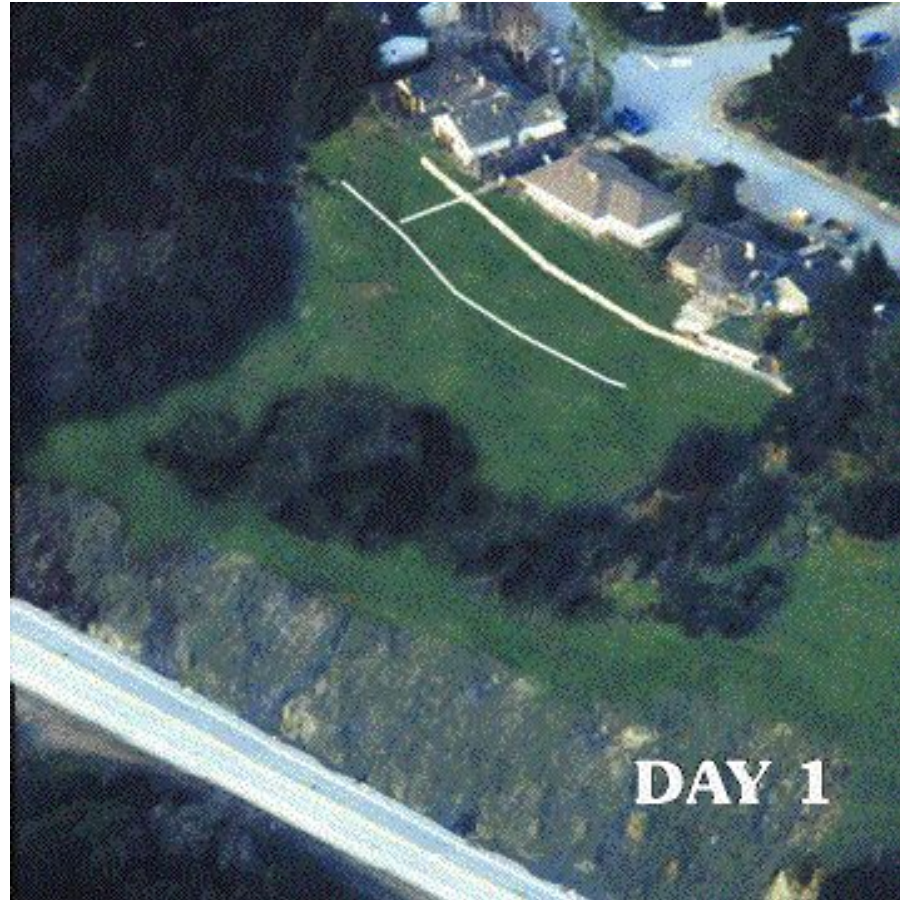


Landslides



Vorobyev
Andrey



- The Mameyes Landslide, in the Mameyes neighborhood of barrio Portugués Urbano in Ponce, Puerto Rico, which buried more than 100 homes, was caused by extensive accumulation of rains and, according to some sources, lightning.



- A **landslide**, also known as a **landslip**, is a geological phenomenon that includes a wide range of ground movements, such as rockfalls, deep failure of slopes and shallow debris flows. Landslides can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability. Typically, pre-conditional factors build up specific sub-surface conditions that make the area/slope prone to failure, whereas the actual landslide often requires a trigger before being released.

Causes

- Landslides occur when the stability of the slope (склон) changes from a stable to an unstable condition. A change in the stability of a slope can be caused by a number of factors, acting together or alone. Natural causes of landslides include:
- groundwater (pore water) pressure acting to destabilize the slope
- Loss or absence of vegetative structure, soil nutrients(питательных веществ), and soil structure (e.g. after a wildfire - a fire in forests lasting for 3–4 days)
- Erosion of the toe of a slope by rivers or ocean waves
- weakening of a slope through(посредством) saturation by snow melt, glaciers(ледник) melting, or heavy rains
- earthquakes adding loads(нагрузка) to barely (едва)stable slope
- volcanic eruptions
- Landslides are aggravated by human activities
- Vibrations from machinery or traffic
- Blasting(взрывы)
- Construction, agricultural or forestry activities (logging) which change the amount of water which infiltrates the soil(почва).

- **Debris flow**



- Slope material that becomes saturated with water may develop into a debris flow or mud flow. The resulting slurry of rock and mud may pick up trees, houses and cars, thus blocking bridges and tributaries causing flooding along its path.
- Debris(селевые) flow is often mistaken for flash flood(паводок), but they are entirely different processes.

