

Gruppo Nazionale per la
Ricerca sull'Ambiente Costiero



10° Premio G3-Miglior Presentazione di Studi Costieri



20 Settembre 2019
Ferrara Fiere e Congressi

GLI IMPATTI DELLE MAREGGIATE: DALLE MISURE SUL CAMPO ALLA QUANTIFICAZIONE DEI DANNI

ENRICO DUO
DIPARTIMENTO DI FISICA E SCIENZE DELLA TERRA – UNIVERSITÀ DI FERRARA
DUONRC@UNIFE.IT

Contenuti

MOTIVAZIONE

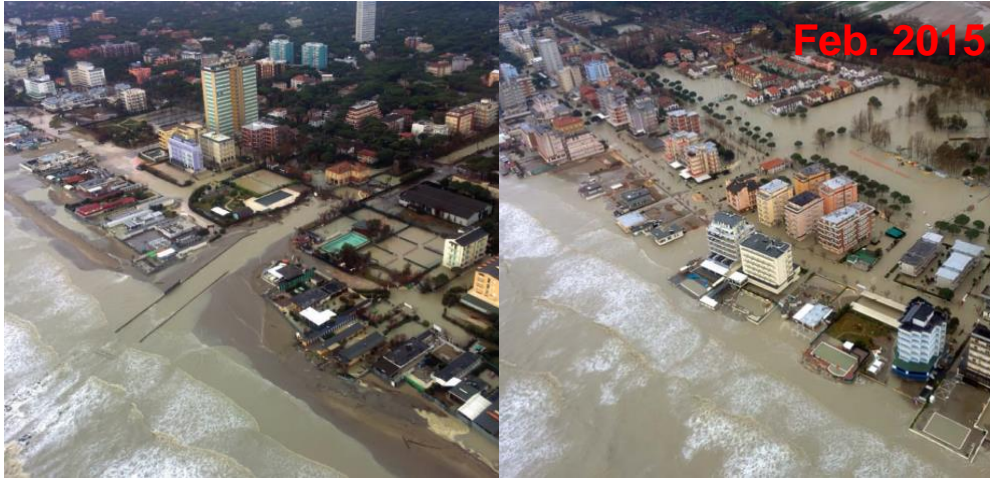


APPROCCIO GENERALE



CASI REALI





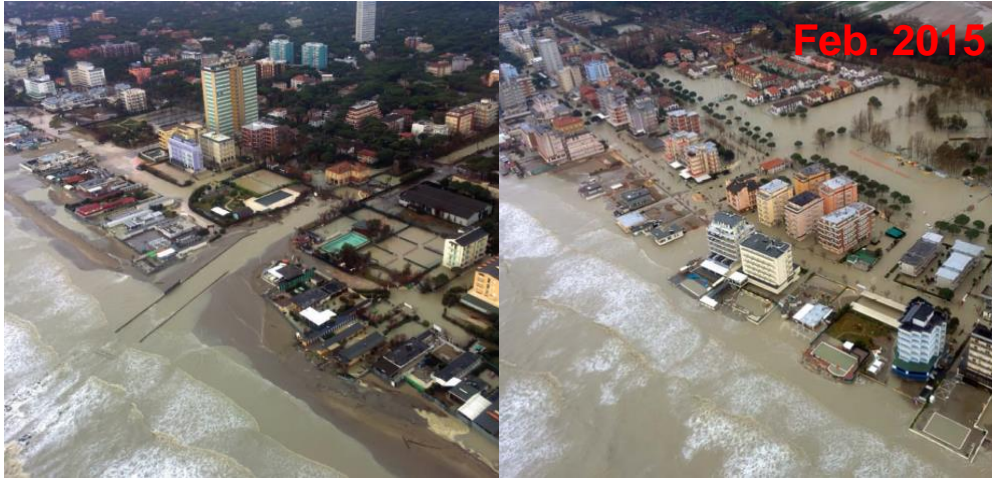
Cesenatico and Lido di Savio (Ravenna, IT; Perini et al., 2015)



Porto Garibaldi (Comacchio, IT)

Lido di Spina (Comacchio, IT; Sanuy et al., 2018; Duo et al., 2018)

Motivazione



Cesenatico and Lido di Savio (Ravenna, IT; Perini et al., 2015)

Motivazione



Porto Garibaldi (Comacchio, IT)



Lido di Spina (Comacchio, IT; Sanuy et al., 2018; Duo et al., 2018)





Motivazione



Cesenatico and Lido di S



Porto Garibaldi (Comacchio, IT)



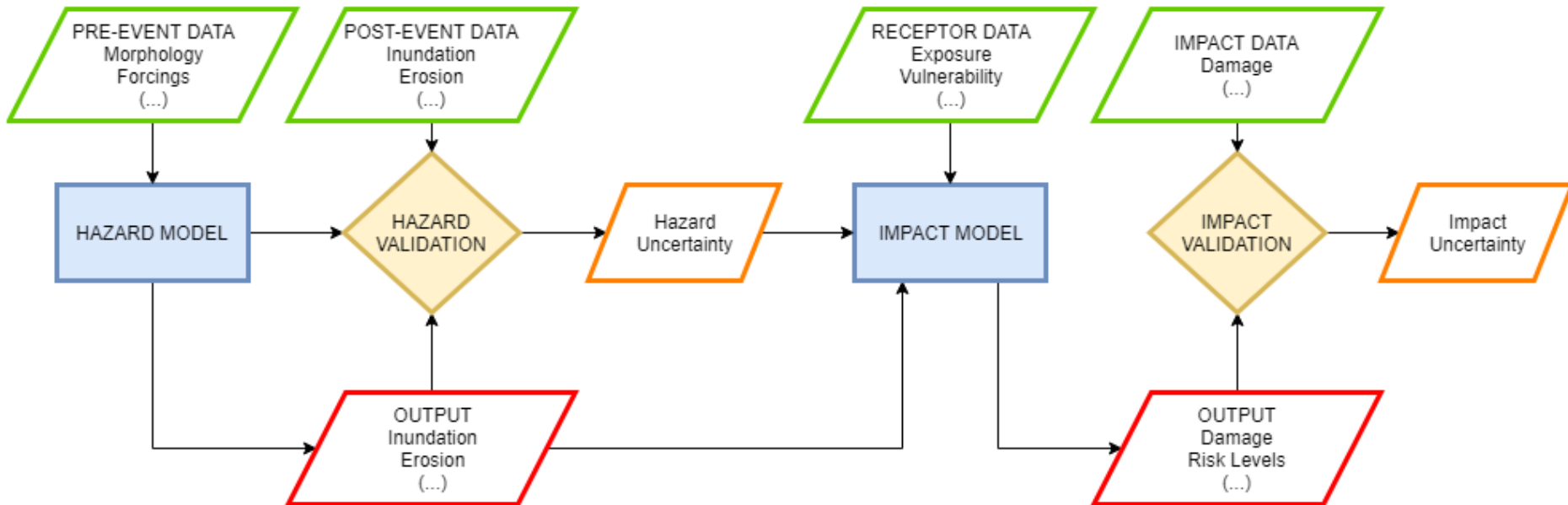
Lido di Spina (Comacchio, IT; Sanuy et al., 2018; Duo et al., 2018)



