MSc or BSc Thesis: Landslides caused by Atmospheric Rivers along the Coast of British Columbia, Canada

Extreme precipitation events can have a large influence on ecosystems, infrastructure, and water resources. For example, floods caused more loss of life and property damage than any other natural disaster in the United States between 1900 and 1999, while landslides cause an estimated 25–50 deaths and ~$3.5 billion (2001 USD) in damages in the United States annually. The North American West Coast region is particularly susceptible to extreme precipitation events, subsequent flooding, and **landslides**. A majority of the annual precipitation and extreme precipitation events along the U.S. West Coast are attributed to landfalling **atmospheric rivers (ARs)**. ARs are typically characterized by water vapor flux from lower latitudes (so-called 'pineapple express') along enhanced corridors of integrated water vapor (IWV) and IWV transport (IVT) that can result in orographic precipitation along coastal and inland mountain ranges (Neiman et al., 2008). ARs are therefore blamed to produce landslides given favorable antecedent conditions (e.g., saturated soils and/or prior wildfire activity).

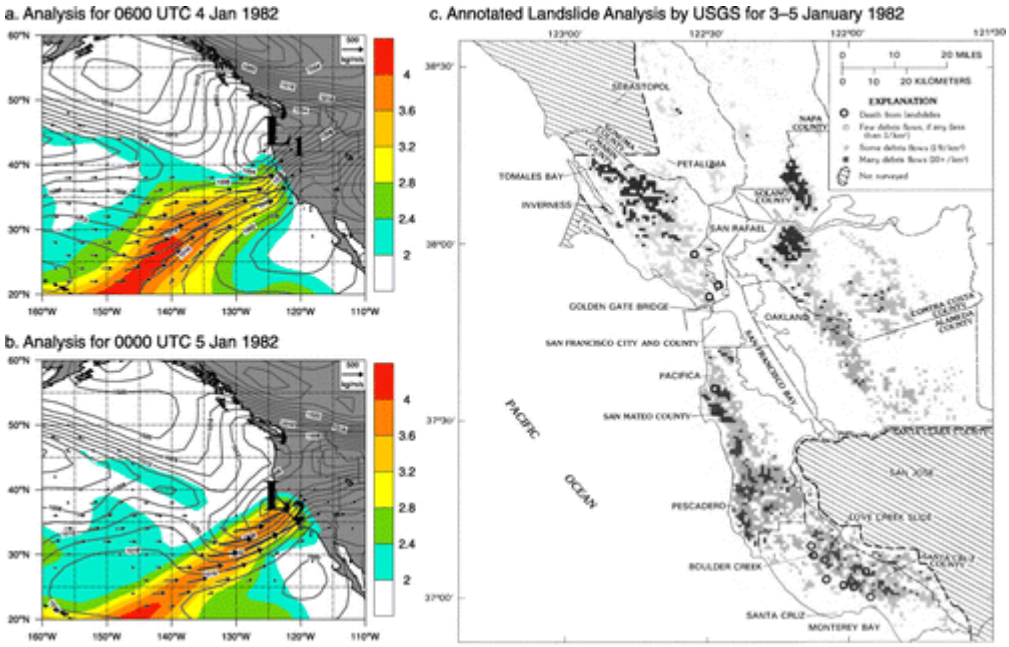

Figure 1. (a),(b) Sea level pressure (hPa; gray contours with labeled storms L1 and L2), IWV (cm; shaded according to scale), and IVT vectors from the NOAA 20CR, and (c) annotated analysis by the USGS showing distribution of mapped debris flows and locations of deaths caused by landslides during 3–5 Jan 1982. (Cordeira et al., 2019)

The aim of this thesis project is to study landslides associated with hillslope failures primarily involving carbon-rich soils that mobilize during or soon after the landfalling of ARs along the steep coast of British Columbia, BC. To this end, we apply the LandslideProbability component of the Landlab modeling environment (Strauch et al., 2018) and test for critical soil water recharge rates by feeding the model with Integrated Vapor Transport dataset downscaled to 500m. This project may be co-supervised by Dr. William Floyd, Vancouver Island University (only on Master thesis level). Beside interest in ecogeomorphic work, skills in statistical modelling, preferably in R, the willingness to learn Landlab is required. Interested? Contact Christian Mohr (cmohr@uni-potsdam.de)