



Fugro-OmniSTAR BV

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VBS

HP

APPLICATIONS

NTRIP

CONTACT US

March. 2004

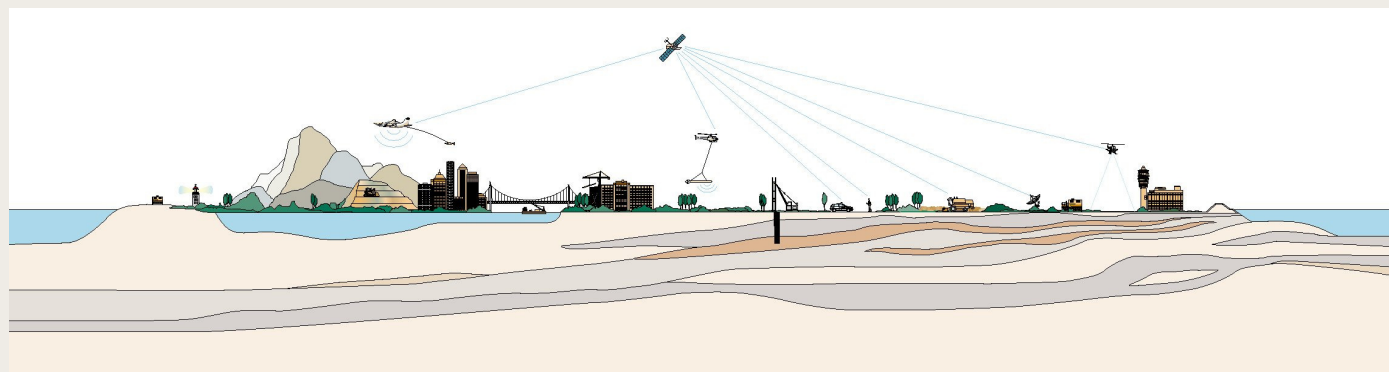
Presentation by

Ir. Hans Visser

Technical Manager

&

Business development





FUGRO N.V.

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STRATEGY

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MEETING THE CHALLENGE OF NATURE

March 2004

A GENERAL INTRODUCTION TO FUGRO
INTRODUCTION TO OMNISTAR\SKYFIX
HP
NTRIP





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INTRODUCTION

activities

global network

management

history



ACTIVITIES

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- collecting, processing and interpreting data related to the surface and subsurface of the earth and the seabed and of the man-made structures built upon it
- advising on soil conditions, construction and infrastructure operations
- providing supplementary specialist services such as precise positioning services , (design) advice, materials testing, geographic and other information systems, environmental services, materials' surveys, reservoir engineering
- operating at sea, along the coast, on land and from the air



GLOBAL NETWORK

9,000 employees in 200 offices in 50 countries

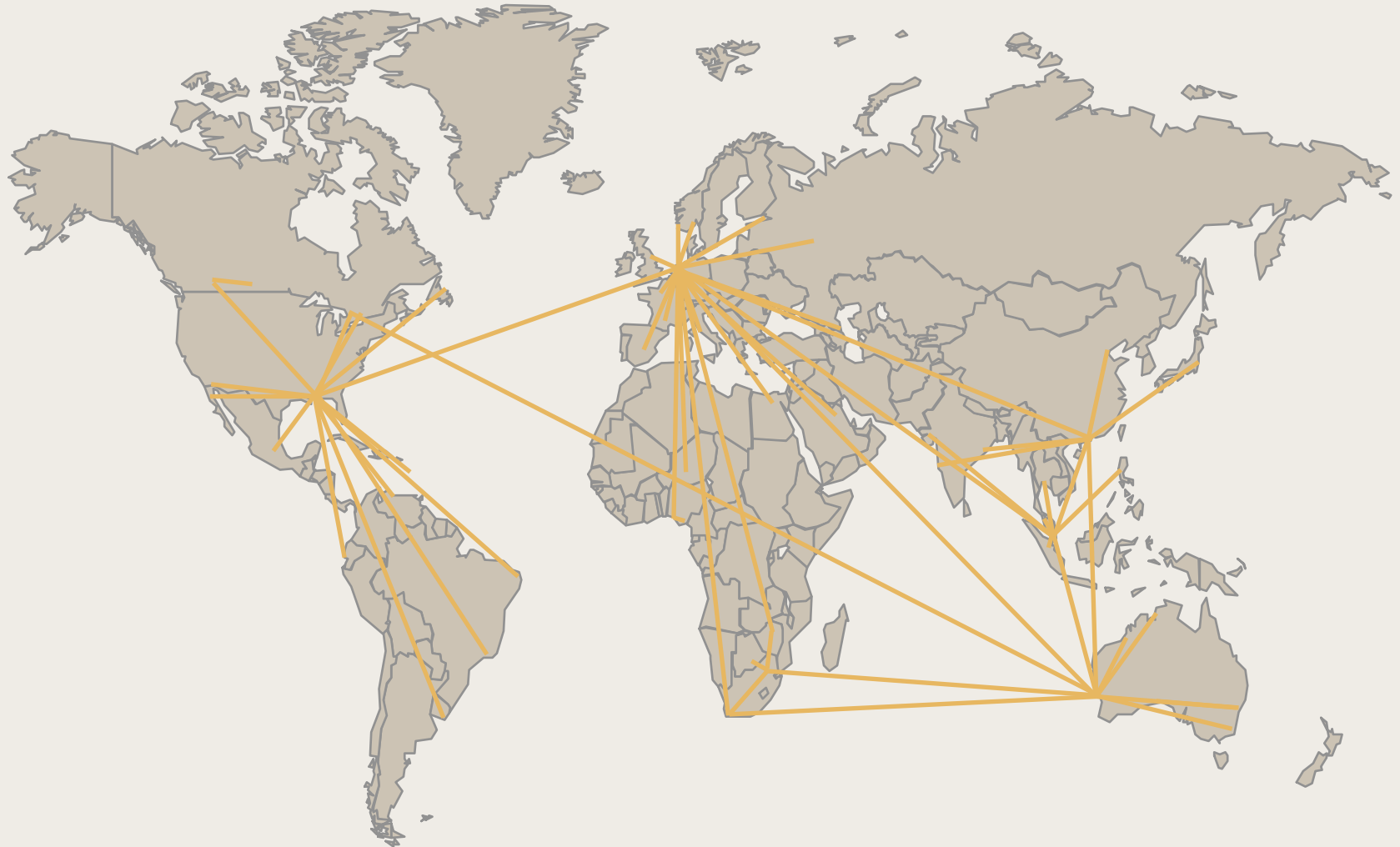
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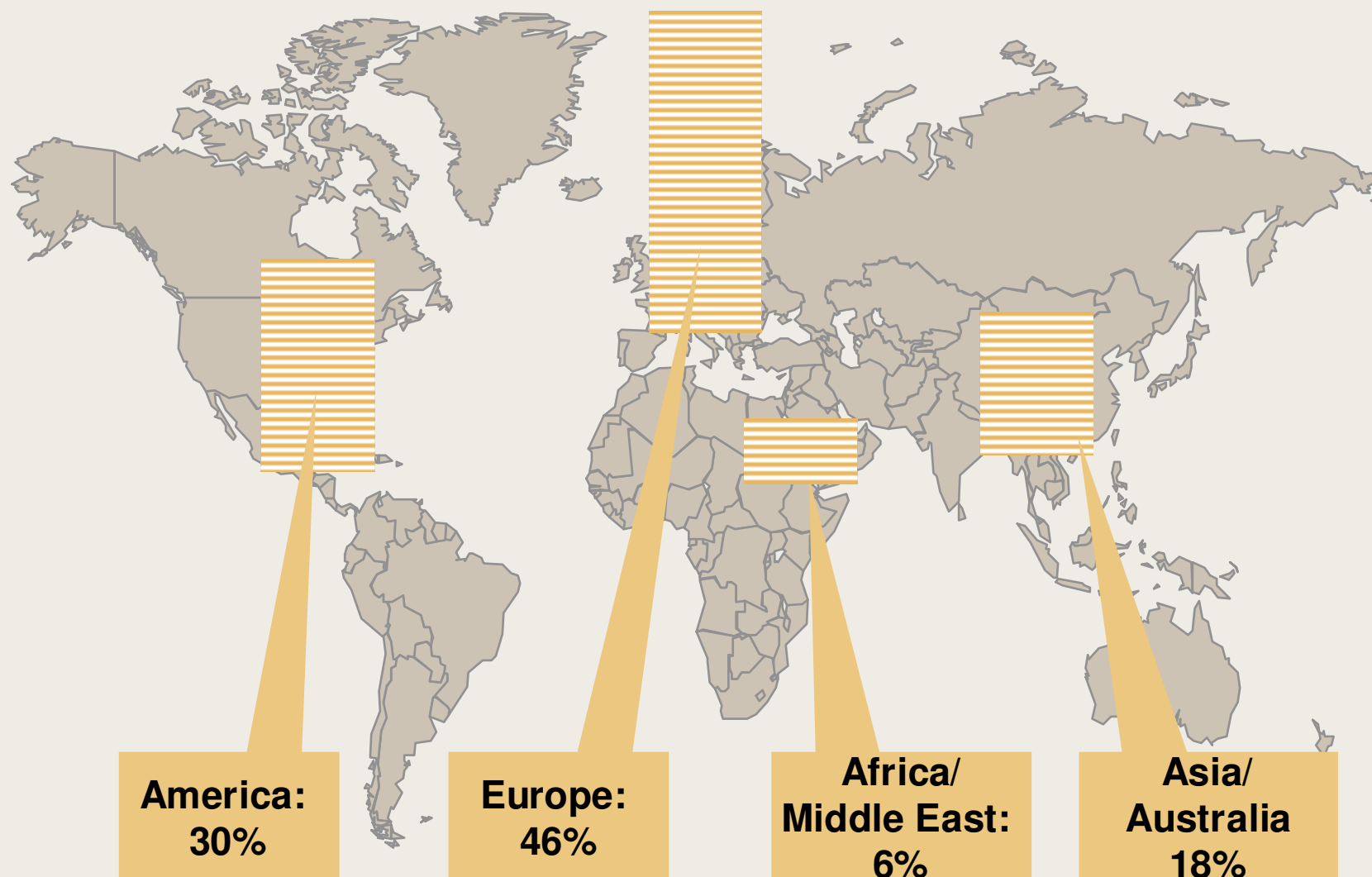
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GLOBAL SPREAD

geographical spread of turnover in 2001



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HISTORY

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1962

foundation of "Ingenieursbureau voor FUnderingstechniek en GROndmechanica Fugro"