Feb. 2015

Modellazione dei danni

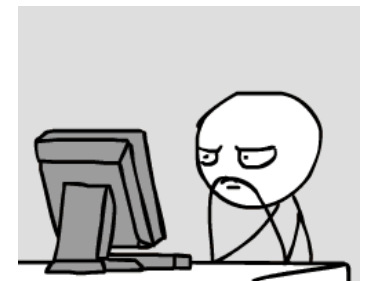
$$R = P \times V \times E \rightarrow R = P \times C$$



S - P - R - C

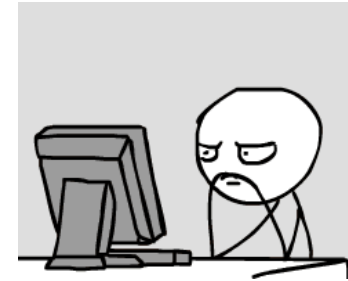
Source-Pathway-Receptor-Consequence

RISC-KIT Special Issue in Coastal Engineering, Van Dongeren et al. (2018).



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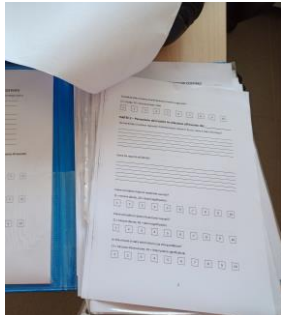
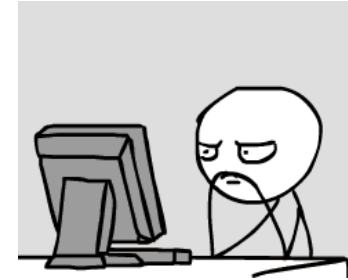


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phibonaccifemio

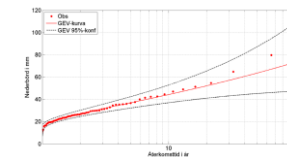
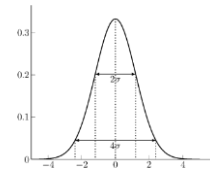
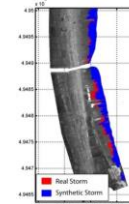
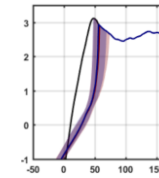
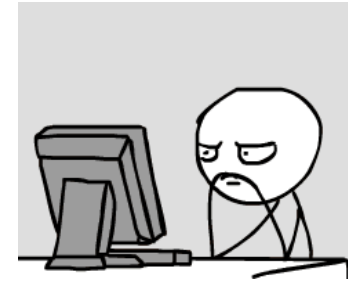


GLI IMPATTI DELLE MAREGGIATE: DALLE MISURE SUL CAMPO ALLA QUANTIFICAZIONE DEI DAMNI

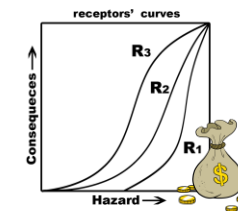
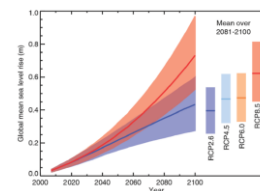
ENRICO DUO



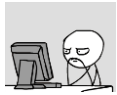
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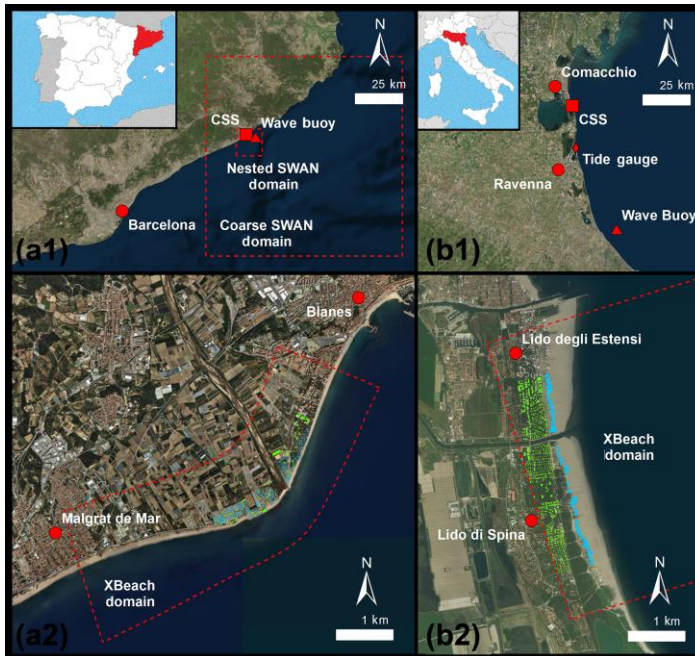
Thomas Bayes
1702 - 1761



Caso studio 1: Lido Estensi-Spina (Italia)



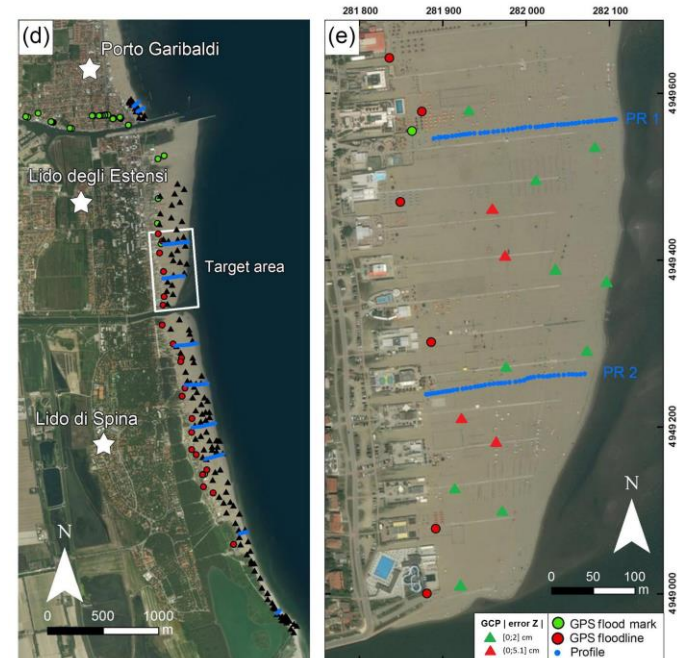
Modellazione numerica
degli impatti



Sanuy, M., Duo, E., Jäger, W.S., Ciavola, P., Jiménez, J.A., 2018. Linking source with consequences of coastal storm impacts for climate change and risk reduction scenarios for Mediterranean sandy beaches. *Nat. Hazards Earth Syst. Sci.* 18, 1825–1847.
<https://doi.org/10.5194/nhess-18-1825-2018>

