

Seminario 4 RESBA

Interferometria satellitare

Regione Autonoma Valle d'Aosta – ing. Franco Collé

Politecnico di
Torino

27 novembre 2019



LE DIGHE IN VALLE D'AOSTA

REGIONE AUTONOMA VALLE D'AOSTA- CATASTO DEGLI SBARRAMENTI

1 A GUILLEMORE
2 A BRUSSON
3 A USSIN
4 A MISERIN
5 B QUINCINETTO
6 A GRANTESTA
7 A BY
8 C EXLAGOLEISSE
9 C SARRE
10 B BARD
11 A LASALLE
12 B MONTJOVET
13 B STMARCEL
14 C GRANDYVIA VASCA
15 C SAUMONT
16 C LYSBALMA
17 C ARTANAVAZ
18 C OLLOMONT
19 C MECOSSE
20 A WEISSMATTEN
21 C VERCOCE
22 C PIANA
23 A TRAMOUAIL
24 C CIMEBIANCHE
25 C VARGNO
26 A FOURCARE
27 A NOUVA
28 C CLUSAZ
29 C MIOLLET
30 C FALERE
31 C PLANAVAL
32 C ORFEUILLE
33 C AYMAVILLES VASCA
34 A INTROD VASCA
35 C VALPELLINE
36 A ENTREBIN VASCA
37 C RHEMES
38 A SORESSAMONT VAS
39 C LA NOUVA
40 C FENILLE
41 C POIGNON VASCA
42 C LILLAZ
43 A STBARTHELEMY VA
44 C SAINTCLAIR
45 B MONTJOVET VASCA
46 B COVALOU
47 A COVALOU VASCA
48 C PROMIOD VASCA
49 C PROMERON VASCA
50 C DRAGONE
51 B BARD VASCA
52 B ZINDREN
53 C ISSIME
54 B CKINCKERE VASCA
55 A IVERY VASCA
56 A BIELDIUKEN VASCA
57 B CRESTAZ VASCA
58 A LAGO BIANCO
59 C OUTRELEVE
60 C ISOLLAZ VASCA
61 C ISOLLAZ
62 B CHAMPELLE VASCA
63 C DINNAS
64 C ILLAZ
65 B PONTEY1
66 C PONTEY2
67 C ENTREVES
68 C ENTREVES VASCA
69 C CHARCHERID

AGGIORNA
CONNETTI
DISCONNETTI
AGGIUNGI DIGA
DATABASE
VISITE
BOLLETTINI
ASSEVER.

LEGENDA

- in costruzione
- normale
- mancanze
- attenzione
- classe 1
- classe 2
- diga conforme
- diga non conforme
- categoria A
- categoria B
- categoria C

LEGGI STATALI

LEGGE REGIONALE

DISPOSIZIONI

DIGHE ACCATASATE

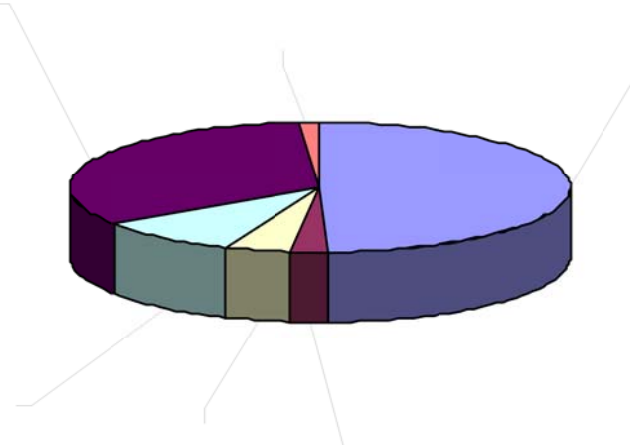
LETTERE e DOCUMENTI

LE DIGHE IN VALLE D'AOSTA

TIPOLOGIA

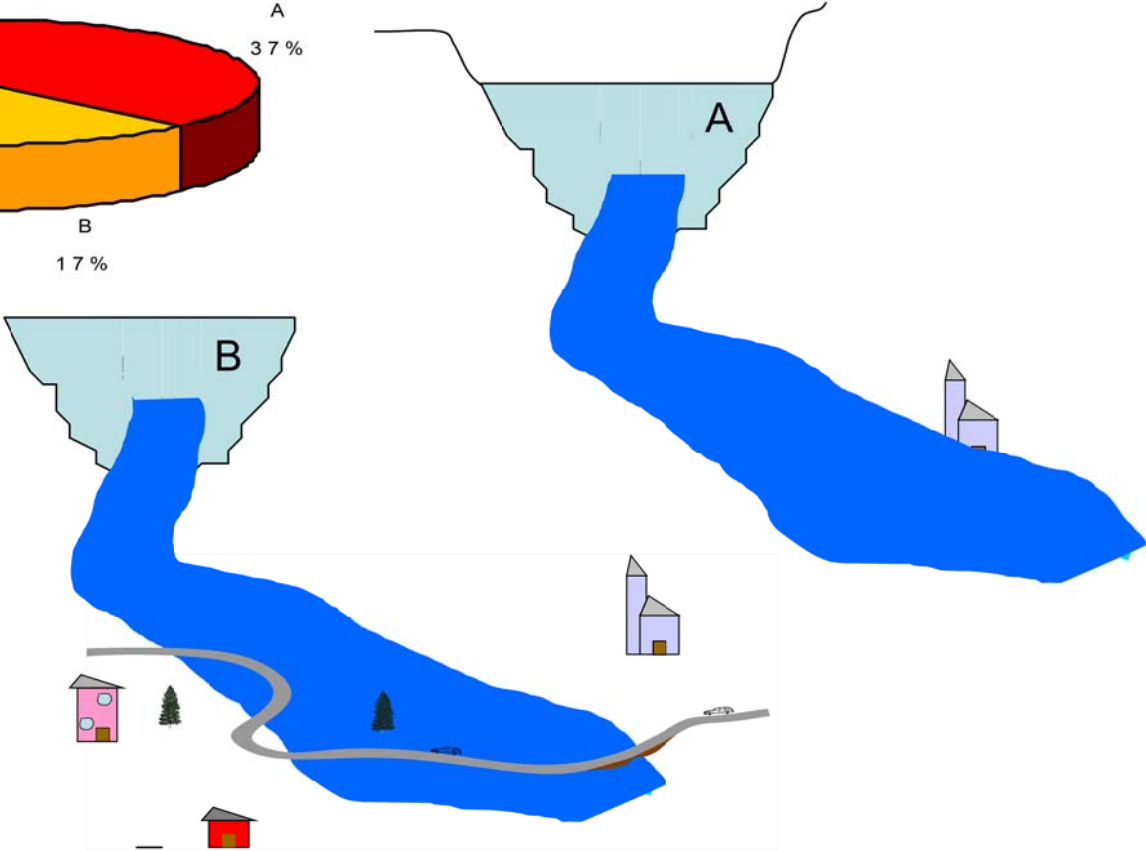
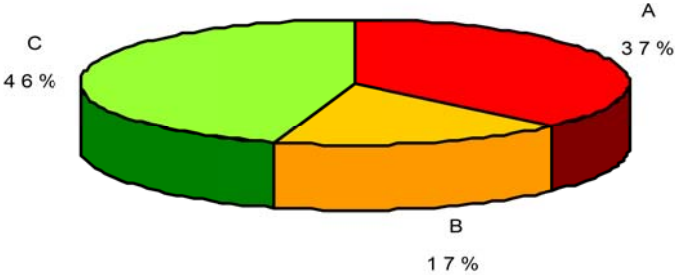