1987

acquisition of McClelland Engineers, Inc. (offshore geotechnical)

1991

acquisition of John E. Chance & Associates, Inc. (offshore survey) (Including Satellite network)

1992

7 April flotation on the Amsterdam Stock exchange at EUR 17.24

**end 1999
/early 2000**

acquisition of several airborne companies (airborne surveys)

2001

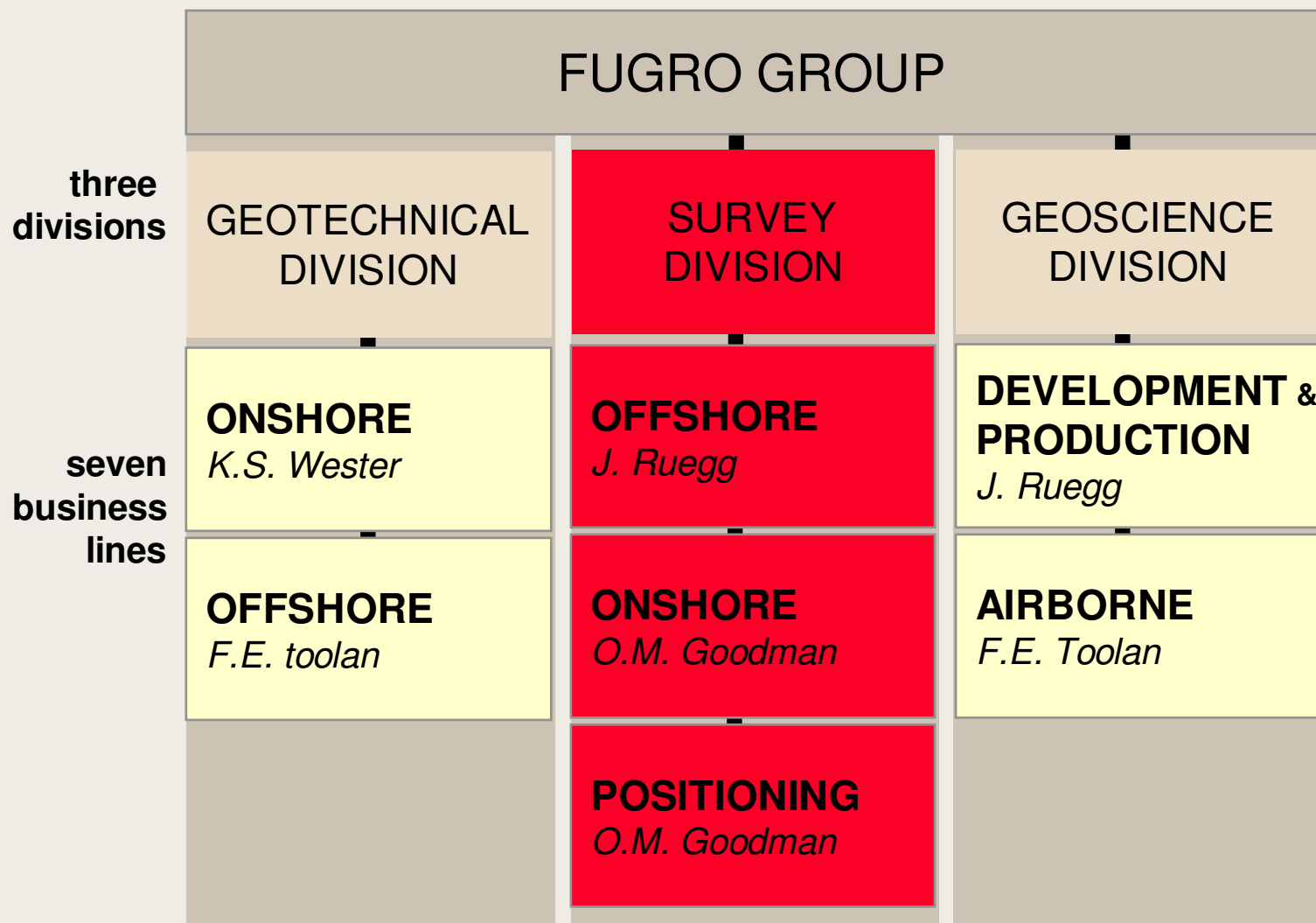
issue of 1,260,000 new ordinary shares at EUR 66.85, introduction of geosciences division

