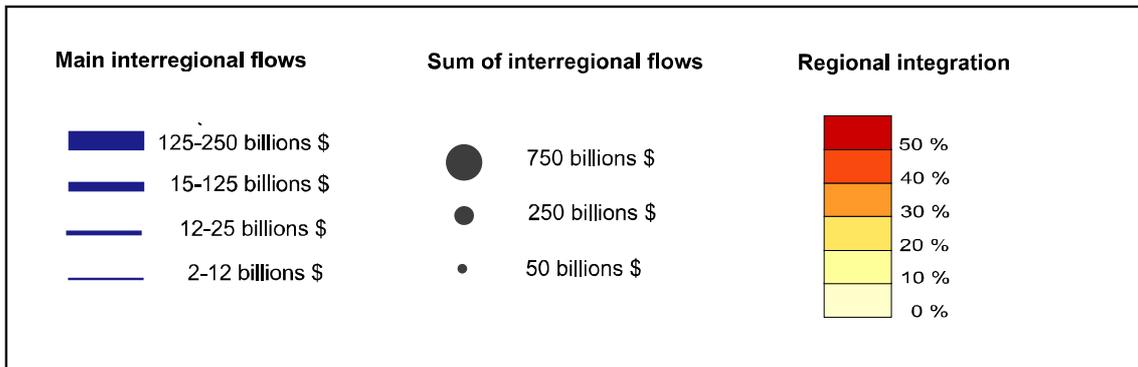
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INTER-REGIONAL FLOWS / BILATERAL TRADE 1996-2000



Original data
CD-ROM PC-TAS
(c) Trade Analysis System ITC-UNSD
Harmonisation of database
Brossier P., Cicille P., Silère G.
CNRS - UMR Espace / Montpellier

Map contour and projection
SAS-MAP revised and completed by
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Cartography
Draft map realised with *Philcarto V.3.x*
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(c) Grasland C., Grataloup C., 2003, CNRS-UMR Géographie-cités-GDR Libergeo

3.3 EUROPE INFLUENCE AREA / AIR FLOWS 2000

According to a division of the international flows between Western Europe (30%), Northern America (20%), Eastern Asia (12%) and “rest of the world” (38%), it is possible to propose a preliminary representation of the comparative influence of Europe and the other members of the Triad.

❖ Europe major influence from Capetown to Vladivostok

At the state level, the European influence area appears as a relative continuous field from Capetown to Vladivostok. Indeed, most African countries and most states from Central Asia, Middle East or former Soviet Union have more passenger flows with Europe than with other members of the Triad or with the rest of the World. In comparison, the influence area of Northern America appears very small and does not even cover all the Americas because of the regional integration of Mercosur. And the influence of Eastern Asia appears relatively limited to the states of Western Pacific coast.

❖ Is Western Europe the “World Wide Hub”?

Looking at this map from air transportation, it appears that in terms of accessibility, Europe is the World Wide Hub. This position can be explained by the great diversity of relations established in the past by the European states (France in Western Africa, UK in Eastern Africa and India, Spain in Southern America, Portugal in Brazil, Italia in Libya and Ethiopia ...). Taking benefit from this inheritance, Europe has to examine the best way to organize its connexions with the rest of the world, which is an external problem (world influence) and an internal problem (choice of gateway cities).

World influence of Western Europe / Interregional air traffic 2000

ESPON REGIONS	Western Europe	Northern America	Eastern Asia	Rest of the World	Total
Western Europe	-	33%	6%	60%	100%
Central Europe	91%	2%	0%	7%	100%
South and East Mediteranea	83%	4%	1%	12%	100%
Western Africa	83%	6%	0%	11%	100%
Southern Africa	79%	5%	3%	12%	100%
Eastern Europe	79%	5%	5%	11%	100%
Eastern Africa	78%	1%	1%	21%	100%
Central Africa	72%	0%	0%	28%	100%
Central Asia	63%	2%	12%	23%	100%
Northern America	51%	0%	19%	30%	100%
Southern America	39%	49%	2%	10%	100%
Persian Gulf	32%	1%	2%	65%	100%
Southern Asia	32%	2%	4%	62%	100%
Central America	26%	71%	0%	3%	100%
South-Eastern Asia	18%	3%	53%	26%	100%
Eastern Asia	17%	32%	0%	51%	100%
Oceania	10%	14%	40%	36%	100%
World	30%	20%	12%	38%	100%