DIGA MURARIAA
GRAVITA'



MONITORAGGIO: PRIORITA'

CLASSI DI RISCHIO



MONITORAGGIO: TIPOLOGIE



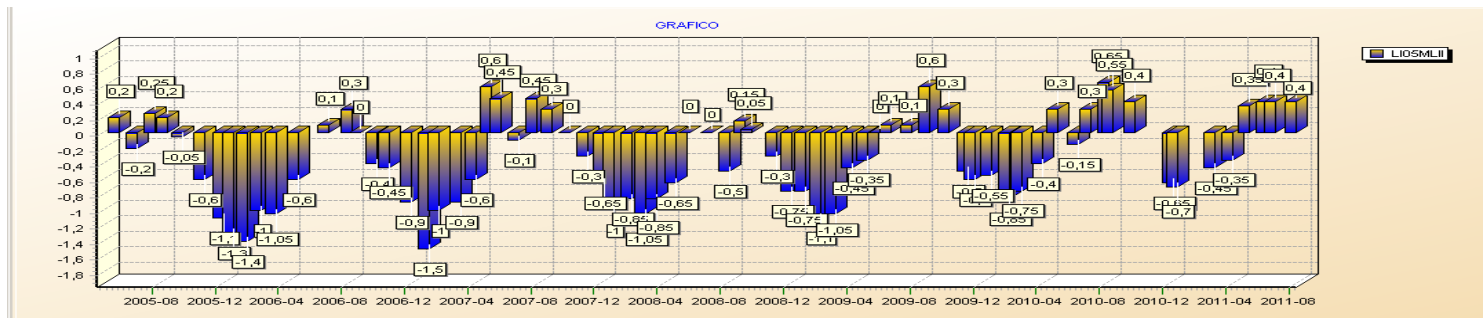
Mis. perdite



Estensimetri



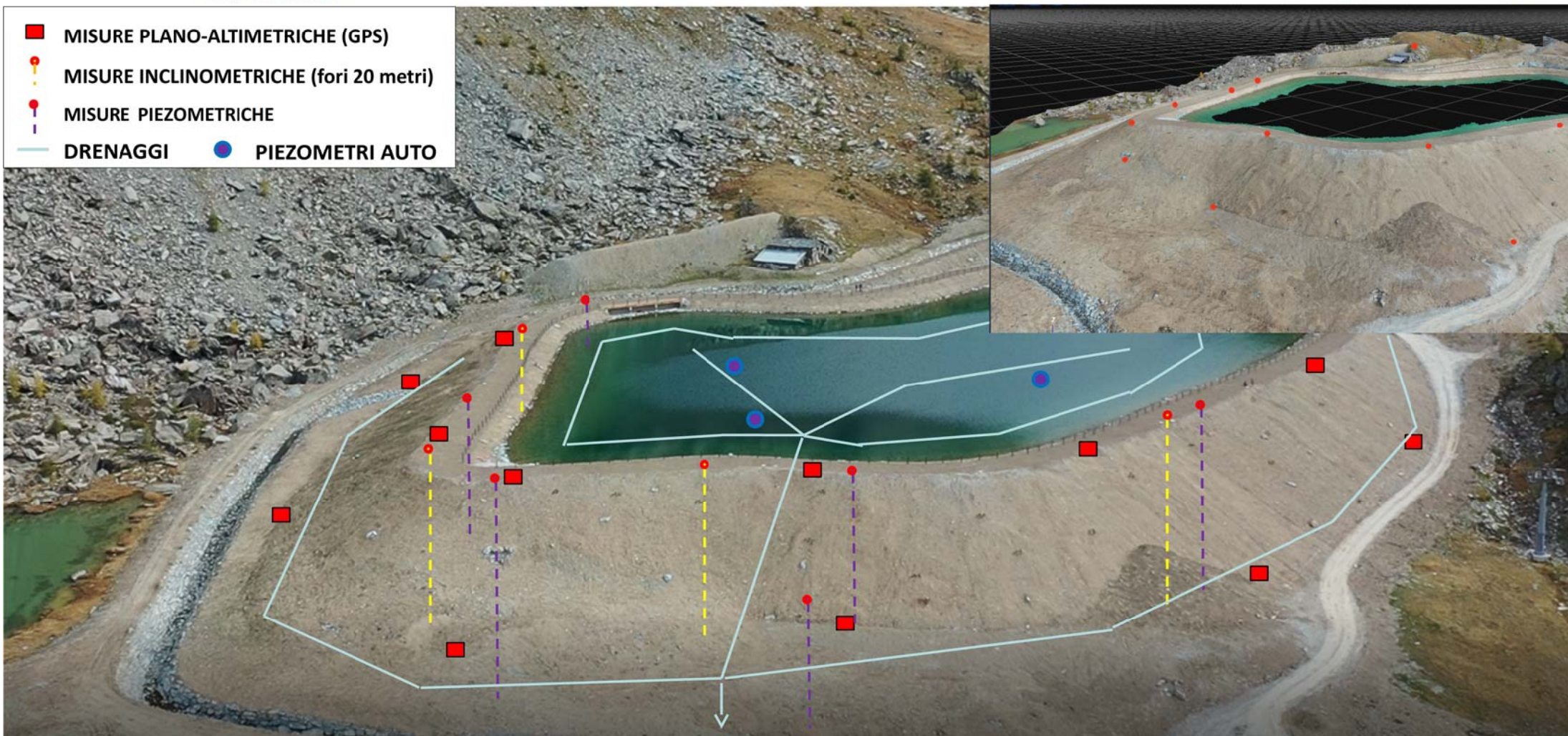
Livellazione



MONITORAGGIO: BACINI INNEVAMENTO

CLASSI DI RISCHIO

- MISURE PLANO-ALTIMETRICHE (GPS)
- MISURE INCLINOMETRICHE (fori 20 metri)
- MISURE PIEZOMETRICHE
- DRENAGGI
- PIEZOMETRI AUTO



