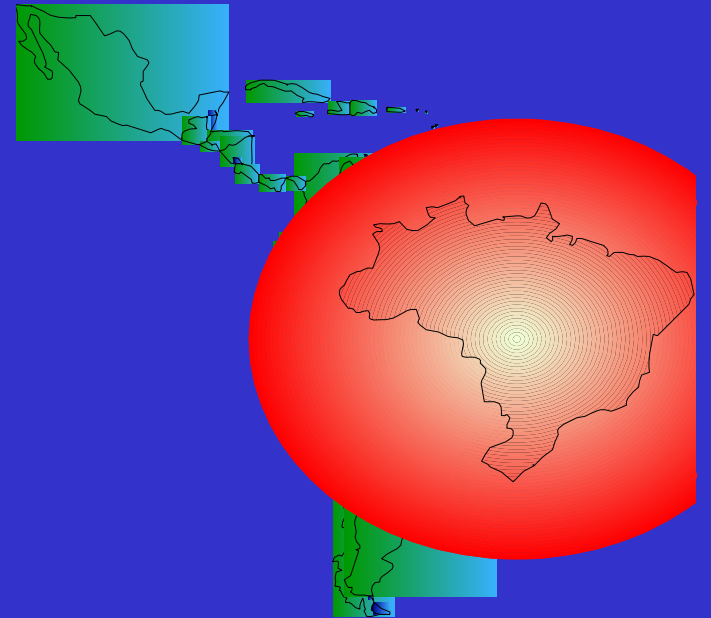


FRESH WATER SPILL 2004 SYMPOSIUM

Oil and Gas Production Projects In the Amazon Region - An Environmental Challenge

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Petroleo Brasileiro S.A - PETROBRAS*

*MAURICIO TAAM
National Petroleum Agency - ANP(Brazil)*





OIL & GAS INDUSTRIAL
INSTALLATIONS AND
ACTIVITIES IN THE AMAZON
REGION



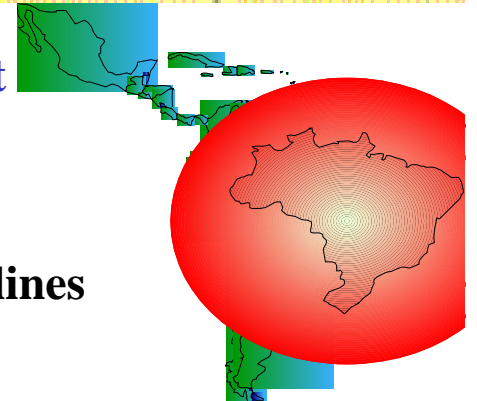
URUCU Oil & Gas Production + Natural Gas Processing Plant

