

# The Avalanche Risk Exposition Compass: A New Geological Magnetic Compass for Geosciences Field Education and Public Avalanche Safety

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## AREC

### AVALANCHE RISK EXPOSITION COMPASS

#### Objectives:

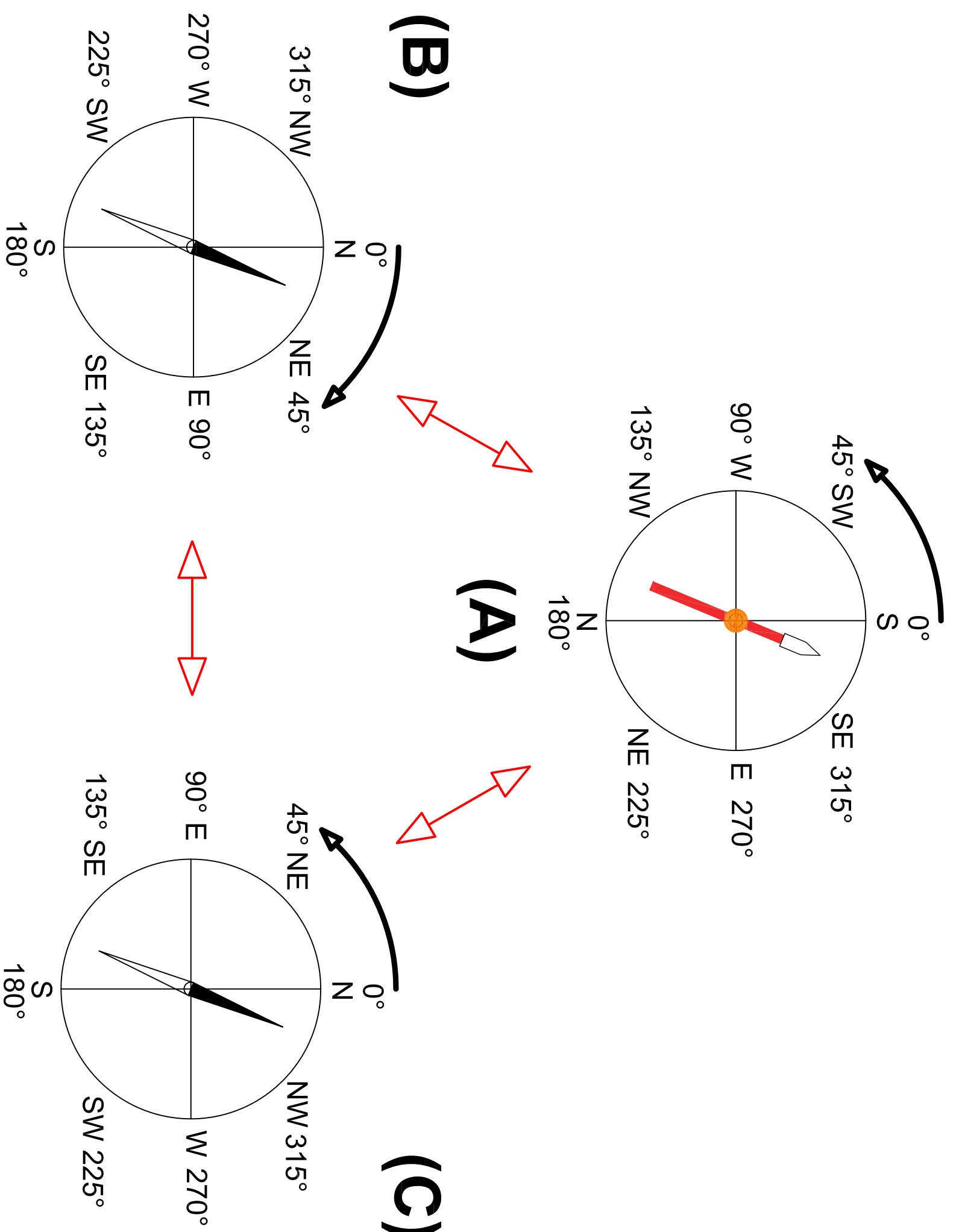
- **Improving avalanche risk awareness and education** by means of a cheap and easy to handle toolkit.
- **Visualizing...**
  - ... numbers (statistics), ...
  - ... pictograms / icons, or ...
  - ... oral / written informationfrom regional / local avalanche risk reports / experts.
- **Measuring ...**
  - ... current wind directions or
  - ... past wind directions from „fossil“ indicators like dunes or zastrugis.