2003

Bought Thales Geosolutions (Formerly Racal Survey) 2000 people 25%



STRUCTURE



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ACTIVITIES

FUGRO GROUP

GEOTECHNICAL DIVISION

**investigation &
advice on the
physical
properties of
soil and
materials for
constructions**

SURVEY DIVISION

**positioning,
mapping and
charting,
geological
advice and
support
services for
developments**

GEOSCIENCE DIVISION

**quantify and
qualify
resources for
oil, gas,
minerals and
optimise
production**

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Applications



Vliegtuig volgen en monitoren





Accurate positioning offshore



INTRODUCTIE

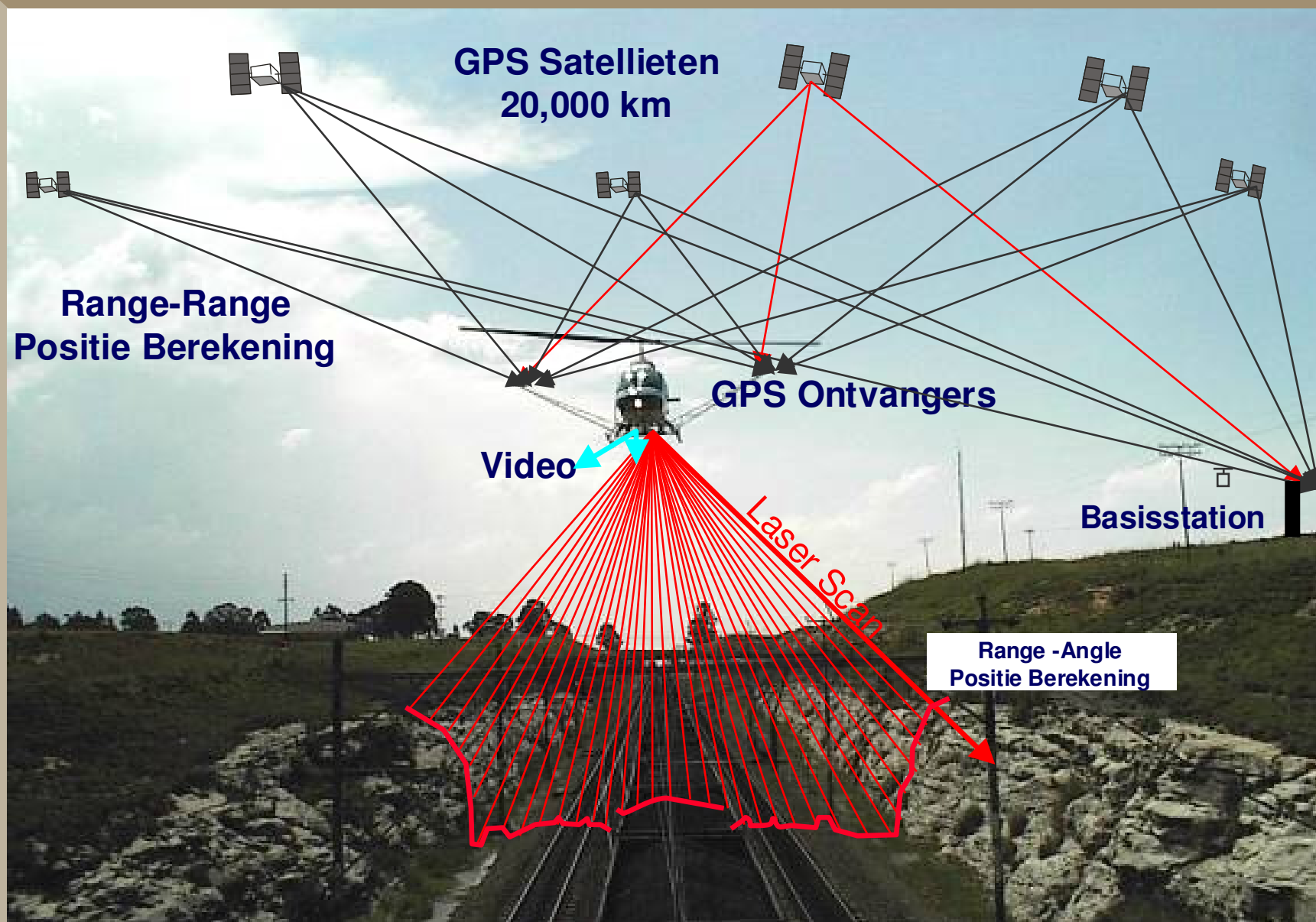
WAT,HOE, WAAROM

TOEPASSINGEN

PROJECTEN

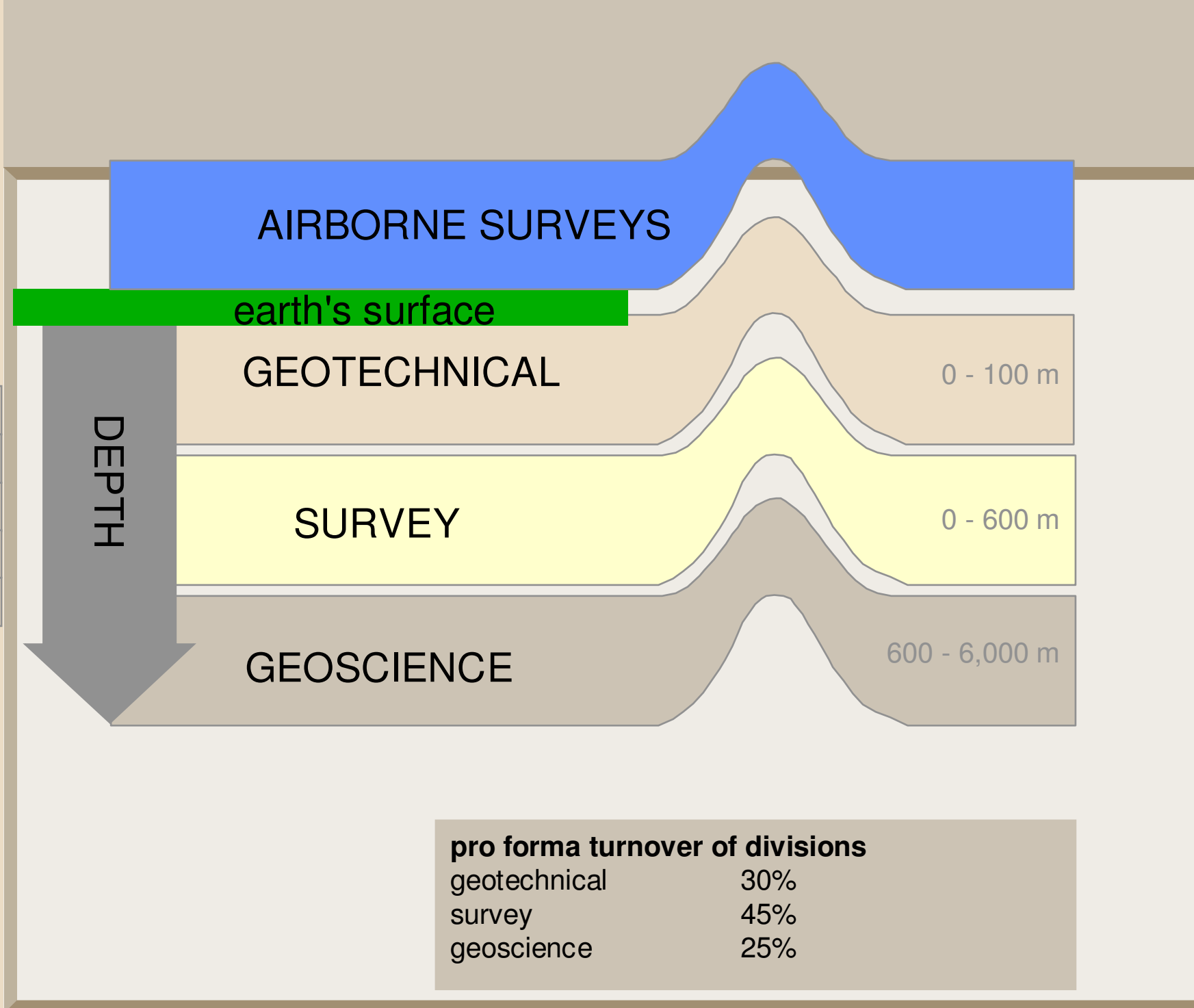
SOFTWARE

SAMENVATTING





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SURVEY MARKETS

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	major clients	markets	market position
offshore	oil & gas companies telecommunication companies	global market	strong
onshore	government, industry and construction contractors	local/regional markets	strong regional position, varying per country/region
positioning	agriculture, mining	global market	strong position in niches
turnover	xxx%	percentage of total amount, based on 2000 results	
operating result	xxx%		
invested capital	xxx%		



SURVEY SERVICES

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OFFSHORE SURVEY

ACTIVITIES

- geophysical and site surveys related to the positioning of drilling platforms;
- route surveys for pipelines and underwater cables;
- positioning services above water (Starfix) and underwater (acoustic);
- management of construction projects at sea generally using dynamic positioned (DP) vessels and ROVs (Remote Operated Vehicles - unmanned underwater vehicles);
- annual inspections of pipelines;
- oceanography;



SURVEY SERVICES

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ONSHORE SURVEY

ACTIVITIES

- mapping;
- applications of geographical information systems;
- photogrammetry;
- geographic registration (FLI-MAP)



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POSITIONING

ACTIVITIES

- provide world-wide (decimetre) precise positioning maintenance of the infrastructure of the Group's satellite positioning system;
- promoting and developing Fugro's OmniSTAR (for agriculture, mineral exploitation and collection of GIS data, etc.) and SeaSTAR (for the general maritime market such as commercial shipping, ferries and fishing boats, etc.) services;
- supporting professional users on land, at sea and in the air



STRATEGY

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- strong autonomous growth
- acquisitions to accelerate growth and develop new niches, identify and develop new niche markets/third leg
- balanced activities
 - ±50% oil & gas - ±50% other
 - ±50% onshore - ±50% offshore
 - maintain variation in market dominance and growth markets
- lead technical innovation (market led)
- (niche) market leader in local, regional or global markets, leverage advantage of size/scale
- optimize synergy and internal cooperation, integrate services, work cost efficiently
- cooperate with clients, emphasis on health and safety, providing high quality services and products



GROWTH

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Fugro can benefit from investments in:

- oil & gas activities (deep water)
- other offshore markets
- construction/infrastructure (local markets)
- minerals exploration

Other drivers:

- increased positioning applications (high precision)
- growth of asset management systems (FLIMAP)
- cross-selling of services

Fugro grows autonomously by strengthening its activities and extending its services and geographic presence



HISTORICAL PERFORMANCE

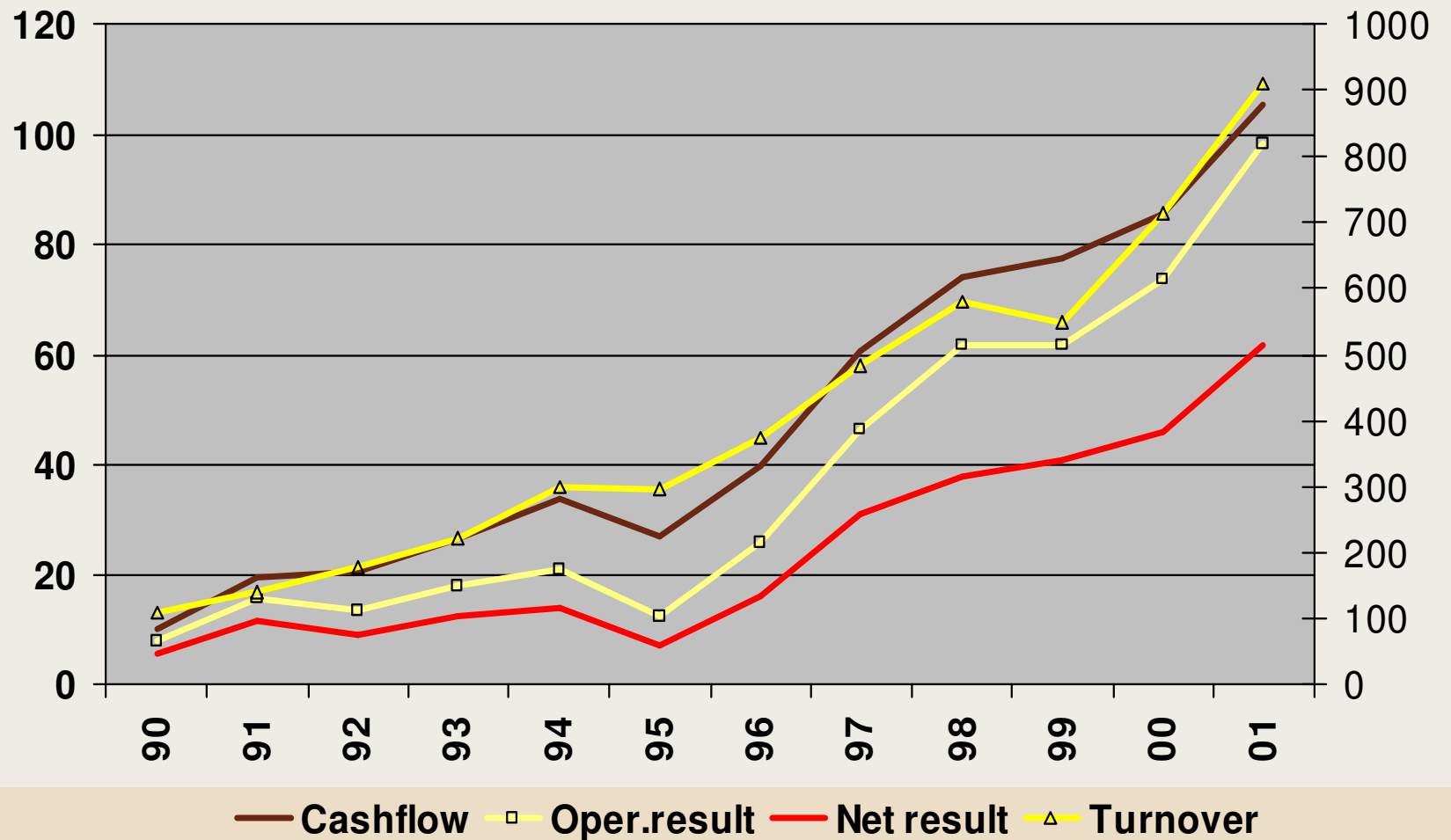
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cash flow + oper. Res. + net res. left scale/turnover right scale in € million