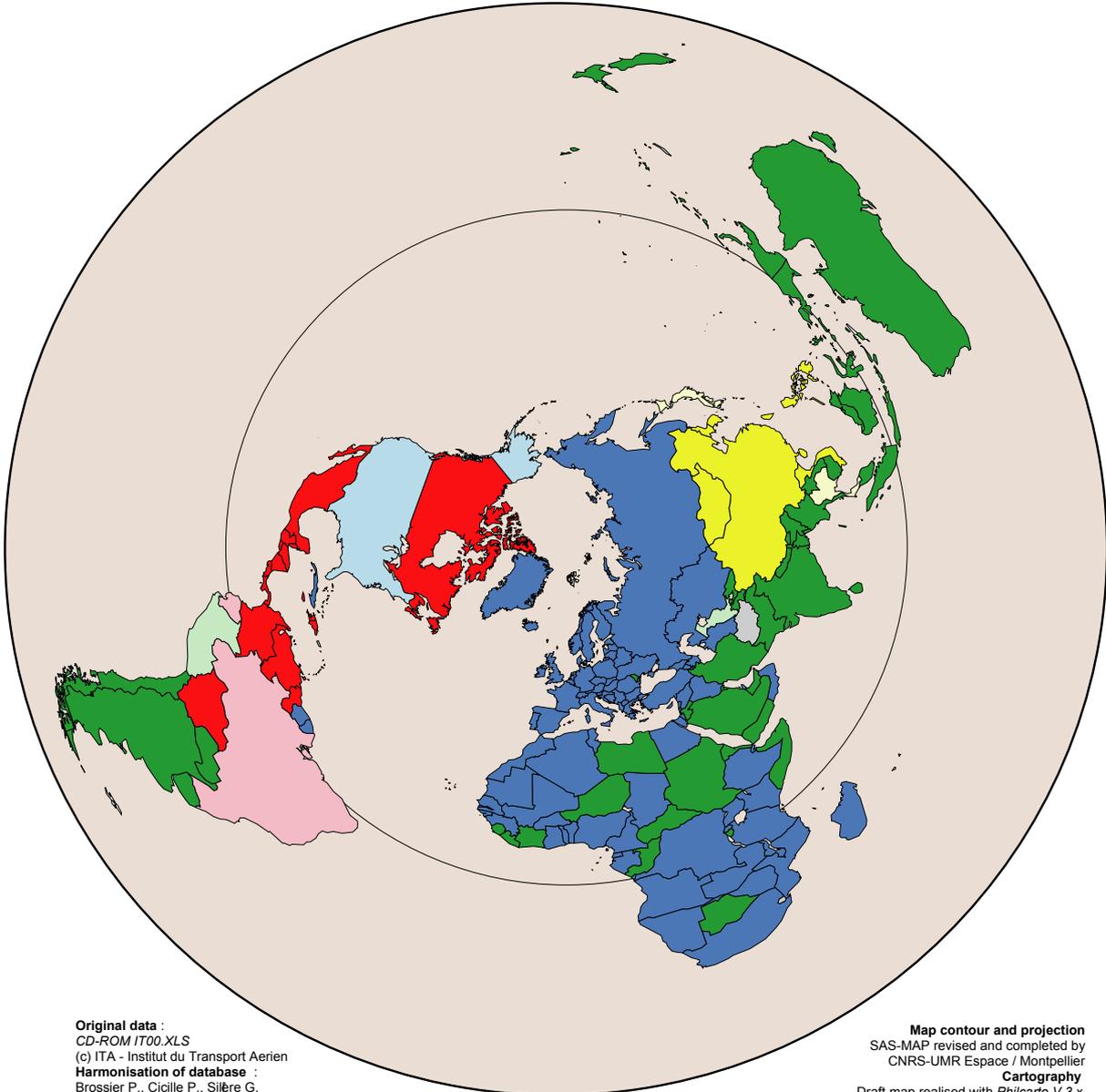
*Original data : CD-ROM IT00.XLS (c) ITA - Institut du Transport Aerien
Harmonisation of database : Brossier P., Cicille P., Sillère G. CNRS - UMR Espace / Montpellier*