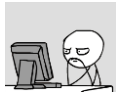


Misure sul campo



Duo, E., Trembanis, A. C., Dohner, S., Grotoli, E., and Ciavola, P., 2018. Local-scale post-event assessments with GPS and UAV-based quick-response surveys: a pilot case from the Emilia–Romagna (Italy) coast. *Nat. Hazards Earth Syst. Sci.* 18, 2969–2989.
<https://doi.org/10.5194/nhess-18-2969-2018>

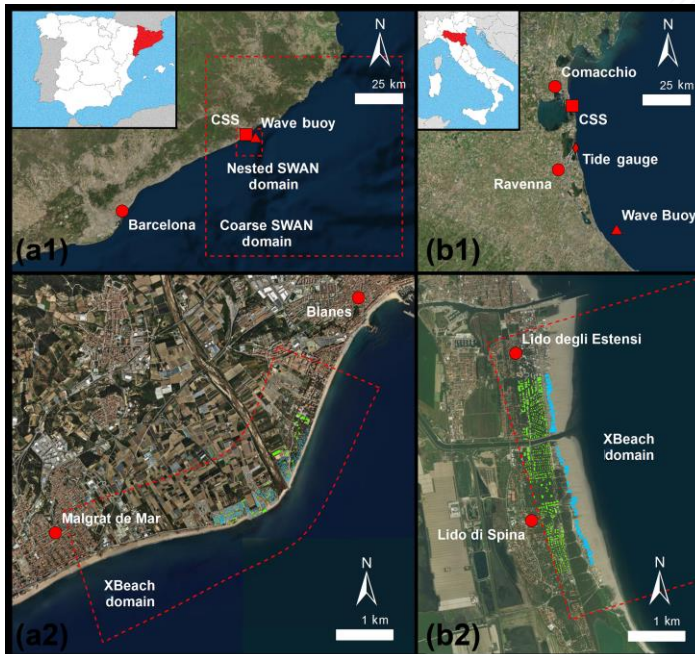
Caso studio 1: Lido Estensi-Spina (Italia)



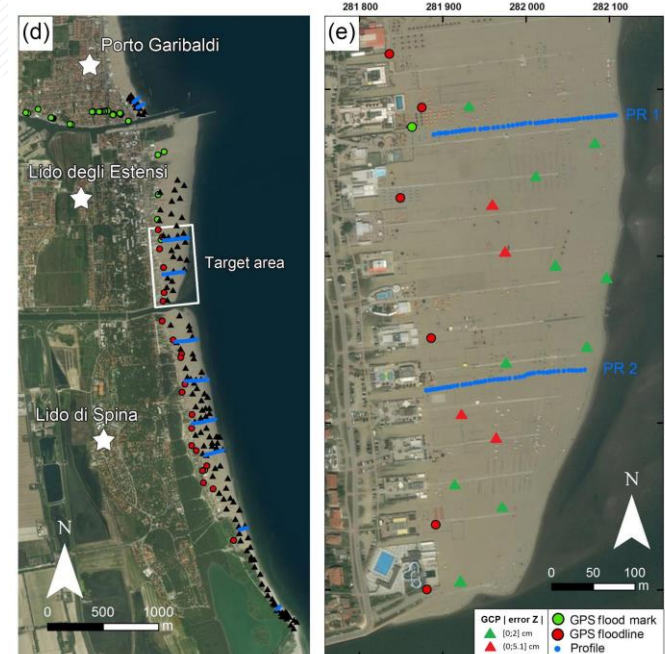
Modellazione numerica
degli impatti



Misure sul campo

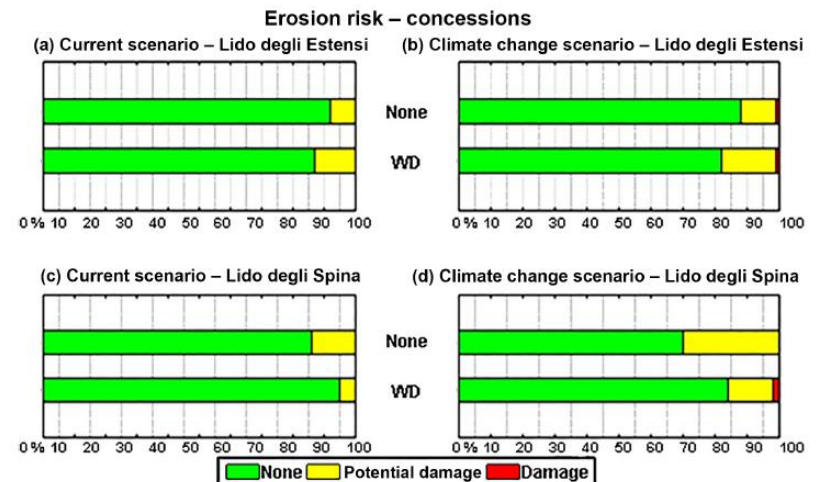
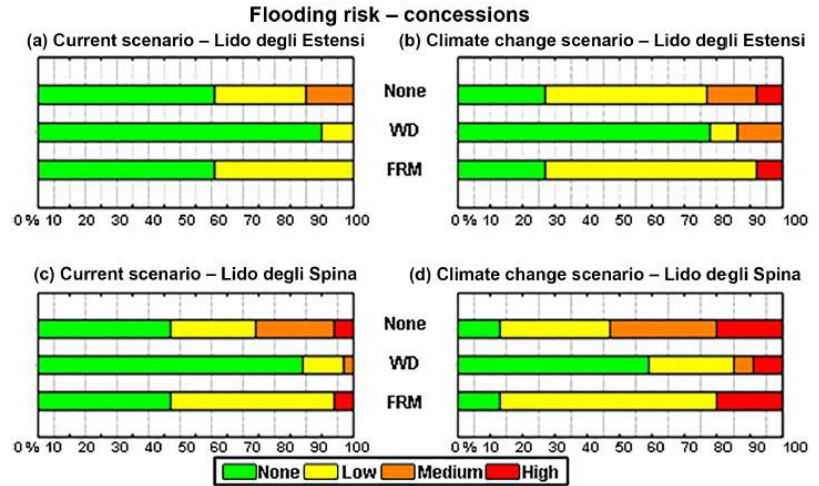
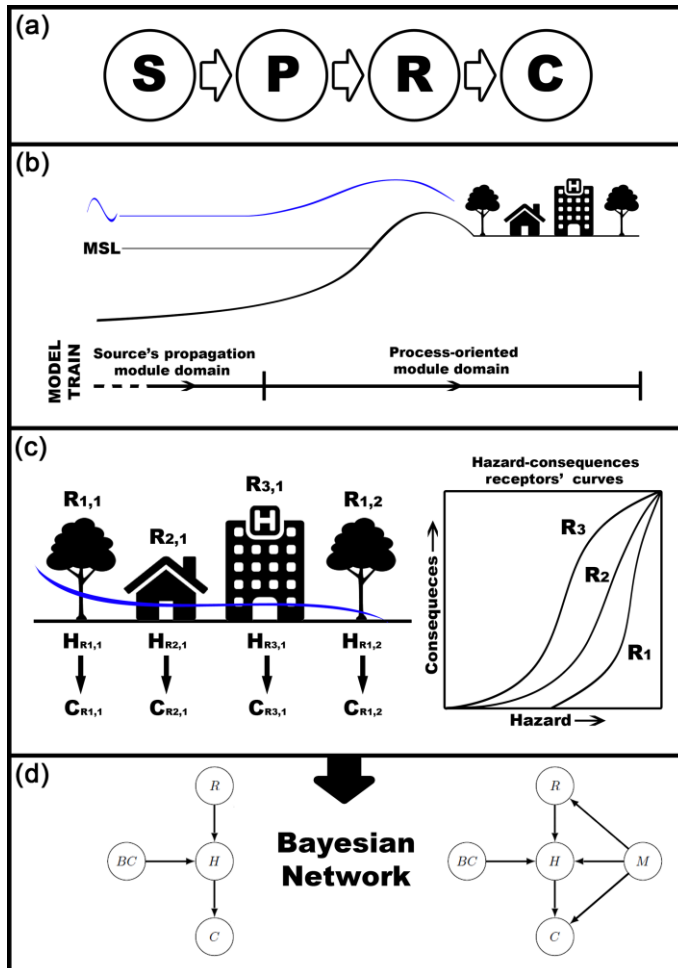