#### Major target groups:

- Backcountry recreationists
- School teachers, university and ski instructors
- Professional mountain guides
- Military, forestry, hunters, mountain rescue teams
- Geoscientists
- (...)

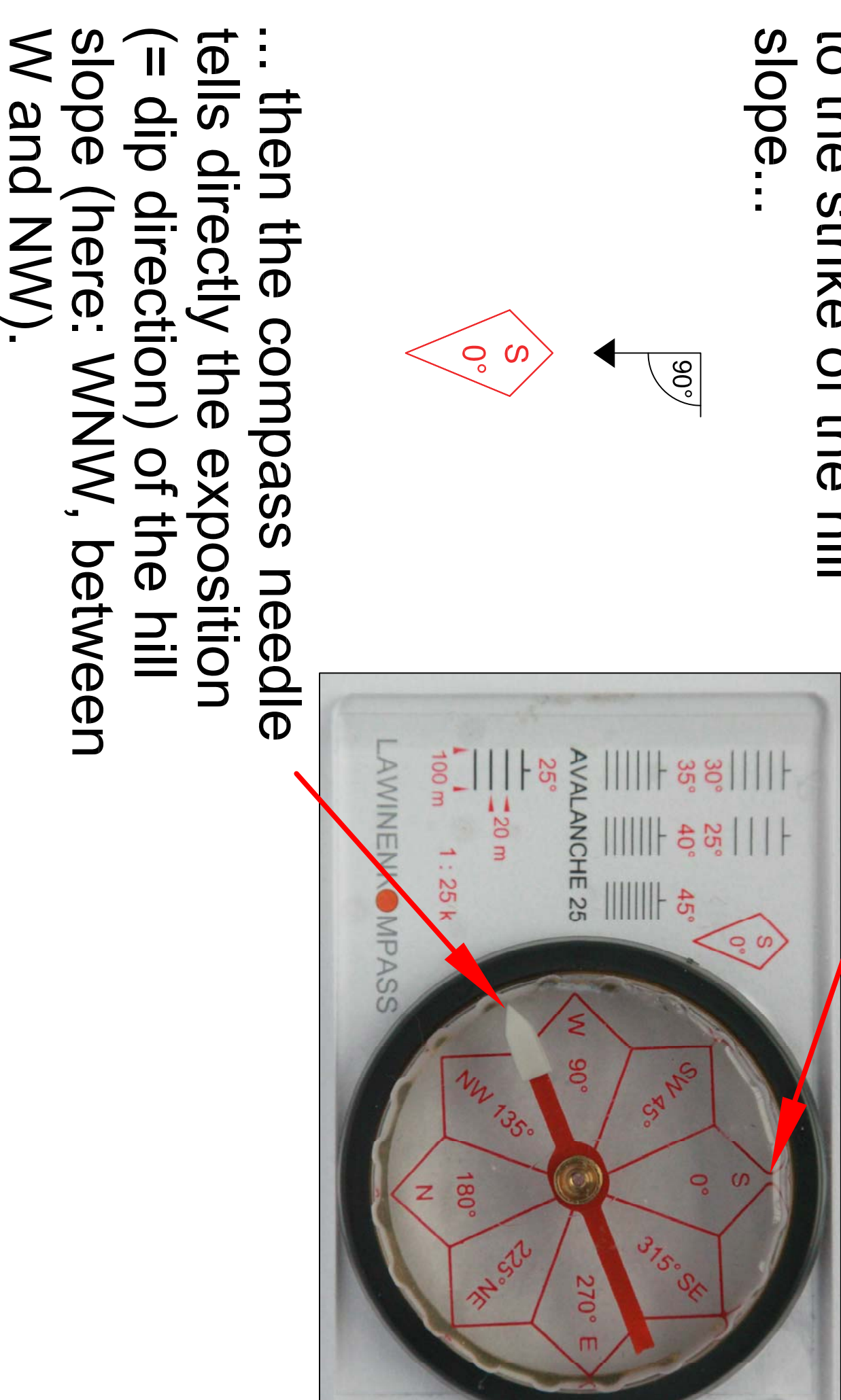
#### What is new and different?