MONITORAGGIO: BACINI INNEVAMENTO

PROBLEMATICHE



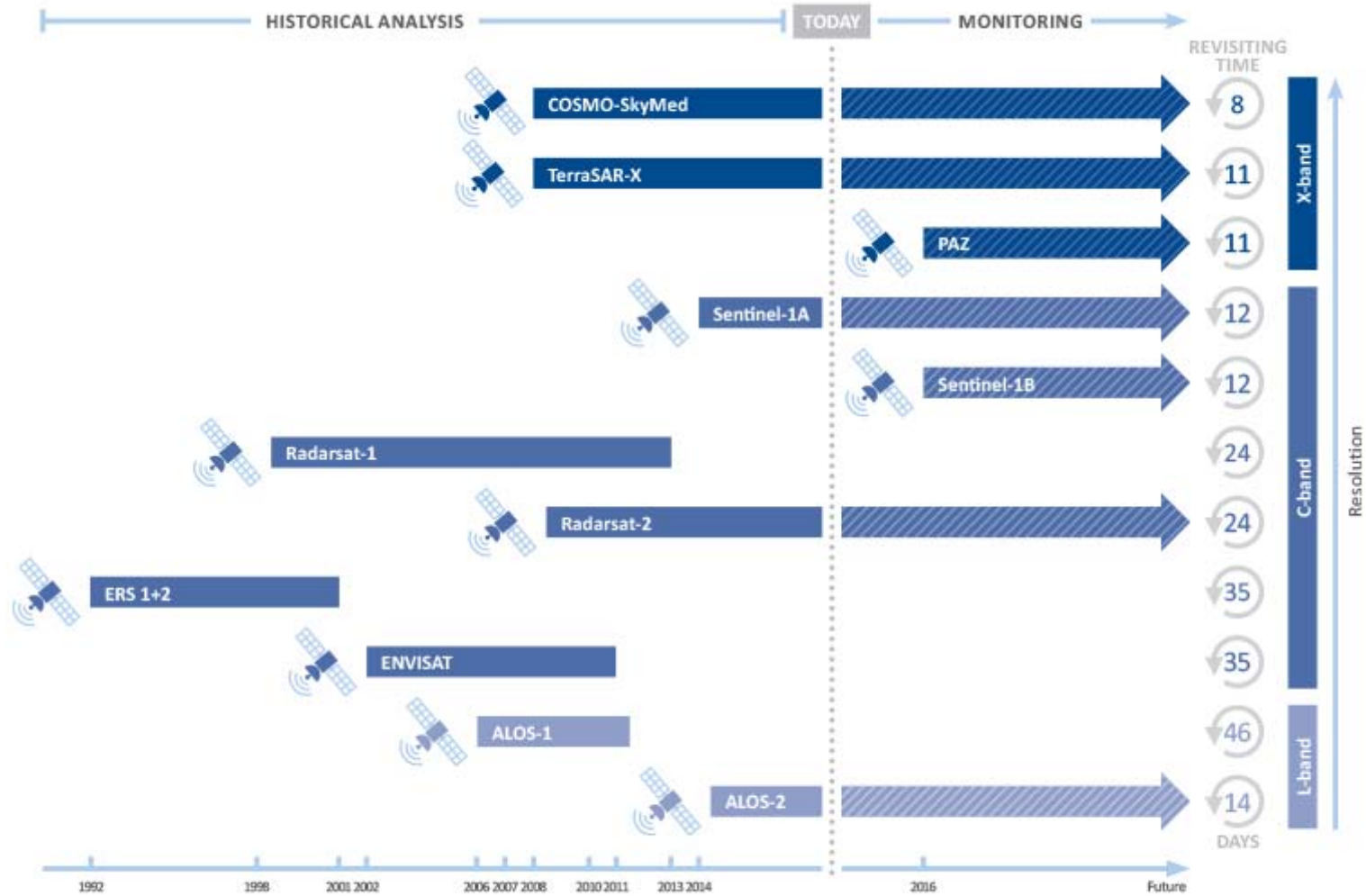
NO: GPS + INCLINOMETRI + PIEZOMETRI + FOTOGRAMMETRIA DA DRONE

SI: DRENAGGI, PIEZOMETRI AUTOMATICI

QUINDI: STRUMENTI INNOVATIVI (FREQUENZA DI MISURA, ANCHE CON NEVE, NON NECESSITA DI ACCEDERE)

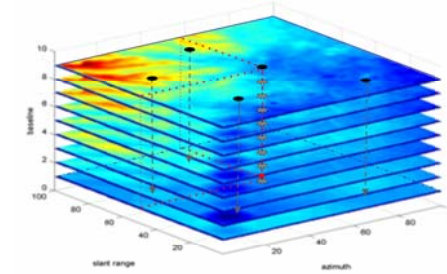
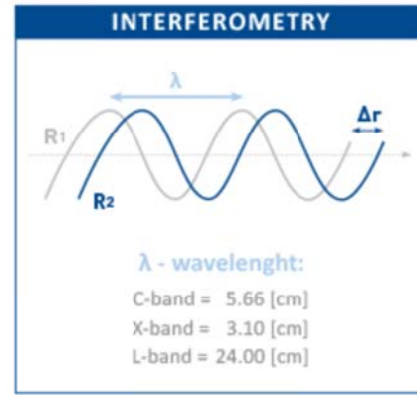
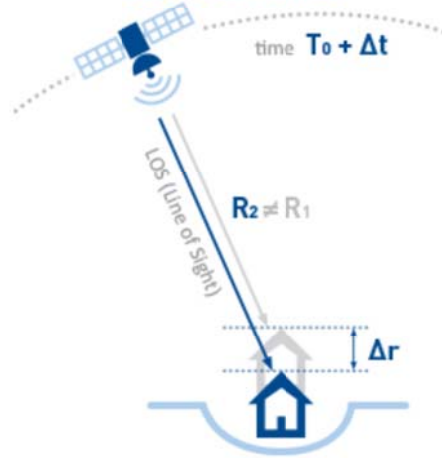
INTERFEROMETRIA SATELLITARE

BANDE E COSTELLAZIONI



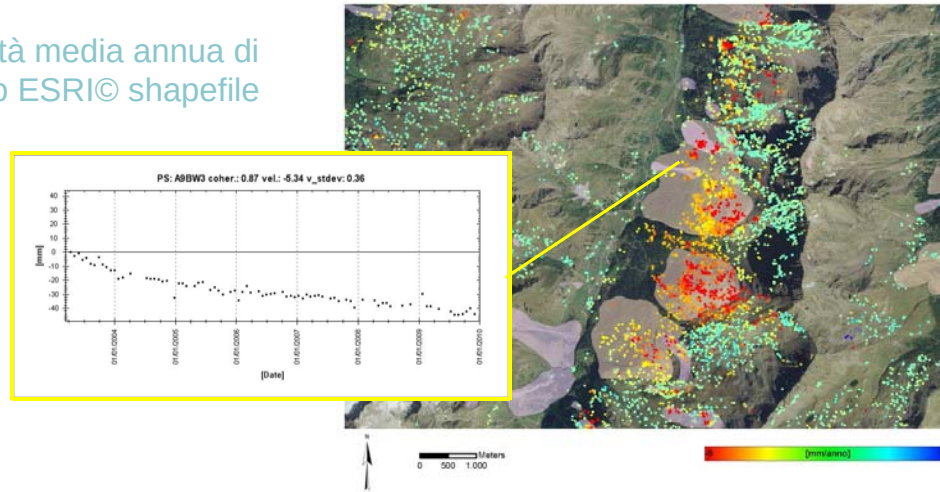
INTERFEROMETRIA SATELLITARE

METODOLOGIA PSINSAR™



Valori puntuali di velocità media annua di spostamento in formato ESRI© shapefile

