



# TOWARDS SHARED NUMERIC BOUNDARY LINES

*CE mission  
April 2016*



**GOALS**  
**SENSITIVE POINTS**  
**WAYS**  
**GOOD PRACTICE**  
**CONCRETELY**

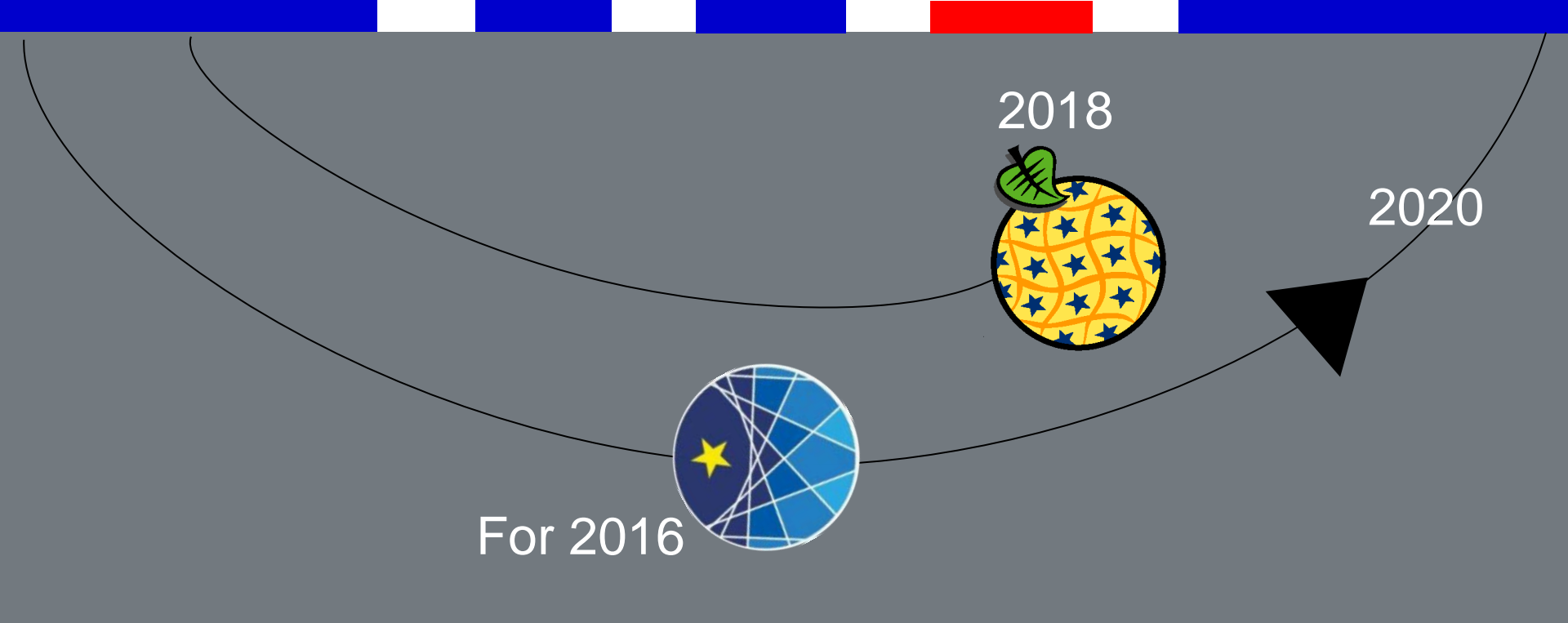


# INSPIRE DIRECTIVE 2007, ARTICLE 10.2

” IN ORDER TO ENSURE THAT SPATIAL DATA RELATING TO A GEOGRAPHICAL FEATURE, THE LOCATION OF WHICH SPANS THE FRONTIER BETWEEN TWO OR MORE MEMBER STATES, ARE COHERENT, MEMBER STATES SHALL, WHERE APPROPRIATE, DECIDE BY MUTUAL CONSENT ON THE DEPICTION AND POSITION OF SUCH COMMON FEATURES.


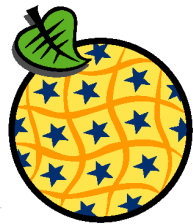

EUROPE





## **BILATERAL BOUNDARIES : THE GOALS**

# EUROPEAN PRIORITIES

	Priority	Level	Period Time	Necessity
	1)	Projet ELF	ready for 2016	contract
	2)	INSPIRE	2018	Directive : «where appropriate»
	3)	SBE-KEN	no	long term

# FROM TEXT TO NUMERIC LINE

## 2 conceptions at play

- The text and traditional perception of the boundary lines
- The expectation for large scale european databases access.  
(new legislative frame PSI et INSPIRE for DG Env)

## An accelerated passage between old and new world



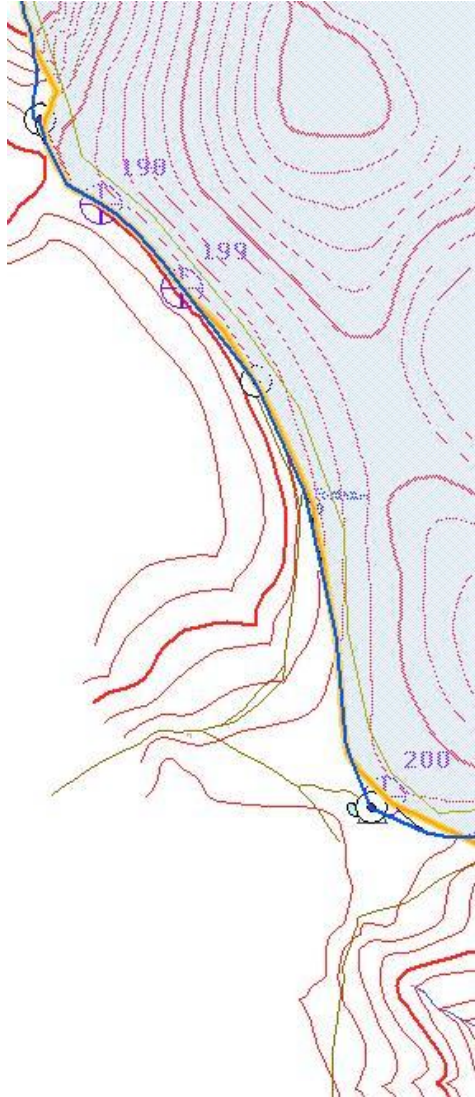
### => crossborder actions

- Text study
- Exchange
- Comparisons

### decisions with Technical arguments

- Restitutions
- GPS mesures

## QUALITY ATTRIBUTE AND TECHNICAL INSURANCE



Shared coordinates of the Markers (10 cm)

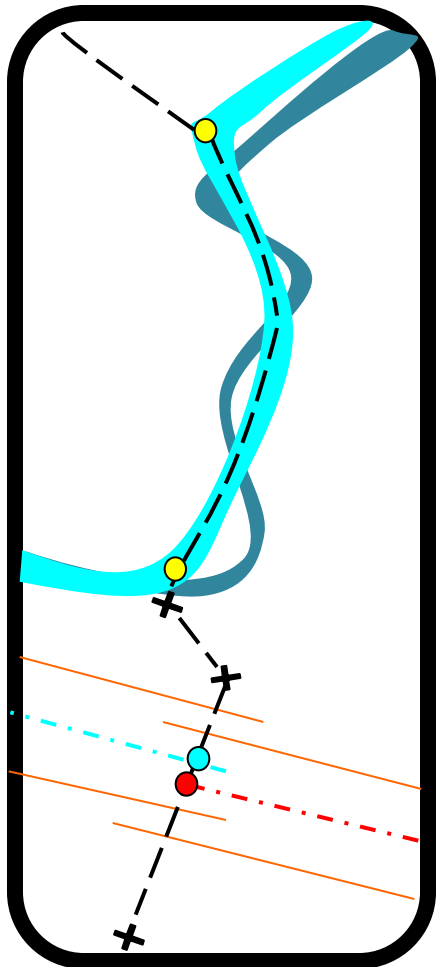
1 : 25 000 map, 30m guaranteed  
Cadaster 1m to 30m guaranteed  
(depends on urban zones)

Line improved by

- specific photogrammetry in mountains and
- georeferenced cadastre

New lines created for INSPIRE directive  
with shared metric accuracy (1m=>5 m)

# INTEROPERABILITY : EDGEMATCH POINTS



=> One boundary line carrying edgematch points

To edgematch data :