KEY FIGURES

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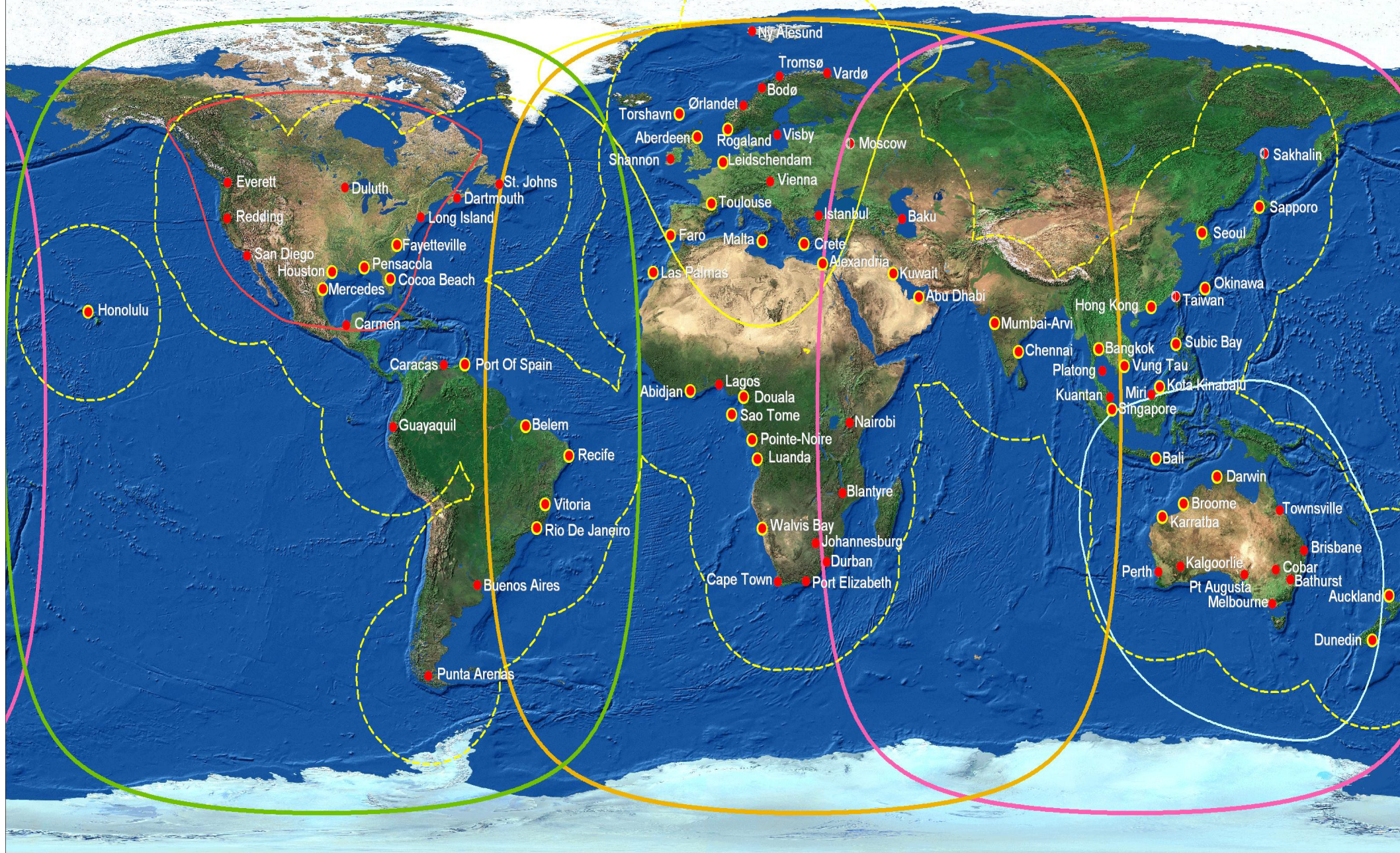
Result (x € million) *	2003	%	2002
Turnover	850.0	27.6%	€ 930.0
NROS	578.1	24.9%	462.7
Operational result	98.5	33.6%	73.7
Cashflow	105.3	23.0%	85.6
Net result	61.7	34.1%	46.0
Balanstotaal	814.8	71.6%	474.7
Group equity	247.6	136.4%	104.7
Solvancy	30.0%		22.2%
Solvancy (incl. convertible bond)	42.3%		43.2%
Return on equity	35.7%		42.7%
Return on total capital	16.0%		19.1%