Compare AREC (A) to the normal sighting compass (B) and the geological compass (C)



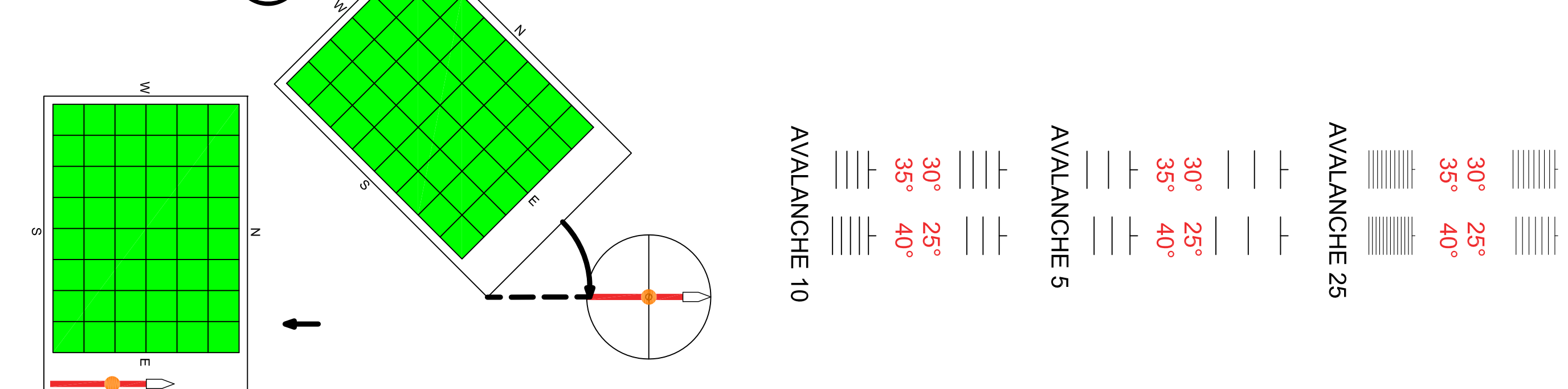
## User Guide

Using AREC is quite simple:  
The sighting direction south (**S**) must point **perpendicular** to the **contour line** of the map (or an imaginary contour line in the field). In other words (or for geologists): Once the E – W direction is aligned parallel to the strike of the hill slope, the compass will measure the dip direction of the slope via **S**.  
If the sighting direction **S** points perpendicular to the strike of the hill slope...



If you use the compass together with a map, the **first step** is to **choose a compass with an inclination scale adjusted to match the scale of the map**. If the scale of your map is 1 : 25 000, take an AVANCE 25.  
If you use an air photograph with contour lines in the scale 1 : 5 000, take an AVANCE 5. For education, a map scale of 1 : 10 000 is appropriate (AVANCE 10).

The next step is to **orient the map or air photograph towards North**. For this you **align the meridians with the pointer**. This means that „up“ in the map or air photograph is pointing North. Now everything on the map (or the air photograph) is in the same direction as in reality. Consequently, you use **AREC on the map or the air photograph in the same way as you use it in the field**.