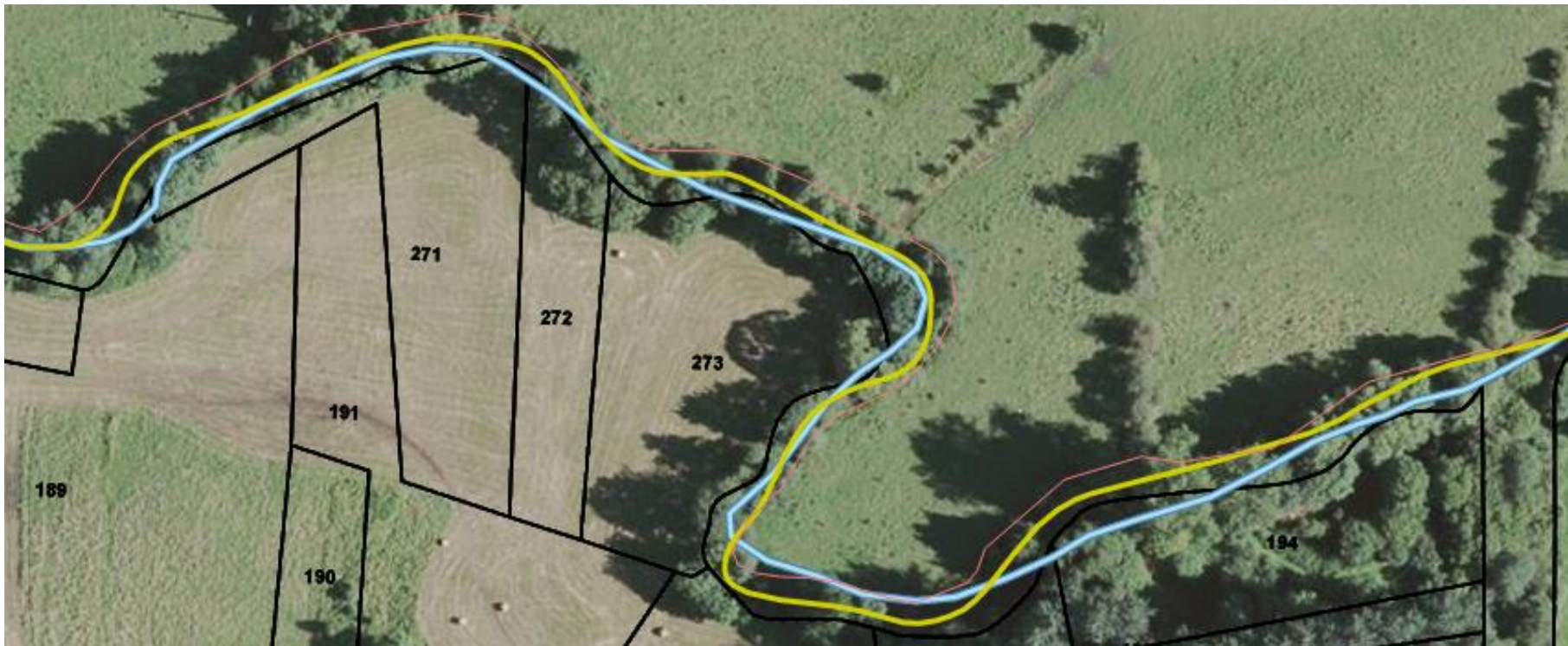
- Crossing object must share the same geometry on the boundary line
- Rivers or road axes must be shared

=> A shared commune line is needed



## EXCHANGES

- Information has to be reachable, fluent exchange
- For access to all, the different lines at each step are displayed on Internet <http://cnig.gouv.fr/apigeoportail/pageapi.php>



# SENSITIVE POINTS



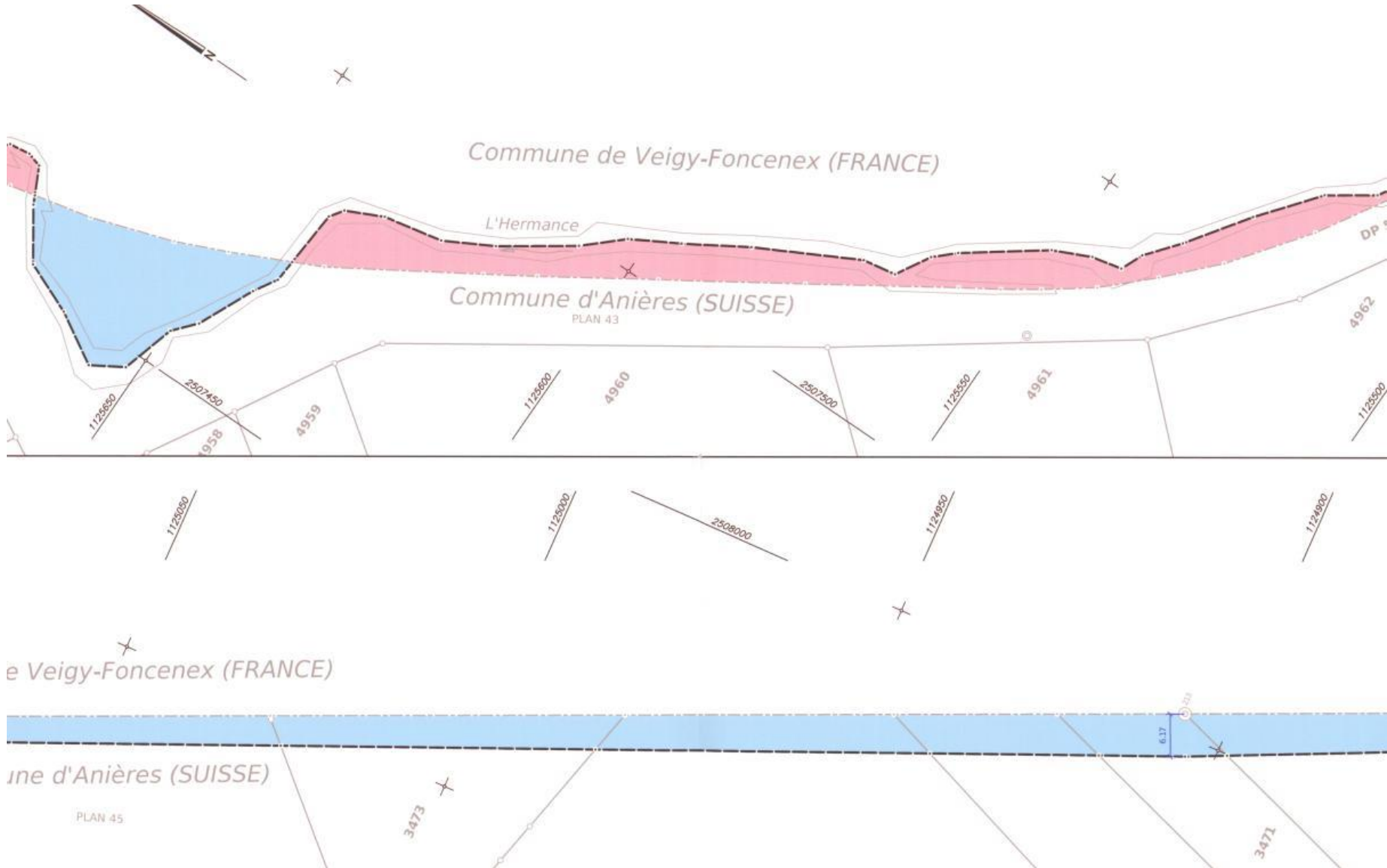
# MOVING BOUNDARIES (1)