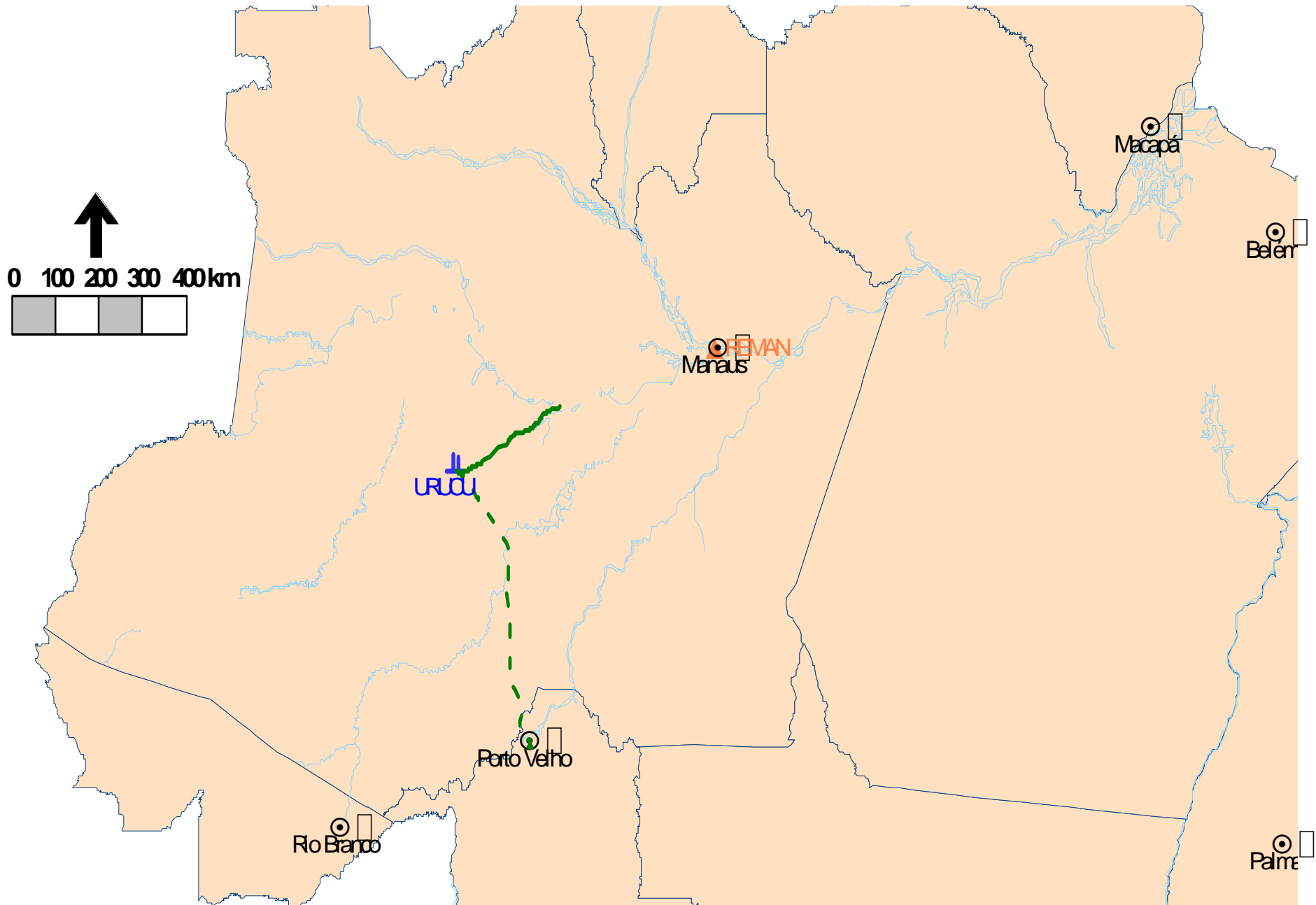
COARI River Terminal

MANAUS Refinery

————— Oil & Gas Pipelines

----- Future Pipelines





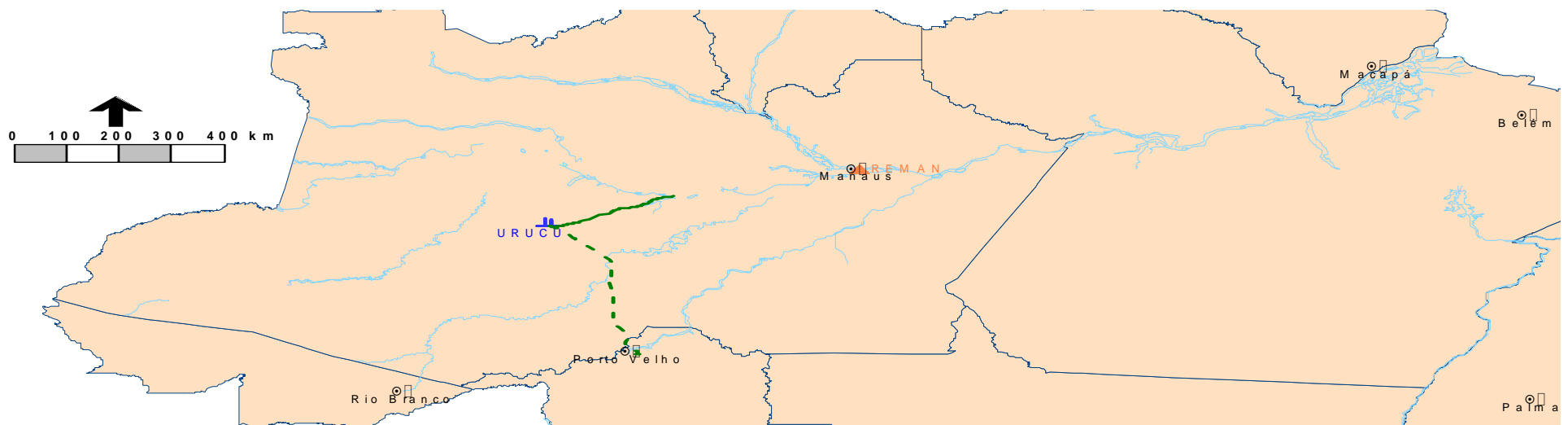
DIESEL OIL & GASOLINE & LPG DISTRIBUTION ALL OVER AMAZON REGION

UNITY	ACTIVITIES DESCRIPTION	NOTES
REMAN	Isaac Sabbá Refinery, founded 45years agos, now operating with 4 Oil Processing Unit representing a total processing capacity of 46.000 BBL/d	Diesel and gasoline Fuel oil LPG and Naphtha production All from Urucu crude oil supply.
UN-BSOL	Oil and Gas Production Unit in the Amazon Basin (also called Solimoes Basin), production activities started in 1988, now having 4 production camps (RUC; LUC; SUC e Igarapé Marta)	55 mil bbl/d oil production All Occidental Amazon supply
URUCU	The industrial complex count also with 2 Gas Processing Units (1 of them being the biggest in Brazil) and a small Diesel Unit.	800 tons / d LPG production All Amazon and part of the Northeast region supply
TA NORTE	<p>River Terminals operating since 1988, nowadays counting ON 4 Terminals- A navigation grid - Manaus, Belém, Macapá and Coari (the so called Solimoes Terminal).</p> <p>The Solimoes Terminal - TESOL having 3 tanks giving a total oil storage capacity of 58.000 tons, 4 LPG storage spheres to cop with a total of 7.500 tons of LPG coming from Urucu. Throughout a 280 Km pipeline.</p> <p>The transport of oil products from TESOL to Manaus is done by river navigation in vessels up to 20.000 tons capacity, small ones are used for the LPG transport.</p>	<p>7,5 millions m³ of Natural Gas - reinjection of 6,5M m³</p> <p>Transportation of Oil and LPG from Urucu to Manaus TESOL 58.000 t oil and 7.500 t of LPG capacity.</p> <p>Transport of oil products from Manaus to all North capitals</p>
BR-GRON	<p>A distribution network for oil product distribution network for all Amazon region.</p> <p>230.000 m³ product per month from Manaus., predominance diesel oil (40%) that is primary source for the electrical generation in Amazon..</p> <p>The operation is carried out by 100 boats from regional navigation companies.</p>	230 mil m ³ of oil products distribution for all Amazon region

Amazon Region Characteristics

- 4.000.000 km²
40% USA, 50% Brazil
- 12 million inhabitants
- 3 persons / km²
USA 27p/km² Italy 190p/km²
- Little or no land transportation

- Huge freshwater volume
20% of Earth's volume
- Continuous rain forest
50% of Earth's
- Large tropical savanna area



GEOGRAPHICAL VIEW



BASIC PRINCIPLES FOR OIL AND GAS INDUSTRIAL ACTIVITIES IN AMAZON

- All installations must have the proper environmental license.
- Installations must present a high environmental and security standard level
- Environmental management at the same level of the “business running” management
- Full respect for local culture aspects
- Assumed partnership in local and regional environmental and social projects and initiatives
- A heavy “Incident Response System” demand

THE ENVIRONMENTAL CHALLENGE

- **Oil spill Incidents can happen**
- The all surrounding area, anywhere, have a high environmental sensitivity
- Any incident or bad response in the Amazon will attract worldwide attention
- Every logistics move is extremely difficult and when possible it is sometimes very much costly
- Any distance is “enormous”

THE ANSWER

- **VAST REGION ENVIRONMENTAL KNOWLEDGE**
- **PREDICTIVE “ACCIDENTAL SCENARIO DEVELOPMENT” TOOLS**
- **HIGHLY IMPROVED LOGISTICS AND RESPONSE STRENGTH AND QUALITY**
- **FULL INVOLVEMENT OF THE COMMUNITIES**