Sanuy, M., Duo, E., Jäger, W.S., Ciavola, P., Jiménez, J.A., 2018. Linking source with consequences of coastal storm impacts for climate change and risk reduction scenarios for Mediterranean sandy beaches. *Nat. Hazards Earth Syst. Sci.* 18, 1825–1847.
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Duo, E., Trembanis, A. C., Dohner, S., Grotoli, E., and Ciavola, P., 2018. Local-scale post-event assessments with GPS and UAV-based quick-response surveys: a pilot case from the Emilia–Romagna (Italy) coast. *Nat. Hazards Earth Syst. Sci.* 18, 2969–2989.
<https://doi.org/10.5194/nhess-18-2969-2018>

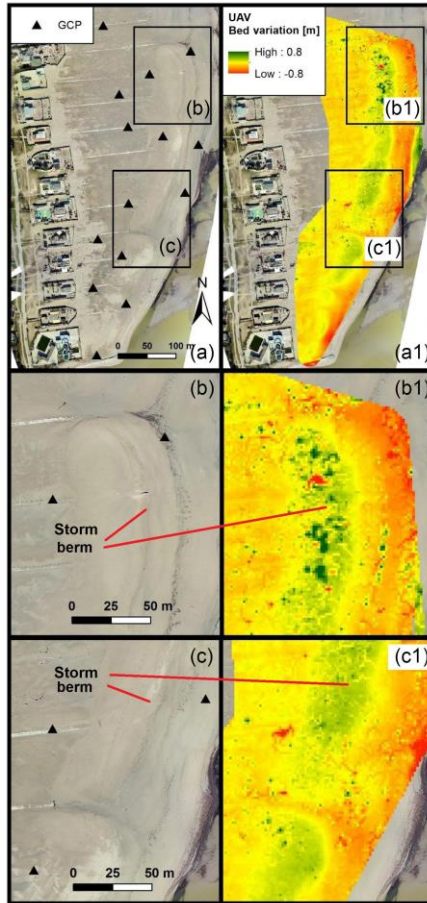
Modellazione dei danni



Eventi (storici + sintetici) x Scenari (Climate Change + DRR)

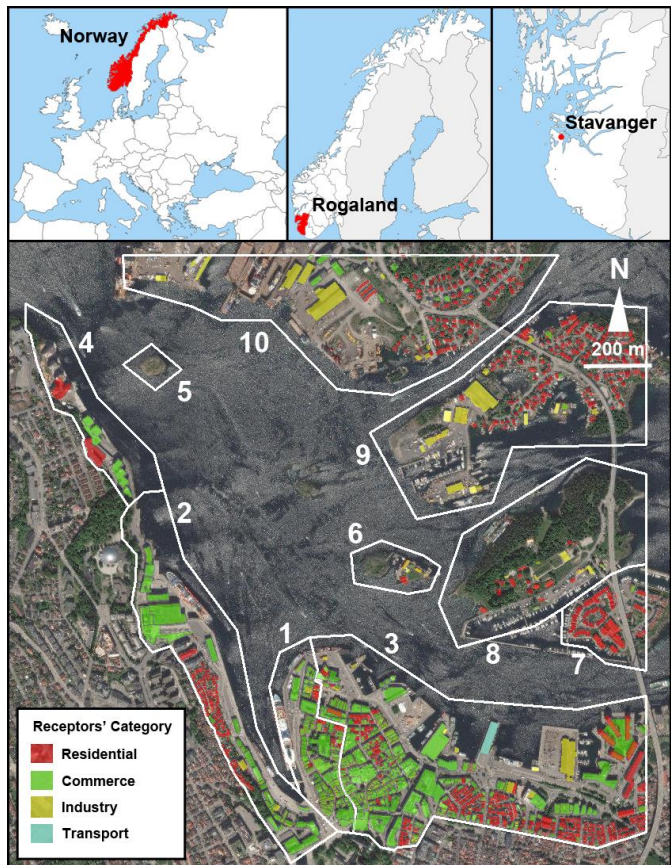


Dati osservati (drone aereo + fotogrammetria)



Mareggiata del 5-6 Febbraio 2015

Caso studio 2: Stavanger (Norvegia)

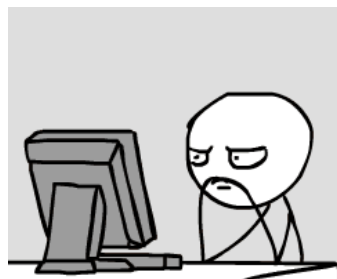


Disponibili:

- Livello mare (1988-2017)
- DEM Lidar topografico 2014
- Recettori (posizione, tipologia)

