Evento finale - Progetto RESBA

*Vulnerabilità degli sbarramenti in materiale sciolto per **rischio sismico** nell'area alpina Francia-Italia*

Vulnérabilité des barrages en remblai vis-à-vis de l'aléa sismique dans l'arc Alpin France Italie

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Webinar

3-4 Dicembre 2020

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  (Évaluation de la vulnérabilité sismique des barrages remblai)
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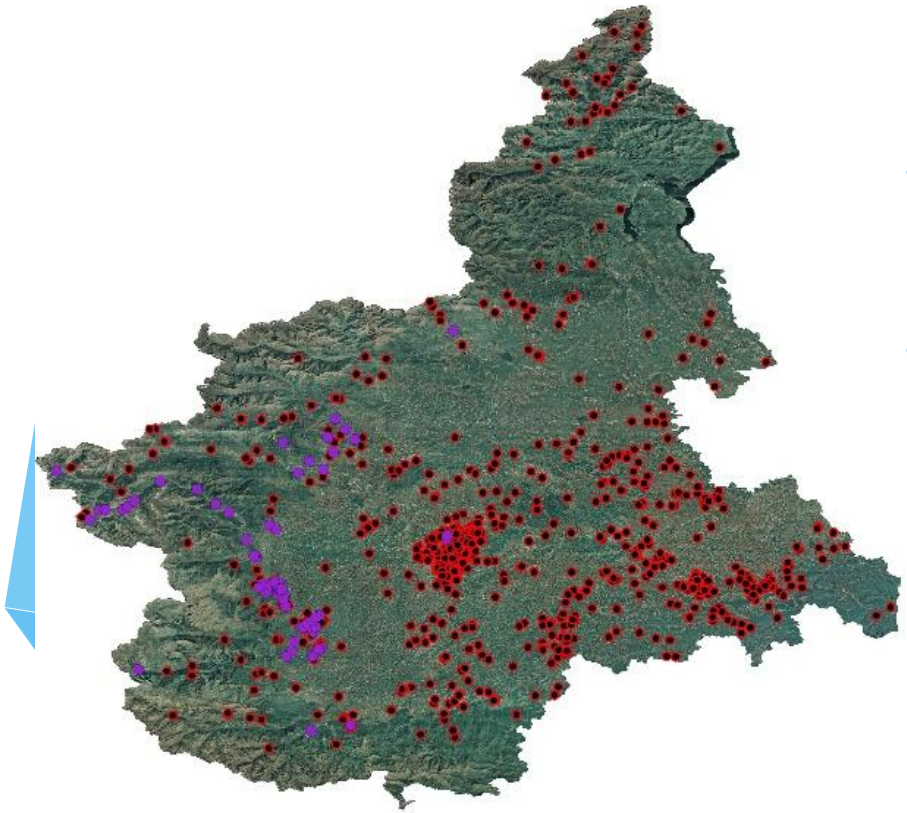
Motivazione dello studio e caratteristiche dei piccoli invasi (Motivation de l'étude et caractéristiques des petits réservoirs)

Norme Tecniche delle Dighe (NTD, 2014): $H_{max} \leq 15$ m; Vol $\leq 10^6$ m^3
(Normes techniques pour les barrages (NTD, 2014): $H_{max} \leq 15$ m; Vol $\leq 10^6$ m^3)



- **Piccoli invasi: oltre 800**

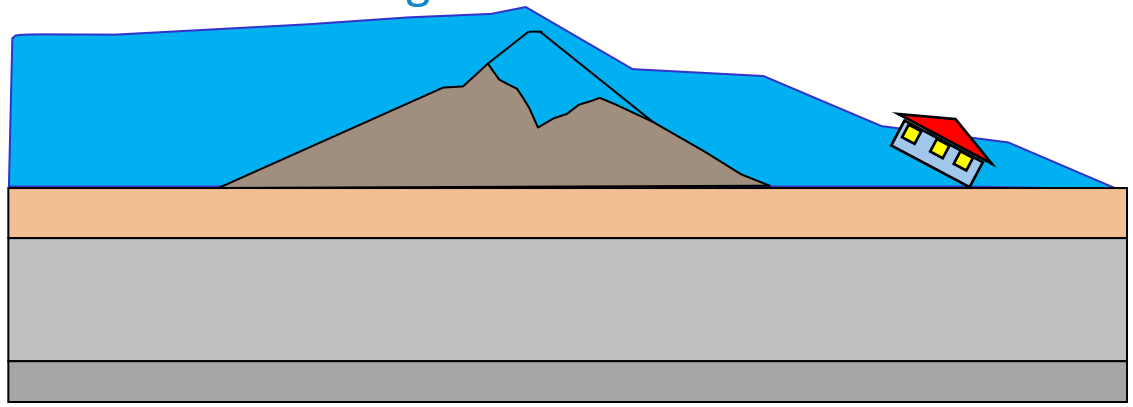
  (petits réservoirs: plus de 800)

- **Un buon numero sono dighe in terra**

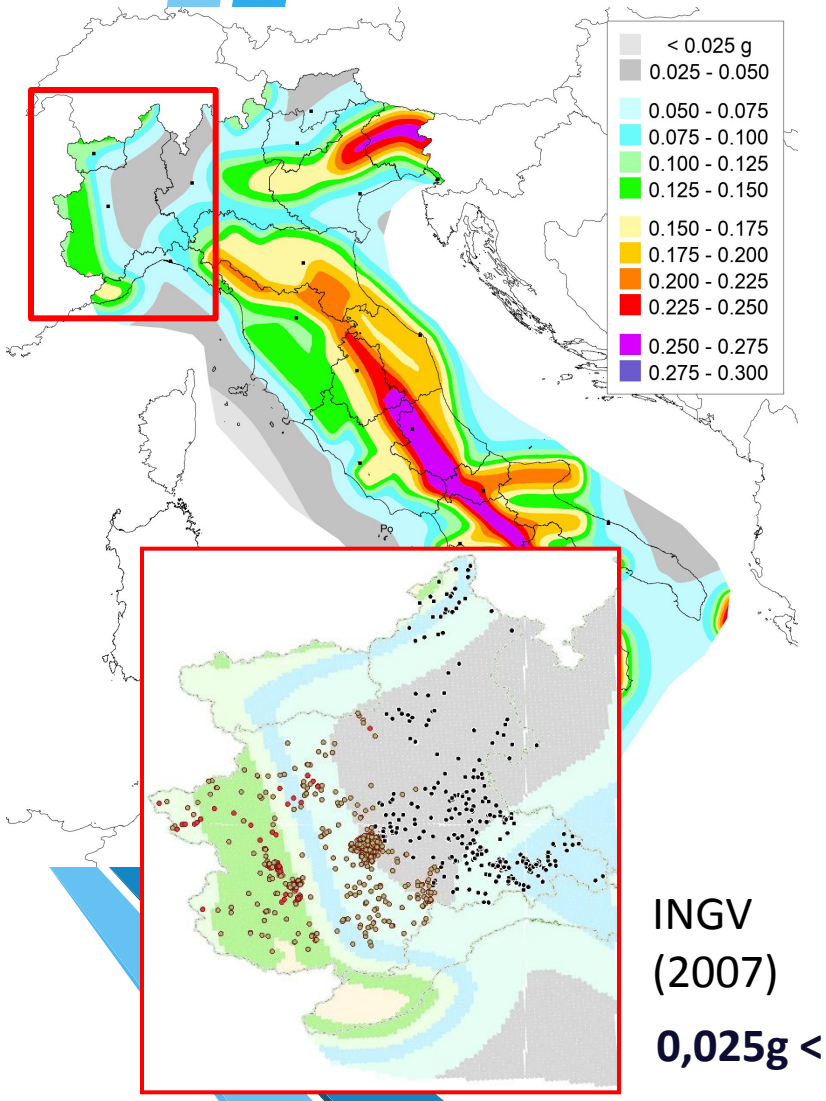
  (Un bon nombre sont des barrages en remlai)