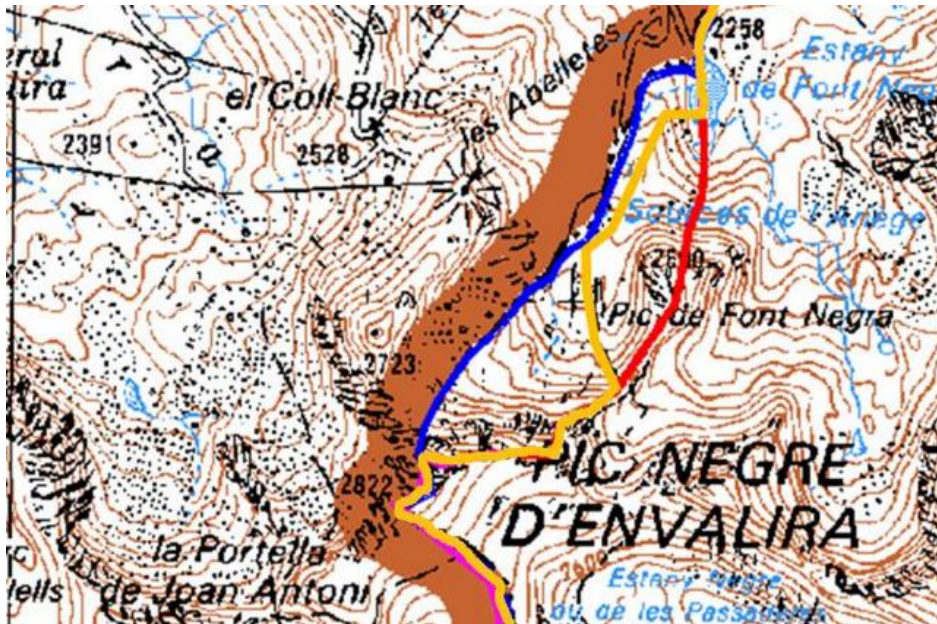
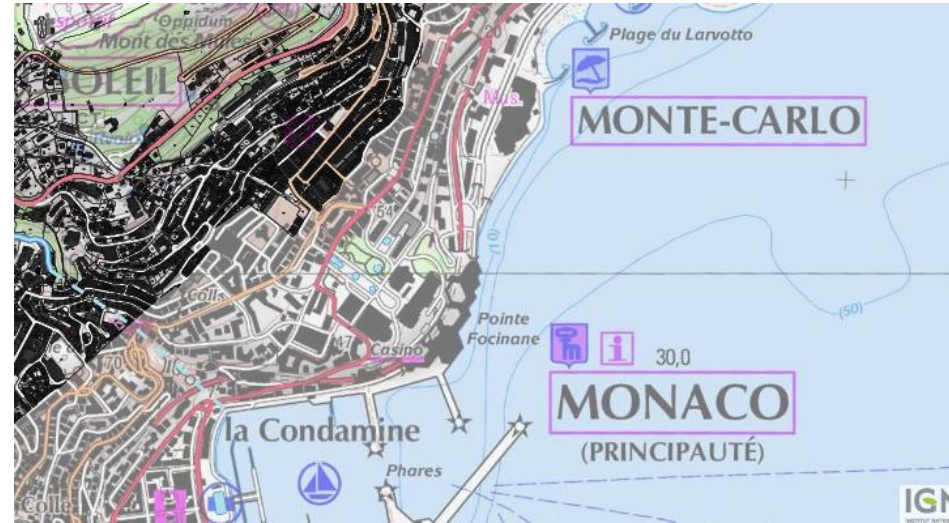
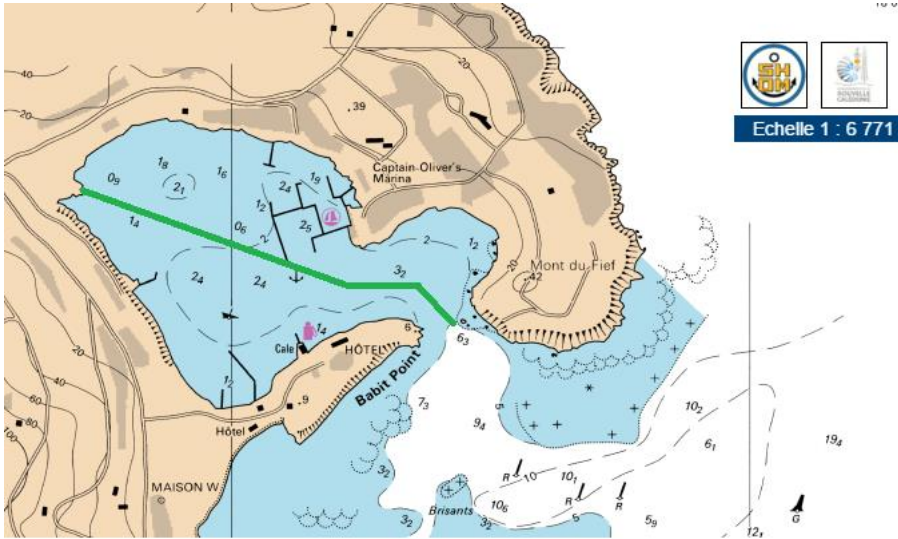
- Glaciers
- Rivers
- Movable boundaries :  
historic preeminence  
is only oral recognition
- 