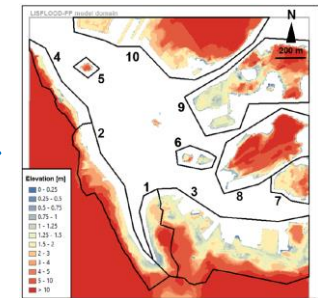
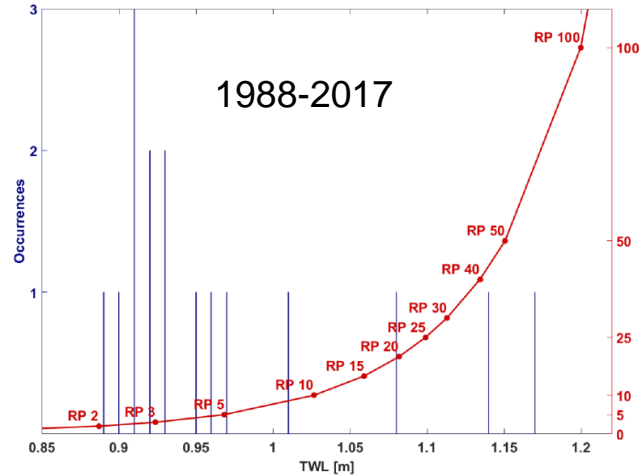
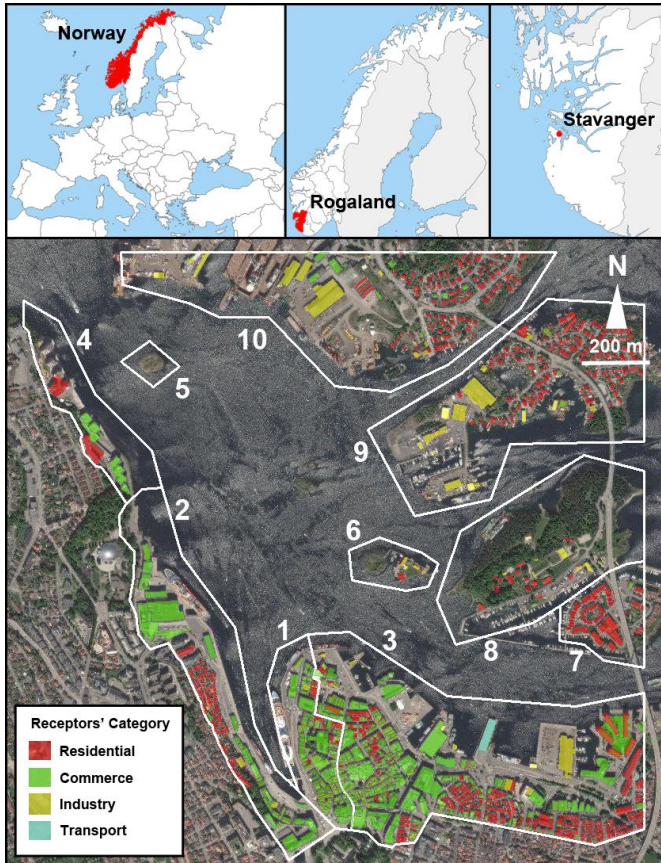
Non disponibili:

- Modelli locali di valutazione del danno
- Osservazioni su inondazioni storiche
- Osservazioni di impatti/danni storici



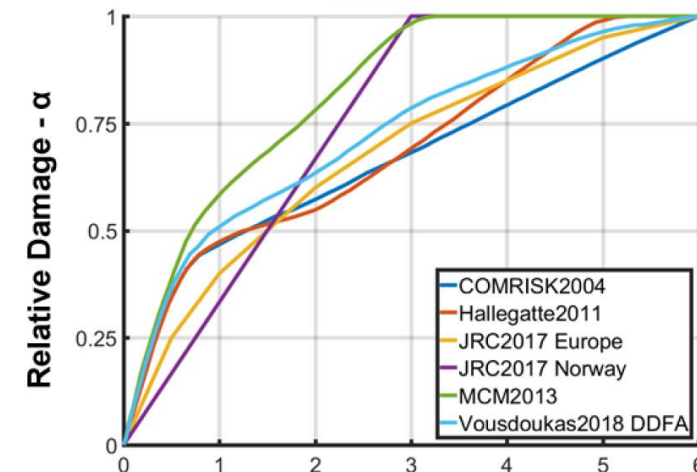
Duo, E., Fernández-Montblanc, T., Armaroli, C. and Ciavola, P., 2019. Coastal Flooding Impact Analysis at Stavanger (Norway). Submitted in July 2019 to Environment International, under review.

Caso studio 2: Stavanger (Norvegia)



LISFLOOD-FP

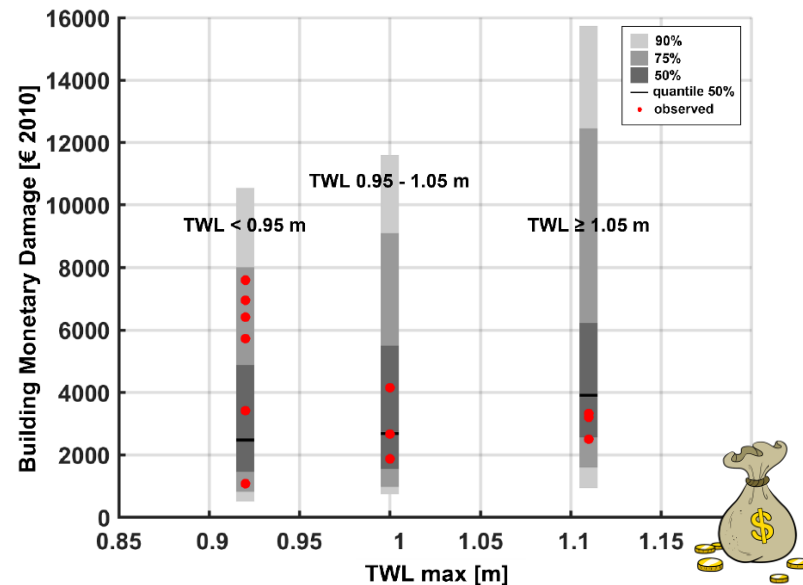
Residential



Duo, E., Fernández-Montblanc, T., Armaroli, C. and Ciavola, P., 2019. Coastal Flooding Impact Analysis at Stavanger (Norway). Submitted in July 2019 to Environment International, under review.



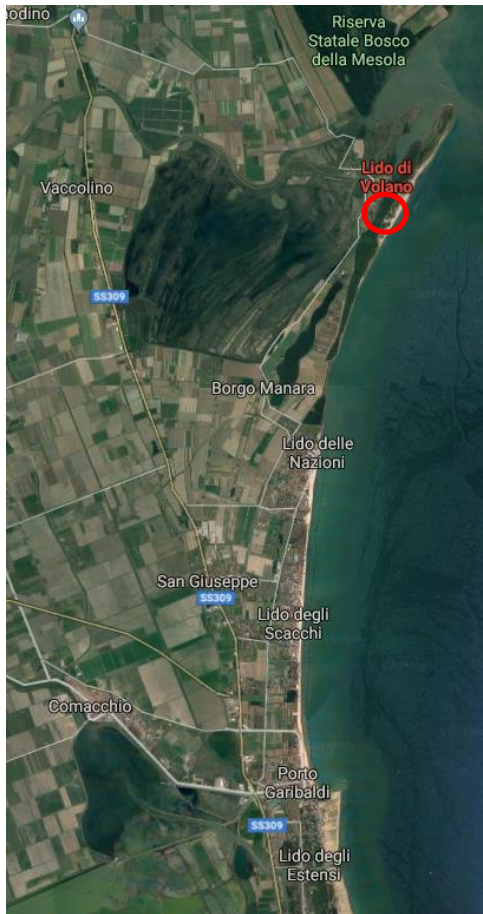
Stavanger, mareggiata di Dicembre 1994. https://www.youtube.com/watch?v=vO66cd9A_b0



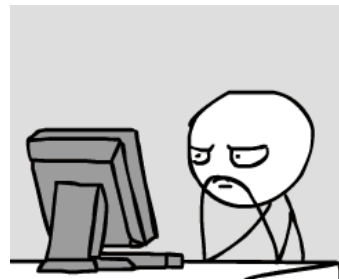
Norwegian Natural Perils Pool, 2019. Natural Disaster Statistics.