- **Localizzate nei pressi delle cittadine delle aree montane e collinari**

  (Situé à proximité des villes demontagne et des zones collinaires)

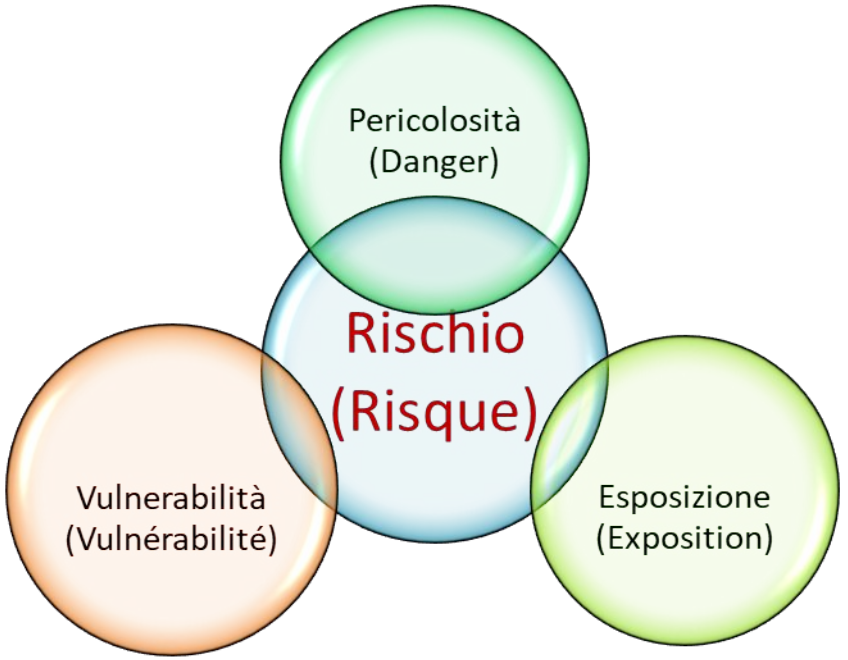


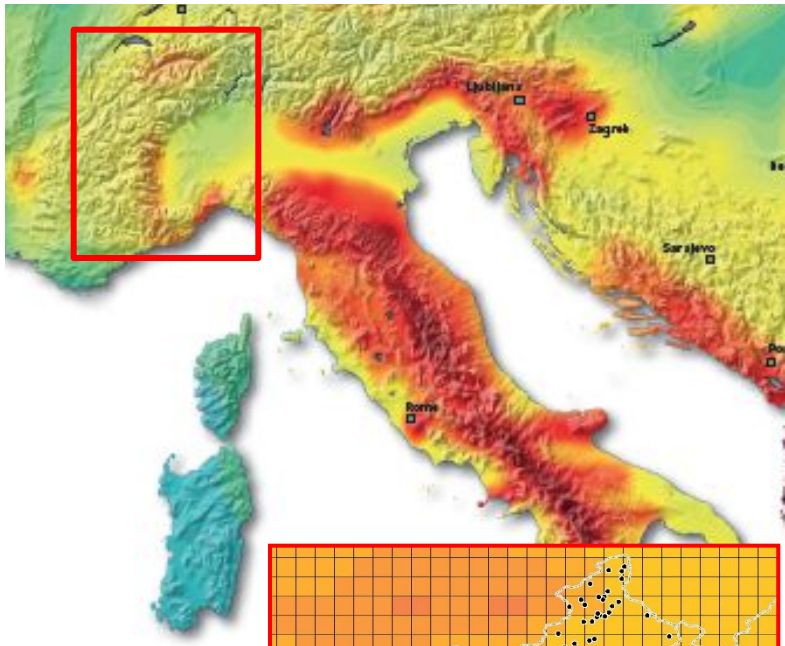
Motivazione dello studio e caratteristiche dei piccoli invasi (Motivation de l'étude et caractéristiques des petits réservoirs)

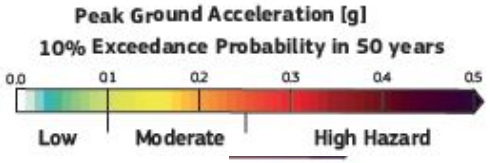


INGV
(2007)

0,025g < a_g < 0,125g

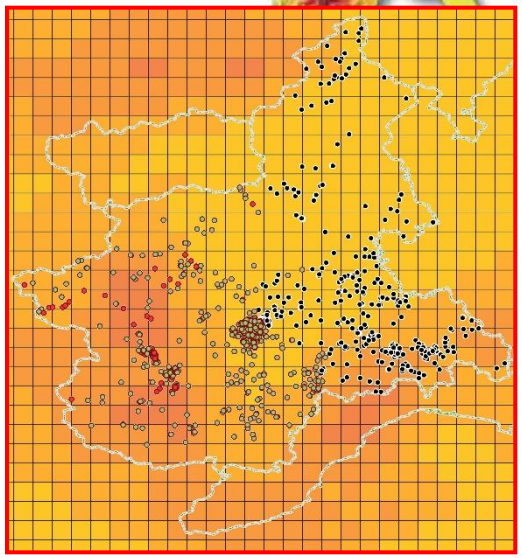






SHARE
(Giardini et al., 2013)

0,08g < a_g < 0,270g



Valutazione della vulnerabilità sismica delle dighe in terra
(Évaluation de la vulnérabilité sismique des barrages en remblai)

Livello di conoscenza
(Niveau de connaissance)

Proprietà e caratteristiche dell'opera
(Propriétés et caractéristiques de l'œuvre)

Analisi storica – critica
(Analyse historique - critique)

Rilievo geometrico
(Relief géométrique)

Caratterizzazione meccanica dei materiali
(Caractérisation mécanique des matériaux)