THE ANSWER

**VAST REGION
ENVIRONMENTAL
KNOWLEDGE**

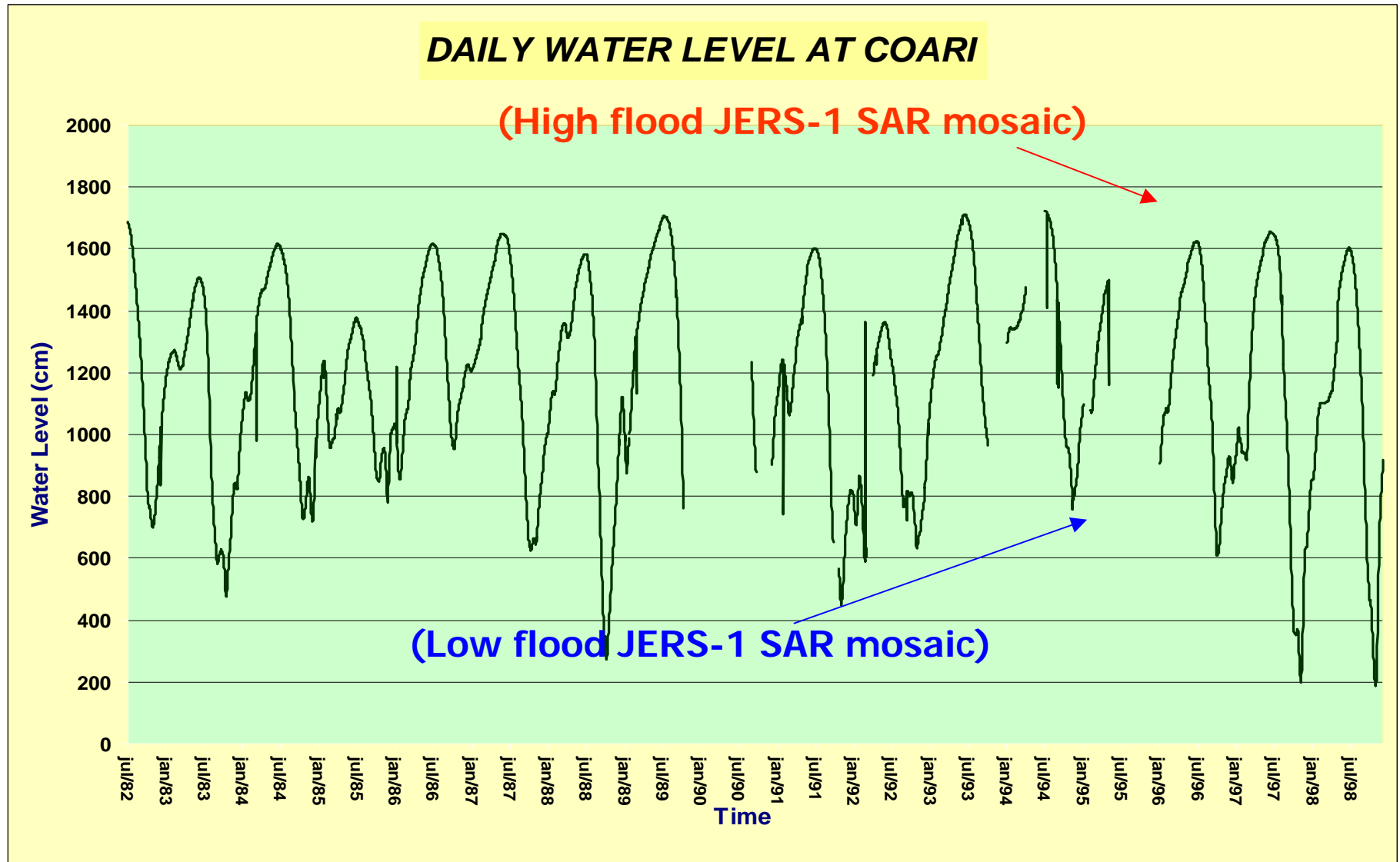
Aerial View of the Study Area



**Flooded vegetation at the
mouth of the Urucu River**

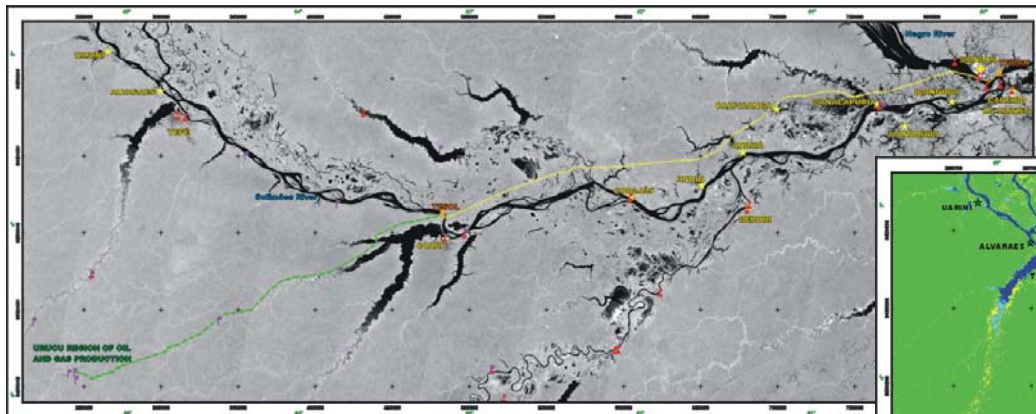


Water Level at Coari Gauge from July 1982 to December 1998

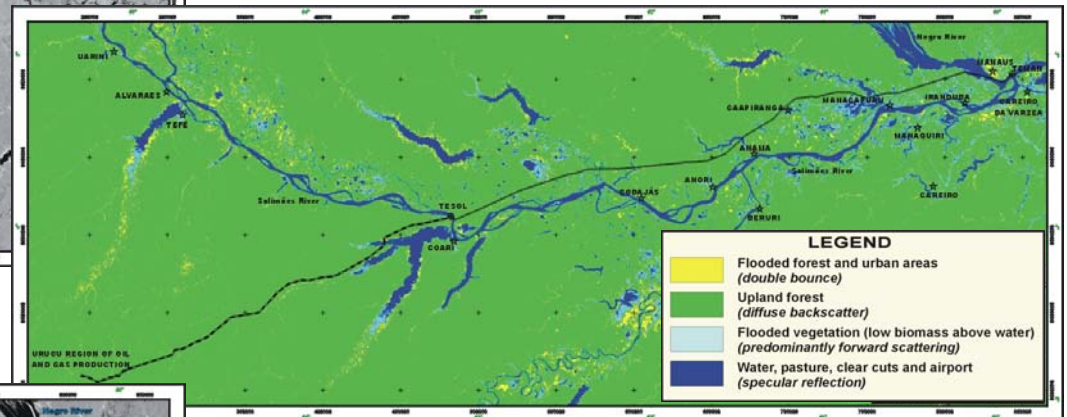


Global Rain Forest Mapping Project

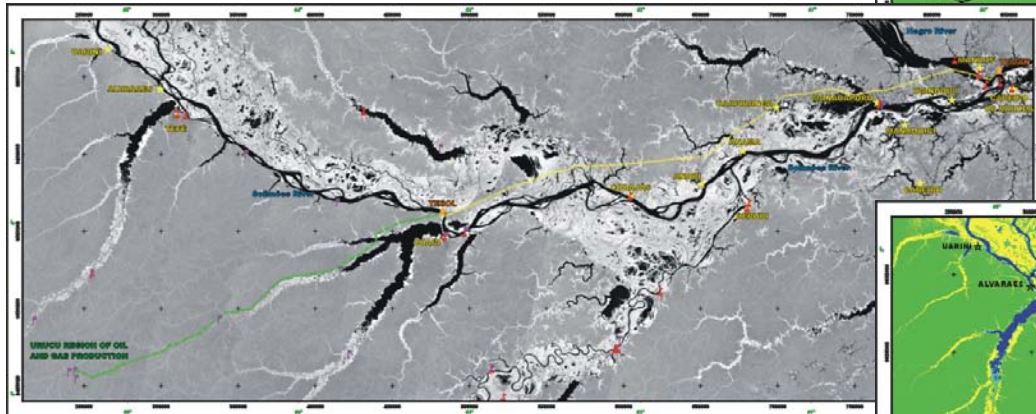