<https://www.naturskade.no/statistikk/>

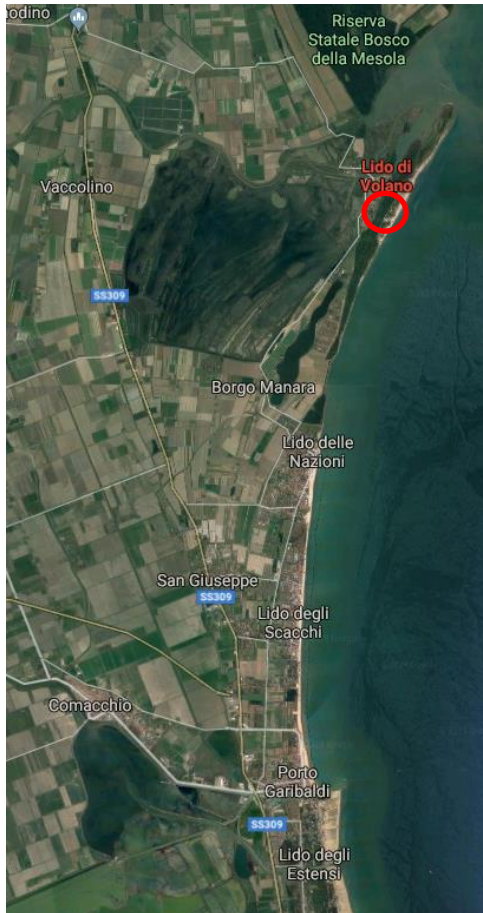
Caso studio 3: Lido di Volano (Italia)



- Buona conoscenza del territorio a vari livelli (regionale, comunale);
- Buona conoscenza storica a livello regionale degli eventi estremi e dei relativi impatti;
- Evento estremo 29 Ottobre 2018;
- Serie temporali delle forzanti
- Misure sul campo: topo-batimetriche, da drone aereo, interviste a portatori di interesse locali.



Caso studio 3: Lido di Volano (Italia)