- **Earthflows**



- Earthflows are downslope, viscous(вязкий) flows of saturated(насыщенных), fine-grained(мелких) materials. Typically, they can move at speeds from 1 to 20 km/h.
- Though(хотя) these are a lot like mudflows(сель), overall they are more slow moving and are covered with solid material carried along by flow from within. They are different from fluid flows because they are more rapid(быстрые). Clay, fine sand and silt(ил) are all susceptible(подверж.) to earthflows. The velocity of the earthflow is all dependent on how much water content is in the flow itself: if there is more water content in the flow, the higher the velocity will be.

- **Debris landslide**



- A debris slide is a type of slide characterized by the chaotic movement of rocks soil and debris mixed with water or ice (or both). They are usually triggered by the saturation of thickly vegetated slopes which results in an incoherent mixture of broken timber, smaller vegetation and other debris. Debris avalanches differ from debris slides because their movement is much more rapid. This is usually a result of lower cohesion or higher water content and commonly steeper slopes.

- **Sturzstrom**



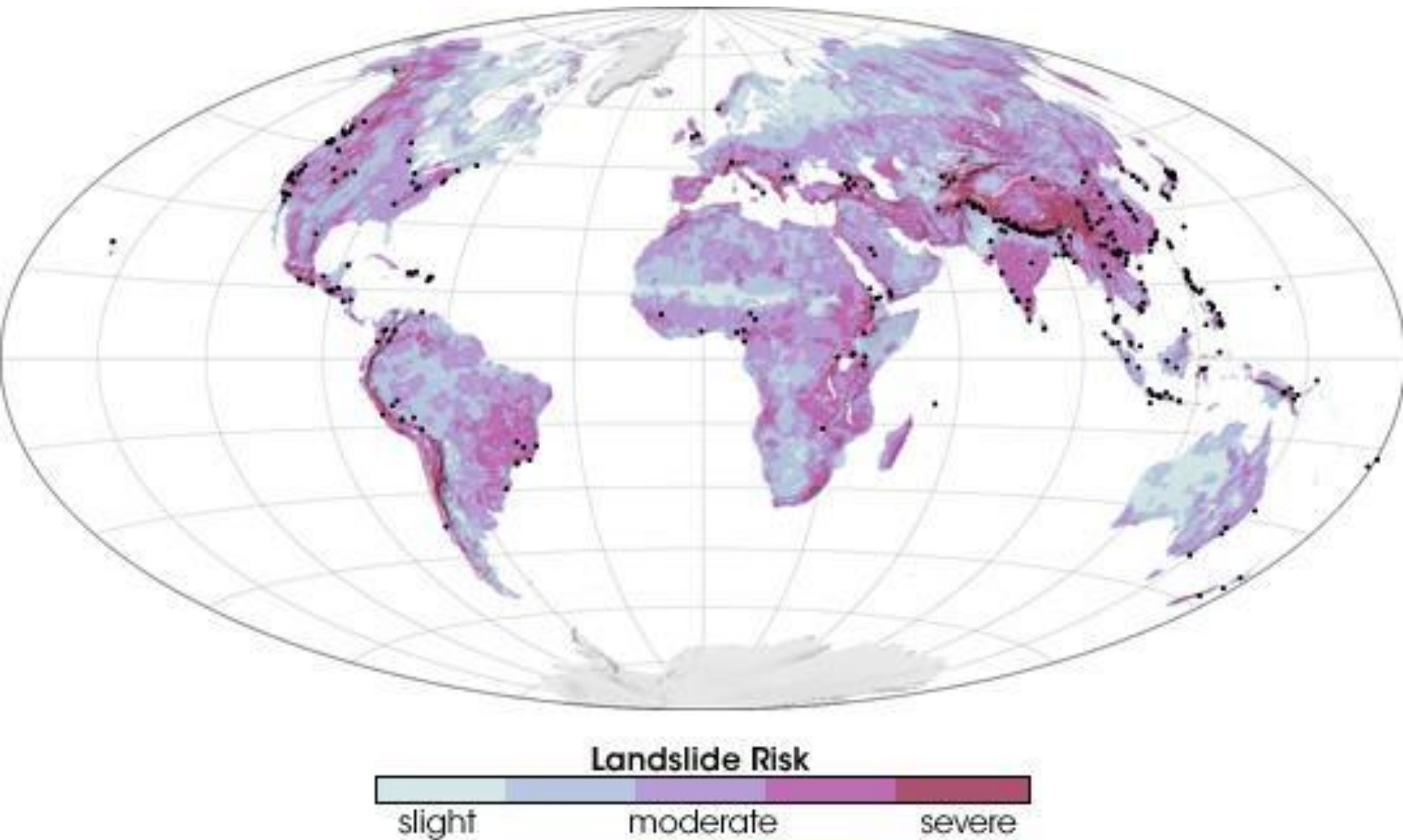
- A sturzstrom is a rare, poorly understood type of landslide, typically with a long run-out. Often very large, these slides are unusually mobile, flowing very far over a low angle, flat, or even slightly uphill terrain.