# MOVING BOUNDARIES (2)



# BOUNDARIES WITHOUT WRITTEN TREATIES



# VALIDATION STEPS

Types de validation

Accord DGFIP



Accord commission mixte



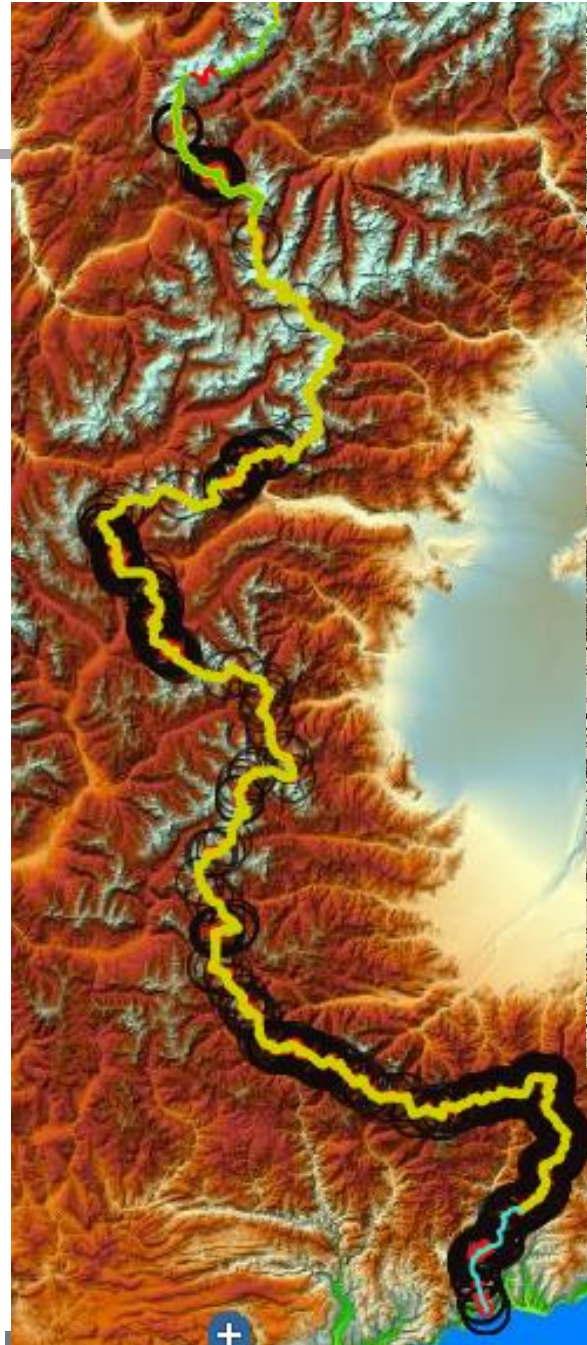
Accord technique



En cours d'étude



Désaccord diplomatique





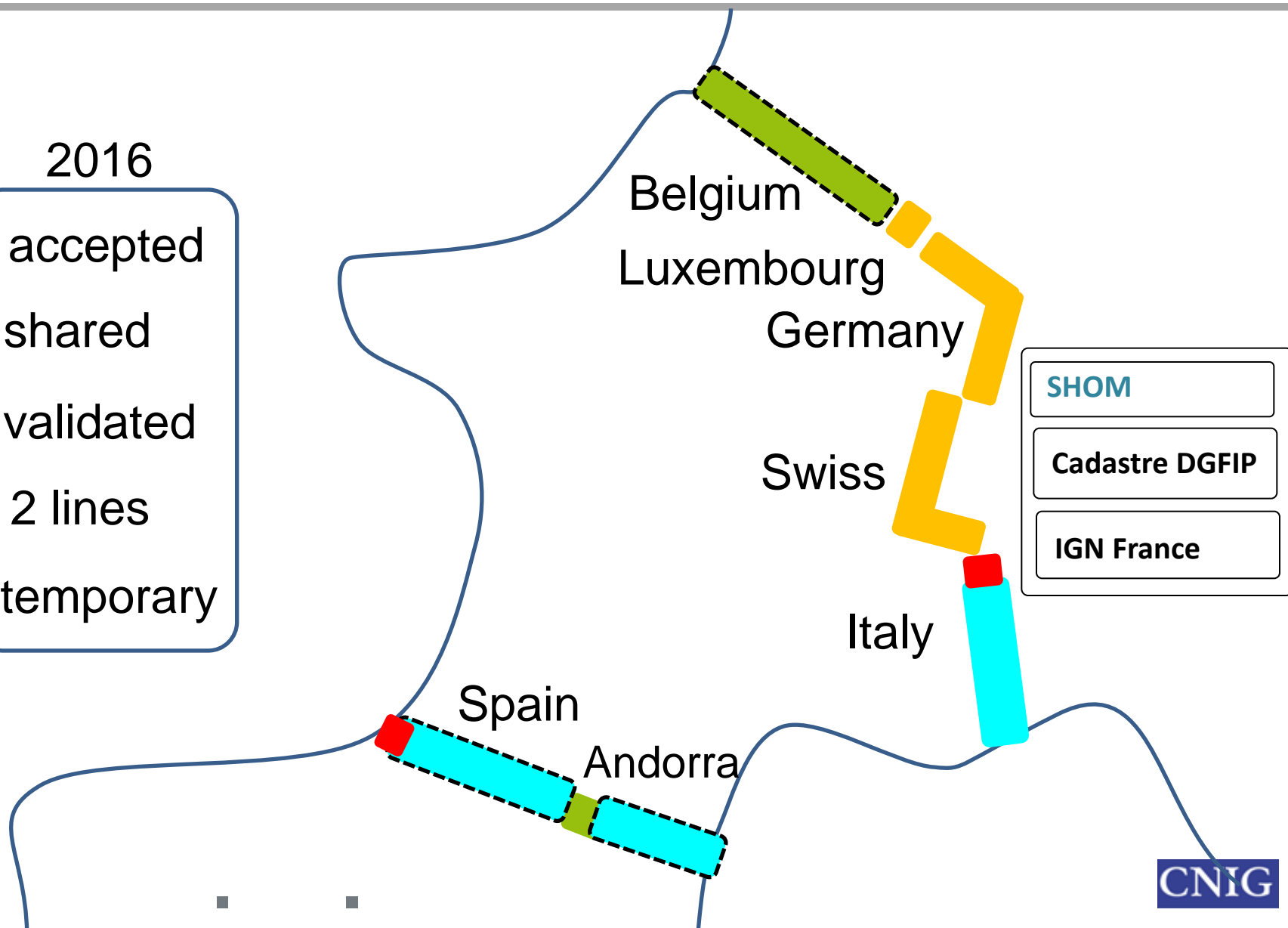
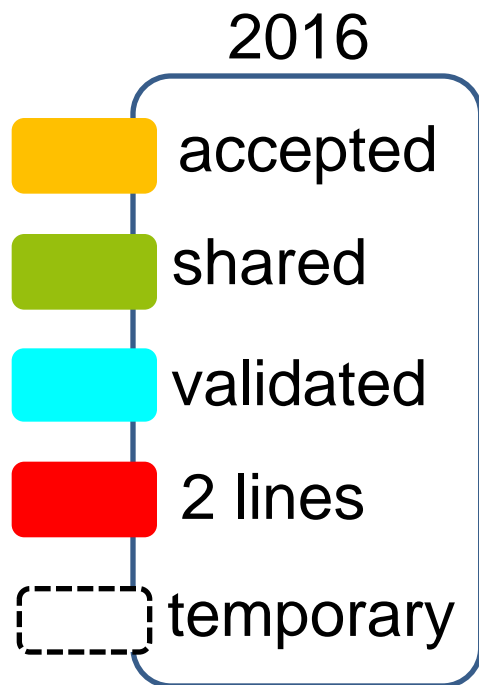
# **WAYS TO GET A QUICK SHARED BOUNDARY LINE**

**A SINGLE LINE TO BE ACHIEVED IN A VERY SHORT TERM**





# 2016 : ALL FRENCH BOUNDARIES ARE BILATERAL



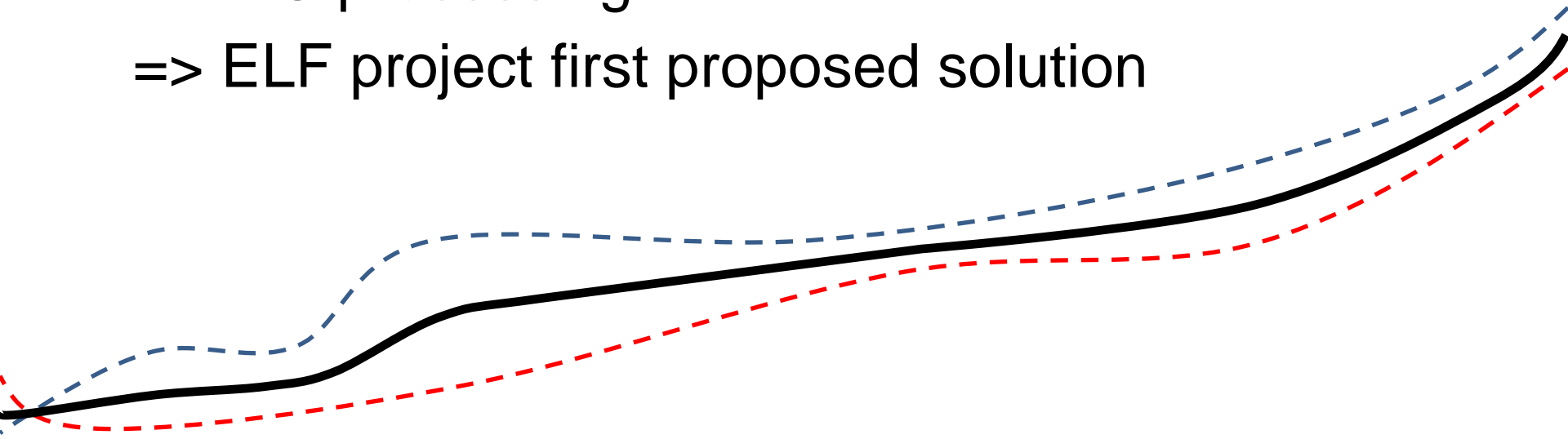
## WAYS TO GET AN UNIQUE LINE

### Half-shared



- Creation of a half-shared line from 2 lines by BKG processing

=> ELF project first proposed solution



## WAYS TO GET AN UNIQUE LINE

### simple agreement



- Contact and data Exchange
  - No Technical differences
  - One side accept the foreign line
- => Line waiting for an official bilateral validation

## WAYS TO GET AN UNIQUE LINE

### Shared agreement type between 2 providers



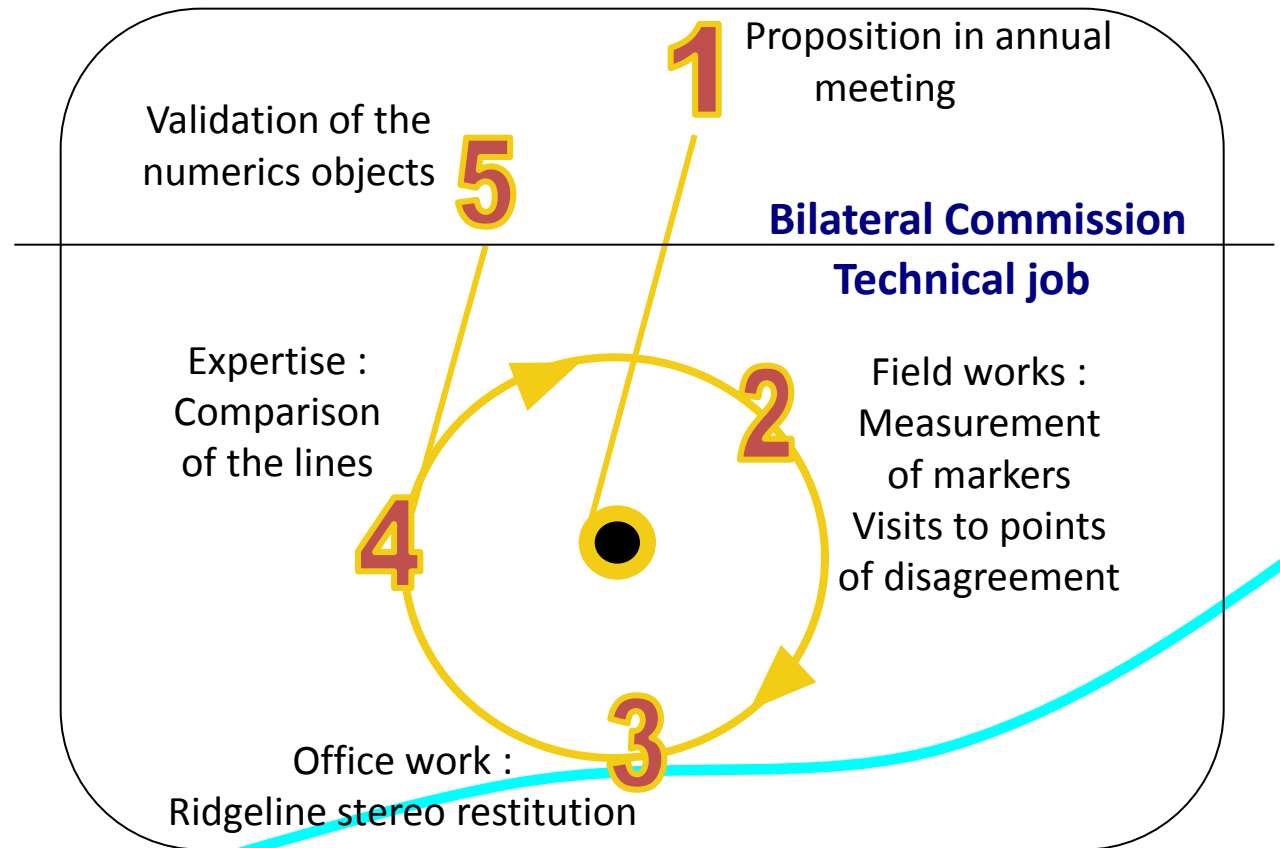
- Contact and data Exchange
  - Technical differences ?
  - What kind of edge match?
- => Line waiting for an official bilateral validation