Serie storiche di spostamento



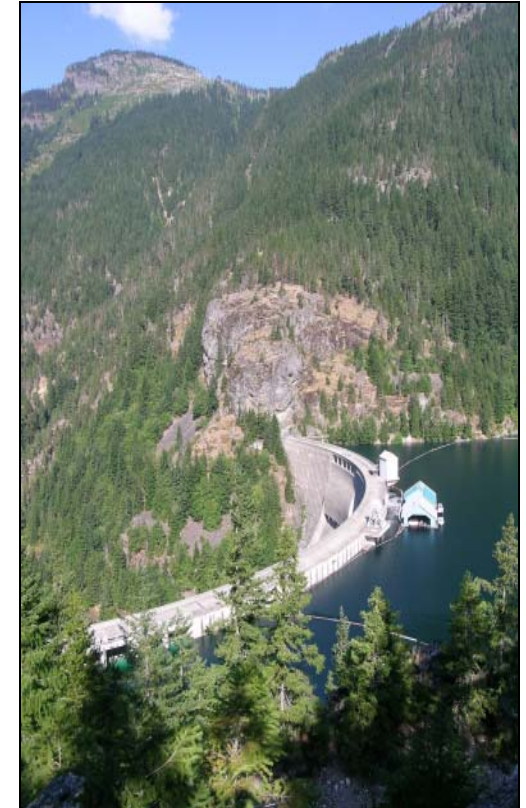
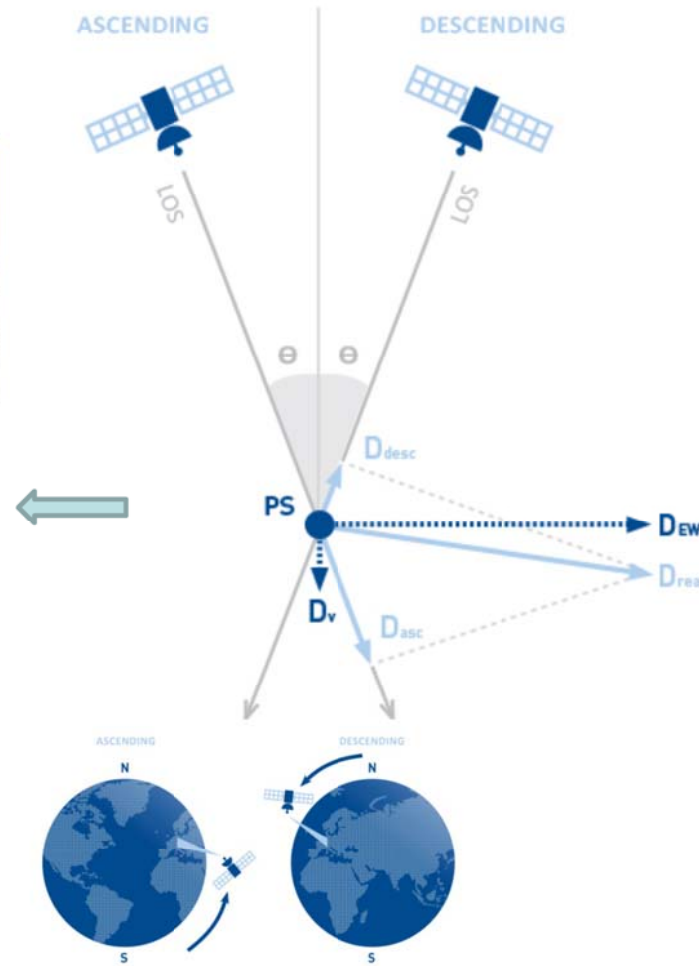
INTERFEROMETRIA SATELLITARE

METEOLOGIA



PERMANENT SCATTERERS

Bersagli radar “costanti” nel tempo:
edifici, monumenti, viadotti, condotte, rocce
esposte...



INTERFEROMETRIA SATELLITARE

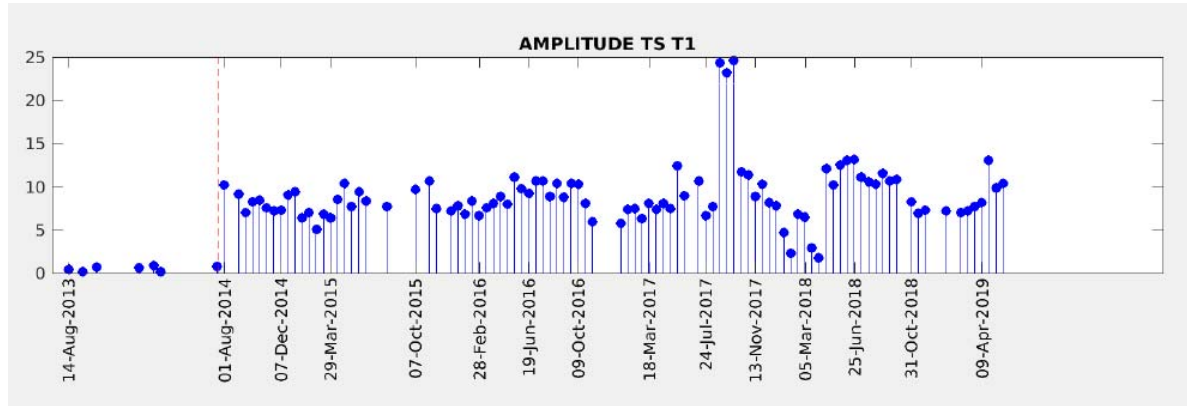
RIFLETTORE ARTIFICIALE



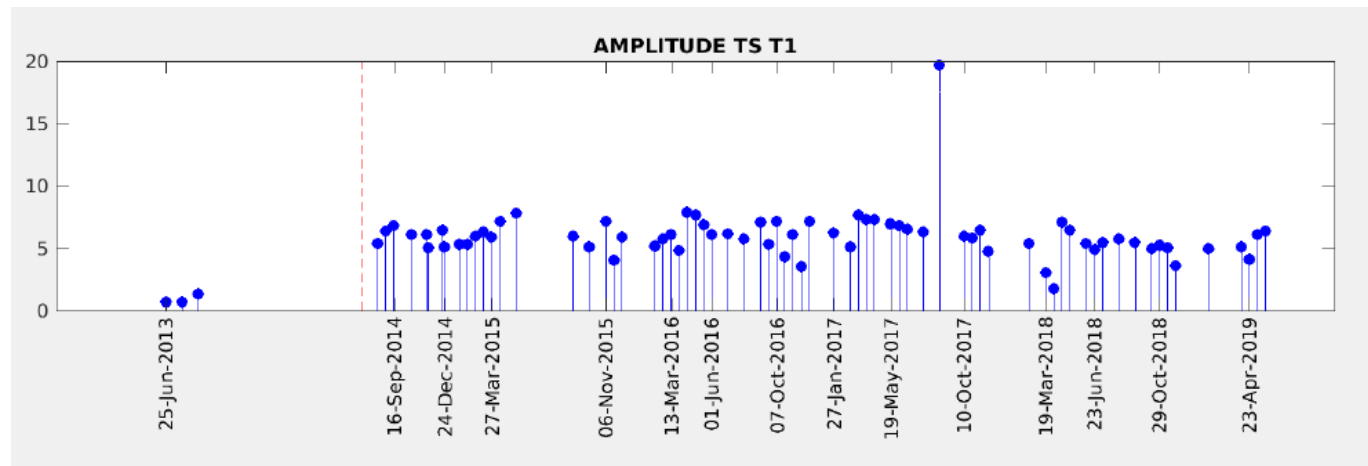
INTERFEROMETRIA SATELLITARE

TEST DI VISIBILITA'