Dual Season Image Mosaics -



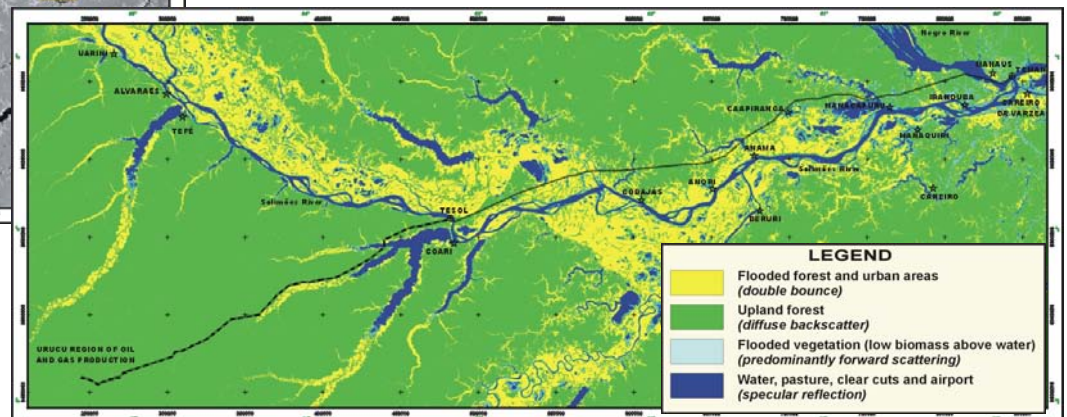
Low flood SAR mosaic – OCTOBER 1995



USTC Classified Mosaic – Low flood

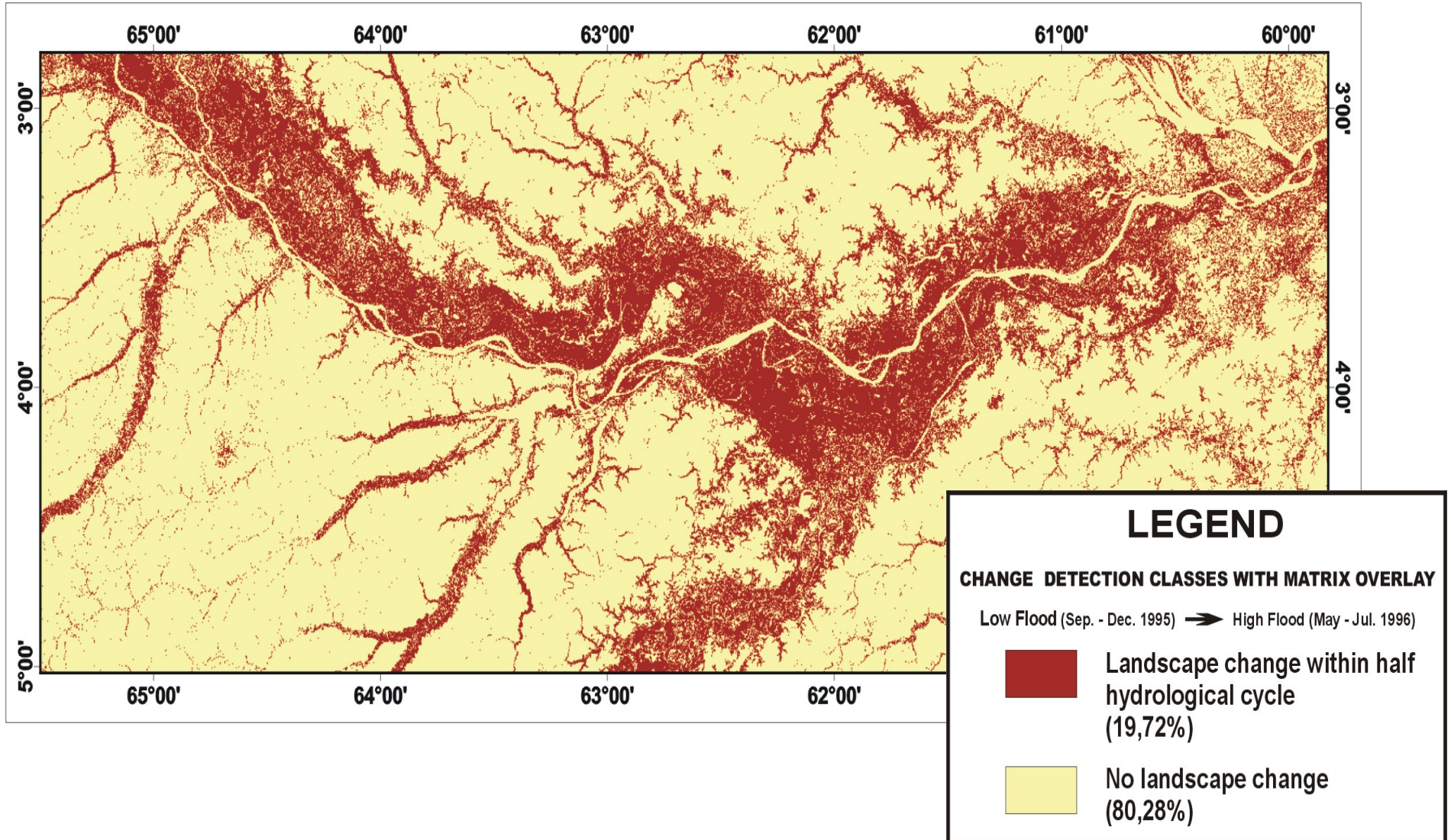


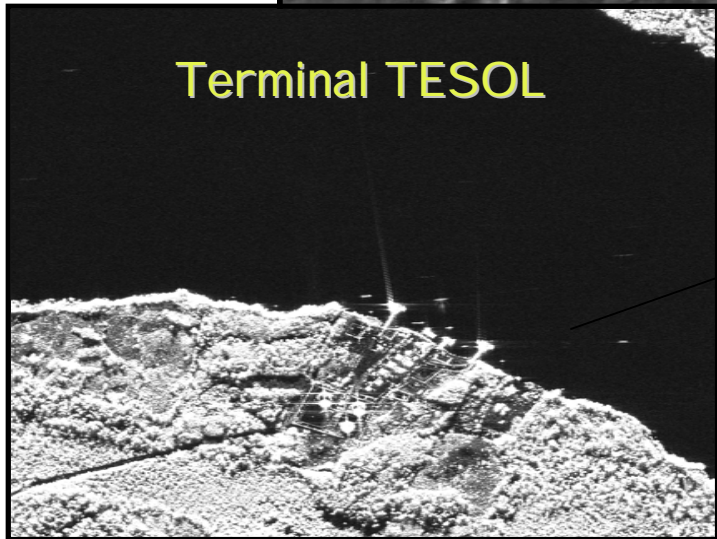
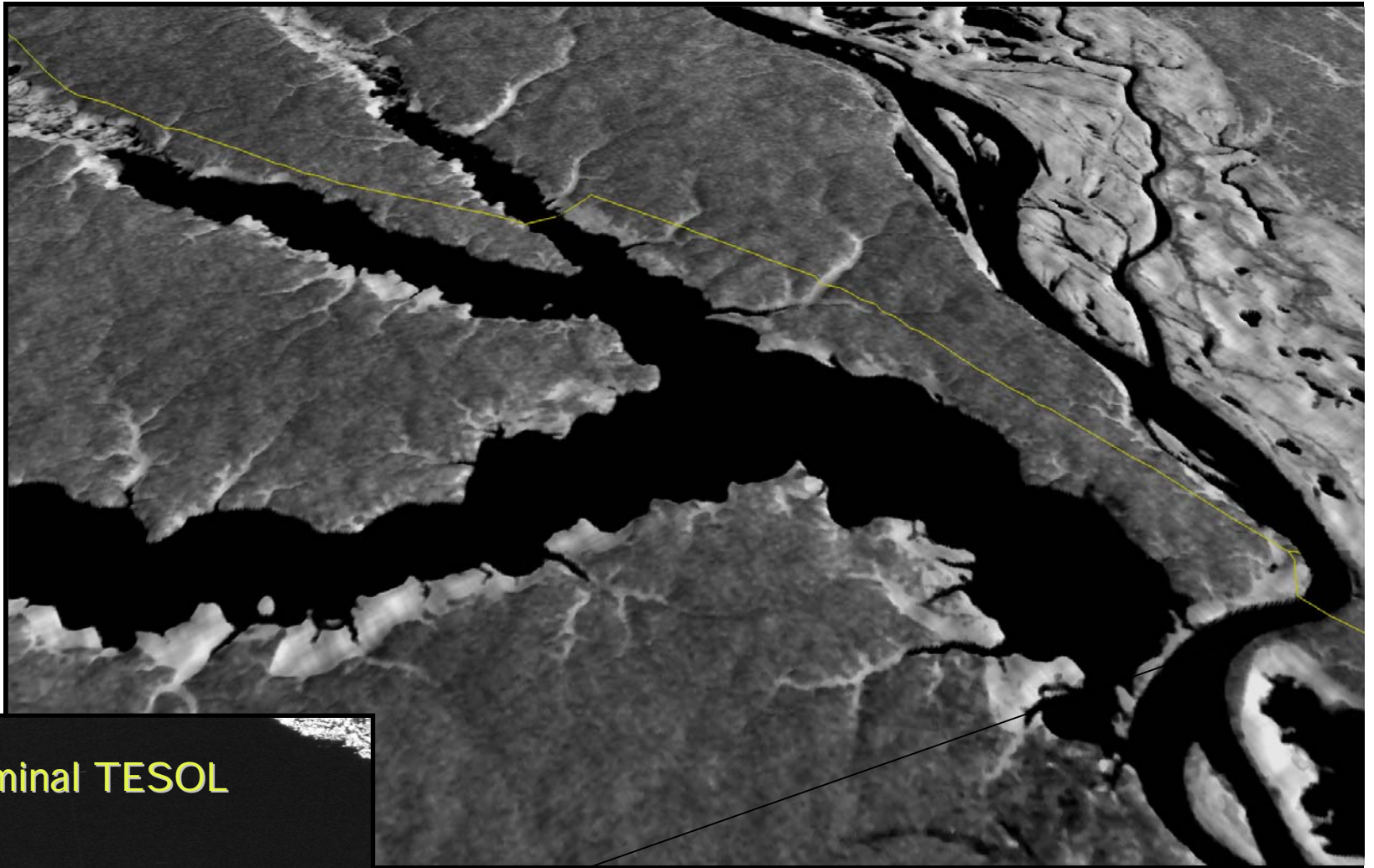
High flood SAR mosaic – MAY 1996



USTC Classified Mosaic – High flood

Summary of Change Detection Results Within Half Hydrological Cycle (Low to High Flood)