# WAYS TO GET AN UNIQUE LINE

## Juridical validation in CMA



Validation  
process  
(can be long)



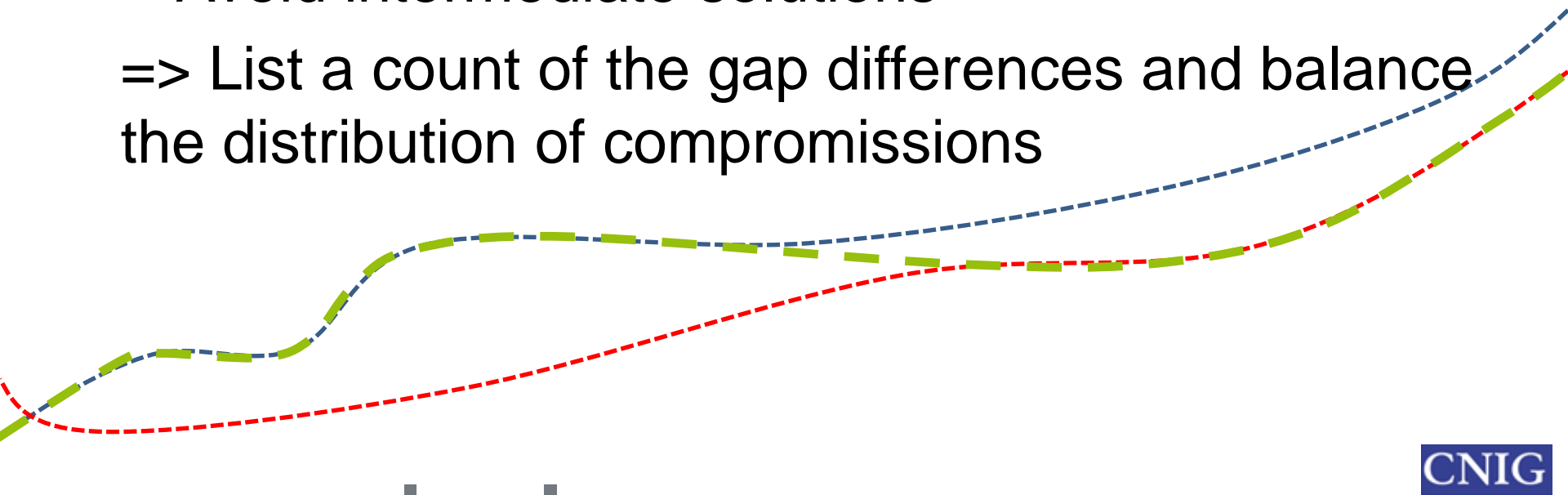
## WAYS TO GET AN UNIQUE LINE

### Temporary validation



- Agreement with future actions planned
- Quick and temporary
- Avoid intermediate solutions

=> List a count of the gap differences and balance the distribution of commissions



## WAYS TO GET AN UNIQUE LINE

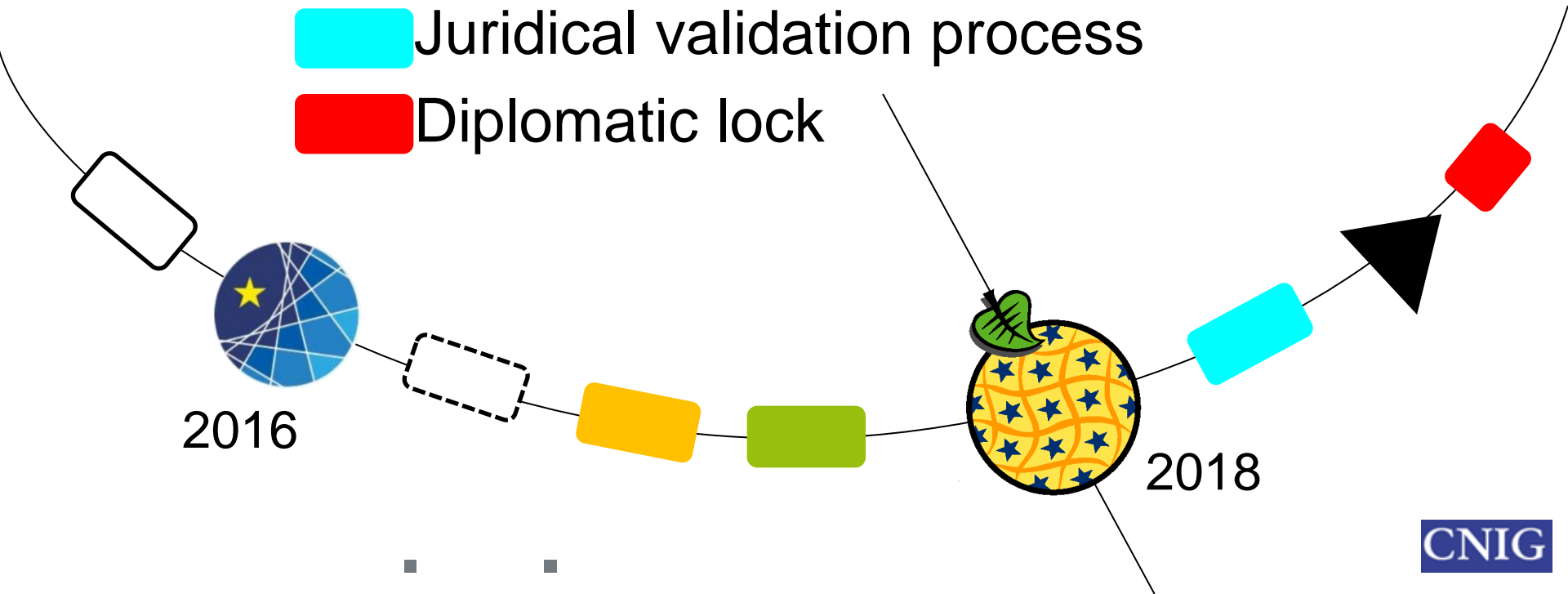
### Disagreement



- To be treated at a politic level
  - must stay out of negotiations
  - 2 lines on such sector
- => future uncontrolled area?

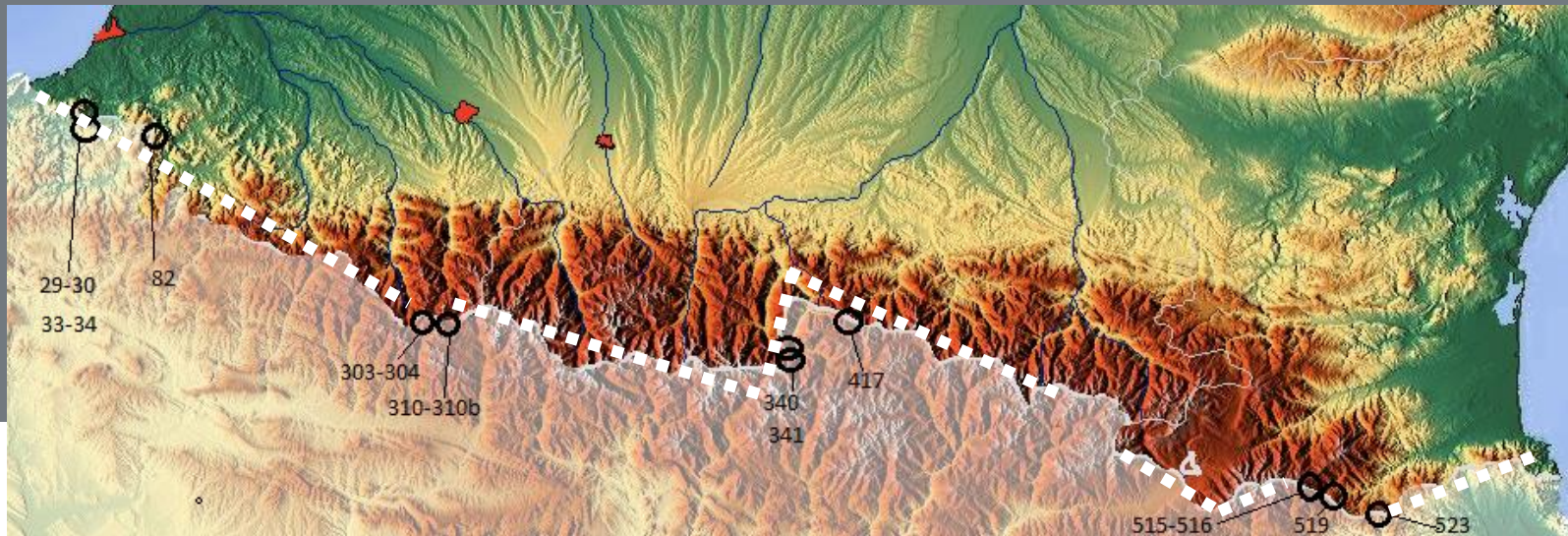
# WAYS TO GET AN UNIQUE LINE

- ELF Half-shared line
- Temporary agreed line
- Agreements from one proposal
- Shared between foreign providers
- Juridical validation process
- Diplomatic lock