Ortofoto da drone
26 Ottobre 2018



18 Ottobre 2018



26 Ottobre 2018



Mareggiata del 29 Ottobre 2018



DURANTE



PRIMA



DOPO

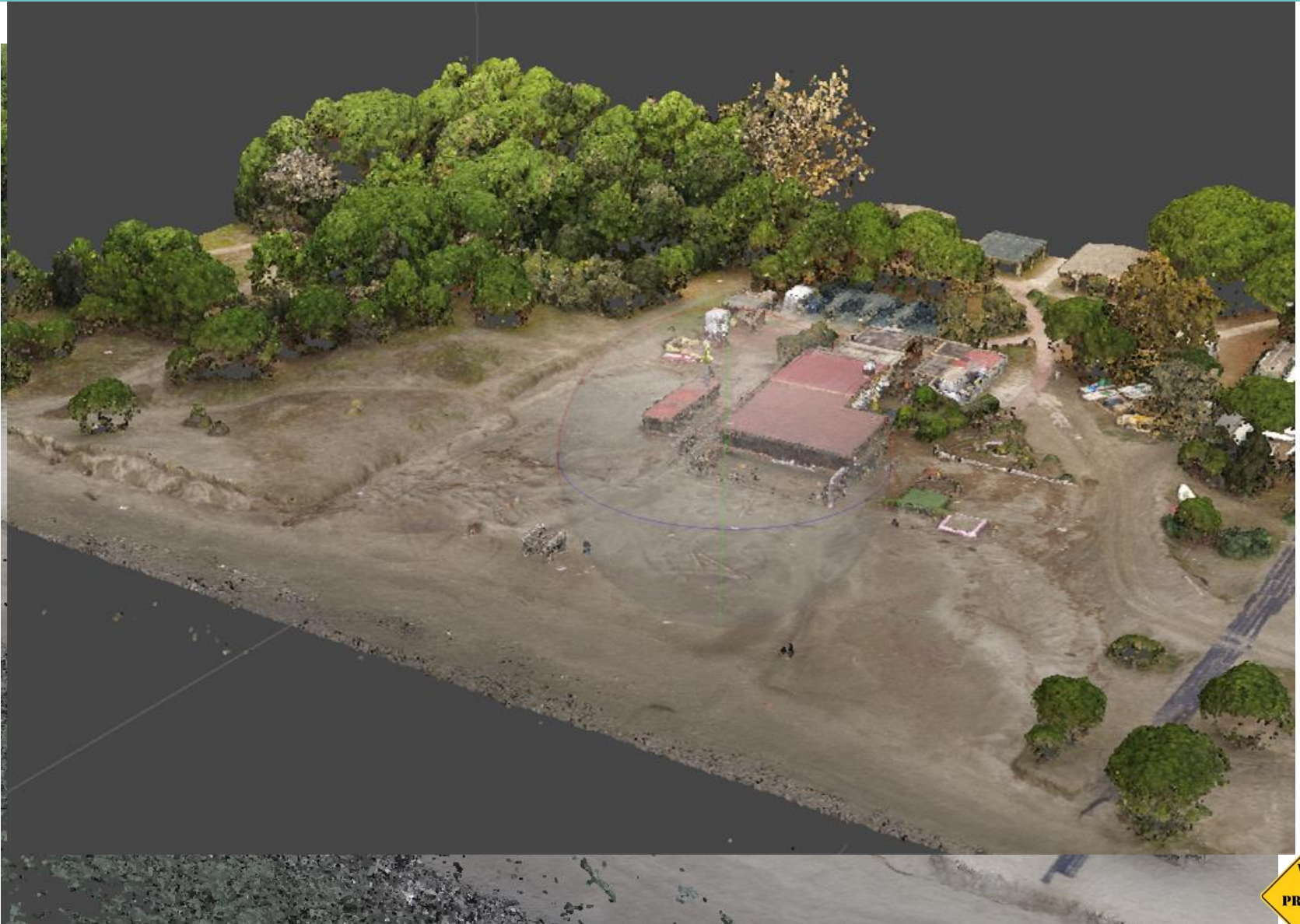






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ENRICO DUO





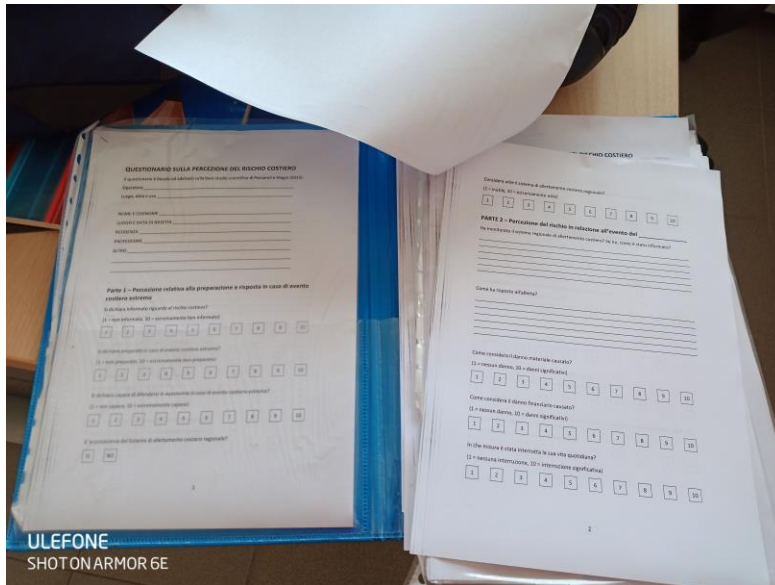
evidenze di
ingressione marina

arretramento ~12 m

duna artificiale rimossa



POCHI GIORNI DOPO L'EVENTO...

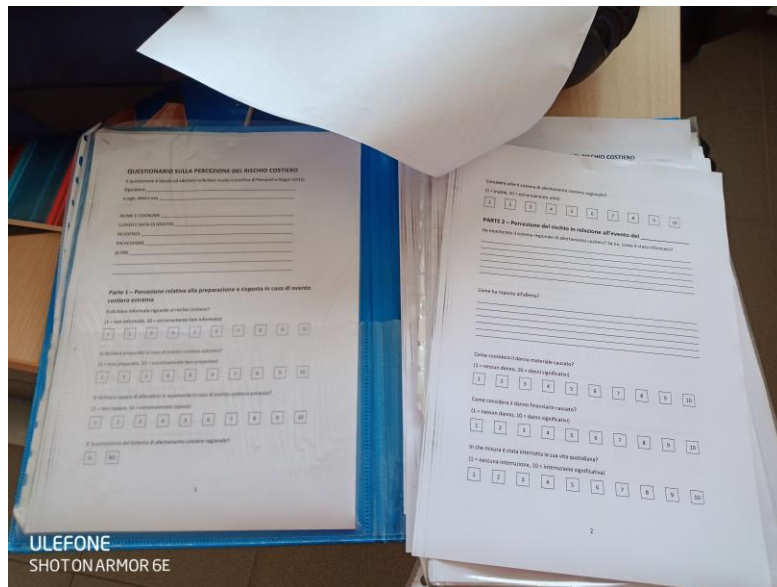


ULEFONE
SHOT ON ARMOR 6E

- Questionari su percezione del rischio;
- Intervistati: concessionari e residenti.

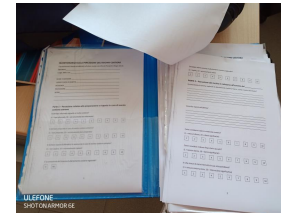


POCHI GIORNI
DOPO L'EVENTO...



- Questionari su percezione del rischio;
- Intervistati: concessionari e residenti.

DOPO 6-12 MESI...
(OTTOBRE 2019)



+

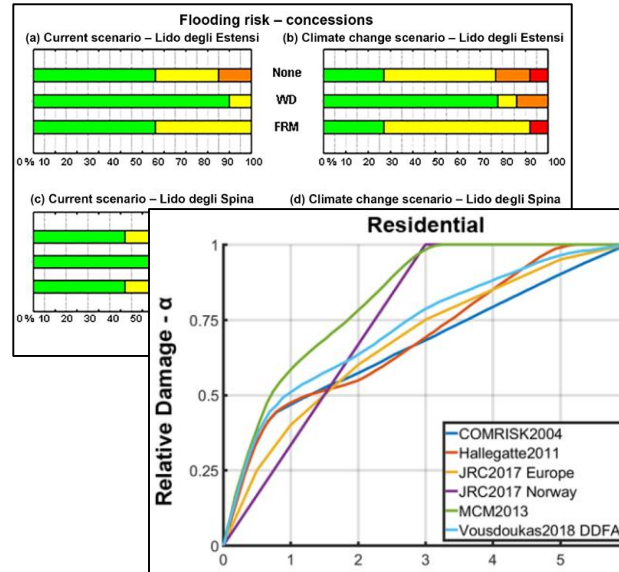
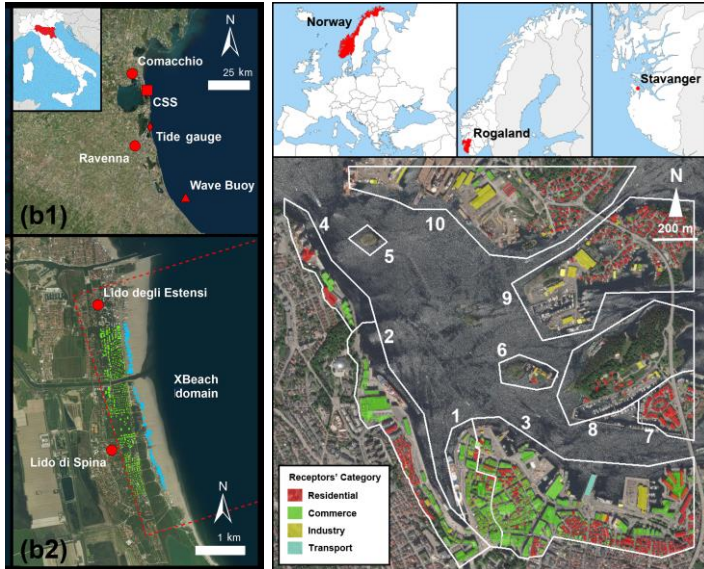


- Stima della preparazione al rischio della comunità locale;
- **Stima di una curva di danno locale per concessioni turistiche e case mobili;**
- ...