MAP 11

EIW0307_6

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COMPARATIVE INFLUENCE OF TRIADE / AIR TRAFFIC 2000



Original data :
 CD-ROM IT00.XLS
 (c) ITA - Institut du Transport Aerien
 Harmonisation of database :
 Brossier P., Cicille P., Silère G.
 CNRS - UMR Espace / Montpellier

Map contour and projection
 SAS-MAP revised and completed by
 CNRS-UMR Espace / Montpellier
 Cartography
 Draft map realised with Philcarto V.3.x
<http://perso.club-internet/philgeo>

	Western Europe	Northern America	Eastern Asia	Rest of the World
Absolute domination (> 50%) of ...				
Relative domination (< 50%) of ...				

N.B. As the smallest air traffic flows has been removed, the level of domination is generally over-estimated.

(c) Grasland C., Grataloup C., 2003, CNRS-UMR Géographie-cités-GDR Libergeo

3.4 EUROPE INFLUENCE AREA / TRADE FLOWS 1996-2000

Many recent publications of American researcher in economy and political sciences have underlined the growing power of the “discrete” Europe which is slowly becoming a “superpower” in many fields, if not in military terms.

❖ “Sweet commerce” and the World power of Europe

Many European policy-makers would probably share the opinion of William Robertson who said in 1769 that “*sweet commerce tends to wear off those prejudices which maintain distinctions and animosity between nations. It softens and polishes the manners of men.*” But they certainly do not ignore that trade is also an instrument of power which induces dissymmetrical links between partners when their sizes are different. According to the polarisation of the world by the Triad, the map 12 shows clearly that Europe has a dominating influence on most African and Middle-East countries. And it is important to underline that the areas where the trade is not dominated by a member of the Triad (Southern India, Southern America, and Eastern Europe) have more relations with Western Europe than with Eastern Asia or Northern America.

❖ European responsibility concerning the neighbouring countries

The dissymmetry of trade relations between Europe and its neighbours is well-known. For example Western Europe represents more than 75% of the commercial trade of Tunisia when Tunisia represents less than 1% of the trade of Western Union. The European policy makers should keep in mind that this situation was the situation of their states in their relation with America before the construction of the EU. Accordingly, they should consider this dissymmetry as a responsibility rather than an advantage.

World influence of Western Europe / Interregional bilateral trade 1996-2000

ESPON REGIONS	Western Europe	Northern America	Eastern Asia	Rest of the World	Total
Western Europe	-	29%	21%	49%	100%
Central Europe	73%	5%	5%	16%	100%
South and East Mediteranea	59%	16%	8%	17%	100%
Central Africa	47%	27%	13%	13%	100%
Western Africa	45%	22%	12%	21%	100%
Eastern Africa	44%	8%	13%	35%	100%
Southern Africa	43%	18%	20%	20%	100%
Eastern Europe	41%	9%	12%	38%	100%
Southern America	33%	31%	17%	19%	100%
Northern America	31%	-	36%	32%	100%
Southern Asia	30%	21%	18%	32%	100%
Eastern Asia	24%	38%	-	38%	100%
Persian Gulf	24%	14%	38%	25%	100%
Central Asia	22%	5%	11%	62%	100%
Oceania	21%	19%	38%	22%	100%
Central America	20%	59%	9%	12%	100%
South-Eastern Asia	19%	26%	42%	13%	100%
World	24%	22%	21%	33%	100%