# SPAIN-FRANCE : GOOD PRACTICE EXAMPLE



CGE - IGNF- Navarra - Cataluña

2011: observation of 600 markers planned

2014: restitutions compared : 20 m >72 divergences> 400 m

2015: shared line firmed

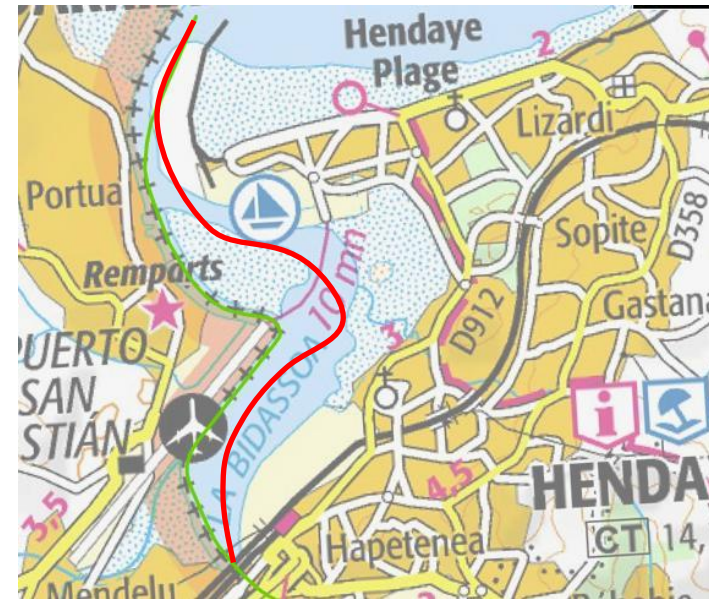
# COMPROMISE LINE

Bidassoa mouth without solution

=> 1 double boundary line obliged

Adoption of a restituted boundary line with corrections

- 1) Some historic lock retraced
- 2) Three solutions proposed and argued :
  - No other double line
  - 5 double boundary lines in sensitive points
  - 72 double lines



# DIFFERENT KIND OF AGREEMENT

<b>MAXIMUM PLAN AGREEMENT ( PLAN A )</b> <b>1 double boundary line on water</b>	<b>PLAN MINIMUM (PLAN B)</b> <b>6 double bordelines areas (or 72)</b>
<b>ADVANTAGES</b>	
Interoperable line for all boundary data.	Move forward a compromise on sound bases, with minimal risk of being challenged in the future.
To solve ancient conflicts, take advantage of the Directive . Advanced compromise can anticipate future problems of definition of the boundary, which will increase with the years (and the costs )...	Validation will be accepted without waves by most of the stakeholders.
<b>DISADVANTAGES</b>	
It is more difficult to change an existing line than to define a new, not yet resolved	Users of GI do not understand that national datasets are not consistent at boundaries
	A conflict zone loses its economic potential

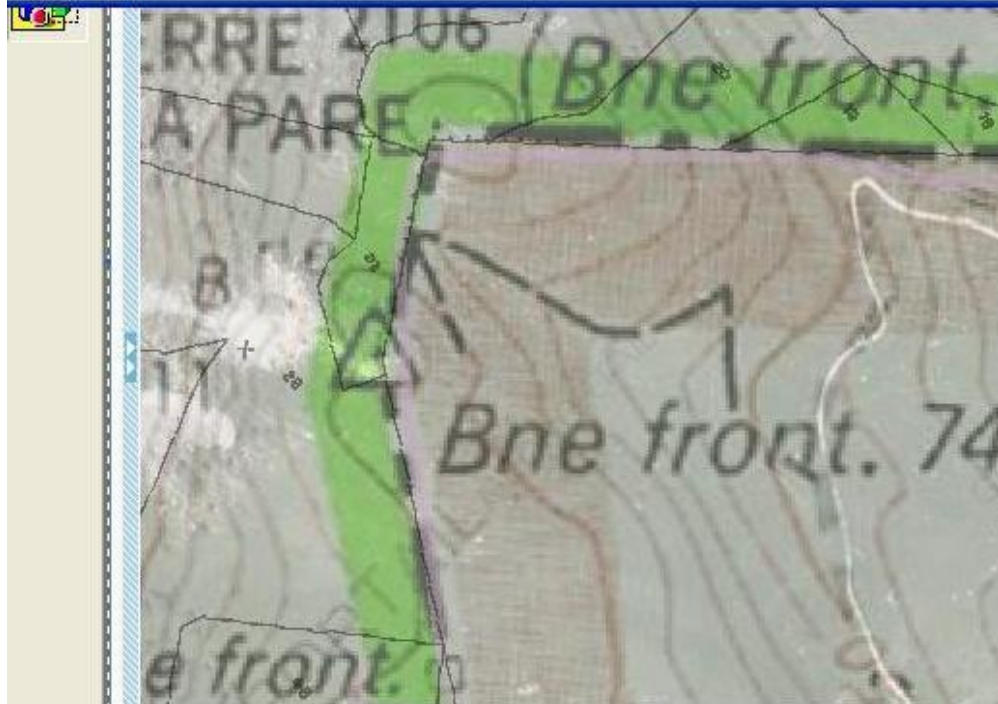
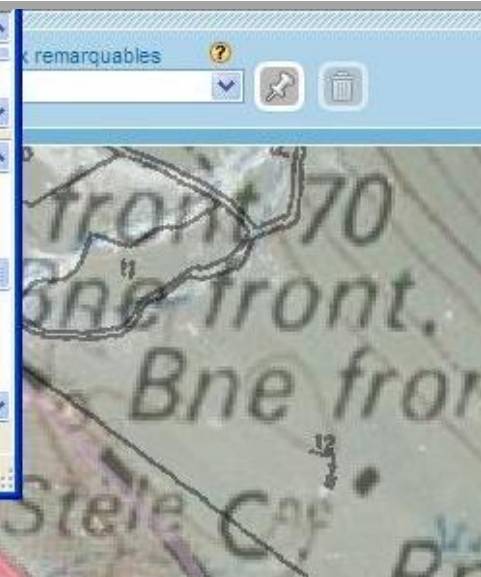


# CONCRETELY



# FIRST STEP : GNSS MESURES

A	B	C	D	E	F	G	H	I	J	K	L	M
Localita Lieu	Numero du point	Coordonnees e Type du point	Mesure e GPS	Latitude Latitude	Longitude Longitude	Quota ellip. Hauteur ellips.	N	E	Quota geoidic a Altitude	Y	X	Quota geoidic a Altitude
Colle della Maddalena	65A	P/P	1999	44°25'23" 5772	6°54'27" 7707	2297,10	4921027,50	1333475,50	2242,70	246010,80	963795,70	2243,00
	66	I/G	2005	44°25'22" 6414	6°54'25" 3590	2293,90	4920999,99	1333421,43	2239,81	245979,00	963744,03	2239,76
	67	C/B	1999	44°25'13" 4495	6°54'10" 1868	2089,60	4920725,00	1333078,70	2035,20	245677,10	963424,70	2035,50
	68	P/P	1999	44°25'18" 7944	6°54'00" 1466	2071,00	4920895,60	1332860,90	2016,50	245829,50	963193,80	2016,80
	69	ND/NM		44°25'20" 2142	6°53'56" 9115		4920941,71	1332791,33		245869,32	963119,93	
	69(R)	C/B	1999	44°25'20" 1808	6°53'57" 0071	2055,40	4920940,20	1332792,60	2001,00	245868,40	963122,10	2001,30
	70	C/B	1999	44°25'18" 7688	6°53'54" 4221	2047,50	4920898,10	1332734,30	1993,10	245821,70	963067,40	1993,40
71	C/B	1999	44°25'15" 6218	6°53'51" 4066	2087,60	4920802,70	1332665,20	2033,10	245721,10	963006,20	2033,40	
Colle della Maddalena	72	C/B	1999	44°25'14" 8296	6°53'50" 6835	2090,30	4920778,60	1332648,50	2035,90	245695,80	962991,60	2036,10
	73	C/B	1999	44°25'15" 1662	6°53'34" 1794	2161,20	4920798,40	1332283,80	2106,80	245688,90	962626,50	2107,10
	74	P/P	1999	44°25'11" 4579	6°53'32" 9490	2165,60	4920684,70	1332253,70	2111,10	245570,20	962605,70	2111,40
	75	C/B	1999	44°25'05" 6039	6°53'34" 8883	2157,50	4920503,00	1332291,90	2103,10	245392,10	962658,50	2103,40