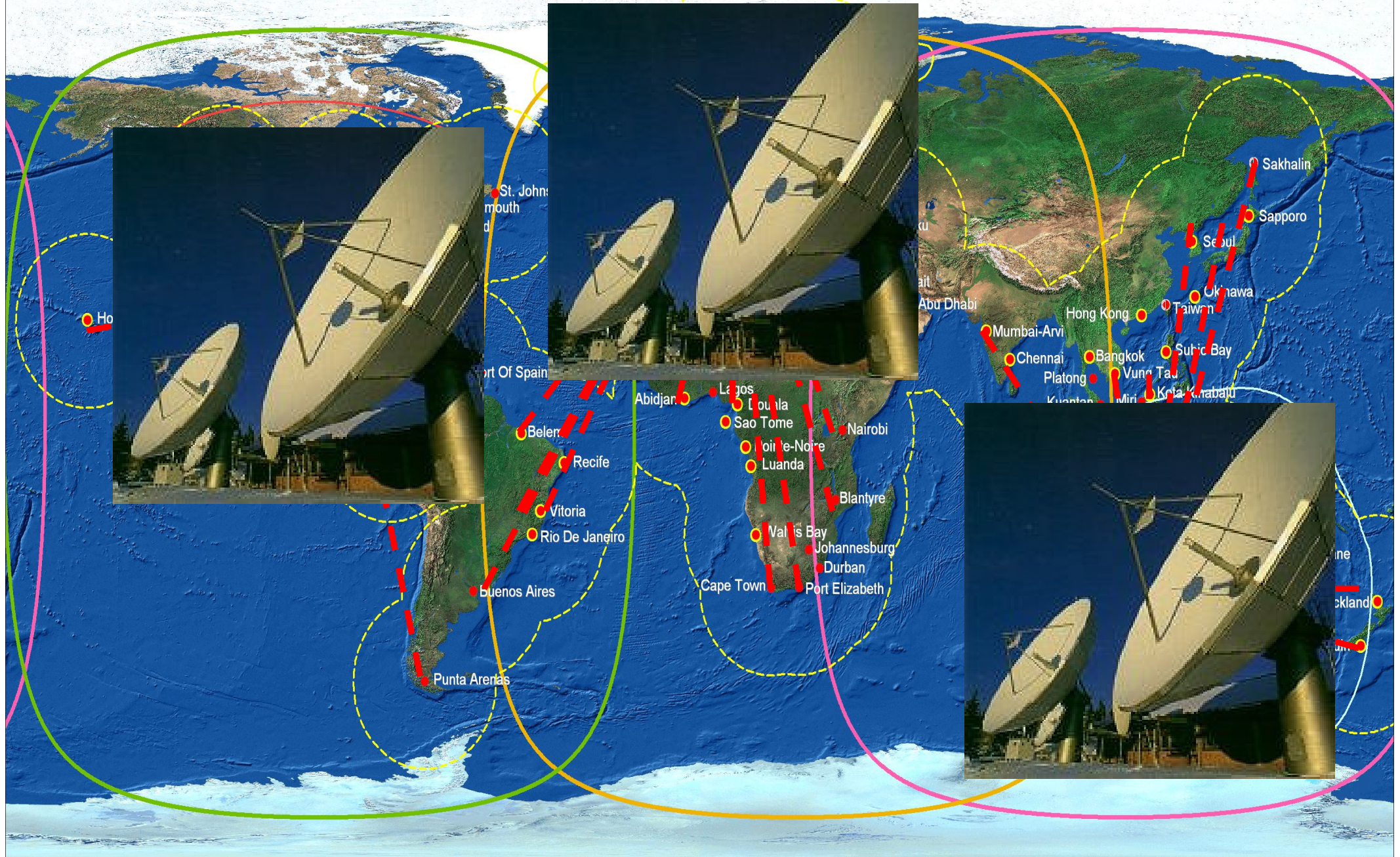
OMNISTAR

Positioning by satellite

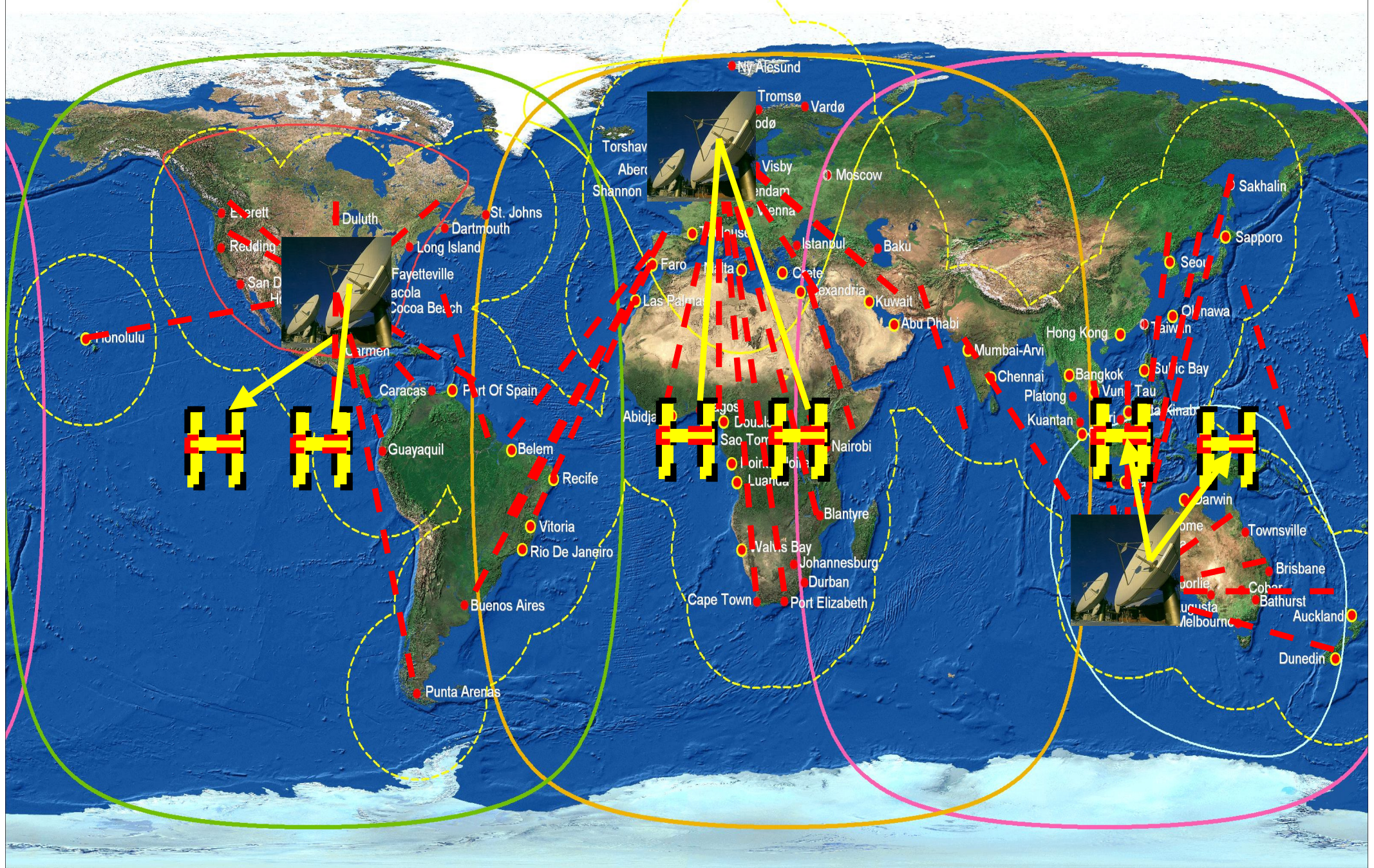
OmniSTAR coverage



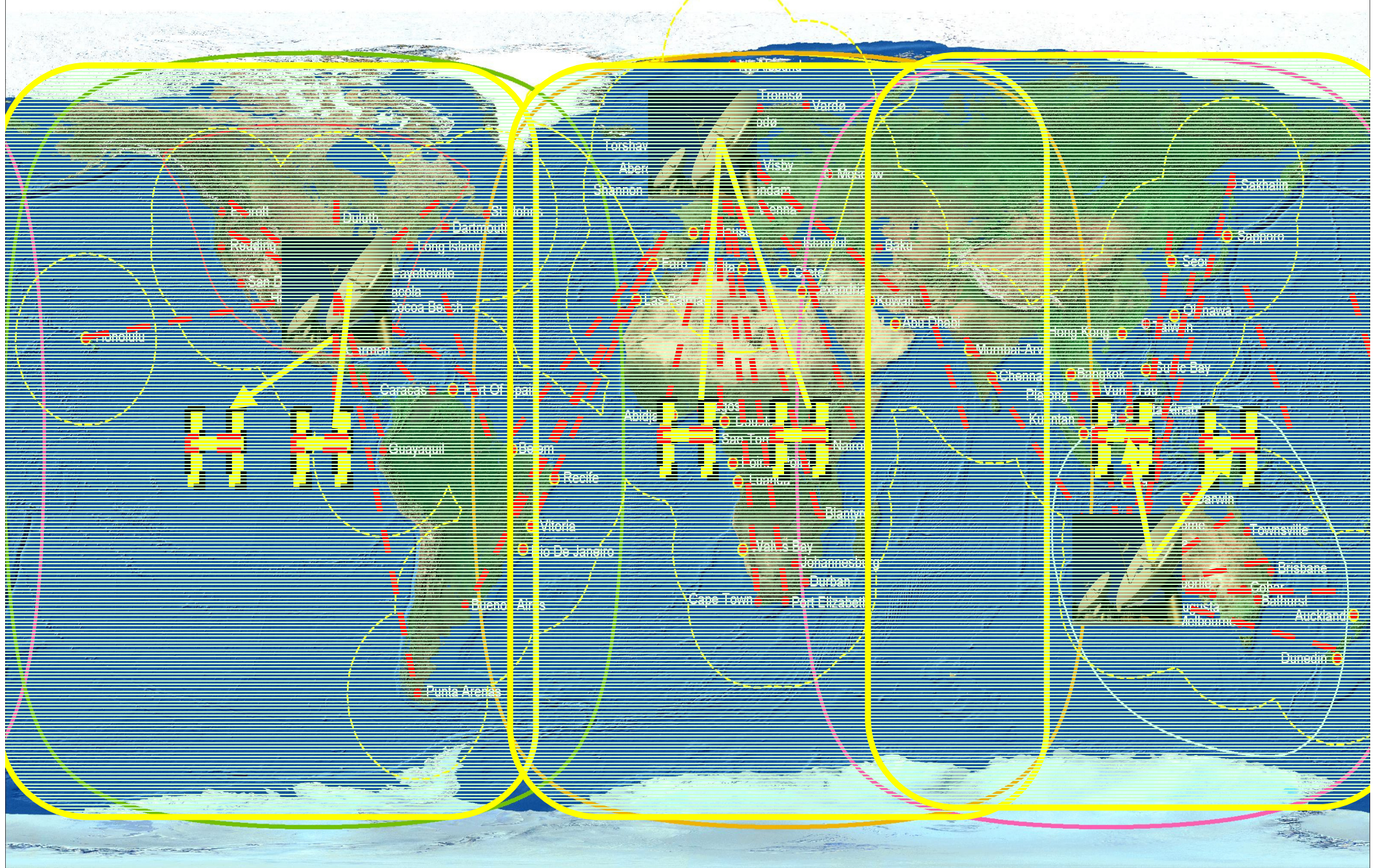
Data versturen



Naar Geo-satelliet



Naar Geo-satelliet





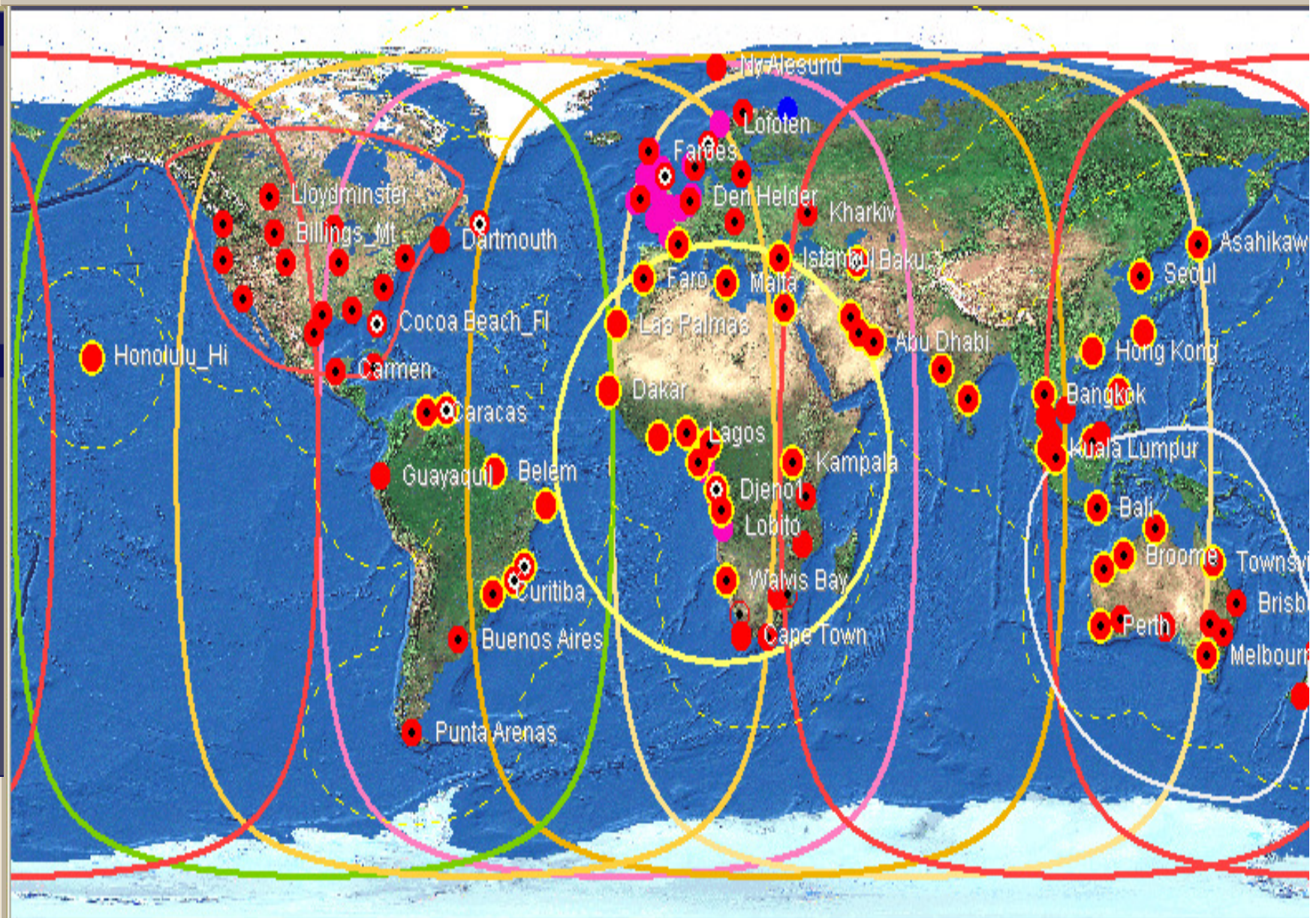
Omnistar current network

Services

- Basic (2000 km)
- Starfix Plus (2000 km)
- Glonass (2000 km)
- Project (2000 km)
- Starfix HP (1000 km)
- Topnav HF (500 km)