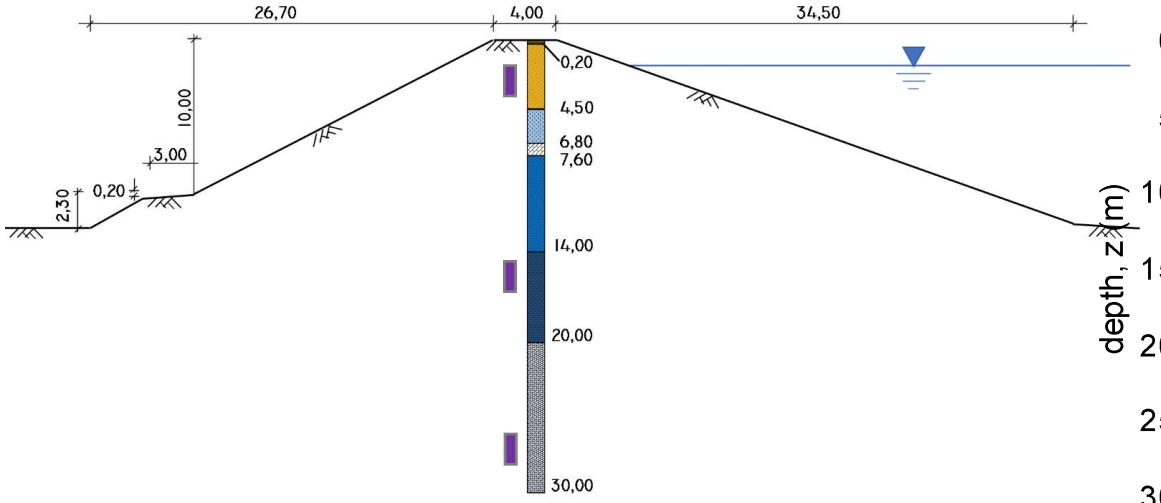
Metodi di analisi
(Méthodes d'analyse)

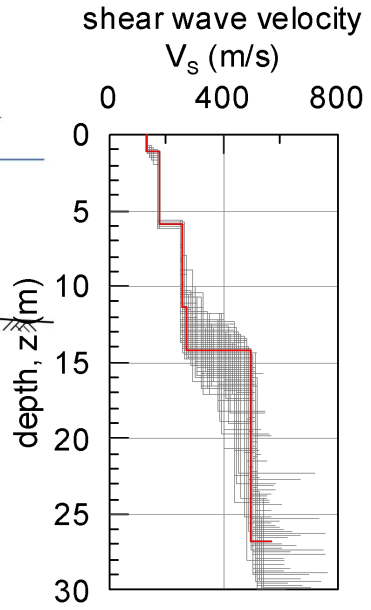
- **Metodi pseudo-statici**
  (Méthodes pseudostatiques)
- **Dinamici semplificati**
  (Dynamique simplifiée)
  - **Accoppiati** (Accouplé)
  - **Disaccoppiati** (Découplé)
- **Dinamici avanzati**
  (Dynamique avancée)
  - **Tensioni totali** (Stress total)
  - **Tensioni efficaci** (Stress efficace)
    - **Accoppiati** (Accouplé)
    - **Disaccoppiati** (Découplé)

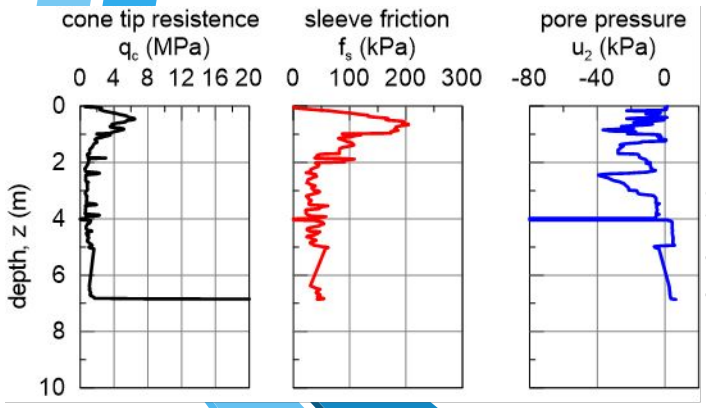
Metodi di analisi avanzati
(Méthodes d'analyse avancées)

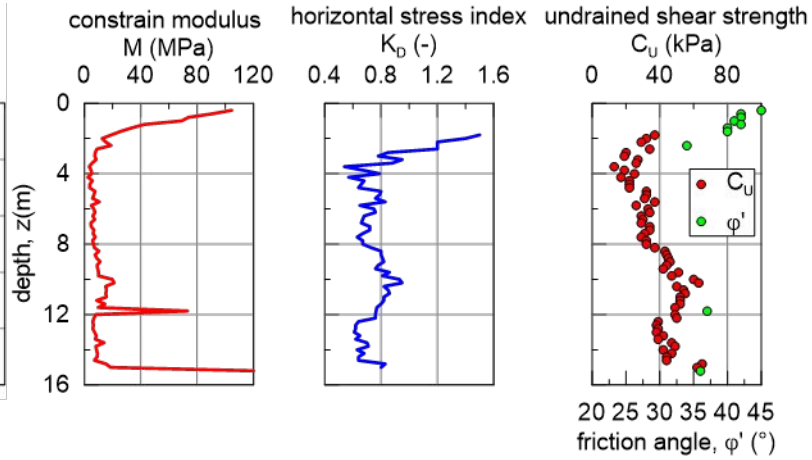
Caso studio: Briaglia (CN) / (étude de cas: Briaglia (CN))

Prove in situ (Tests in situ)