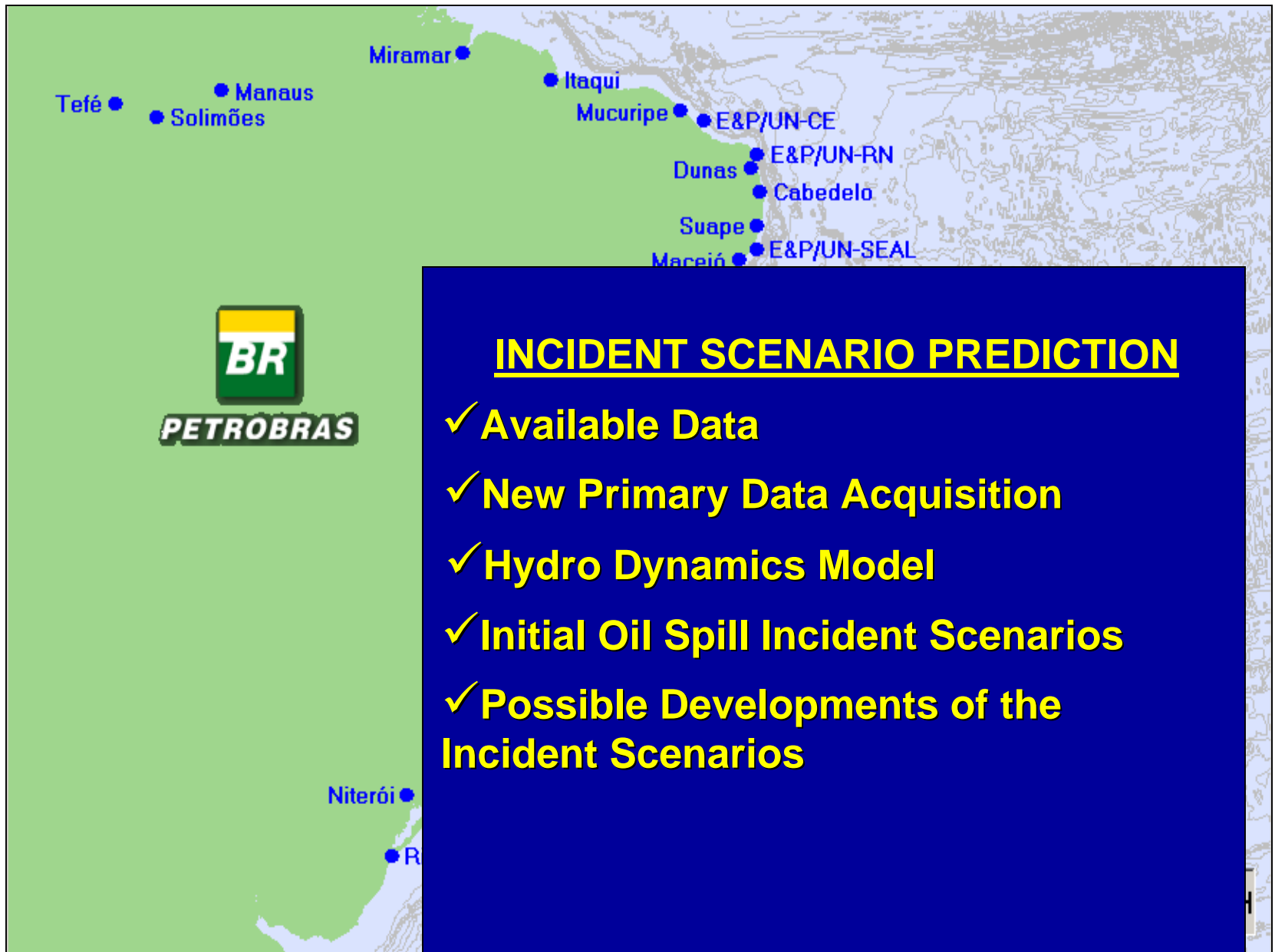




Urucu-Coari PIPELINE

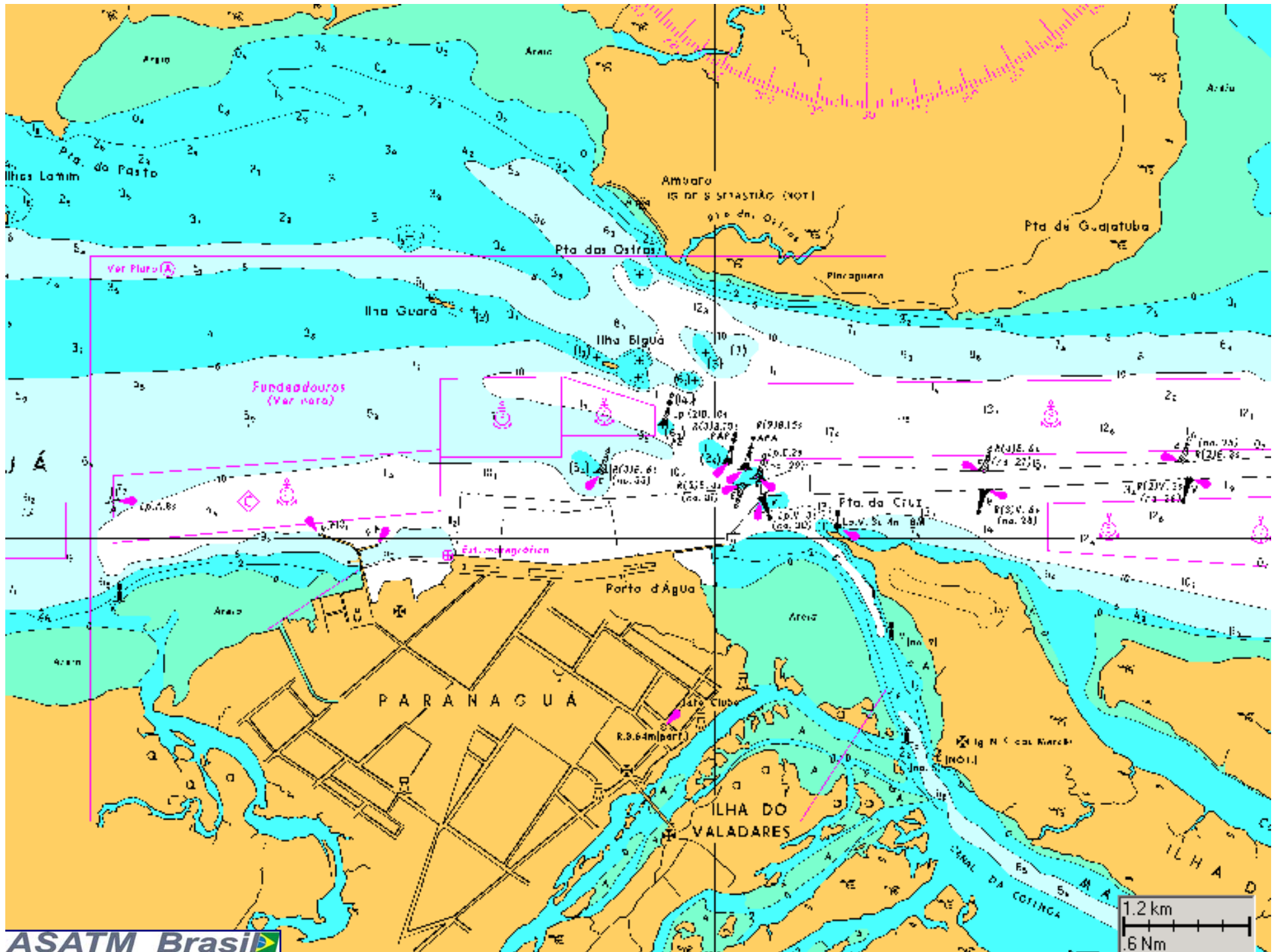
THE ANSWER

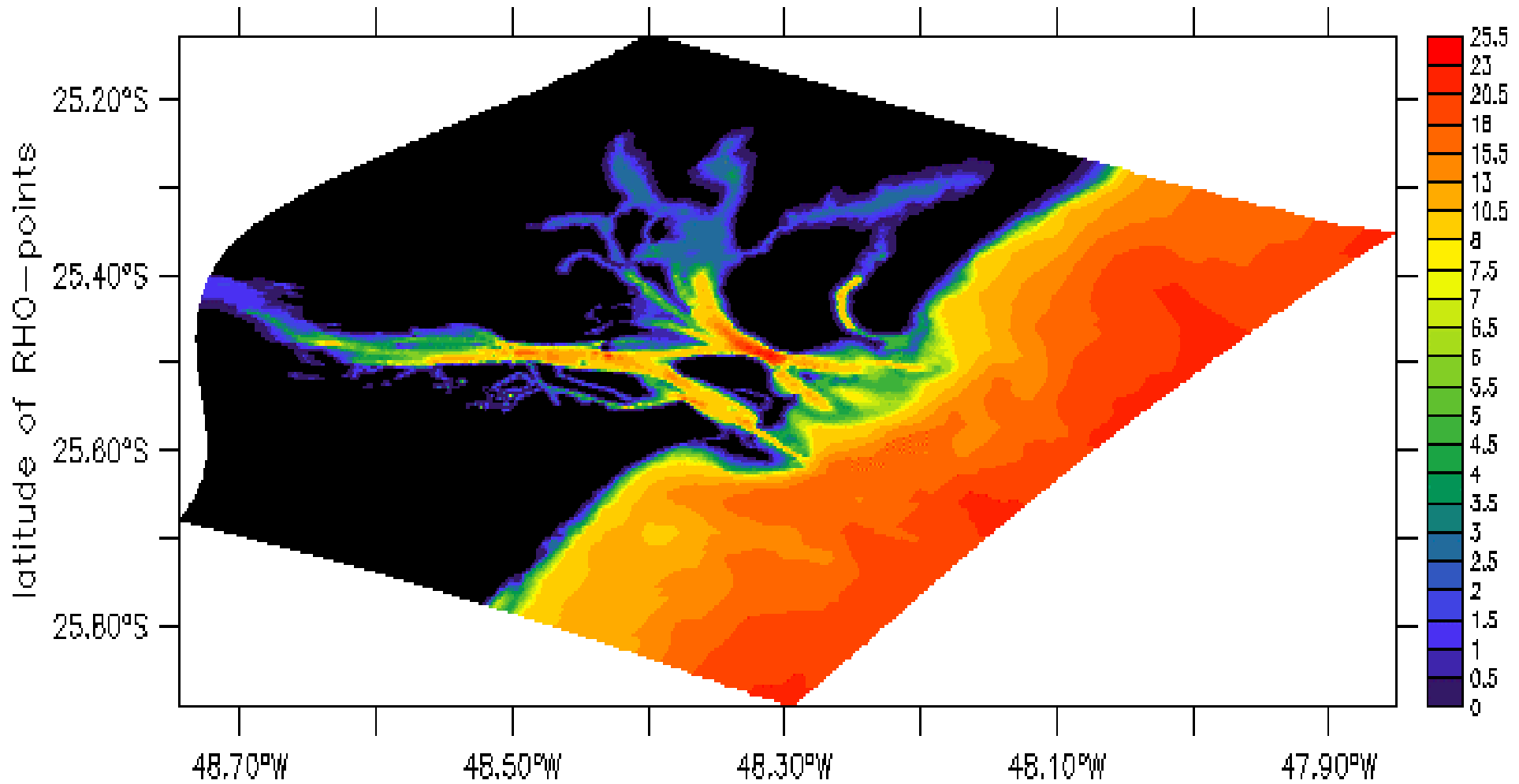
**PREDICTIVE “ACCIDENT
SCENARIO DEVELOPMENT”
TOOLS**



INCIDENT SCENARIO PREDICTION

- ✓ Available Data
- ✓ New Primary Data Acquisition
- ✓ Hydro Dynamics Model