### 1. Combining AREC with statistical information

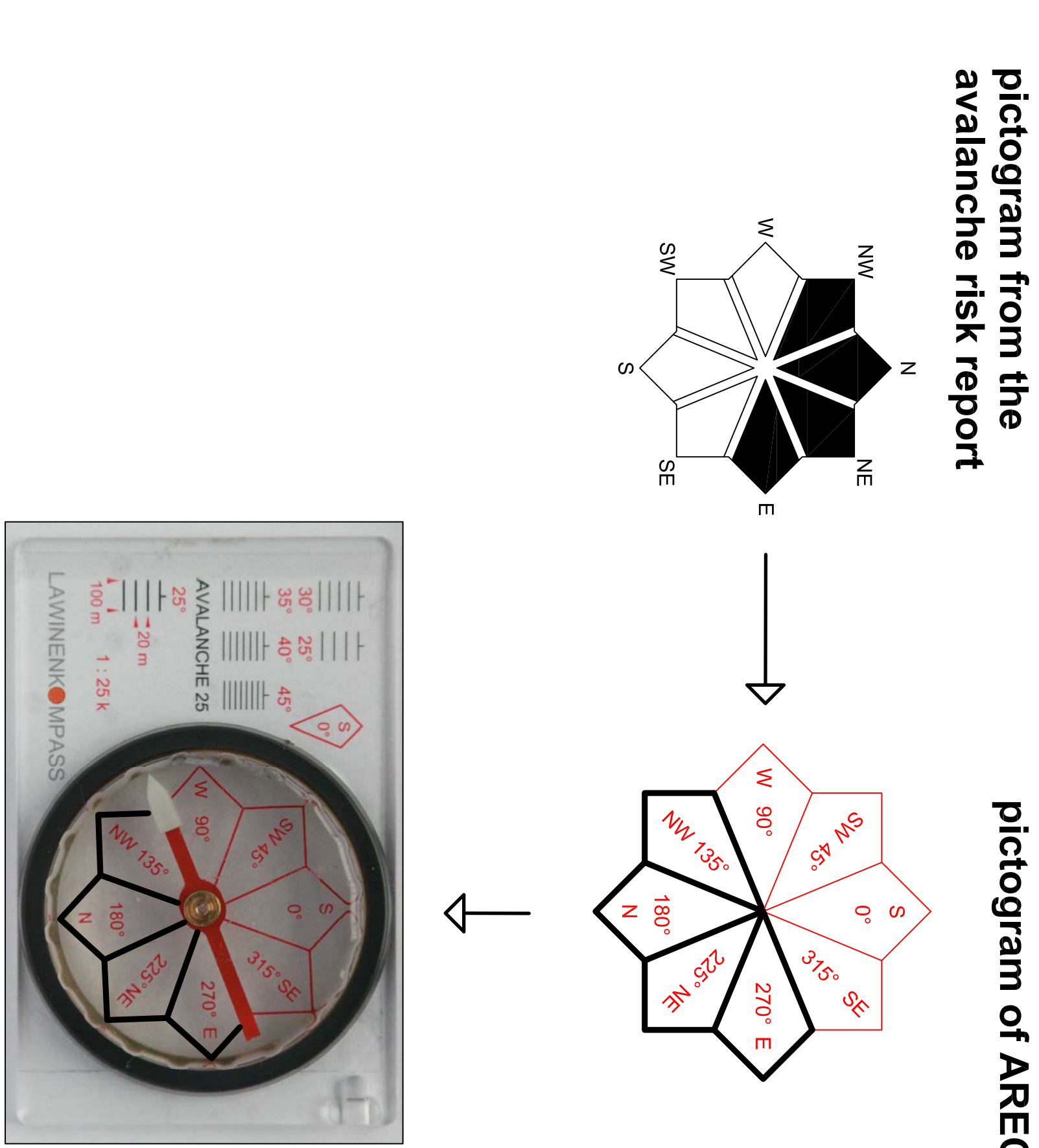
- a) Most (50 % to 60 %) fatalities occur in the sector NW – NE.
- b) If you generally want to avoid this sector because of your personal risk management strategy, just colour the respective direction indicators NW, N and NE of your compass, as it is shown below.



- c) You may now identify any hill slope on the map, the air photograph or in the field belonging to that group by pointing with the sighting direction south (**S**) perpendicular to the strike of the respective hill slope.
- d) AREC tells you, whether you point at an exposition which belongs to a group of expositions, where statistically 50 % to 60 % of all fatalities occur.
- e) You may now decide whether you want avoid this part of the hill, or not.