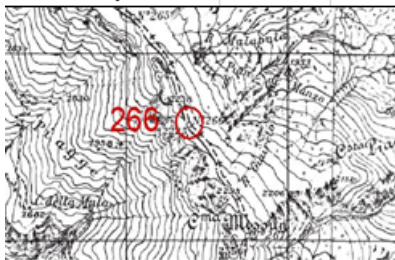


# FRENCH ITALIAN BONDARY DOCUMENTATION

COMMISSIONE MISTA ITALO-FRANCESE PER LA MANUTENZIONE DEI TERMINI E DELLA LINEA DI CONFINE

COMMISSION MIXTE FRANCO-ITALIENNE POUR L'ENTRETIEN DES BORNES ET DE LA LIGNE FRONTIERE

<b>Località / Emplacement:</b>	<b>SETTORE / SECTEUR VII</b>	<b>N° 266</b>
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*Descrizione della linea di confine verso il termine*  
*Description de la frontière vers la borne suivante*

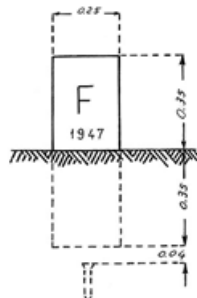
Dal cippo 266 la mulattiera di cresta che va da NO verso SE, rotando in territorio francese, cartituire la linea di confine fino ad una incavatura della linea di cresta dallo quale sale fino a Cima Mirzun. Da qui **scende in direzione NE (?)** e poi descrive un'arista accentuata verso sud interna a Cima Mirzun. Il punta 267 è partenziale qamita ad est della mulattiera di cresta. De la borne 266, la frontiere suit le zentier mulattier de crête orienté NO / SE laissé en territoire français, jusqu'à une échancrure de la ligne de crête de laquelle elle monte à la cime Mirzun. Elle décrit ensuite un virage marqué vers le Sud autour de la cime Mirzun. Le point 267 se trouve dans ce virage à l'Est du zentier mulattier. De la borne 266, la frontiere suit le zentier

Cippo in granito Borne en granit
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Foto / Photo: 1948

PROSPETTO E SEZIONE / ÉLÉVATION ET COUPE



Demarcazione / Implantation: 1948

L'Esperto tecnico italiano

L'Expert technique français

Il Presidente della Delegazione italiana

Le Président de la Délégation française

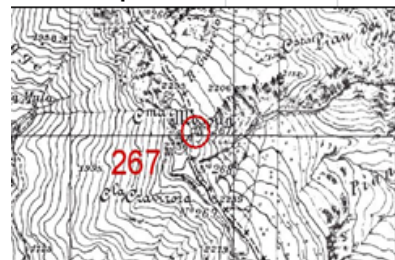
Coordinate / Coordonnées: ETRS89  
Ellissoide / Ellipsoïde: GRS80

lat.	44° 06' 18,8952"
long.	7° 41' 30,1451"
q.ell. / haut.ell.	2276,20

COMMISSIONE MISTA ITALO-FRANCESE PER LA MANUTENZIONE DEI TERMINI E DELLA LINEA DI CONFINE

COMMISSION MIXTE FRANCO-ITALIENNE POUR L'ENTRETIEN DES BORNES ET DE LA LIGNE FRONTIERE

<b>Località / Emplacement:</b>	<b>SETTORE / SECTEUR VII</b>	<b>N° 267</b>
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*Descrizione della linea di confine verso il termine*  
*Description de la frontière vers la borne suivante*

La linea di confine continua a seguire la mulattiera di cresta, mantenendola in territorio francese. Dopo aver pigiato verso S.-S.O. intorno a Cima Mirzun parte verso S.E. fino all'incavatura di Cella Cravairola. Il cippo 268 è parte a N.E. della mulattiera.

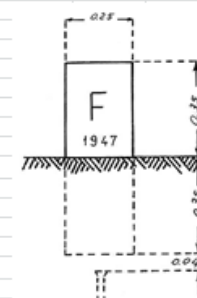
La ligne frontière continue à suivre le sentier mulattier de crête, laissé à la France: après un virage vers le SSO, autour de la cime Mirzun, elle poursuit vers le SE jusqu'à l'encellement du col du Cravairola. La borne 268 est positionnée au NE du chemin mulattier.

Cippo in granito Borne en granit
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Foto / Photo: 1948

PROSPETTO E SEZIONE / ÉLÉVATION ET COUPE



Demarcazione / Implantation: 1948

L'Esperto tecnico italiano

L'Expert technique français

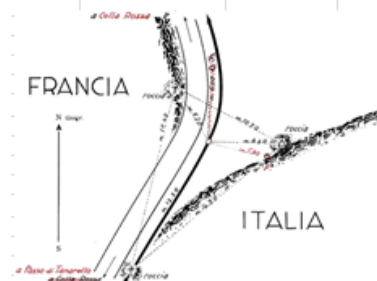
Il Presidente della Delegazione italiana

Le Président de la Délégation française

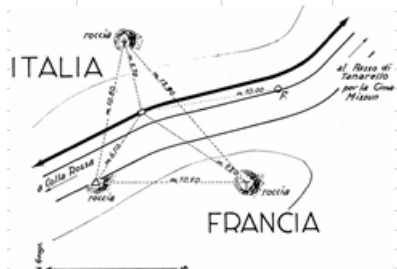
Coordinate / Coordonnées: ETRS89  
Ellissoide / Ellipsoïde: GRS80