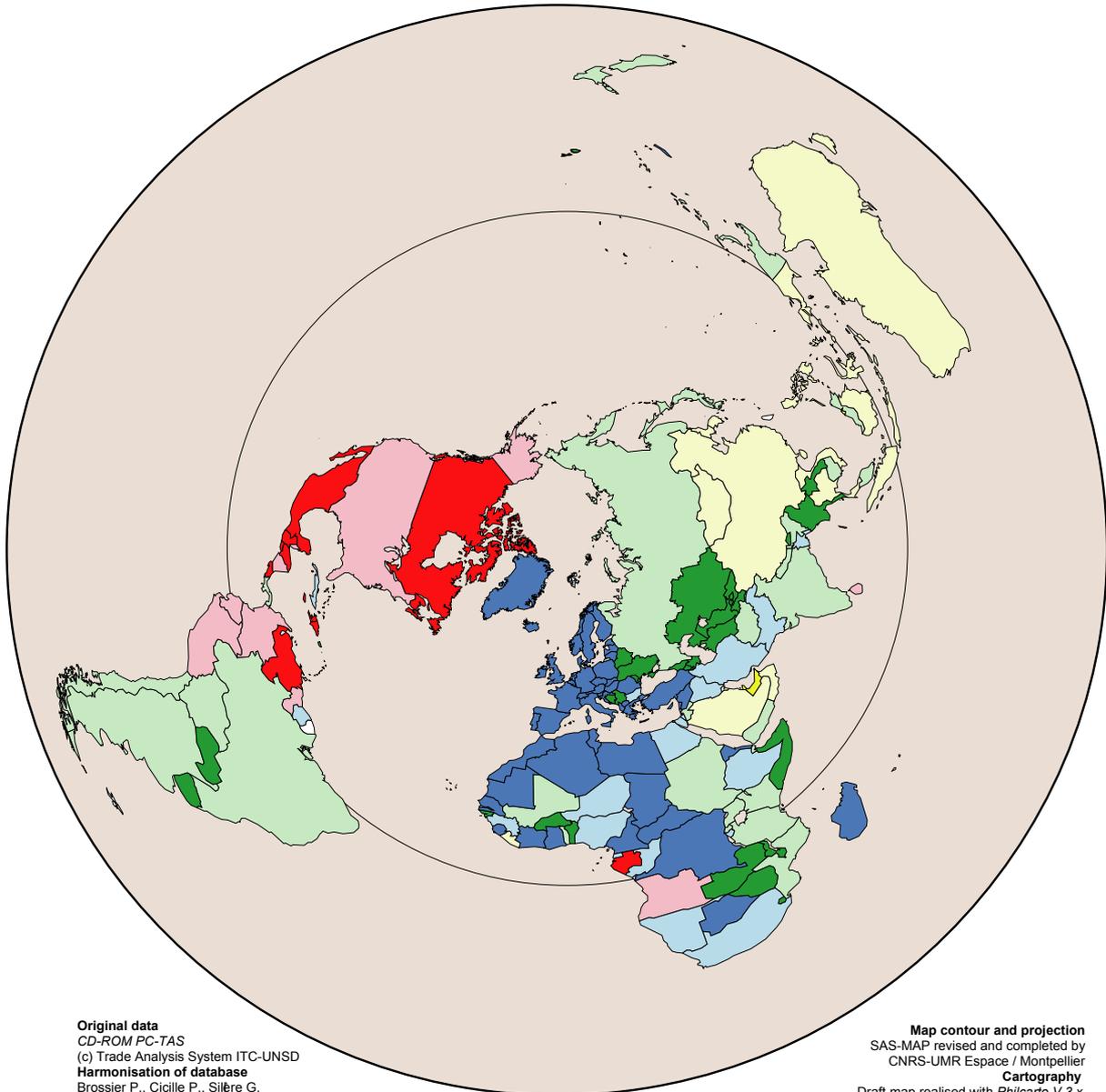
Original data : CD-ROM PC-TAS (e) Trade Analysis System ITC-UNSD
Harmonisation of database : Brossier P., Cicille P., Sillère G. CNRS - UMR Espace / Montpellier

MAP 12

European Spatial Planning Observatory Network
 ESPON 3.1 / Workpackage "Europe in the World"

EIW0307_7

COMPARATIVE INFLUENCE OF TRIADE / BILATERAL TRADE 1996-2000



Original data
 CD-ROM PC-TAS
 (c) Trade Analysis System ITC-UNSD
Harmonisation of database
 Brossier P., Cicille P., Silère G.
 CNRS - UMR Espace / Montpellier

Map contour and projection
 SAS-MAP revised and completed by
 CNRS-UMR Espace / Montpellier
Cartography
 Draft map realised with *Philcarto V.3.x*
<http://perso.club-internet/philgeo>

	Western Europe	Northern America	Eastern Asia	Rest of the World
Absolute domination (> 50%) of ...				
Relative domination (< 50%) of ...				