Broadcasts

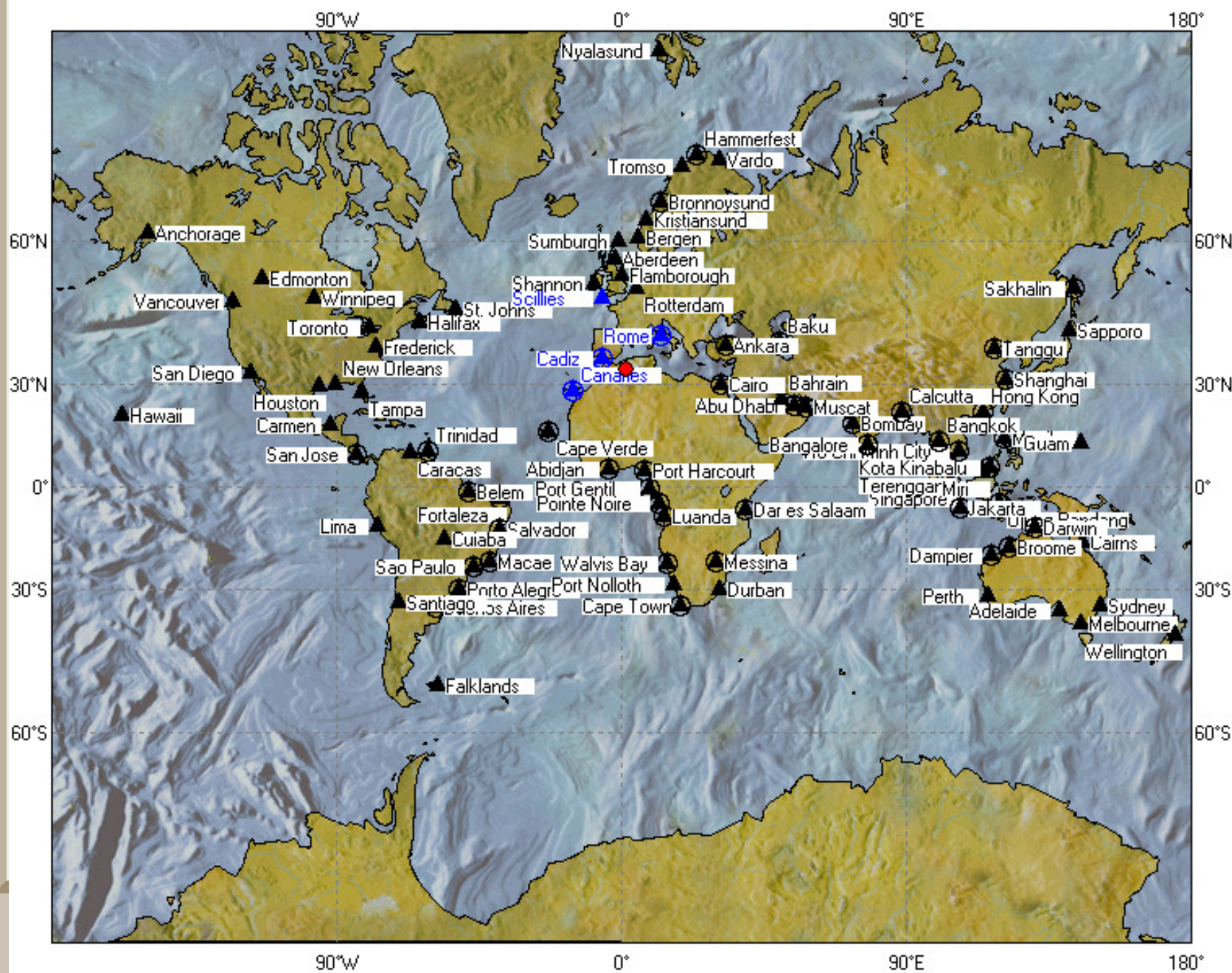
- AMSC
- OPTUS
- POR
- APSAT
- AFSAT
- AORW
- AMSAT
- EASAT
- IOR
- AORE



www.surveyplanner.com



Fugro Skyfix(Landstar) current Network





Omnistar L1 VBS Features

Network Solution using Virtual Base Station (VRS)

L1 data only

Better than 1 Meter 2DRMS in Europe

Generation of RTCM from Network data

Implemented in GPS receivers

Trimble Ag132, Ag114, Pro-Xrs, Pathfinder Power, AG252

CSI LGBXI/II, DGPSMAX,

Novatel Propak LB

Sokkia

Raven (Starlink)



REFERENCE STATIONS

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DATA CENTRE AND NCC LINKS

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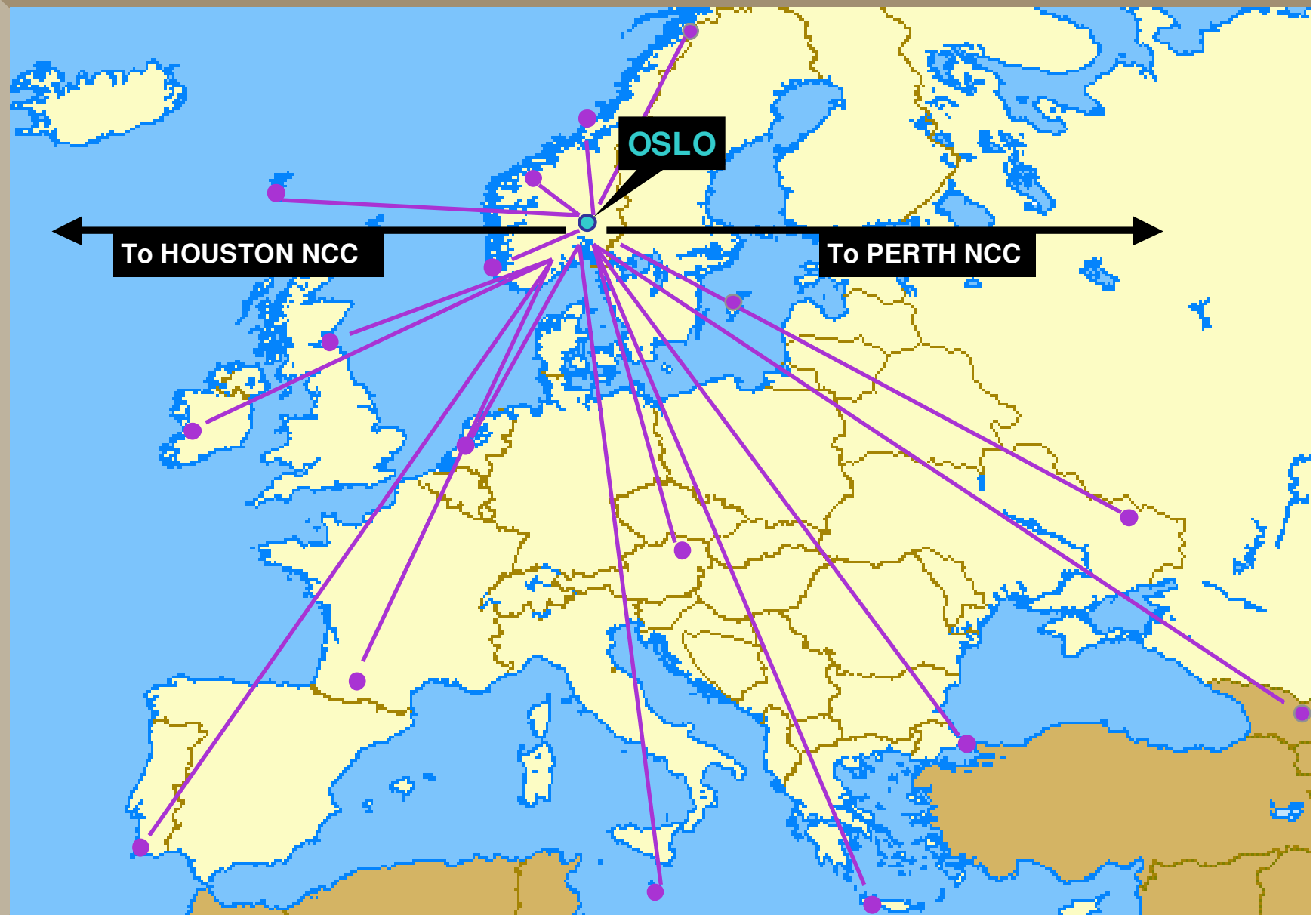
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NETWORK CONTROL CENTRE (NCC)

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- Data acquisition
- Geological survey
- Asset tracking
- Railway maintenance
- Environmental monitoring





AGRICULTURE: Precision Farming

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- Yield monitoring
- Soil sampling
- Site specific applications
- Aerial spraying
- Seed drilling
- Fertilizing



AERIAL APPLICATIONS

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- Photogrammetry
- Altimetry
- Drones
- Search & Rescue
- Avionics testing





HP MARKETS & APPLICATIONS

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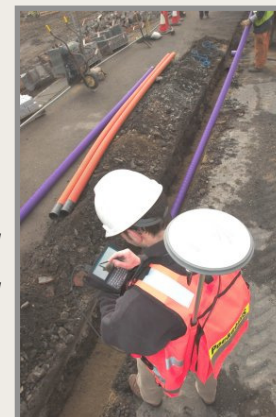
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A whole range of
applications



Source:
Positioning
Resources
Ltd.