lat.	44° 06' 00,5586"
long.	7° 41' 47,0988"
q.ell. / haut.ell.	2370,20

SCHIZZO E RIFERIMENTI / CROQUIS ET REPÈREMENT



SCHIZZO E RIFERIMENTI / CROQUIS ET REPÈREMENT

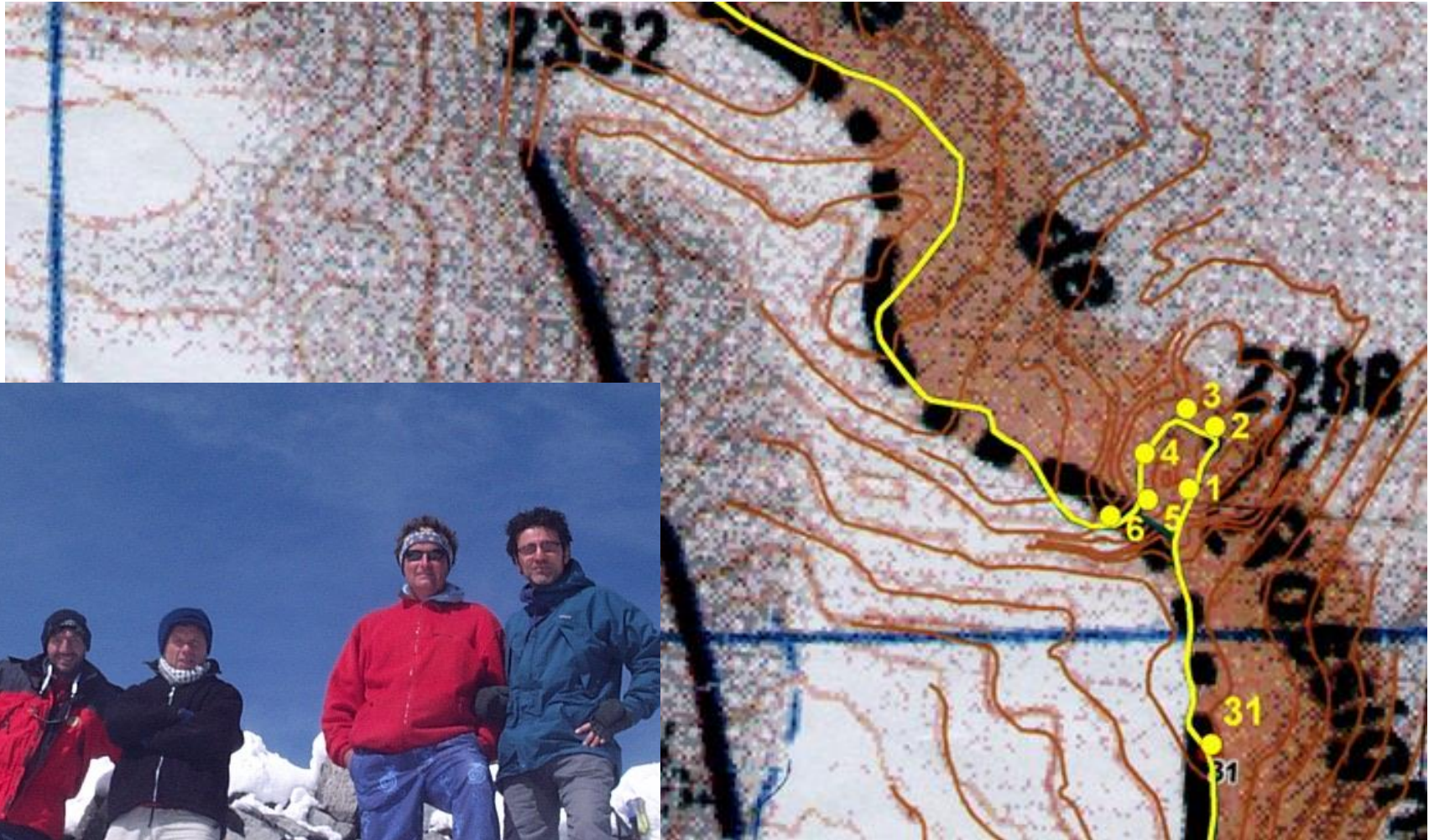


# EUREF

6 IGS stations  
whose coordinates  
are known in  
ETRS89 system

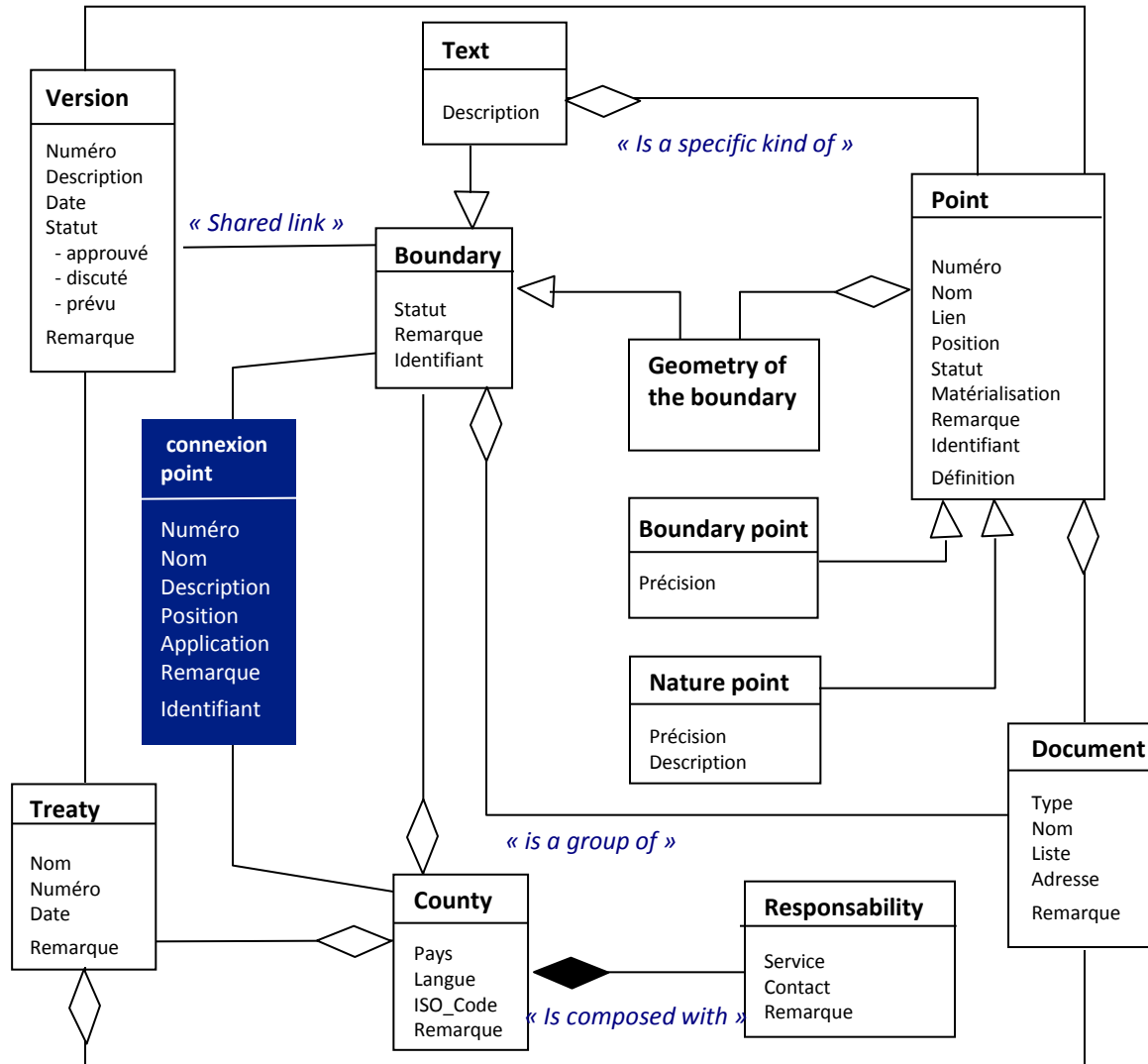


# COMPARE THE PHOTOGRAMMETRIC RESTITUTIONS





# SBE APPLICATION SCHEMA : HOW ARE ORGANISED THE DATA IN THE GIS



UML  
Class diagram

# INFRASTRUCTURE ORGANISATION

“Reply to environment laws and ecological questions”

- Build an infrastructure (national and regional catalogs+ portals)
- Structure the data with standards
- Implement services (consult, unload)



“Open the data”

- Economic interest

Kiev 2016



European  
Commission

*Питання? ...?*



## IGN : FOREIGN MISSION

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IGN : experience in delimitation

- Saudi Arabia / Qatar 2005
- Benin / Niger 2003
- Tchad lake 1990

- And former missions

(Algeria/ Lybia 1958, Mauritanie 1957, Djibouti / Ethiopia 1950...)

# IGN : 2002 GEODETIC MISSION SANTO DOMINGO



Suprema Corte De Justicia de la República Dominicana

Programa de Modernización de Jurisdicción de Tierras

municipio  
**Sabana dela Mar**

Provincia  
**Monte Plata**



IGN-FI 2002

**SMAR**
Red de los Puntos fijos de Materialización Tradicional

Coordenadas geográficas		Elipsoide : IAG- GRS80
-69°22'53"47620	19°03'37"24970	-34.66 m
longitud	latitud	Altura elipsoid
Coordenadas cartesianas en el ITRF 2000		
2123628.58 m	-5644294.35 m	2069653.03 m
X	Y	Z
Coordenadas planas en el ITRF 2000		
2107548.39 m	459859.20 m	Proyeccion MTU fuseau 19
Xplano	Yplano	



Observaciones 2002

software de cálculo : Trimble Total Control 2.5  
Geolab 3.2



tempo de observación : 6 horas

cadena : 30 s

precisión planimétrica : 0.006 m

precisión altimétrica : 0.017 m

1/2

Hoja al 1:50 000 : Sabana dela Mar  
revisada en (1988)

**Dirección**

Camino de pescadores, frente al mar

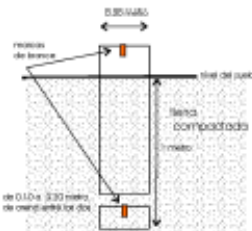
**Itinerario**

Cruzar Sabana y a tres esquinas del Muelle, doblar a la derecha para tomar la calle Rinsí que se dirige casi hasta el mar. Cuando la calle gira a noventa grados, continuar a pie 120 metros por el camino de los pescadores

**TEXTO**

	: marca geodesica		: poste
	: distancia en metro		: tribuna de cancha
	: casa		: barro
	: Declive, talud		

**fecha de construcción :** Octubre 2002



**MATERIALIZACIÓN**  
Marca de Bronce de Ø 12mm implantada en el centro de un mojon de concreto

Fijación antigua en Datum NAD 1927

m

Longitud

Latitud

elevación

2/2