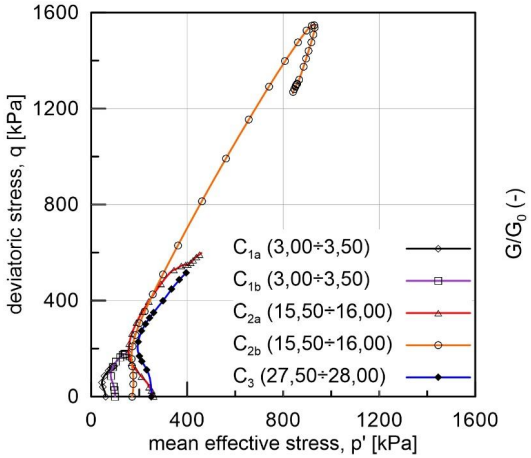


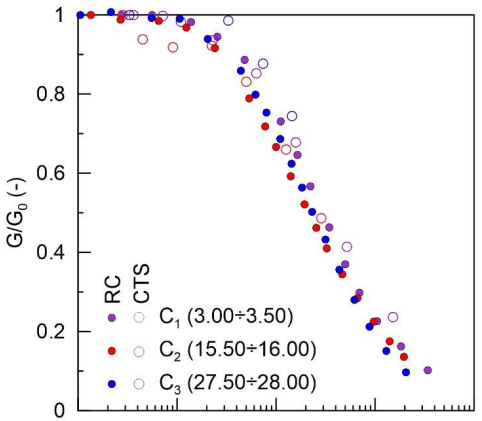


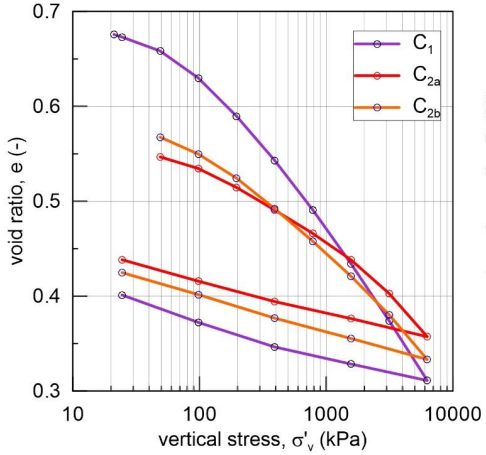


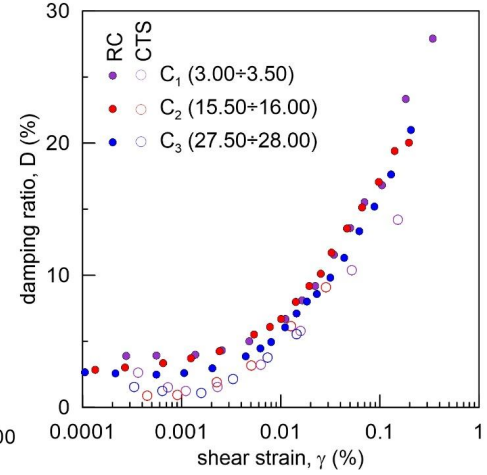


Prove di laboratorio (Tests de laboratoire)

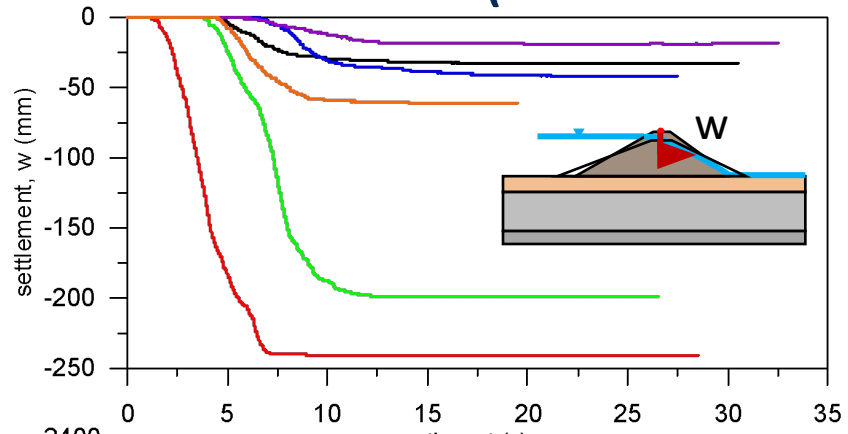


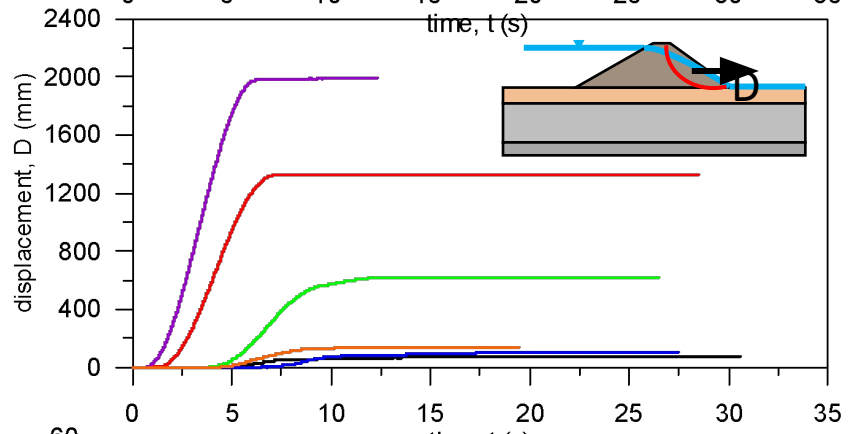


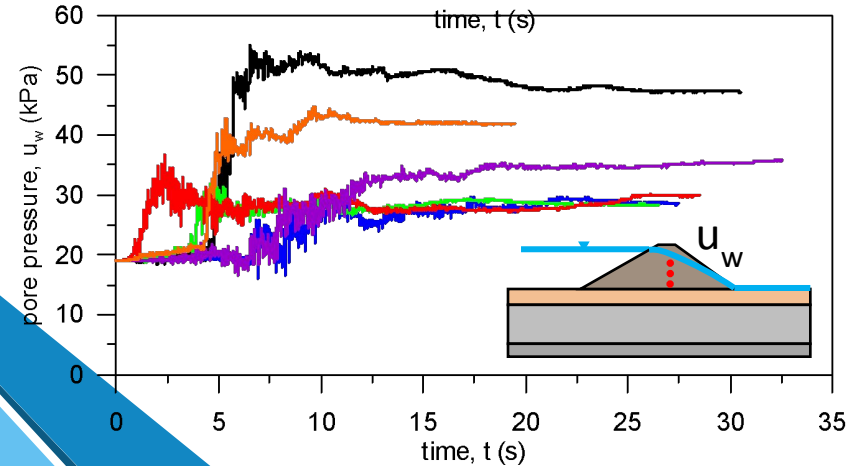


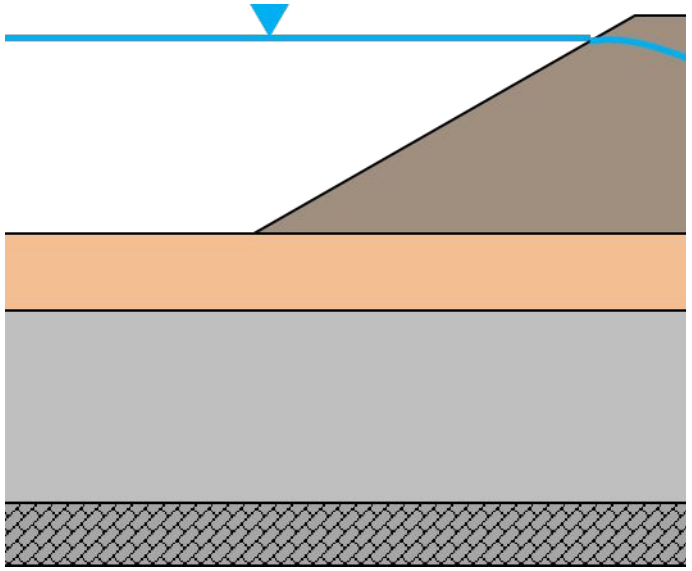


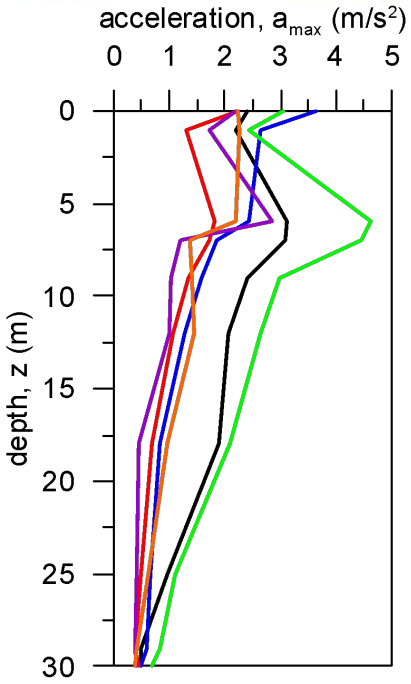
Metodi di analisi avanzati
(Méthodes d'analyse avancées)