N.B. The computation of influence is made on **bilateral** trade flows (import+export).

(c) Grasland C., Grataloup C., 2003, CNRS-UMR Géographie-cités-GDR Libergeo

CONCLUSION

“The World transformed himself into the form of a magnificent white bull and appeared in the sea shore where Europa was playing. The great bull walked gently over to where Europa stood and knelt at her feet. The appearance and movements of the bull were so gentle that Europa spread flowers about his neck and dared to climb upon his back. But suddenly, the bull rushed over the sea abducting Europa. Only then the bull revealed its true identity and took Europa to the Mediterranean island of Crete. There, the World cast off the shape of the white bull, and back into his human form, made Europa his lover beneath a simple cypress tree. Europa became the first queen of Crete and had many sons all around the World⁸.”

The aim of this very preliminary study on “Europe in the World” is certainly not to provide definitive results on such a complex subject. All studies and maps presented in this annex should be considered as **exploratory results** which try to indicate new interesting directions for further research to be developed in the future by the members of the ESPON Program. According to the political objectives of ESPON we have yet identified some priorities for further research

- 1) **Identification of the peripheries of Europe through a combination of criteria of homogeneity, flows and accessibility.** As a very preliminary example of such a research, we have tried to combine in the same factorial analysis the basic structural characteristic of the 17 ESPON regions (demography, economic development, urbanisation ...) with their degree of connexion to Europe according to air and trade flows. As a result, we obtain a graphic plot which present an interesting representation of the positions of the regions of the world according to their level of development (Factor 1) and the intensity of their relationships with Europe (Factor 2).
- 2) **Comparison of the European territory with the other global integration zones of the world.** For most political concepts developed in the ESPON programme (polycentrism, territorial cohesion, gateway cities, ...), it should be interesting to compare the European Territory with comparable territories of NAFTA or Eastern Asia. The partnership between OECD and ESPON could be the ideal platform for such exchange of experiments.

⁸ Text adapted from <http://www.windows.ucar.edu/tour/link=/mythology/planets/Jupiter/Europa.html>