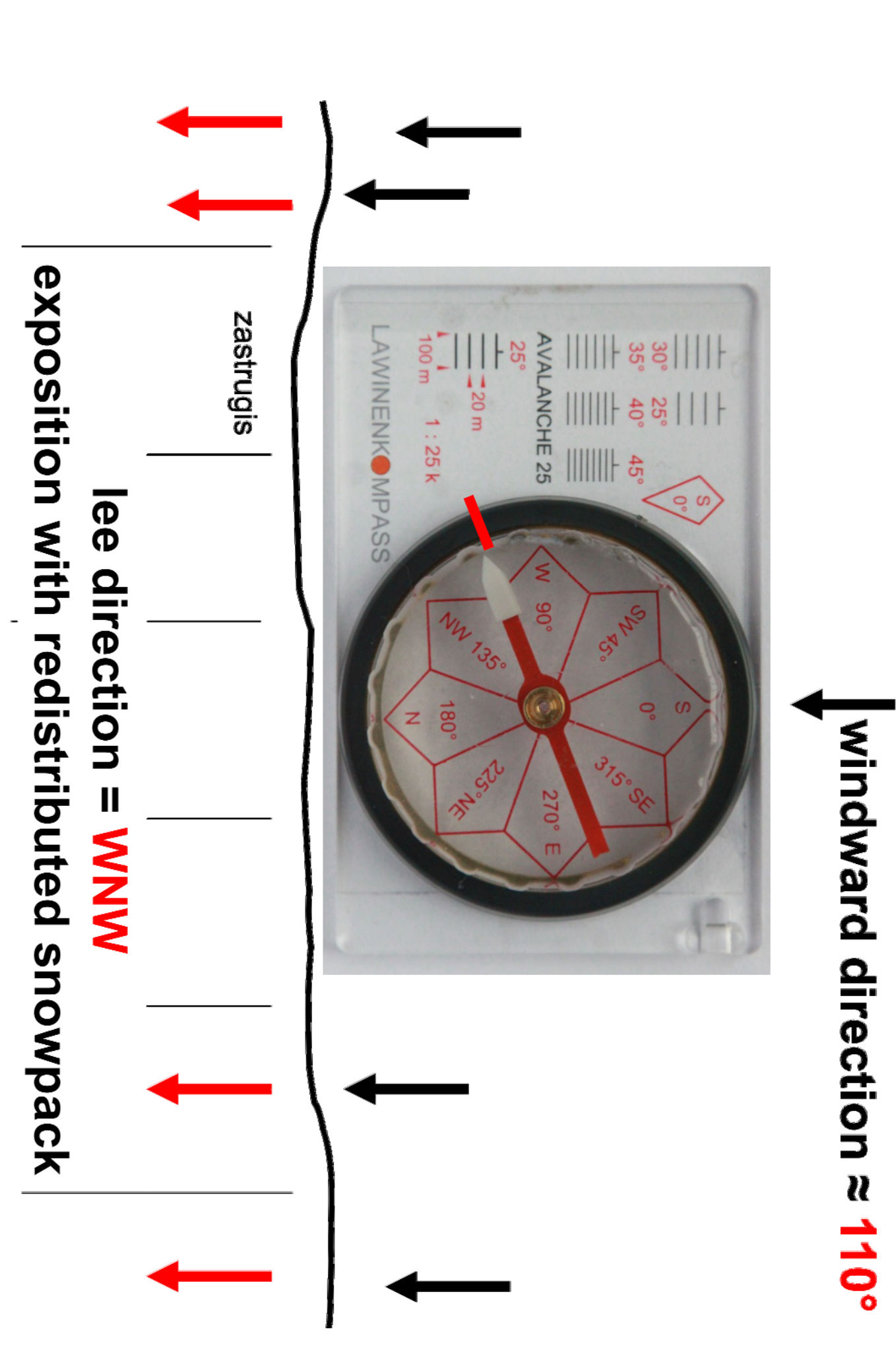
### 2) AREC + information from avalanche risk reports

- a) Translate detailed information (e. g. text, numbers) of the avalanche risk report into „tactical icons“.
- b) The example below is taken from a Bavarian avalanche risk report, publicly available via internet. This report tells the public, that according to the local experts' opinion the **sector fields between NW and E are regarded as dangerous** sectors. The text is translated into a pictogram or icon.
- c) If you want to follow the recommendations of the local experts because of your personal risk management strategy, modify AREC by means of this pictogram and colour the respective direction indicators NW, N, NE and E of your compass, as it is shown below:



### 3) Visualizing “fossil” windward and lee directions

- a) Sometimes there is field evidence for „fossil“ wind directions, e.g. **zastrugis** or dunes, which are not mentioned in the avalanche risk report, because the phenomenon is locally too restricted.
- b) These „fossil“ signs are very important with respect to avalanche safety. They tell not only the windward directions of the past, but also the possible **lee directions**, where redistributed snow accumulations can be expected. Hence, you may get an idea, in which expositions **instable snowpacks** may occur.
- c) In the following example, the zastrugis show a **windward direction of 110°**.