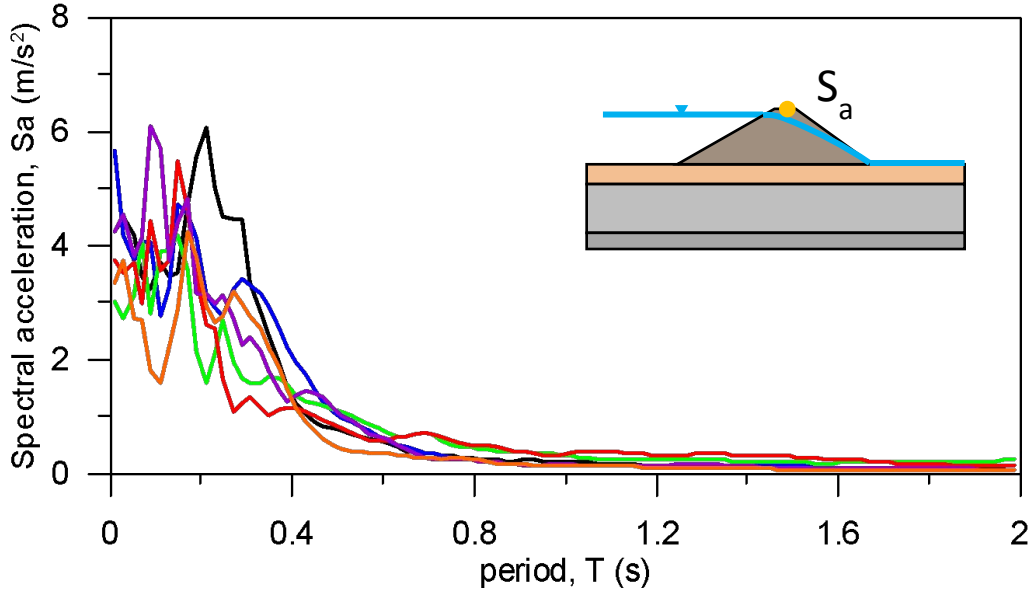




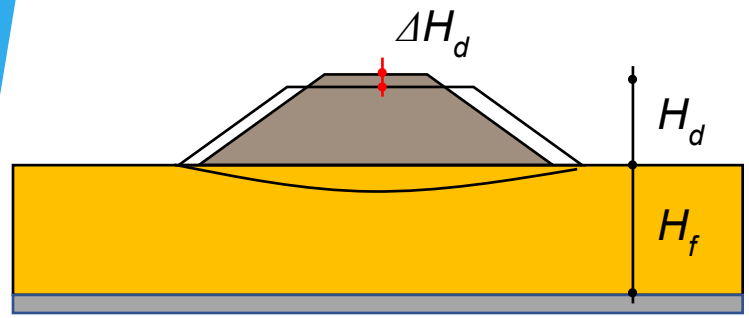








Approcci semplificati: relazioni pseudo-empiriche (Approches simplifiées: relations pseudo-empiriques)



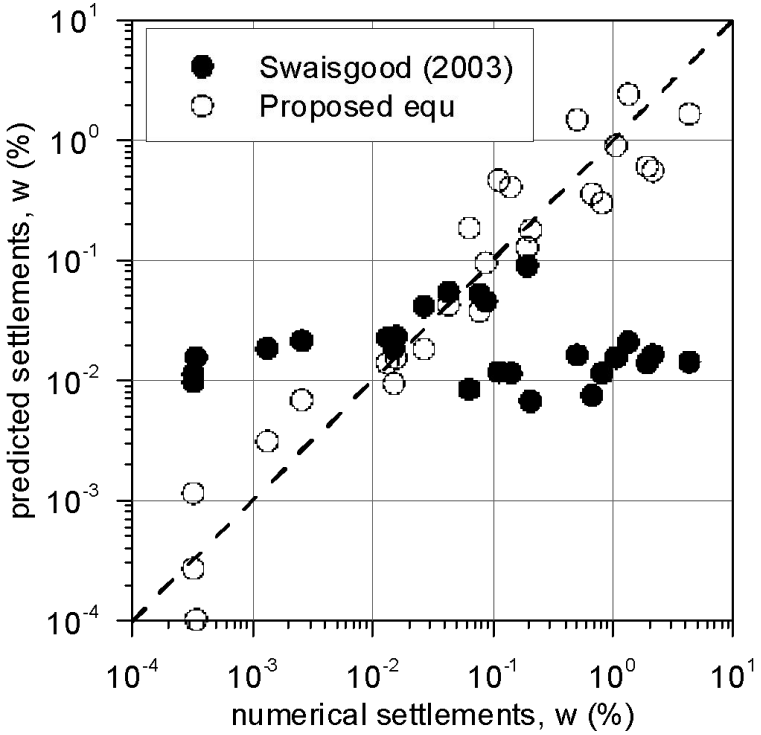
Swaisgood, 2003

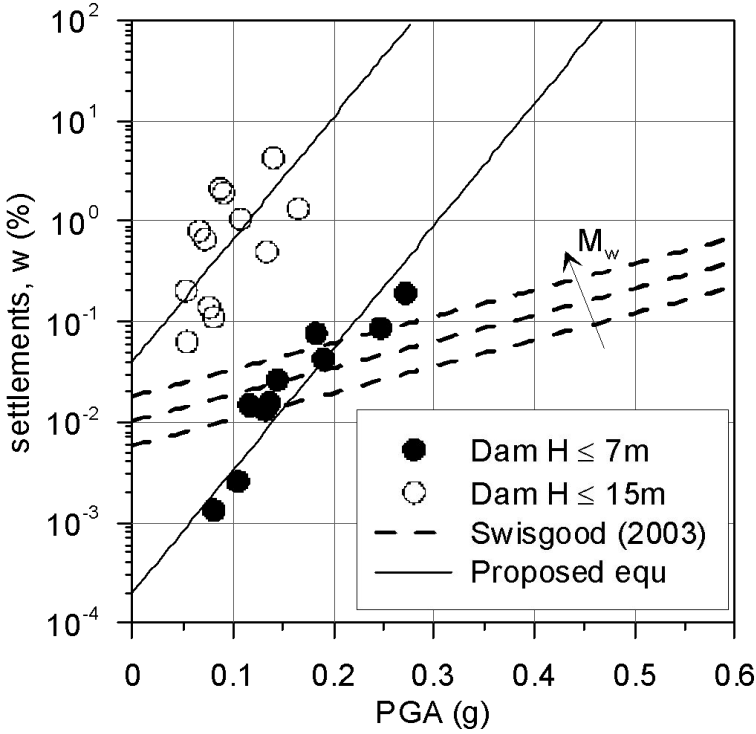
$$w(\%) = \frac{\Delta H_d}{H_d + H_f}(\%) = e^{(6.07 \cdot PGA + 0.57 \cdot M - 8)}$$