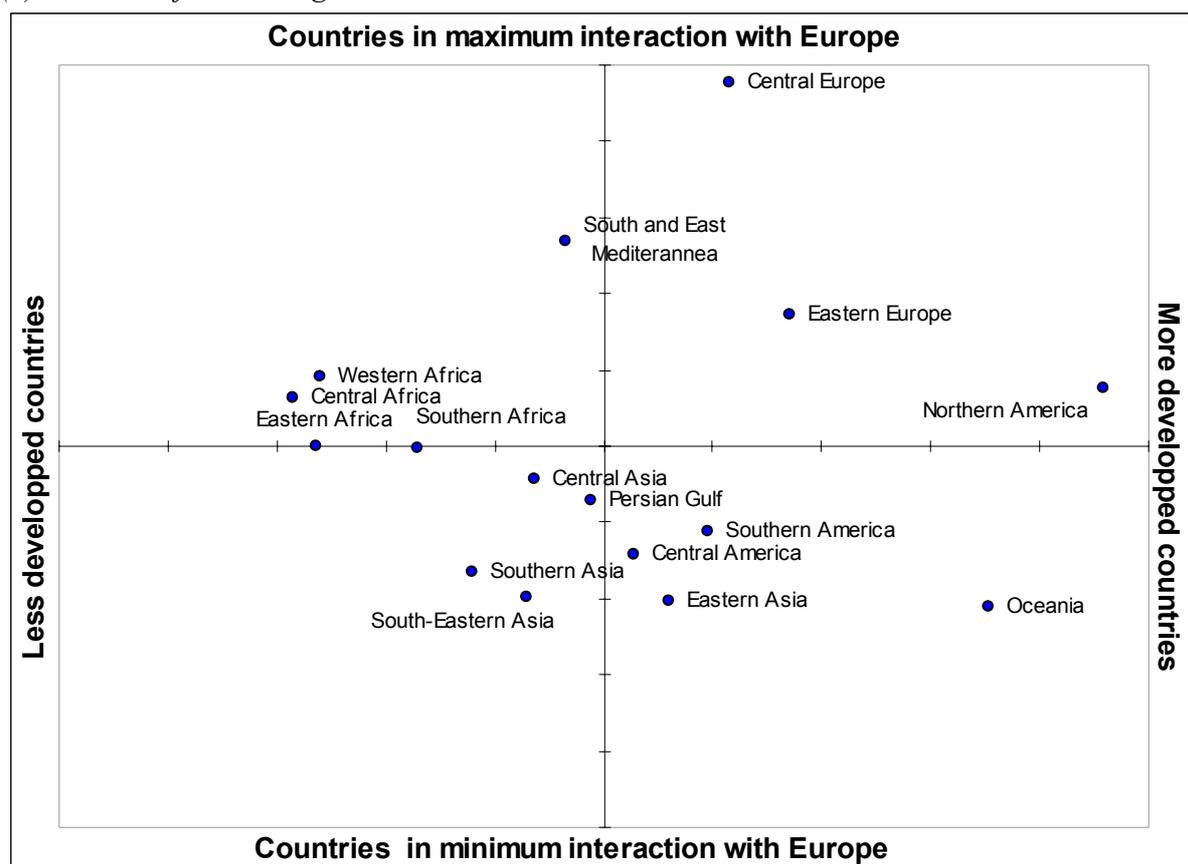
PRELIMINARY SYNTHESIS OF “EUROPE IN THE WORLD” RESULTS

(a) Correlation of variables with factors

VARIABLES (in 2000)	Factor 1 (46.8%)		Factor 2 (30.4%)	
	Coord	Contrib.	Coord	Contrib.
(A) Interaction with Europe				
Mean arian distance to Western Europe	0.177	0.672	-0.834	22.923
Air flows toward W. Europe (% of flows*)	-0.312	2.082	0.913	27.446
Air flows toward W. Europe (per inhabitant)	0.616	8.115	0.500	8.224
Trade flows toward W. Europe (% of flows*)	-0.341	2.485	0.812	21.698
Trade flows toward W. Europe (per \$ of GDP)	-0.495	5.233	0.669	14.738
(B) Structural situation				
% of 0-14 in population	-0.874	16.309	-0.118	0.460
% of 65 and more in Population	0.838	15.019	0.196	1.260
% of urban population	0.824	14.526	0.218	1.572
GDP/inh in pps	0.958	19.598	0.134	0.592
CO2 emission per inhabitant	0.864	15.962	0.182	1.089

* the percentage of flows is calculated after exclusion of internal flows of the world regions.

(b) Position of world regions



Annex 1: The world database on air flows

Les données brutes utilisées pour construire la base de données géoréférencées proviennent de l'Institut du Transport Aérien (ITA), association regroupant au niveau international les différents acteurs du monde aéronautique (directions de l'aviation civile, compagnies aériennes, aéroports, etc.).

Fiabilité des données

Le fichier des flux de passagers par liaison aérienne d'aéroport à aéroport, fourni par l'ITA, comprenant souvent plusieurs sources pour une même liaison (33 048 lignes en tout), une seule a été conservée. Les sources nationales ont été privilégiées. Les données concernant la répartition du nombre de passagers entre vols réguliers et non réguliers n'étant pas exploitables pour l'ensemble du réseau mondial (trop de données manquantes), n'ont pas été conservées dans la base finale. Le niveau d'exhaustivité des données est différent d'un pays à l'autre: la France est certainement le pays le mieux renseigné (données pour 112 aéroports sur les 136 ayant une piste goudronnée de plus de 1 523 mètres). Globalement tous les pays européens sont relativement bien renseignés.

Il manque certainement beaucoup de liaisons nationales, aux États-Unis, voire en Australie (l'aéroport de Canberra n'est pas présent, par exemple) et dans une grande partie de l'Asie.