GEOMETRIA ASCENDENTE



GEOMETRIA DISCENDENTE



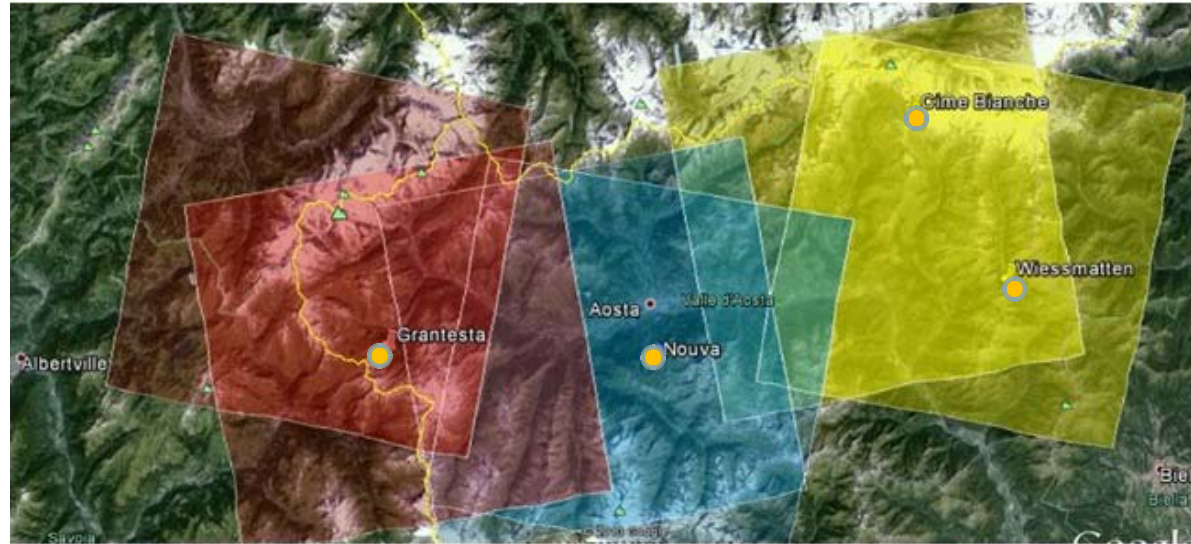
INTERFEROMETRIA SATELLITARE

Nouva - Pila Gressan

IMMAGINI E SBARRAMENTI



La Grantesta- La Thuile



AOI	CONSTELLATION	GEOMETRIA	SAT	MODE	TRACK
Nouva	COSMO-SkyMed	ascending	sar1	H4-01	2
		descending	sar1	H4-03	128
Weissmatten Cime Bianche	COSMO-SkyMed	ascending	sar2	H4-03	2
		descending	sar2	H4-01	128
Grantesta(*)	COSMO-SkyMed	ascending	sar2	H4-05	165
		descending	sar3	H4-04	128