$$w(\%) = \frac{\Delta H_d}{H_d + H_f}(\%) = A \cdot e^{\alpha \cdot PGA}$$

$$A = 0.002 \div 0.04 \left(\propto \frac{H_d}{L_c}\right)$$

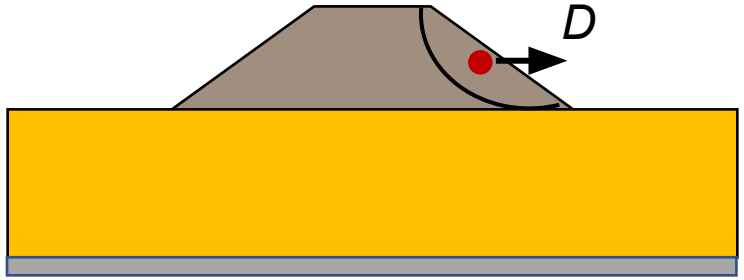
$$\alpha = 28$$





Approcci semplificati: relazioni pseudo-empiriche (Approches simplifiées: relations pseudo-empiriques)

Blake et al., 2002

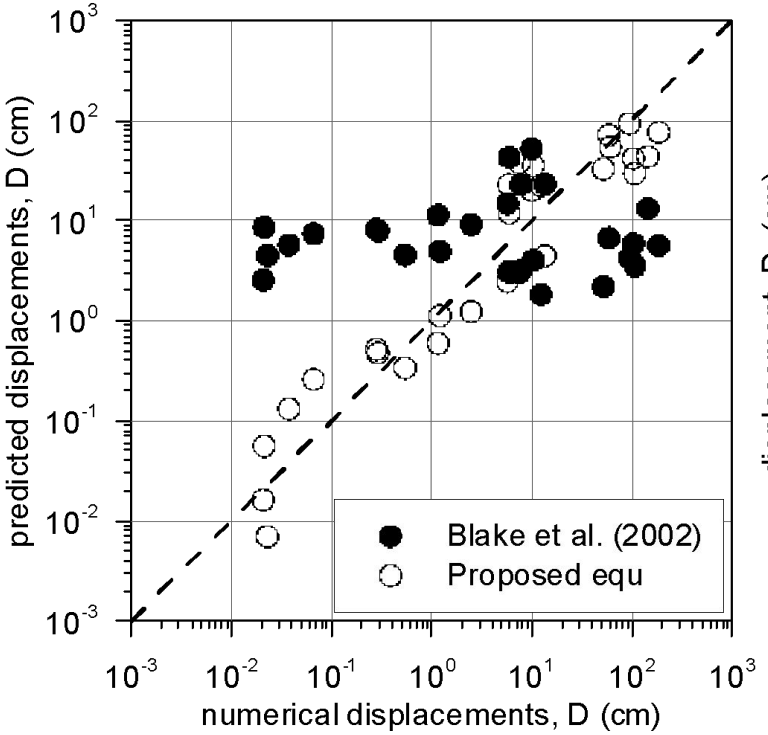


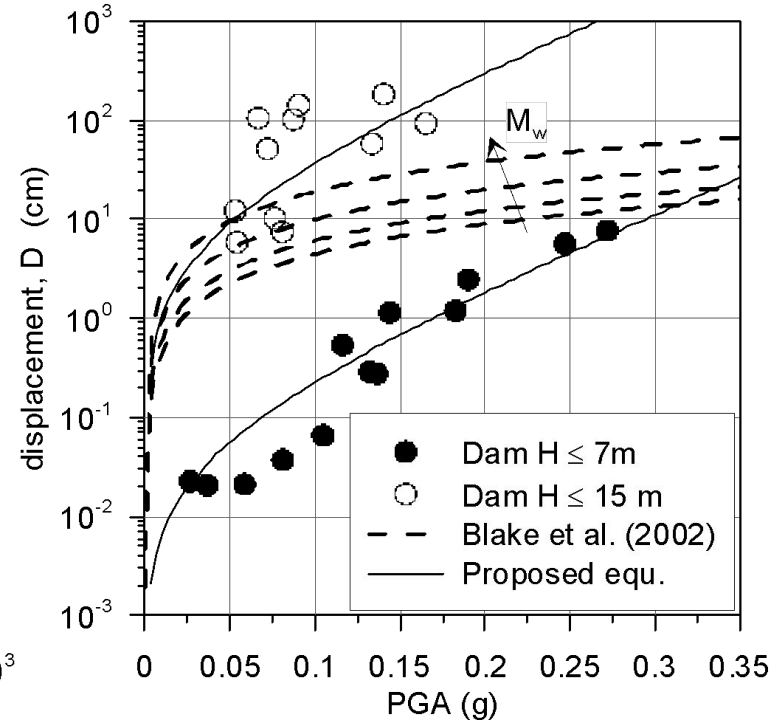
$$D = k_{max} \cdot D_{5-95} \cdot 10^{1.87-3.477\frac{k_y}{k_{max}}}$$

$$D = A \cdot e^{\alpha \cdot PGA} \cdot k_{max} \cdot D_{5-95}$$

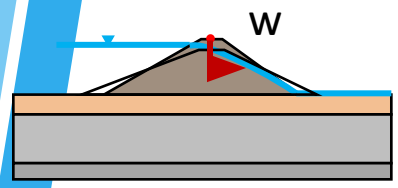
$$A = 0.1 \div 10 \ (\propto \frac{L_b}{L_c})$$

