Improving landslide hazard risk assessments with satellite InSAR

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Why can peat fail?

- Peat is a soft poroelastic organic material.
- Water content influences load, stress or resistance.
- Sudden water input, e.g., heavy rain, may not be accommodated by internal structures such as pores and pipes.

Deficiencies of current hazard risk assessments

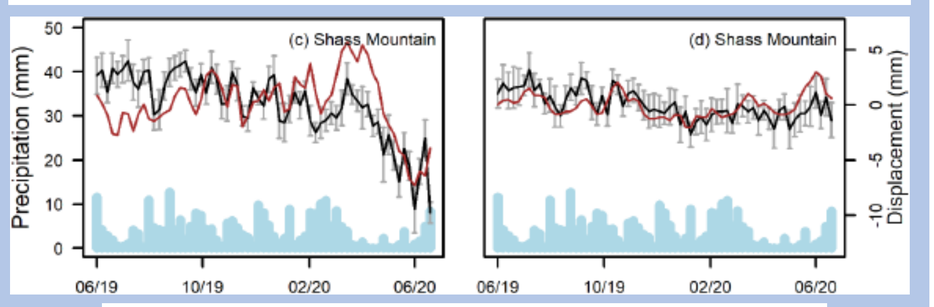
- Based on non-organic soils.
- Little accommodation of highly variable peat properties
- No representation of the response of peat to the changing hydrological conditions.

Better hazard risk mapping is required

- Policy priorities such as forestry, windfarm construction and bog restoration need to be wary of their consequences for peat stability.
- Surface motion can provide some assistance.

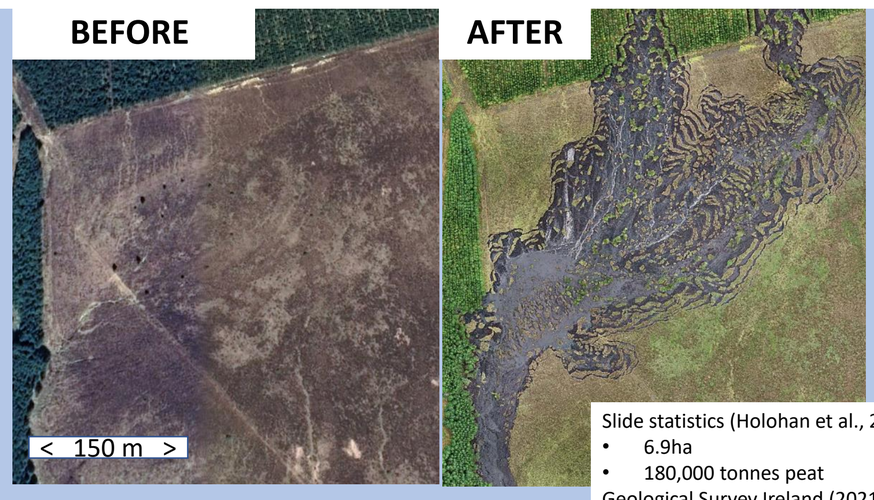
InSAR surface motion data

- We studied satellite derived InSAR APSIS surface motion of three slides in Ireland that occurred in 2020.
- Relative Vertical Surface Motion (RVSM) was calculated in the lead up to the slides.
- The likely failure points of the peat (Dykes 2022) occurred within areas of the most extreme RVSM movements.



RSVM contrasts in slide (c) and non slide area (d)

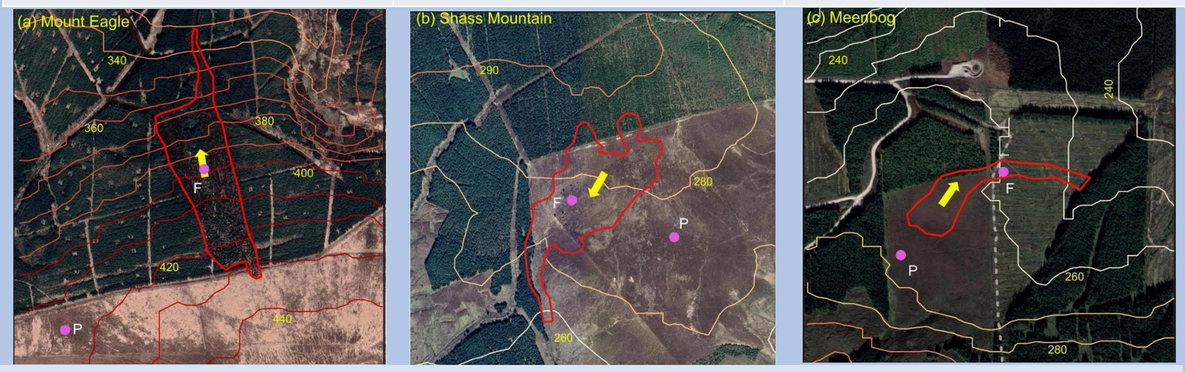
MOUNT SHASS PEAT SLIDE 28 JUNE 2020



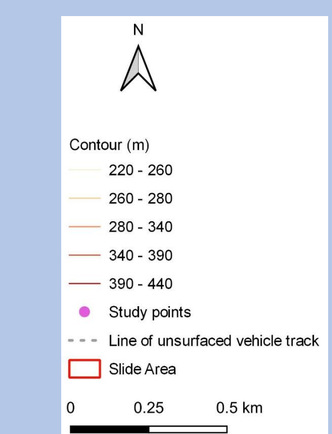
Slide statistics (Holohan et al., 2022)
- 6.9ha
- 180,000 tonnes peat

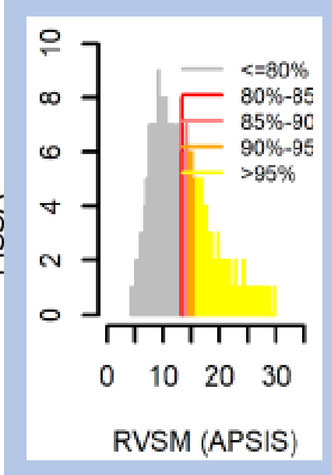
Geological Survey Ireland (2021)
- Hazard risk, low to moderately low

Mount Eagle	Mount Shass	Meen Bog
Dykes 2022 failure descriptions		
Break in convex slope	Break in convex slope, peat dragged in from upslope	Loading by road near failure that then removed lateral support holding area of wet peat upslope



Islam et al 2022 RVSM





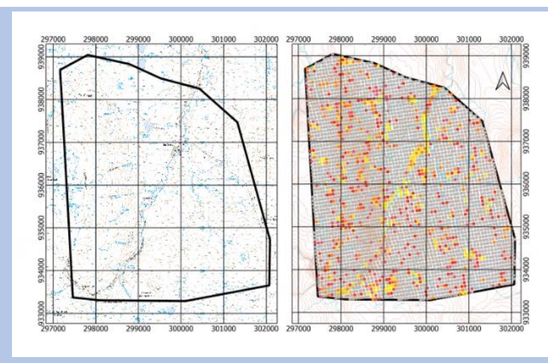
Peat slides have consequences for:

- Carbon storage
- Biodiversity
- Water quality
- Farmland
- Infrastructure

RVSM and the future of peatland hazard risk mapping

- Shows areas that have excessive surface motion.
- Can compliment existing knowledge and fill gaps.
- Prioritise areas that show greatest risk which would need attention, or have not been deemed particularly noticeable.
- We are trialling RSVM maps across different sites with Forestry and Land Scotland.

Glutt, Scotland, Peatland Action restoration site



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