Cime Bianche - Cervinia

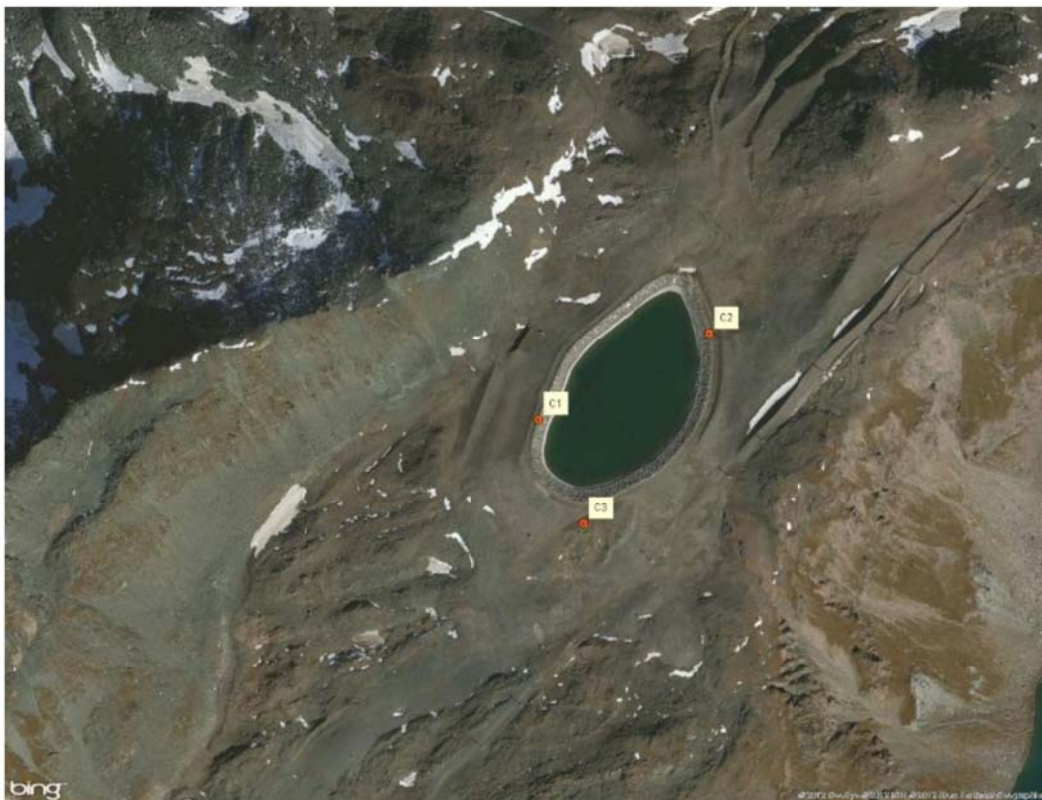


Weissmatten - Gressoney

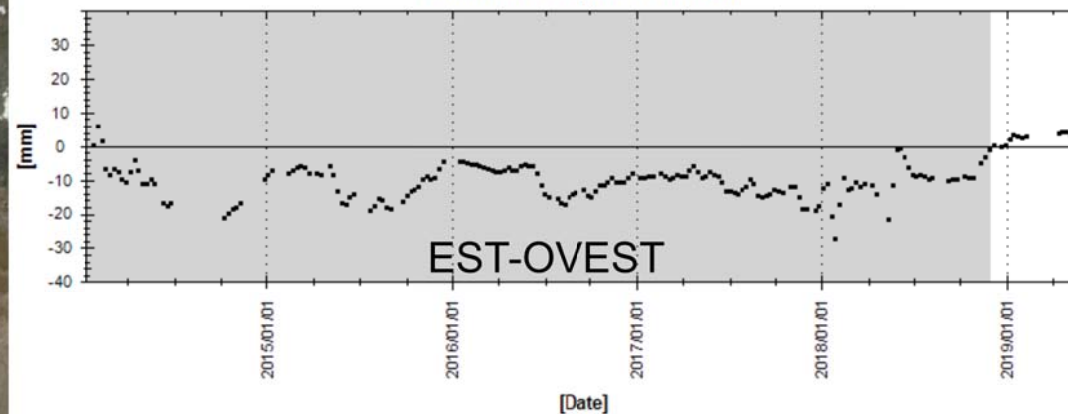


INTERFEROMETRIA SATELLITARE

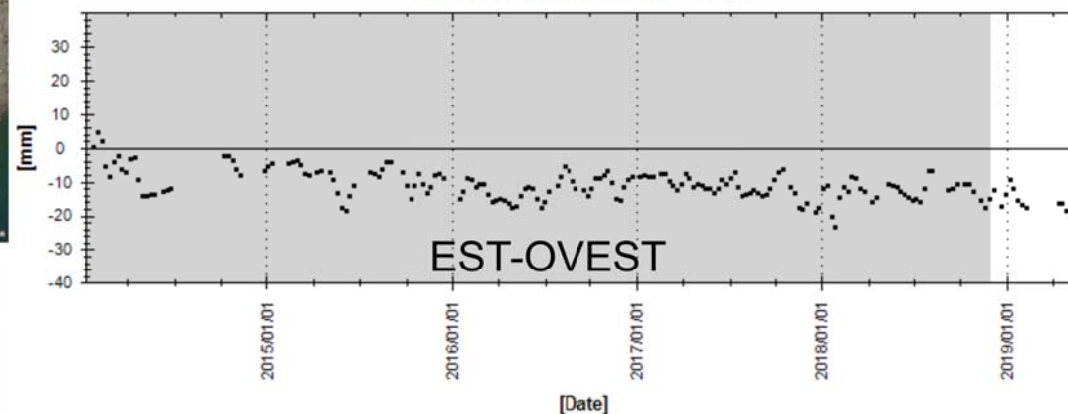
CIME BIANCHE - VALTOURNENCHE



C1 - deformation rate: 0,74 - deformation rate standard deviation: 0,30
Cumulative displacement: 3,40



C2 - deformation rate: -1,61 - deformation rate standard deviation: 0,20
Cumulative displacement: -20,90



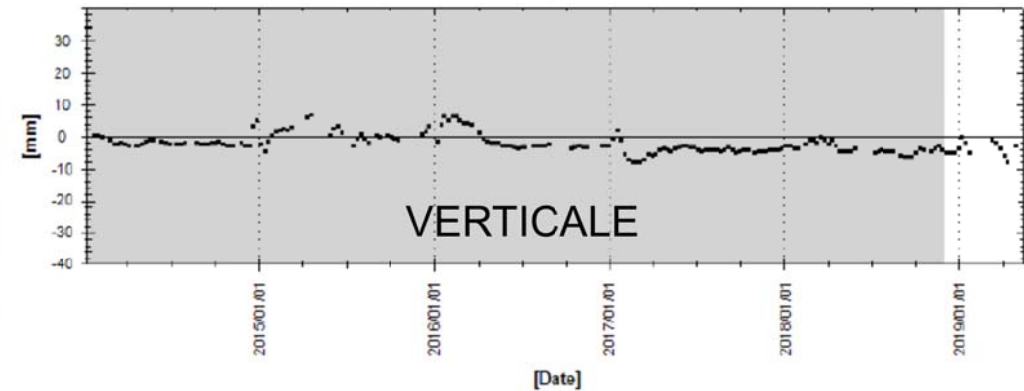
AR	LAT	LON	QUOTA (elliss)
C1	45,91655572	7,68542569	3042,252
C2	45,91722087	7,68724555	3042,62
C3	45,91577821	7,68592775	3043,897

INTERFEROMETRIA SATELLITARE

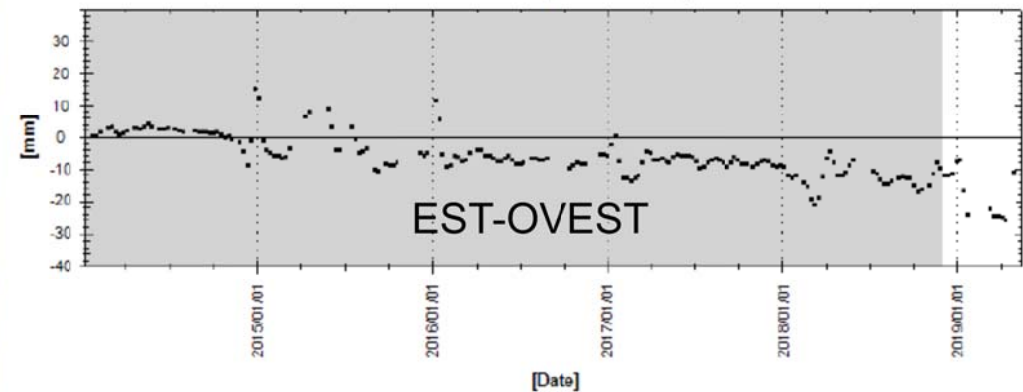
NOUVA-PILA



P1 - deformation rate: -0,95 - deformation rate standard deviation: 0,20
Cumulative displacement: -3,00



P1 - deformation rate: -3,54 - deformation rate standard deviation: 0,30
Cumulative displacement: -11,30



AR	LAT	LON	QUOTA (elliss)
P1	45,66830248	7,31530796	2230,07
P2	45,66781518	7,31501022	2229,949
P3	45,66881129	7,31446053	2214,498

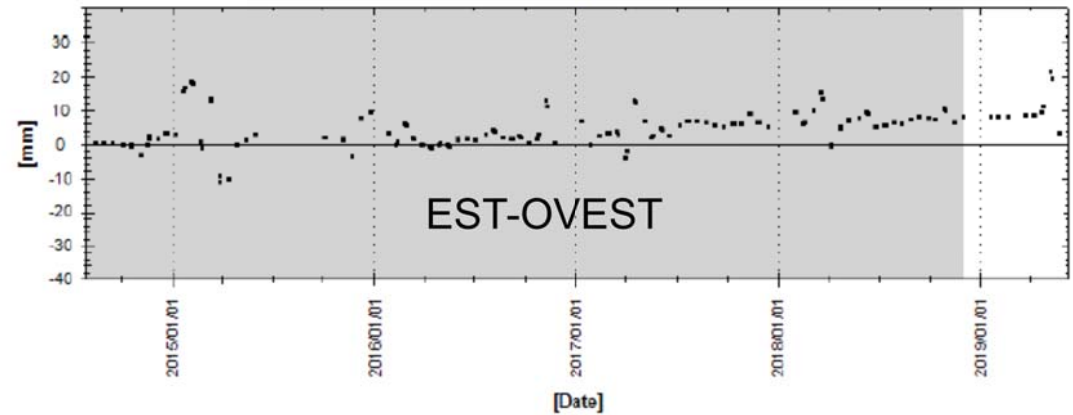
INTERFEROMETRIA SATELLITARE

GRANTESTA – LA THUILE

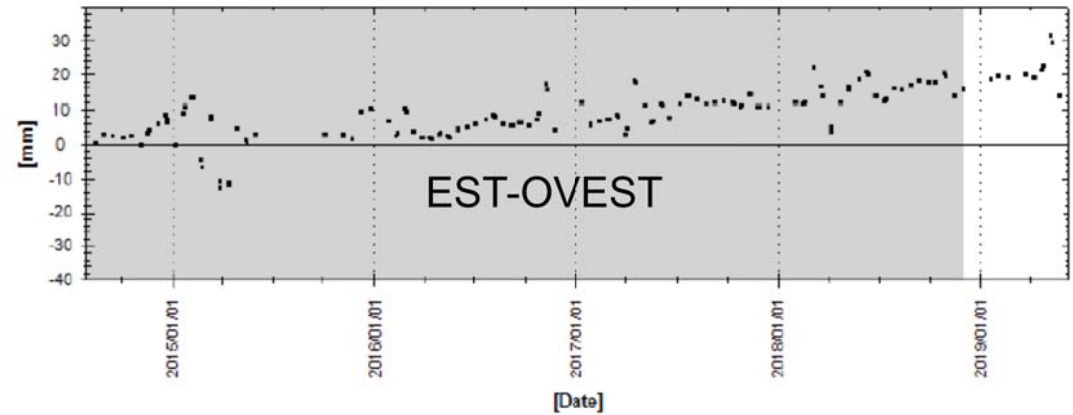


AR	LAT	LON	QUOTA (elliss)
T1	45,682128	6,931426	2281,64
T2	45,682535	6,931539	2281,41
T3	45,681288	6,932840	2263,87