Base de données géoréférencées

La base de données construite par l'UMR ESPACE (Patricia Cicille, CNRS UMR ESPACE et Magali Amiel) comprend 16 525 liaisons de ville à ville : 48 villes ayant au moins deux aéroports, les flux de passagers ont été cumulés par ville. Pour chaque liaison décrite, on dispose du nombre de passagers (arrivées et départs cumulés) en 2000 et de la longueur de la liaison (distance en km). La correspondance avec un fond de carte *Villes Monde* a été réalisée (Patrick Brossier, UPV UMR ESPACE) à partir d'un fichier de coordonnées (longitude, latitude) de 8 341 aéroports (source : <http://www.airportcitycodes.com>). La correspondance avec un fond de carte *Pays Monde* a également été réalisée (Patricia Cicille et Patrick Brossier) à partir d'un fichier de codes de pays comprenant à la fois les codes OAG, les codes IATA (International air transport association), les codes Nations unies, les codes ISOA2 et A3. Ce fichier comprend également des codes permettant de réaliser des cartes par grandes régions du monde (source : UNEP/DEWA/GRID-Geneva, United Nations Environment Program/Division of Early Warning and Assessment/Global Resource Information Database) et par regroupement économique (type Union européenne, ALENA, etc.).

Annex 2 : Drawing maps without borders

The making of the CD-Rom "6 billion people... and me" [3] provided an opportunity to apply several new mapping methods to the study of the distribution of the world's population and wealth. This project was made possible thanks to the data base of the United Nations Environment Program which shows the distribution of the world's population, in 1990, according to a 1-degree latitude/longitude grid, and ignoring state borders (UNEP-GRID). On the basis of this grid, we estimated the distribution of world wealth by allocating each country's GNP in proportion to its population located within each cell of the grid. However, this method does not account for regional variations of the per capita GNP, and as a result the location of wealth remains to a certain extent approximate.

Two approaches were chosen to carry out the "borderless" analysis of the distribution of population and wealth. The "potential"-based approach consists in evaluating the quantity of population (or wealth) located in the vicinity of a specific point in the world, on the basis of certain hypotheses suggesting a weakening of the link with growing distance⁹. This method makes it possible to determine the main points of concentration of population or wealth. The "accessibility" approach makes it possible to evaluate the average distance between a given point on the Earth's surface and the entire world population or wealth. Each point of the globe can be measured in terms of demographic or economic accessibility, and one can determine the most accessible point of the world, in demographic or economic terms.

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⁹ The calculation of potential is weighted by a Gaussian function of a value of 0.5 for a distance of 1,000 km. In concrete terms, this means that a population mass of 5 million people will contribute 100% (5 million) to the potential of the place where it is located, only 50% (2.5 million) to the potential of a place located 1,000 km away and less than 5% (250,000) to the potential of a place 2,000 km away.

EUROPE IN THE WORLD
By Claude Grasland & Christian Grataloup

SUMMARY

INTRODUCTION	p.5
1. TOWARD AN ESPON VISION OF EUROPE IN THE WORLD	p.7
1.1 WHICH CARTOGRAPHICAL PROJECTION OF THE WORLD?	
1.2 WHICH DIVISIONS OF THE WORLD?	
1.3 WHICH SCALE OF ANALYSIS?	
1.4 WHICH POLITICAL MESSAGE?	
2. EUROPE IN A WORLD WITHOUT BOUNDARIES	p.17
2.1. GEOGRAPHIC POTENTIAL	
2.2 DEMOGRAPHIC POTENTIAL	
2.3 ECONOMIC POTENTIAL	
2.4 POLLUTION POTENTIAL	
3. THE FUNCTIONAL INFLUENCE AREA OF EUROPE	p.27
3.1. MAIN INTER-REGIONAL FLOWS / AIR 2000	
3.2 MAIN INTER-REGIONAL FLOWS / TRADE 1996-2000	
3.3 EUROPE INFLUENCE AREA / AIR FLOWS 2000	
3.4 EUROPE INFLUENCE AREA / TRADE FLOWS 1996-2000	
CONCLUSION	p.37

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