- **Deep-seated landslide**



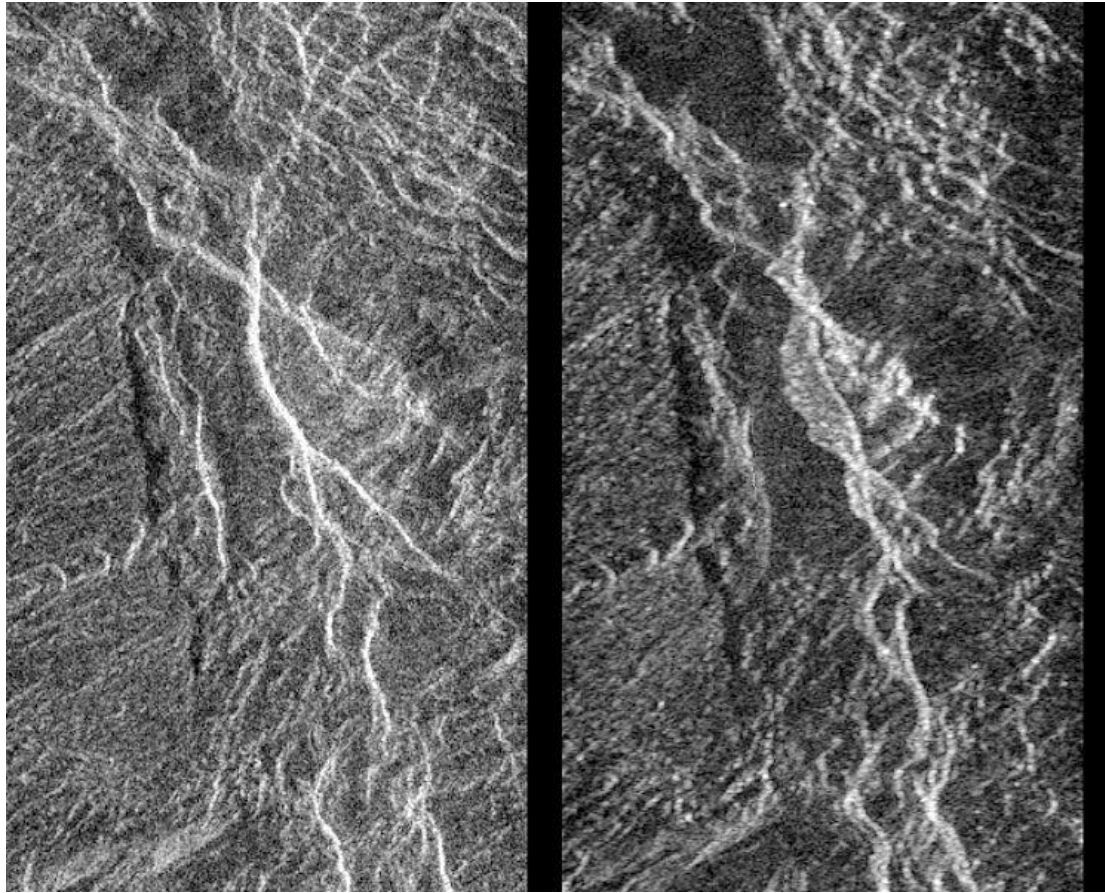
- Landslides in which the sliding surface is mostly deeply located below(НИЖЕ) the maximum rooting depth of trees (typically to depths greater than ten meters). Deep-seated landslides usually involve(ВКЛЮЧАЮТ) deep regolith, weathered rock, and/or bedrock and include large slope failure associated with translational, rotational, or complex movement. This type of landslides are potentially occur in an tectonic active region like Zagros Mountain in Iran. These typically move slowly, only several meters per year, but occasionally move faster. They tend(КАК ПРАВИЛО) to be larger than shallow landslides and form along a plane of weakness such as a fault or bedding plane. They can be visually identified by concave(ВЫГНУТЫЙ) scarps at the top and steep areas at the toe.

Global Landslide Risks





- The landslide at Surte in Sweden, 1950. It was a quick clay slide killing one person.



- Before and after radar images of a landslide on Venus. In the center of the image on the right, the new landslide, a bright, flow-like area, can be seen extending to the left of a bright fracture. 1990 image.



- Landslide in progress on Mars, 2008-02-19