T1 - deformation rate: 1,78 - deformation rate standard deviation: 0,40
Cumulative displacement: 3,30

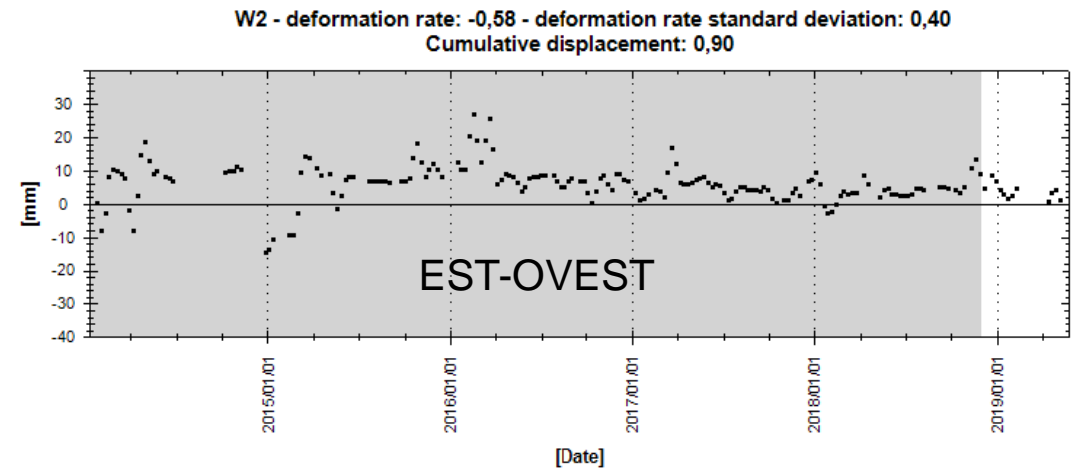
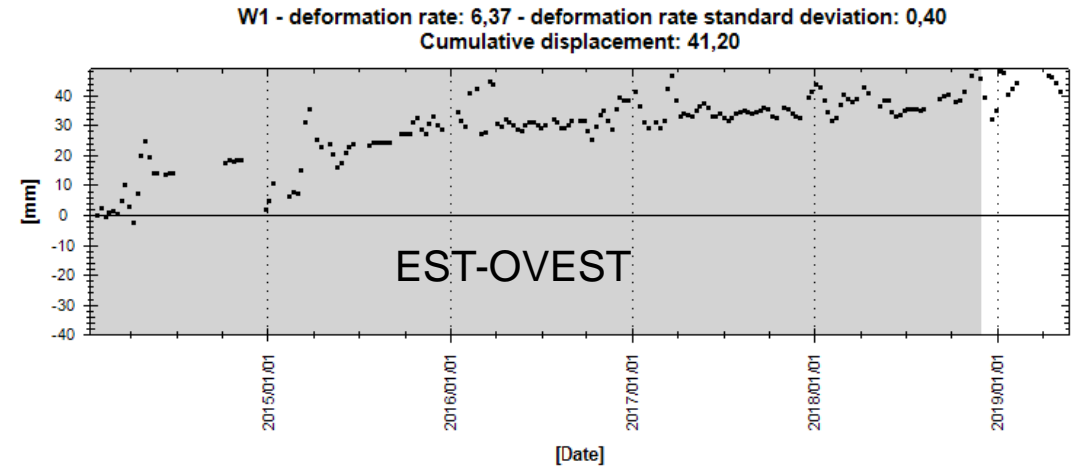


T2 - deformation rate: 4,11 - deformation rate standard deviation: 0,40
Cumulative displacement: 13,90



INTERFEROMETRIA SATELLITARE

WEISSMATTEN – GRESSONEY ST. JEAN



INTERFEROMETRIA SATELLITARE

TECNICA PSINSAR™ CONCLUSIONI

PREGI:

- **NON RICHIEDE ACCESSIBILITA'**
- **MISURE CONTINUA (8 giorni)**
- **SCOMPOSIZIONE DELLO SPOSTAMENTO (H e V)**
- **BUONA PRECISIONE PER SPOSTAMENTI PICCOLI**
- **IMMAGINI GRATUITE PER ENTI PUBBLICI**
- **IMMAGINI DISPONIBILI ANCHE IN PERIODI NON DI INDAGINE**

DIFETTI:

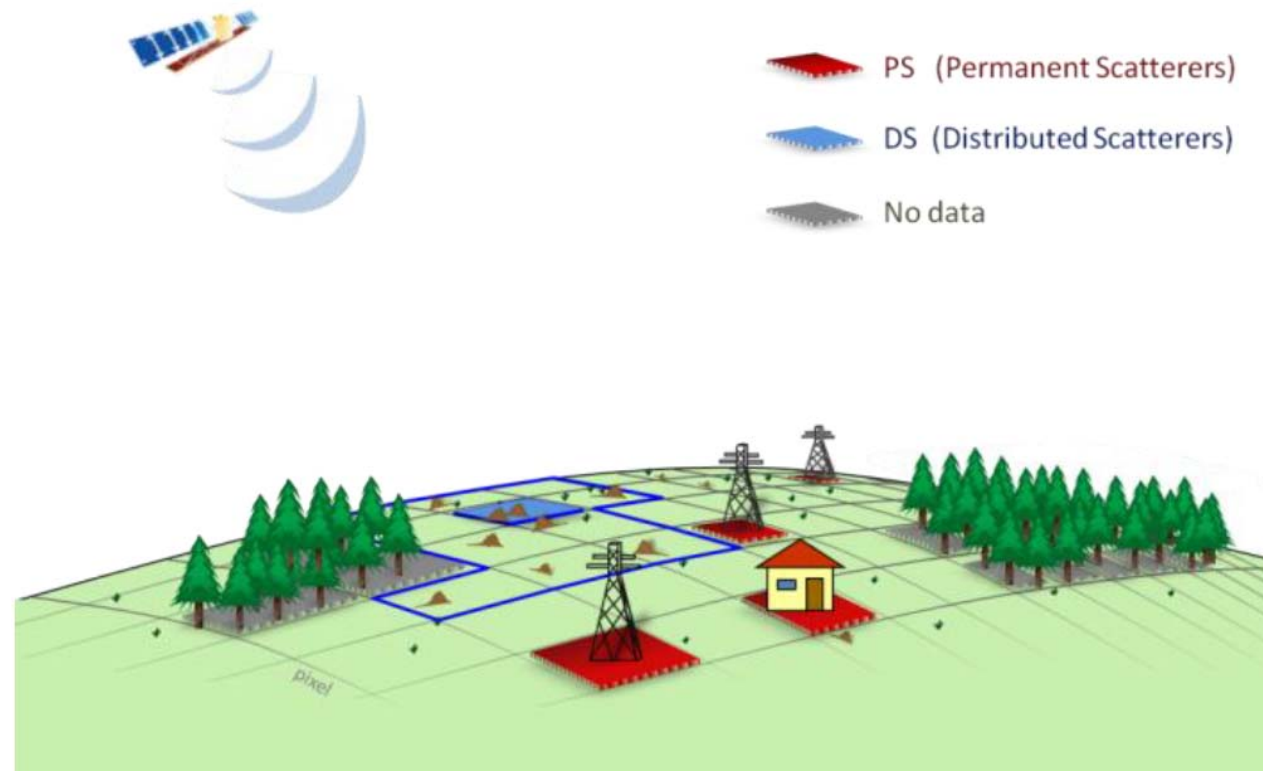
- **LE MISURE NON SONO IN TEMPO REALE (necessitano elaborazione)**
- **COSTO ELABORAZIONE**
- **COMPONENTE ORIZZ. RUMOROSA (elevata inclinazione della LOS rispetto verticale-26°)**
- **CALI DI RIFLETTIVITA' CON NEVE E GHIACCIO**
- **NECESSITA' DI AVERE UN PS VISIBILE**