$$\alpha = 14$$



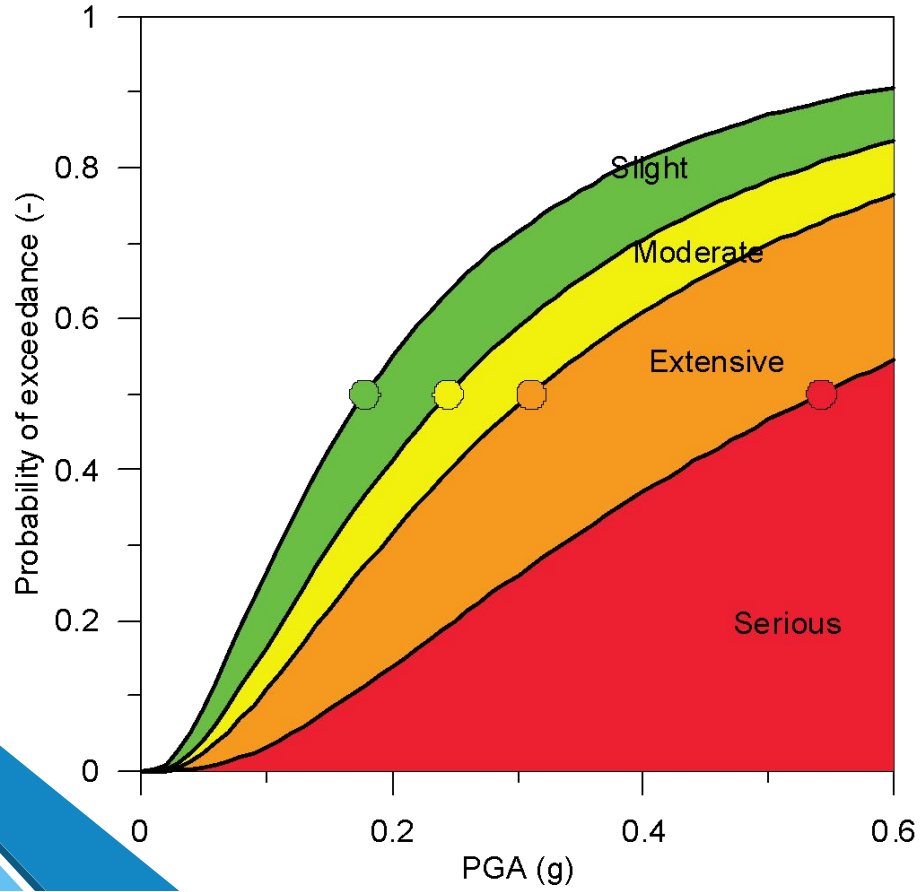


Approccio probabilistico: Curve di fragilità
(Approche probabilistique: courbes de fragilité)

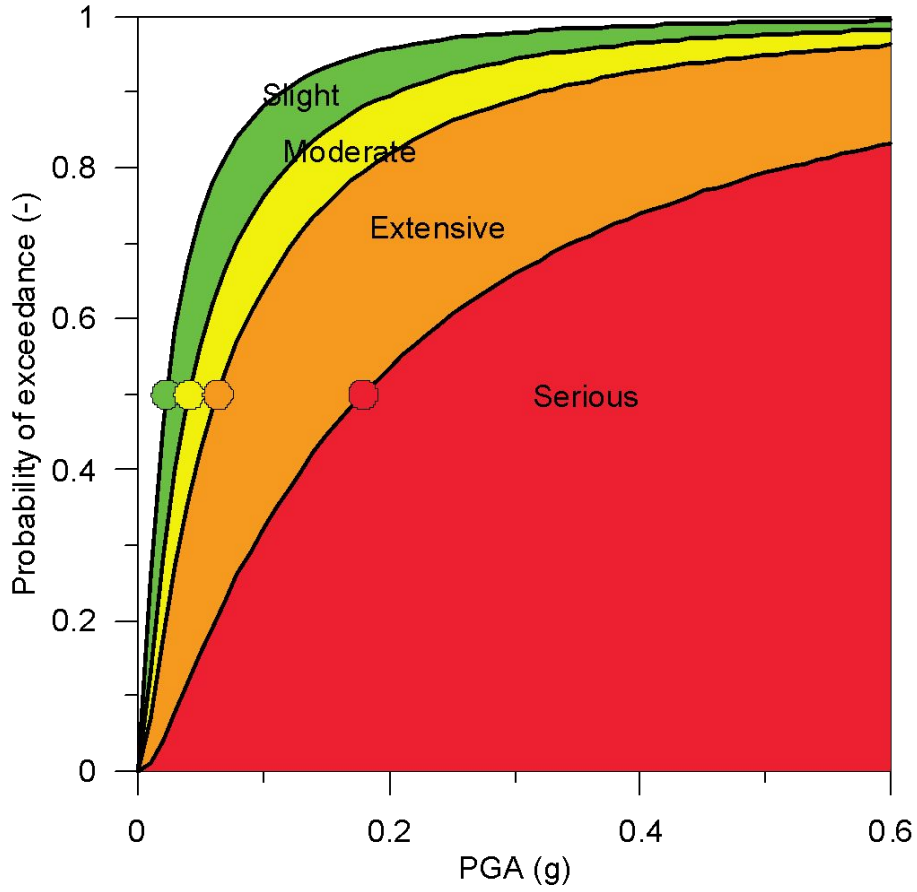


$$P[D \geq d(IM)] = 1 - \phi\left[\frac{1}{\beta_{ds}}\ln\left(\frac{d}{S_D}\right)\right]$$

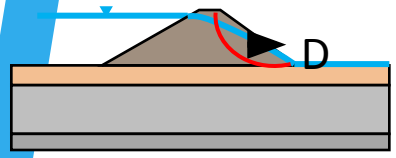
Dam H ≤ 7 m



Dam H ≤ 15 m

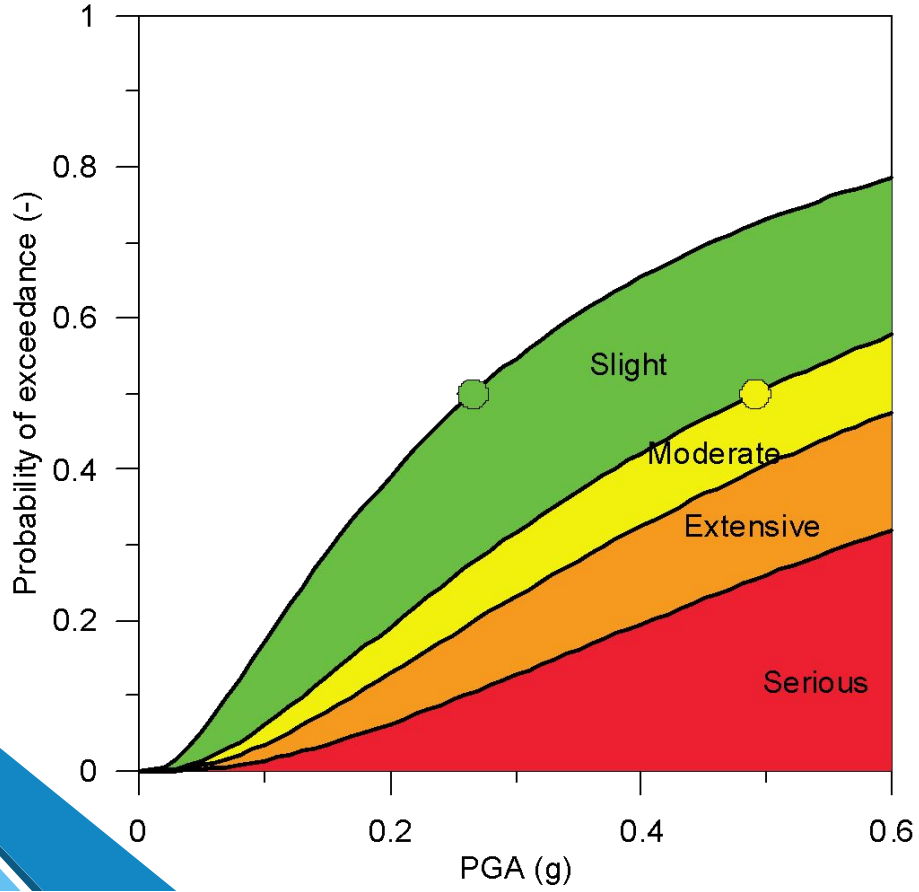


Approccio probabilistico: Curve di fragilità
(Approche probabilistique: courbes de fragilité)