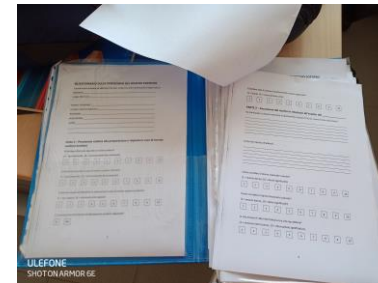
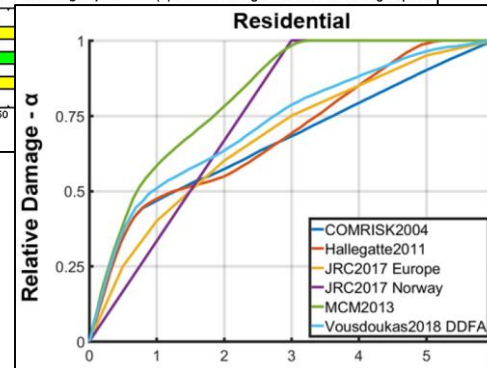
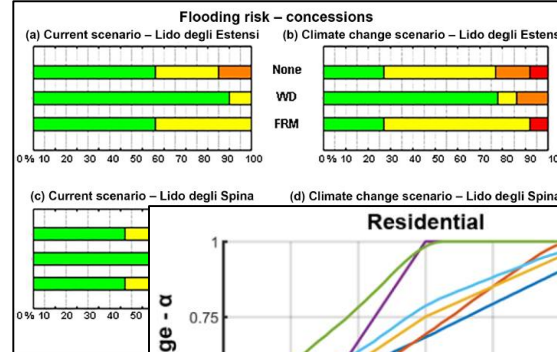
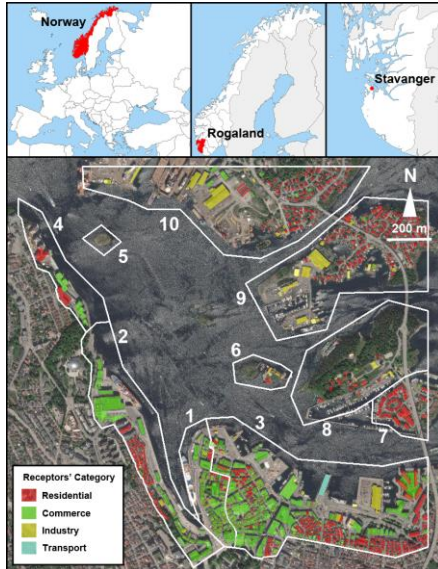
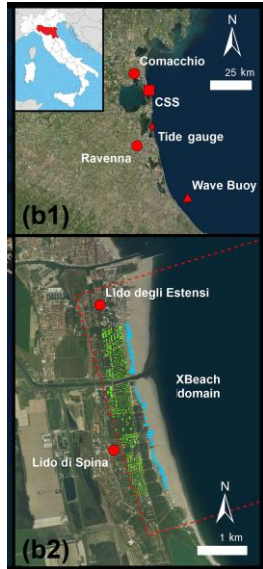


Conclusioni: **No (field) data, no party...?**

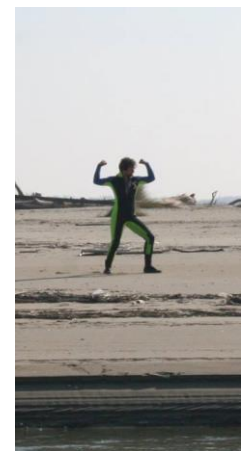
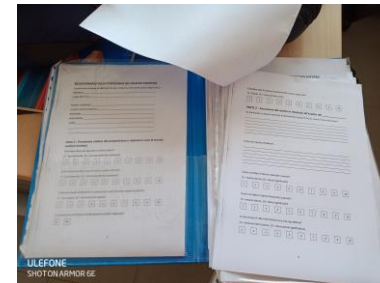
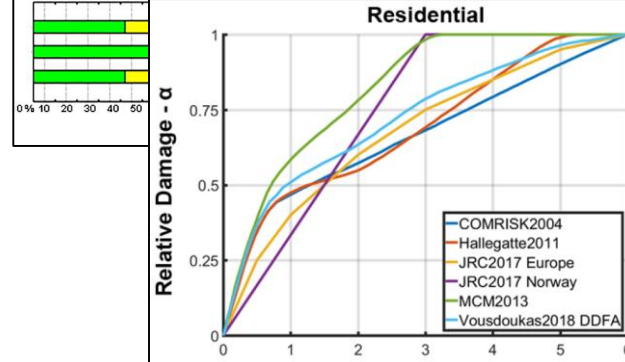
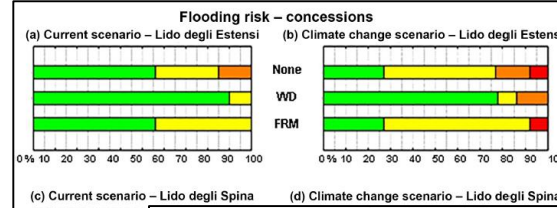
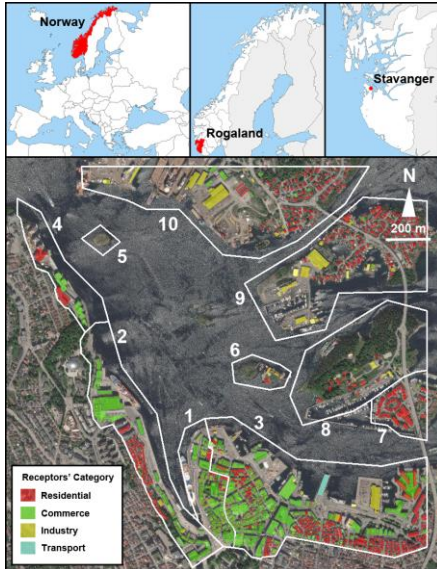
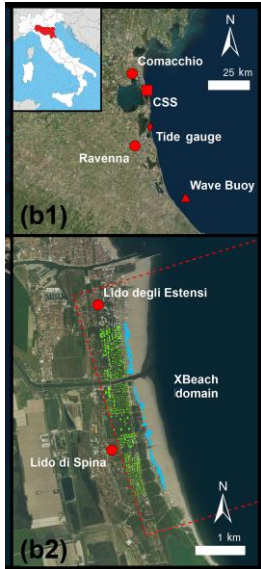
Conclusioni: No (field) data, no party...?



Conclusioni: No (field) data, no party...?



Conclusioni: No (field) data, no party...?



Ringraziamenti

COSTUF Team - UNIFE

Prof. Paolo Ciavola

Prof. Clara Armaroli

Dr. Tomas Fernandez

Dr. Stefano Fabbri

Dott. Silvia Cilli

Dott. Riccardo Brunetta



Università degli Studi di Ferrara



Altri ringraziamenti

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Dr. Edoardo Grottoli

Prof. Art Trembanis

Prof. José Jiménez

Prof. Andrea Ninfo

Dr. Stephanie Dohner

Dr. Ap van Dongeren

RISC-KIDS

ANYWHERE Team

Luisa Perini

Paolo Chiarelli

Francesco Droghetti



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Regione Emilia-Romagna



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