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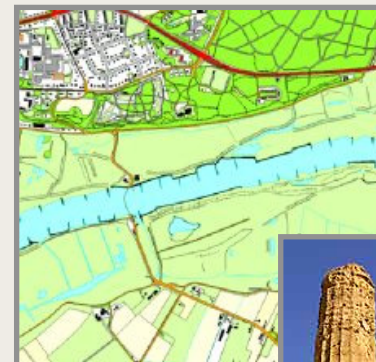
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APPLICATIONS

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- General survey
- Cadastral surveys
- Roads maintenance
- Engineering projects
- Trenching
- Relocation of hidden valves
- Rail maintenance
- Archaeology/ Ancient monuments
- Pipeline inspection
- Cable laying





UPLINK

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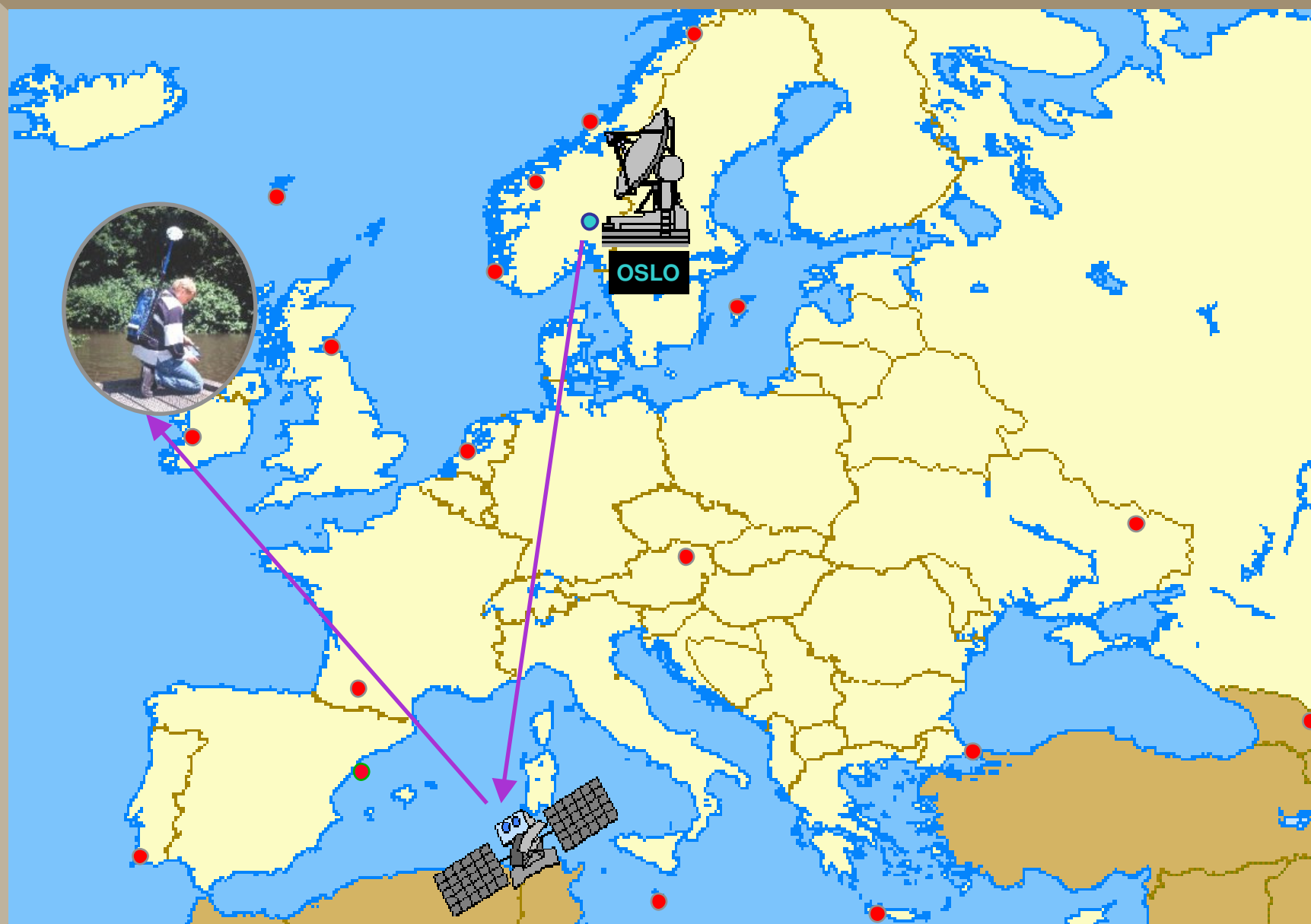
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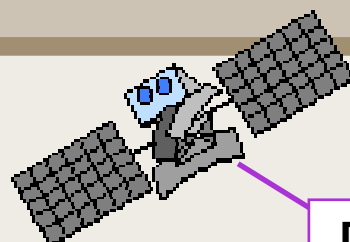
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TO THE RECEIVER



DGPS
signal



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OMNISTAR VBS COMPATIBLE HARDWARE

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CSI



NovAtel



Starlink



Sokkia



Trimble



Topcon





Omnistar High Performance Features

Network Solution

L1/L2 data

Broadcast Ionosphere free correction data

Estimate troposphere

Use precise satellite clocks and orbits

Convergence time 25 minutes to 30 cm accuracy

Convergence to 5-6 cm standard deviation steady state

In Network

Solved Loss of Lock through fast re-initialisation

Implemented in GPS receivers

Novatel Propak LB	Release begin 2003
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Trimble (Ag252)	Release Feb 2004
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Beeline (Integrated with INS)

Raven (Trueline)



Omnistar datum

ITRF 00 (Datum now)

every time reference station has moved update coordinate!

USA VBS was based on NAD'83 but will move to ITRF 00(Now)

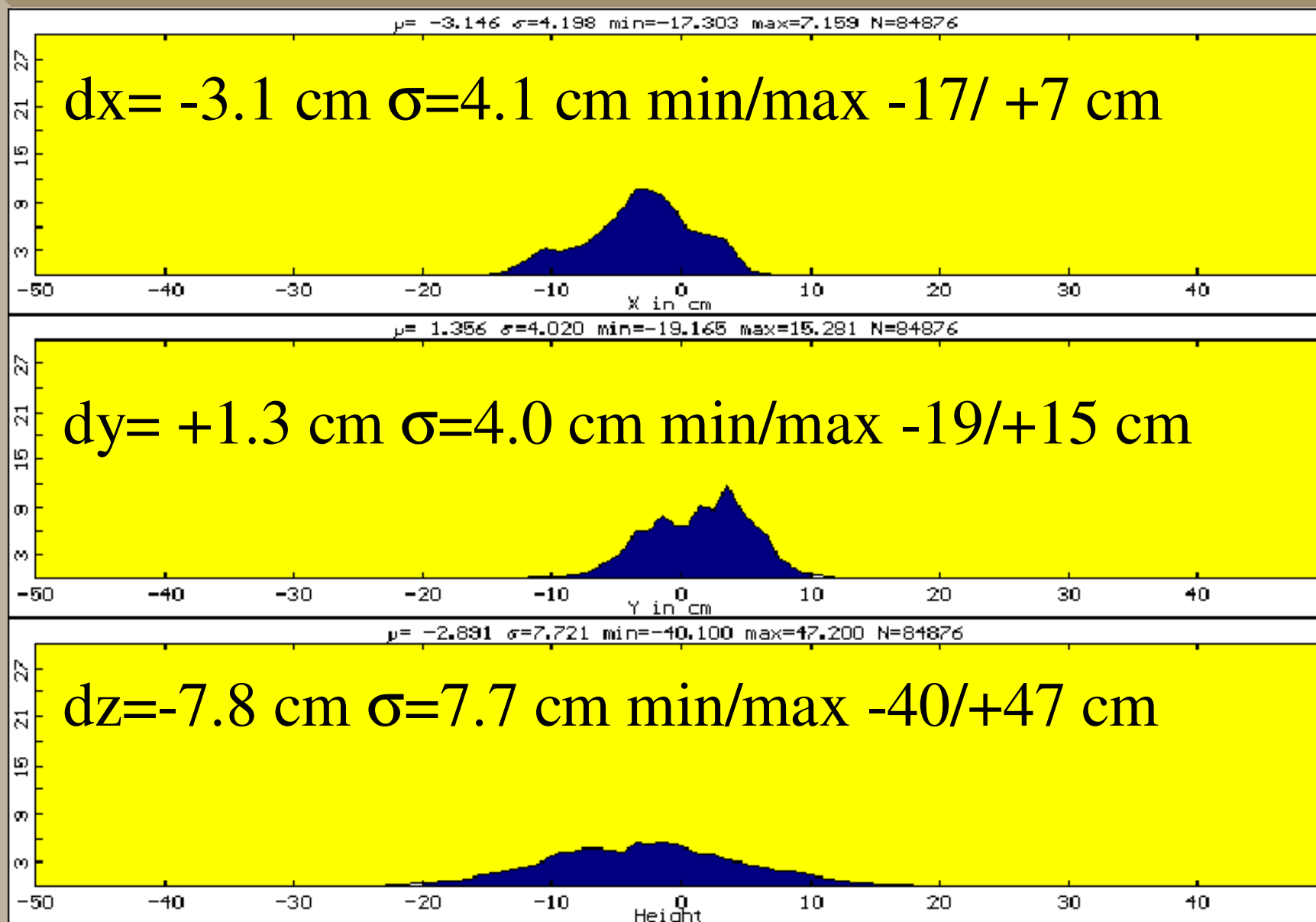
Australia (Works on AGS)

Reason for ITRF: Not using will create frictions in our network solutions.