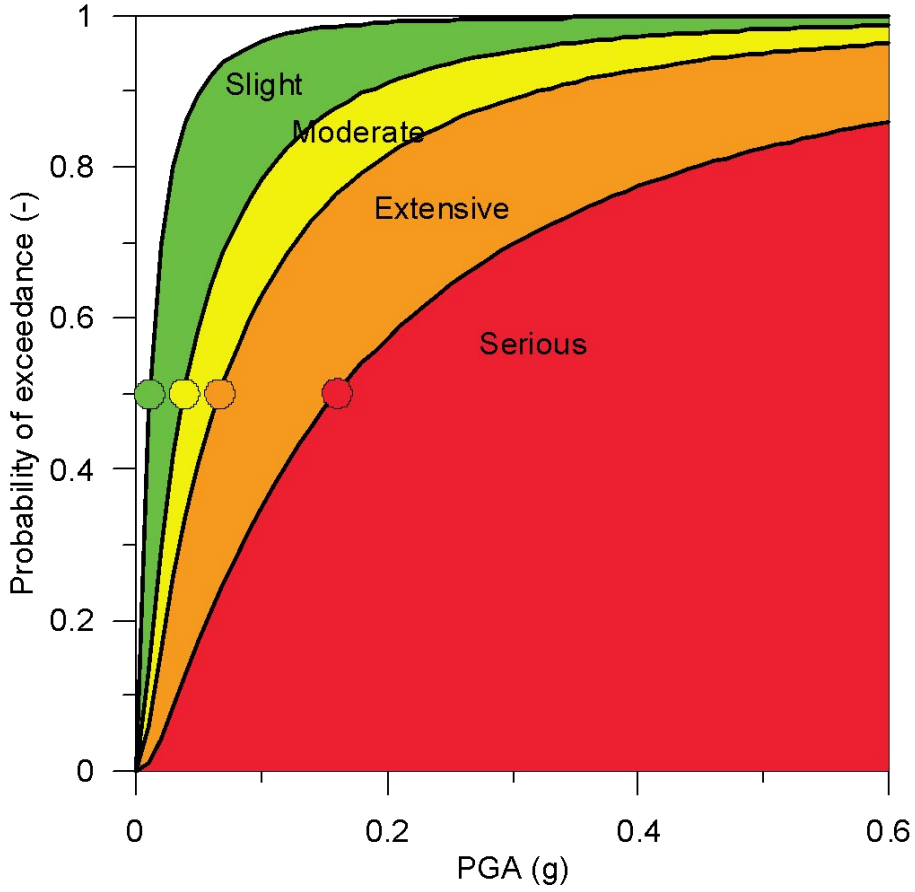


$$P[D \geq d(IM)] = 1 - \phi\left[\frac{1}{\beta_{ds}} \ln\left(\frac{d}{S_D}\right)\right]$$

Dam H ≤ 7 m

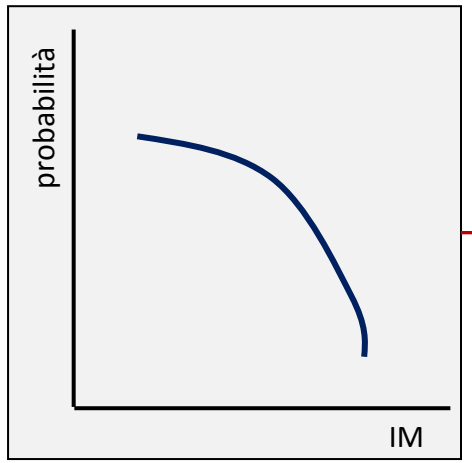


Dam H ≤ 15 m

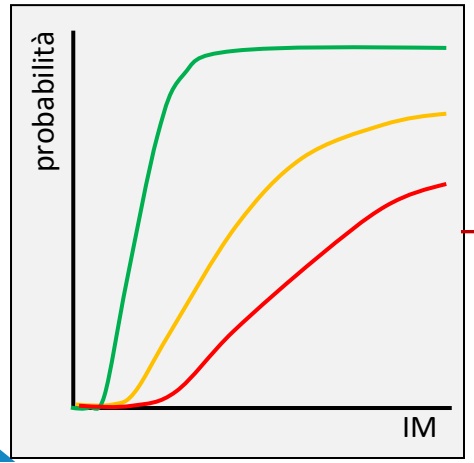


Sviluppi futuri
(Développements futurs)

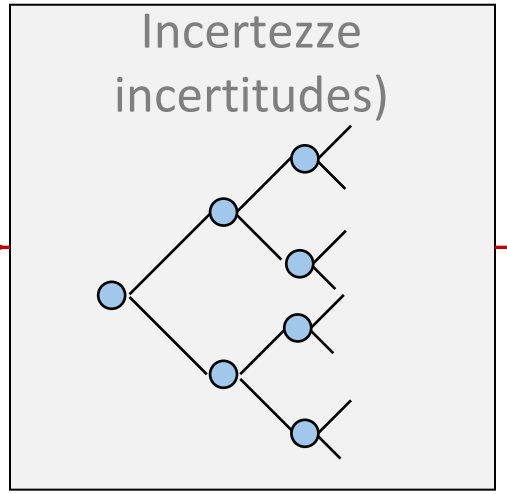
Pericolosità
(Danger)



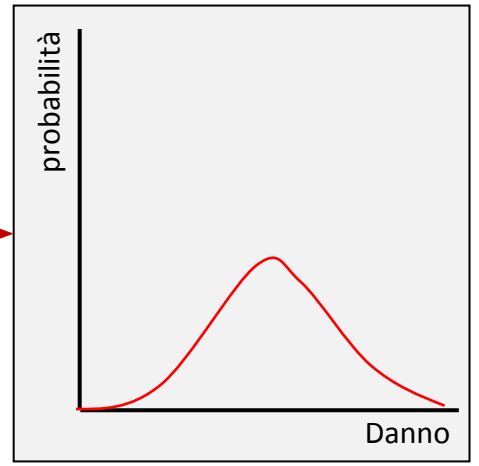
Vulnerabilità
(Vulnérabilité)



Incertezze
incertitudes)



Danno
(Dommage)



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Merci pour l'attention

Ringraziamenti

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Merci

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Webinar

3-4 Dicembre 2020