- ✓ Initial Oil Spill Incident Scenarios
- ✓ Possible Developments of the Incident Scenarios





FERRET Ver 5.22
NOAA/PMEL TMAP
Nov 21 01 15:10:28

Working bathymetry at RHO-points (meter)
DATA SET: paranagua2.nc



Manaus Terminal – Rio Negro



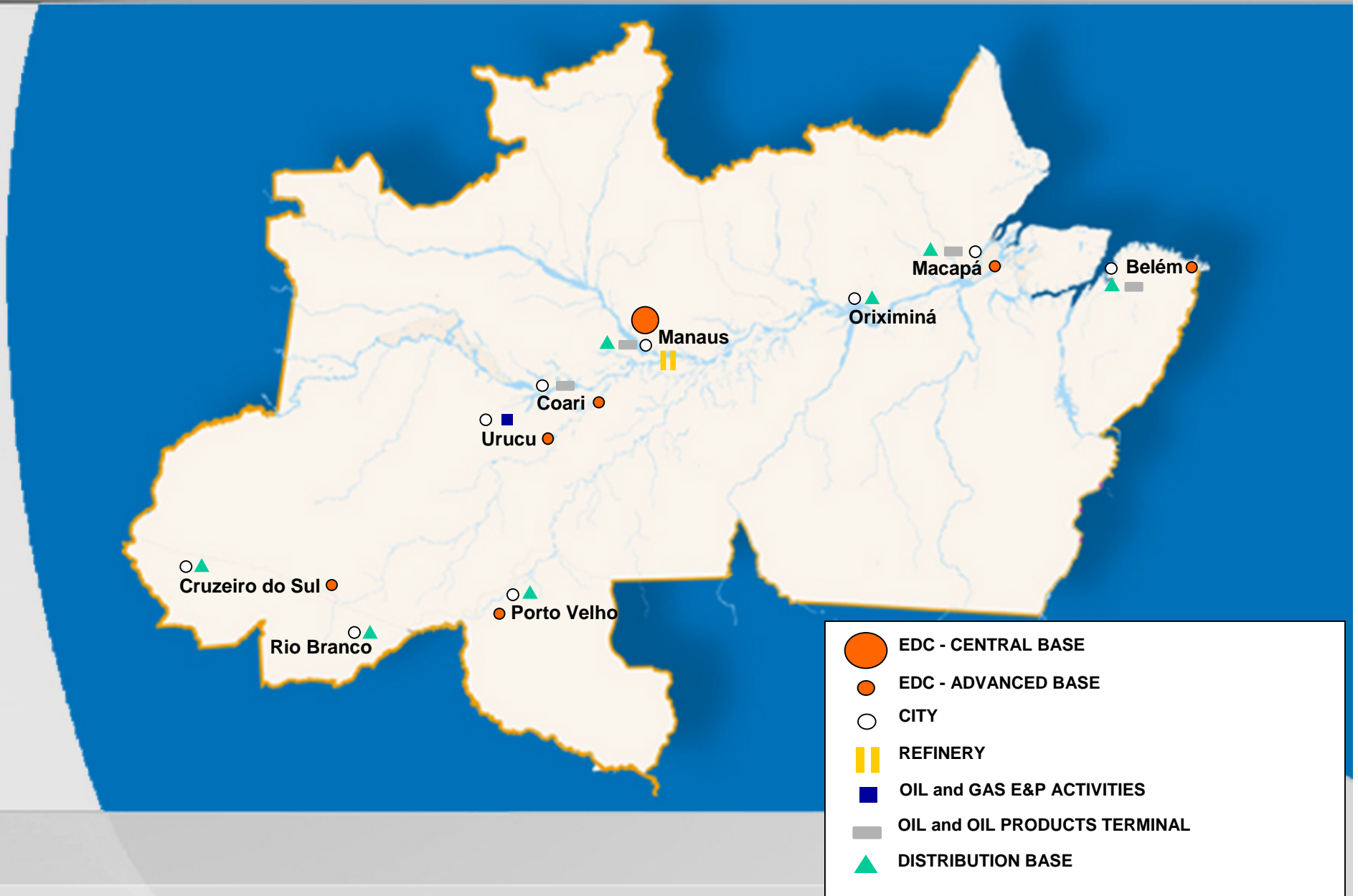
100m³ Oil Spill Incident Scenario - Dry Season - WE Winds