Problem: Conversion for field applications in ETRF '89

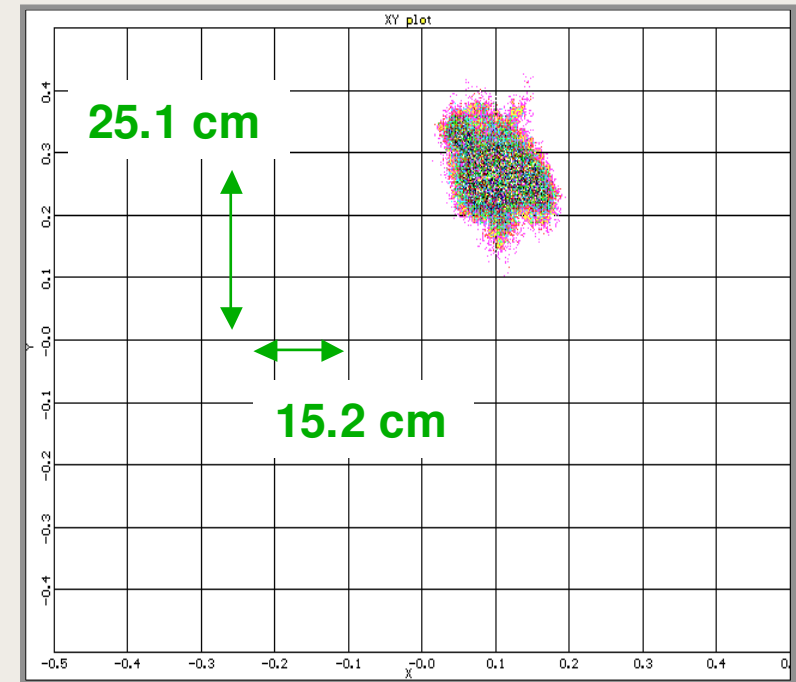


Hp Histogram 6 Stations



ETRF '89 (European Terrestrial Reference Frame)

- Reference frame fixed to the Eurasian tectonic plate
- Defined by a number of IGS stations over Europe
- ETRF '92 epoch 1989



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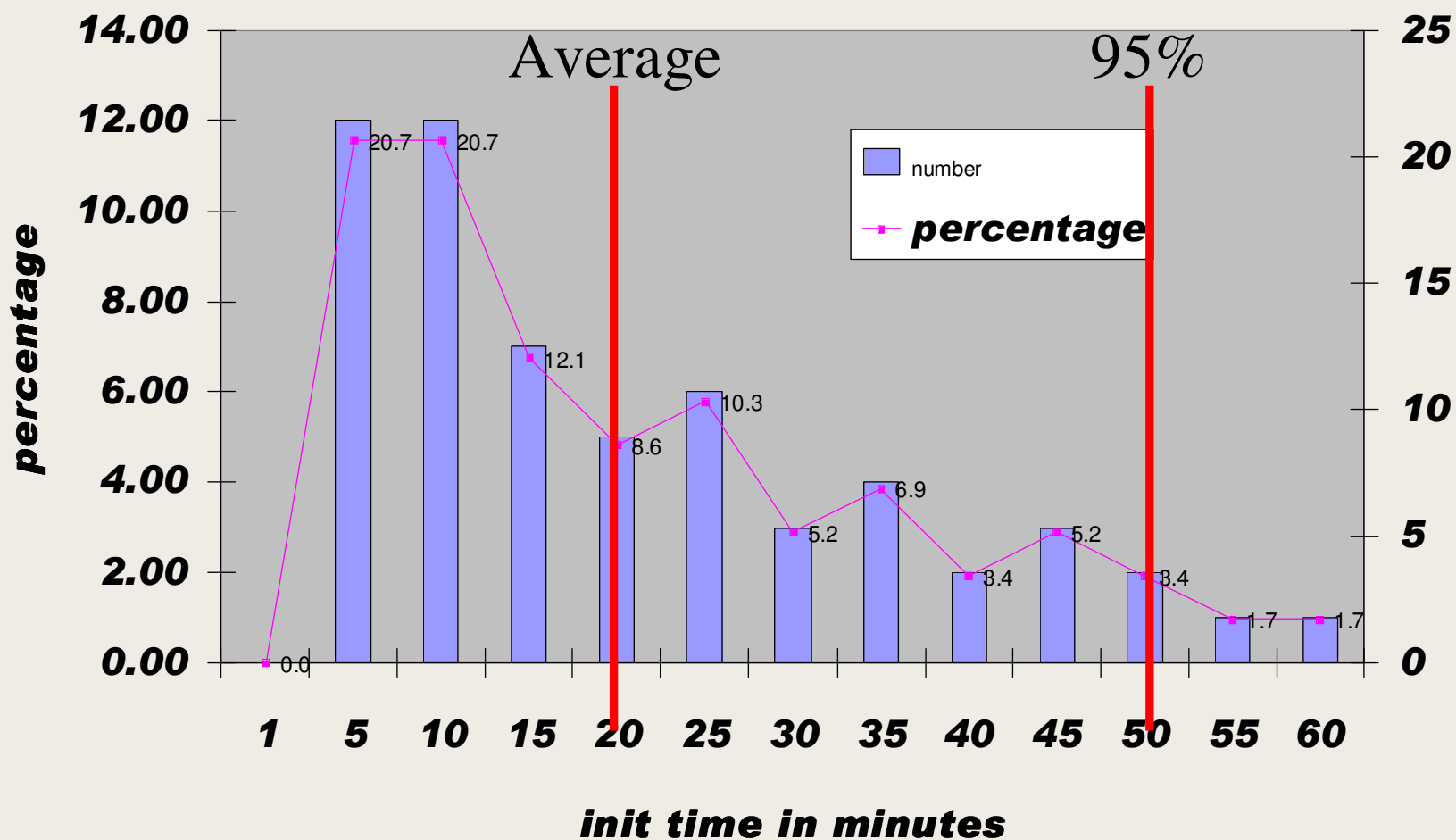
AM

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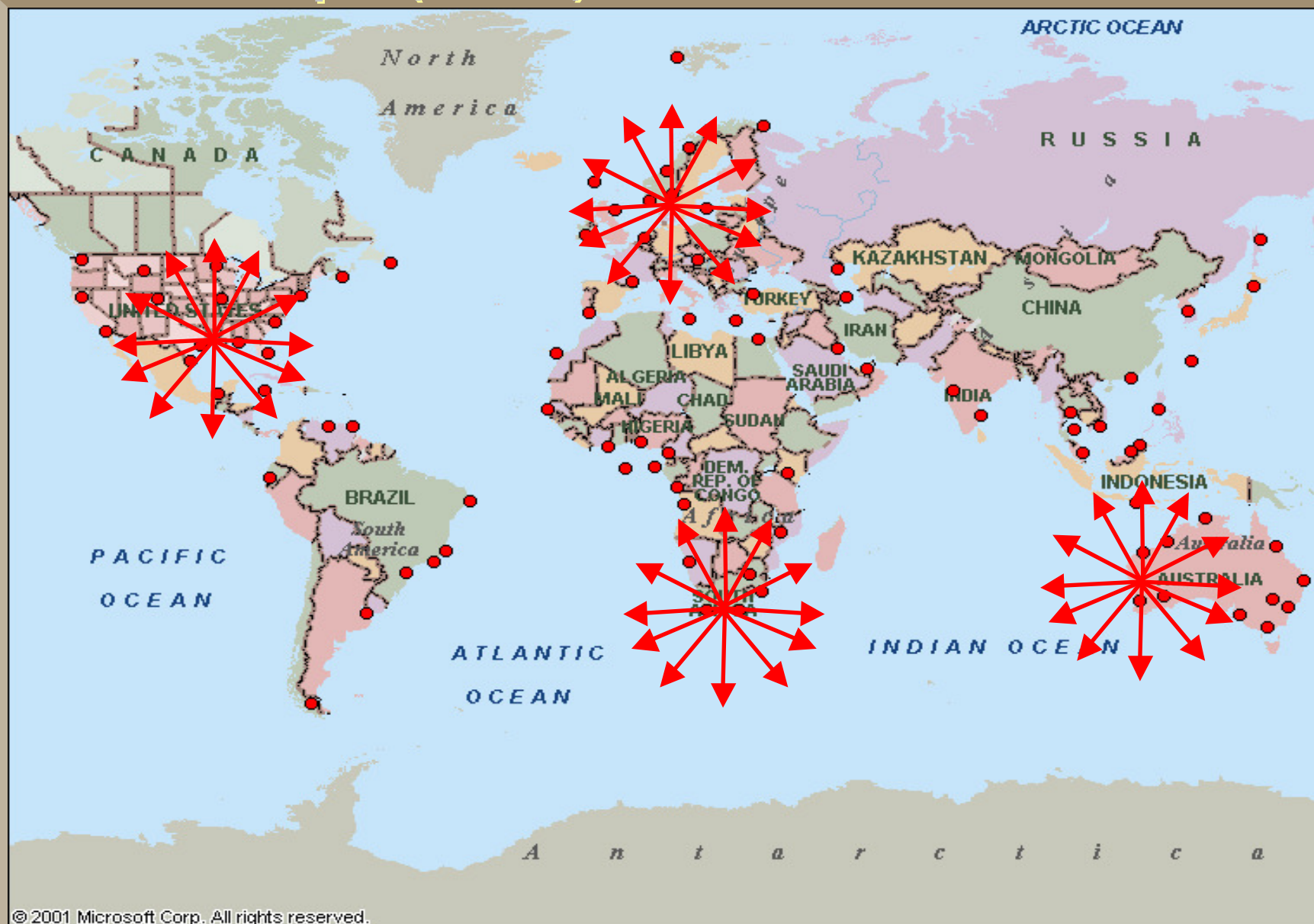
Init Time Dr<20 Cm

Histogram





Possible OmniSTAR Approach 1 or Multiple (broad) Casters





Reason for invitation

- 1) Inform EUREF about Fugro activities
- 2) NTRIP experiments for Mr. Weber BKG
- 3) Request to use NTRIP data for Fugro network
- 4) Make a commercial proposal for NTRIP technique

- 5) Status: NTRIP only testing
- 6) Business Plan ready May 2004



WE DON'T
JUST PROVIDE
CORRECTIONS,

WE ALSO LISTEN.

Being available to our customers is just
as important to us as our DGPS accuracy.