INTERFEROMETRIA SATELLITARE

TECNICA SQUEESAR™

Distributed Scatterers (DS): bersagli distribuiti, che caratterizzano tutto un gruppo di pixel e che generano caratteristiche pressoché identiche del segnale radar riflesso.





INTERFEROMETRIA SATELLITARE

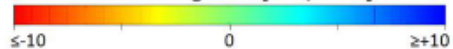


GRANTESTA



NOUVA

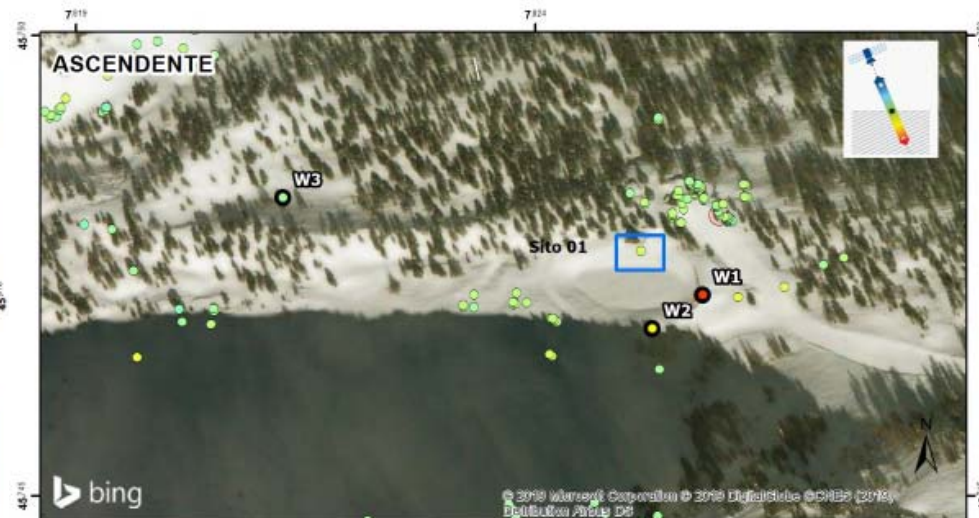




INTERFEROMETRIA SATELLITARE



CIME BIANCHE

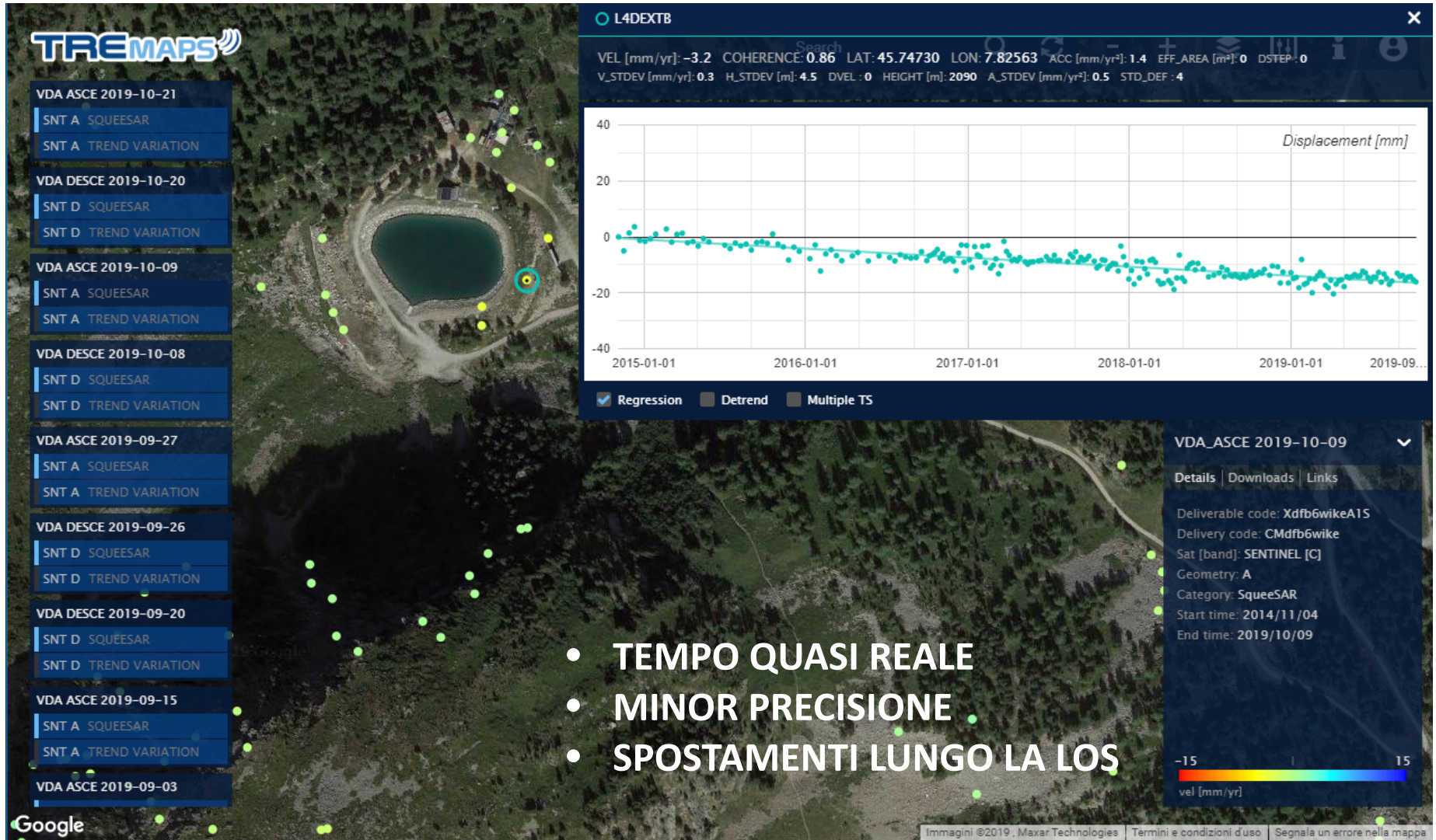


WEISSMATTEN



INTERFEROMETRIA SATELLITARE

SENTINEL





GRAZIE PER L'ATTENZIONE