THE ANSWER

**HIGHLY IMPROVED
LOGISTICS STRENGTH AND
QUALITY OF RESPONSE**

MATERIAL AND HUMAN RESOURCES

THE ENVIRONMENTAL DEFENSE CENTER STRATEGY IN AMAZON



ENVIRONMENTAL DEFENSE CENTER



CONTAINMENT BOOMS



BASIC RESPONSE EQUIPMENTS



WORKBOAT



EGMOPOL Oil Recovery Equipment



PERMANENT TRAINING



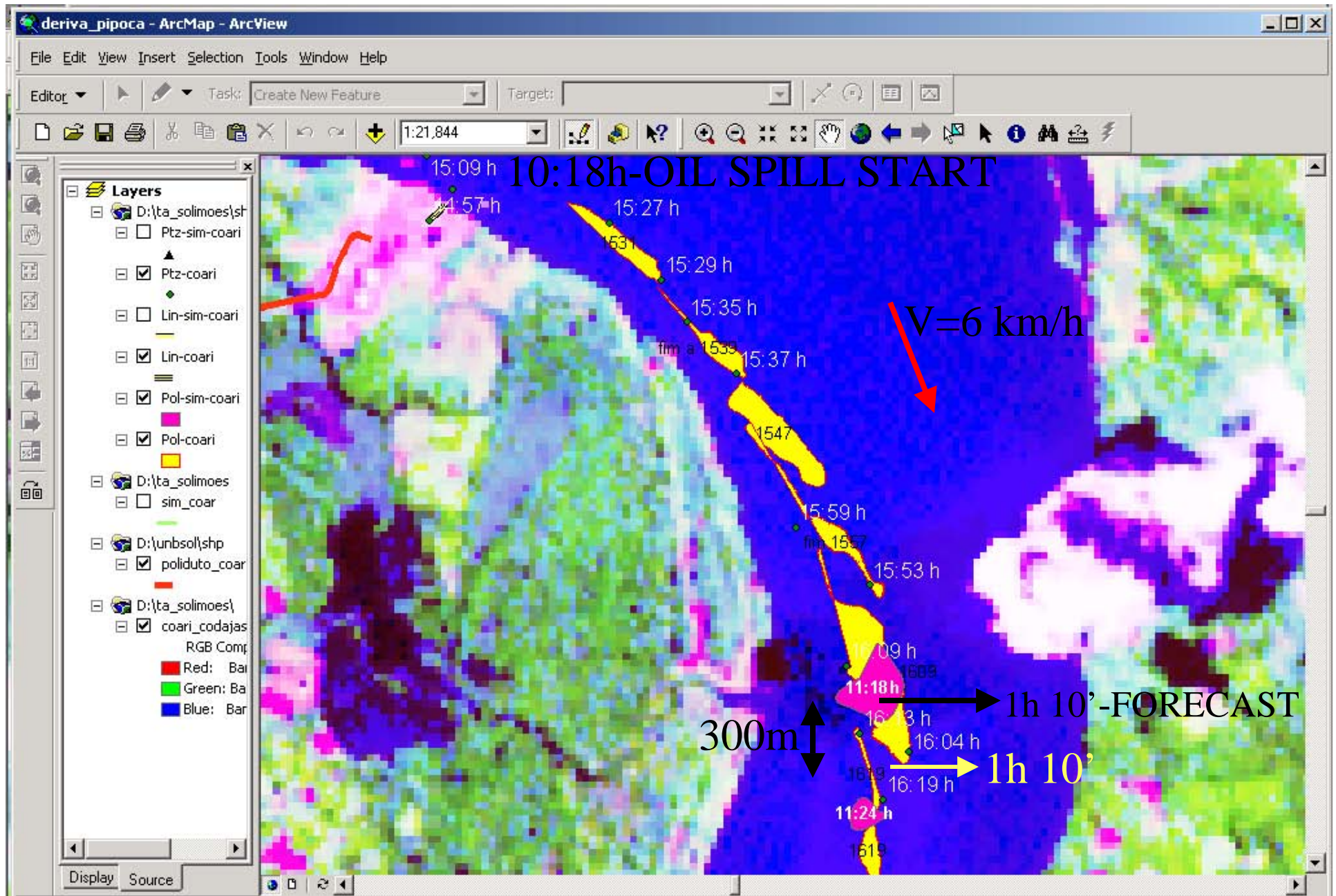
DRILLING THE “U” FORMATION



ROBUST SUPPORT SOFTWARE

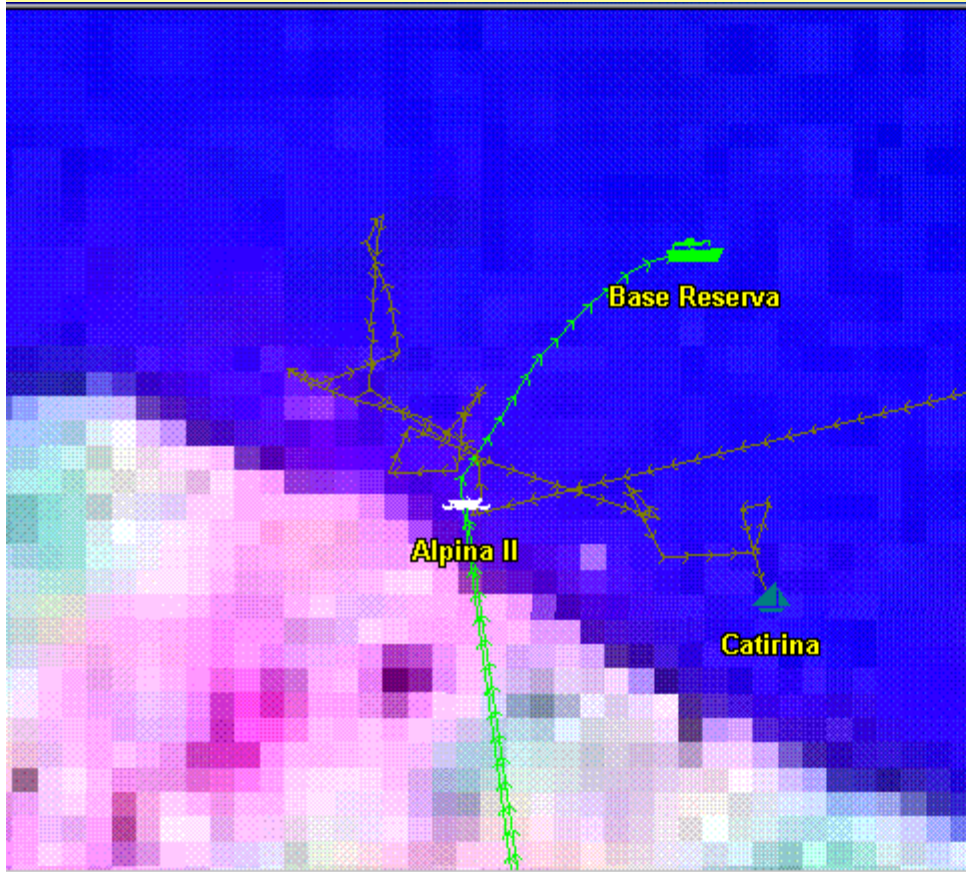
The **INFOPAE**

- Prediction and Monitoring the Incident Scenario.
- Follow up and technical information for decision maker during the spill response operations.
- Precise “on line” information about the incident development - and the response achievements.
- Provide “at any time” a full Incident Report.



FORECAST X REAL OIL SPILL DEVELOPMENT

INCIDENT / RESPONSE FOLLOW UP



Veh. ID	Veh. Name	Report Time	Position Time
0004	Alpina II	11:30:44, 29/10/2003	12:29:27, 29/10/2003
0001	Base Reserva	11:41:06, 29/10/2003	12:39:52, 29/10/2003
0002	Ararajuba	15:52:26, 10/05/2002	16:52:51, 10/05/2002
0005	Alpina III	16:25:11, 23/09/2003	12:16:26, 23/09/2003
0006	Mergulhão	16:42:04, 23/09/2003	17:40:46, 23/09/2003
0007	Reman I	16:23:39, 23/09/2003	17:22:22, 23/09/2003
0008	Catirina	11:41:19, 29/10/2003	12:40:02, 29/10/2003
0009	Maite	15:49:29, 23/09/2003	16:48:05, 23/09/2003
0003	Alpina I	15:42:19, 23/09/2003	16:41:02, 23/09/2003



