PICO #1.15
Crossing physical simulations of snow conditions and a spatial model of ski areas to assess ski resort vulnerability

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Building of gravity envelopes for ski areas

Available data (BD Stations)
- DEM
- Ski-lift linear data
- Real estate linked to the resort
Building of gravity envelopes for ski areas

Gravity envelope:
All pixels accessible from the top of the ski-lift which allow the skiers to come back to the foot of any ski-lift in the same resort
Building the ski area gravity envelope

1. From top: find all neighbors pixels in D8 with a lower elevation than central pixel (slight tolerance to consider inertia)

2. From bot: find neighbors pixels with an upper or equal elevation than central pixel

3. Keep the geometries intersection
Building of gravity envelopes for ski areas

Addition of snowmaking area

- Ski-lift near real estate and their own gravity envelope
- Slopes less than 25°
Ski area properties: altitudes

Les Deux Alpes: a well balanced altitude ranges
Les Deux Alpes: a similar pattern to other resorts ...

...with a small imbalance favourable to stronger slopes
The whole resort has a clear trend to the W/NW which is specific characteristic of local resorts.
Assess the viability by crossing ski resort modelling with SAFRAN Crocus snowpack model

- Previous rasters are used to match the correct Crocus output
- Altitude information about ski-lift is used to weight each elevation range and are homogeneously distributed over pixels
- The 100 days rule has been adapt to take into account Crocus-Resort development and consider snow density rather than simple snow height. Here a threshold of SWE $\geq 100$ has been used
Viability assessment between seasons from 2002-2003 to 2011-2012

- Up to a certain threshold of natural snow, grooming play an important role
- Seasons we will carefully look for: 2006-2007 and 2008-2009
Les Deux Alpes held up well to warm winter, thanks to its elevation which secures snow and allows for snow production.
Like other resorts, Les Deux Alpes benefits of a good: grooming and snowmaking certainly help to improve season length.