## Exercise

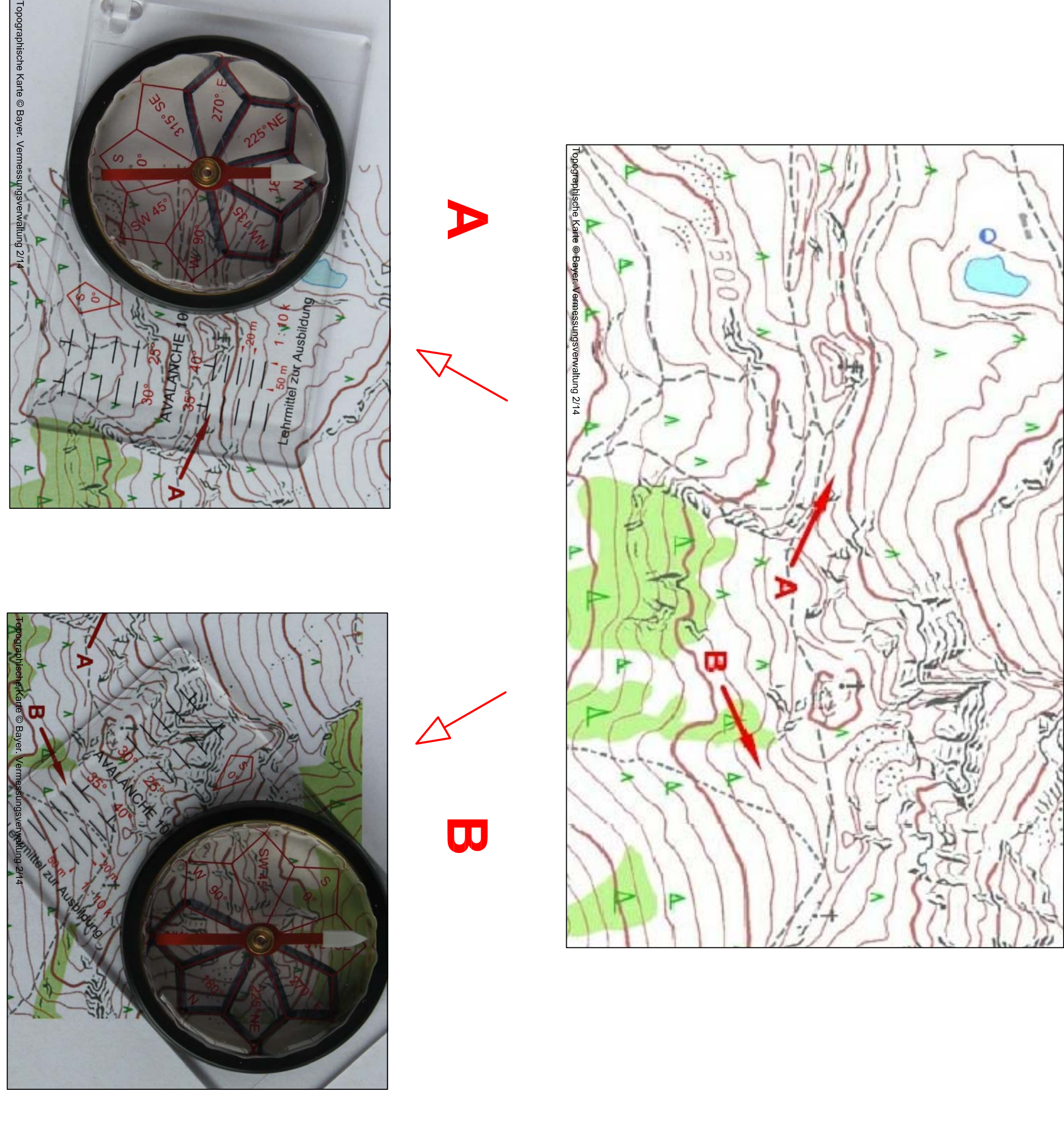
This is an easy exercise as you may use it for teaching in the classroom or for winter field training. The problem to solve is quite simple, but real life:

The story: **After a period of snowstorms, the dangerous expositions at Mount Mousehole are between NW and E. According to the local avalanche risk report, hill slopes with an inclination above 30° should be avoided in these sectors“.**

The question:

Are location A, or location B, or even both locations dangerous places under these circumstances, according to the consensus view of the local experts?

The two locations A and B at Mount Mousehole:



**Location A:** Exposition N, slope 35°

According to the local experts, this is a dangerous place, which should be avoided with respect to avalanche safety!

**Location B:** Exposition SE, slope 35°

This is not a dangerous place, although the hill slope is > 30°. However, according to the risk report, both conditions must be fulfilled, which is not the case.