PETROBRAS



THE ANSWER

**FULL INVOLVEMENT OF THE
COMMUNITIES**

PROJECTS

- SOCIAL PROJECTS
- ENVIRONMENTAL EDUCATION
- TECHNICAL SKILL EDUCATION
- OIL SPILL SURVEILLANCE

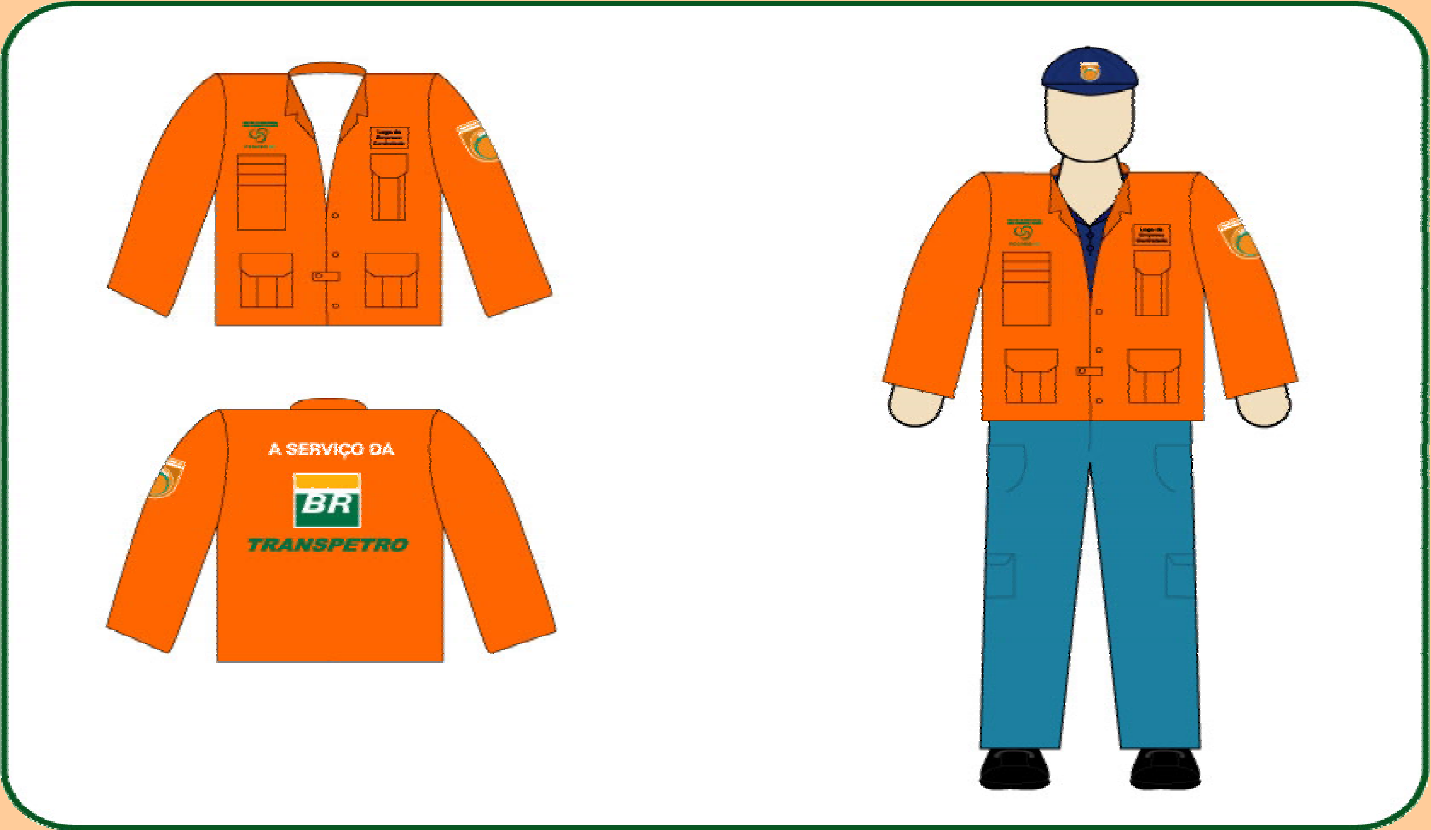
EDUCATIONAL ACTIVITY



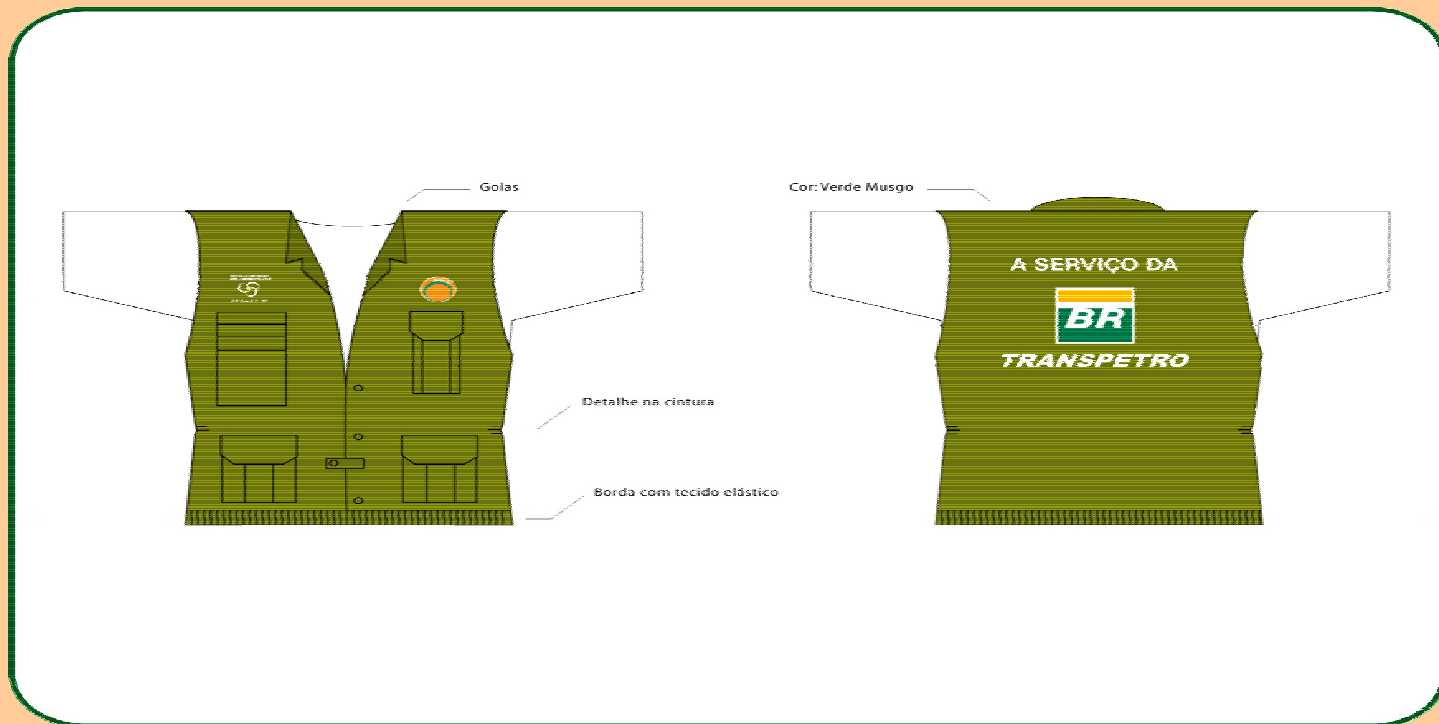
SPREADING ENVIRONMENTAL CONCEPTS



OIL SPILL SURVIELLANCE TEAM UNIFORM



INFORMATION MULTIPLIER TEAM UNIFORM



CONCLUSION

- **IF YOU CAN UNDERSTAND DIFFERENCES**
- **IF CAN HAVE AND DEMONSTRATE REAL COMMITMENT WITH THE REGION AND THEIR PEOPLE**
- **IF YOU REALLY CARE ABOUT THE ENVIRONMENTAL AND THE COMMUNITIES**
- **IF YOU AND YOUR BUSSINESS CAN BECOME PART OF IT, AND NOT THE CONTRARY**

IT CAN BE POSSIBLE TO ESTABLISH OIL AND GAS INDUSTRIAL ACTIVITIES IN AMAZON AS AN ENVIRONMENTALLY SUSTAINABLE BUSINESS

THANKS FOR YOUR ATTENTION

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