

Orographic convection session

Chair: Daniel Kirshbaum

Co-chair: Mario Marcello Miglietta

WHITE PAPER

2.1.4 Boundary-layer control of convective pre-conditioning and initiation

2.3.3 Parameterizations of sub-grid-scale processes

2.3.4 Forecast uncertainty and predictability issues

Main points in White Paper (2.1.4 Boundary-layer control of convective pre-conditioning and initiation)

i) INITIATION

ii) PRECONDITIONING

iii) THEORY

iv) MESOSCALE INTERACTIONS

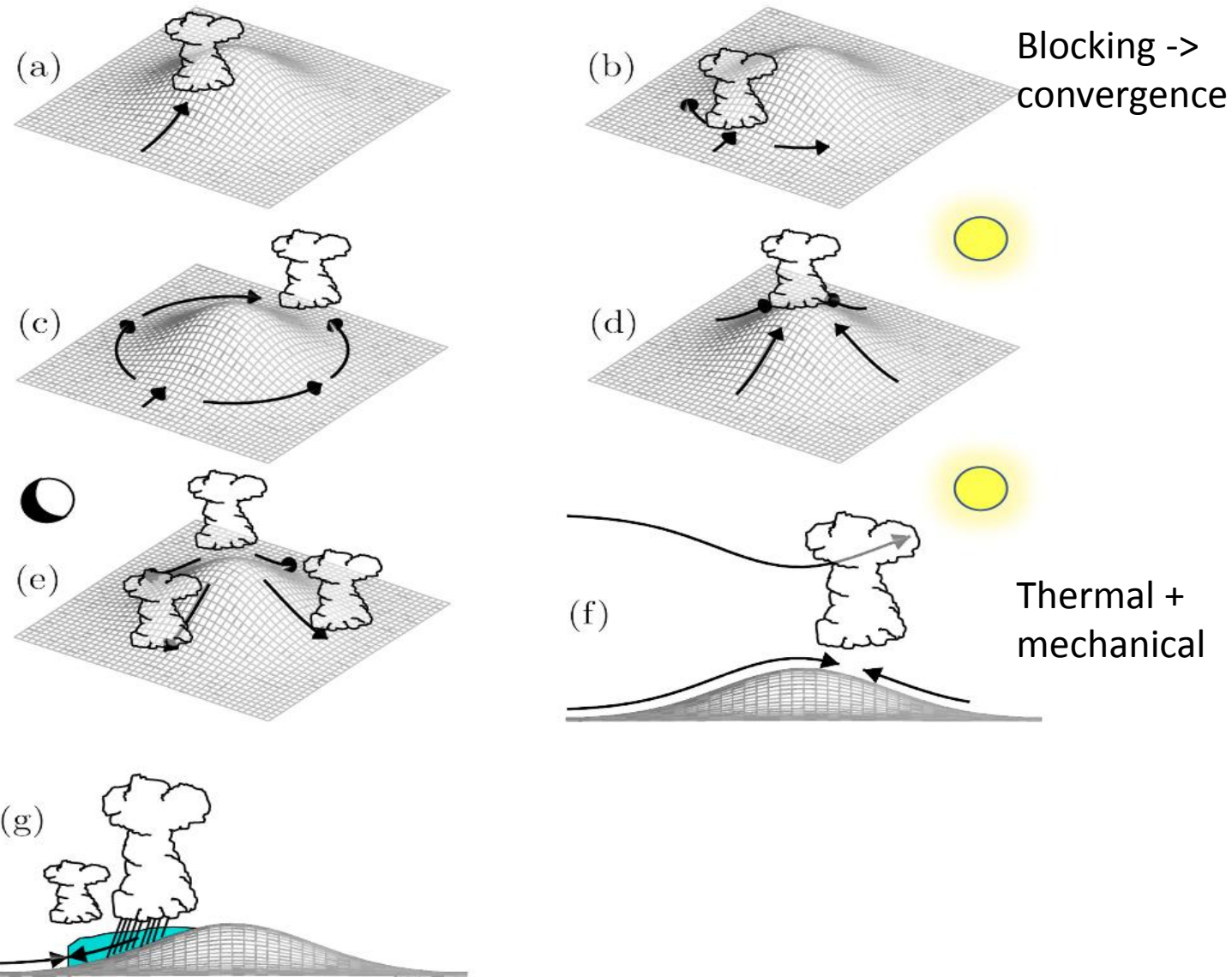


Figure 6. Schematic of basic mechanisms of convective initiation over mountains: (a) forced ascent, (b) upstream blocking, (c) lee-side convergence, (d) thermally forced anabatic flow and convection over the crest, (e) nocturnal katabatic flow and convection near the mountain base, (f) lee-side thermally driven upslope flow and gravity-wave ascent aloft, (g) quasi-stationary cold pool beneath precipitating convection.

Kirshbaum et al. (2018)

Aims of the discussion

- i) Review relevant parts of TEAMx **White Paper**, determine (and, time permitting, draft) necessary modifications
- ii) Define the most pressing **scientific questions**
- iii) Develop concrete **plans for future activities** (e.g., observations, numerical experimentation, theory, target regions, etc.) to address the above questions
- iv) Establish a **working group** on orographic convection to interface with TEAMx and broader meteorology community

Aims of the discussion

i) Review relevant parts of TEAMx **White Paper**, determine (and, time permitting, draft) necessary modifications

More focus on triggering (relevant on plains or on the side of the mountains)

Need to distinguish primary from secondary triggering

Less focus on mesoscale interactions (“Finally, ... topographically-induced internal gravity waves and other lifting mechanisms in the initiation of nocturnal convection near mountains still has to be firmly established” should be reduced)

Interaction with Marine Boundary Layer

Katabatic flow and different breeze systems

Aims of the discussion

ii) Define the most pressing **scientific questions**

- What does mountain meteorology cover? The effect of the mountains may extend over long distances: can we consider Po Valley area as part of mountain meteorology studies?
- Mountains **produce distant uplift** and **precondition convection over plains**: Is it really within TEAMx aims?

Aims of the discussion

ii) Define the most pressing **scientific questions**

- The structure of PBL in valleys may dramatically affect the triggering in mountain areas and in plains. **Valley stratification** is critical not only for dry but also for moist meteorology
- Valley and sea **breeze** also important
- **Pan-Alpine climatology of convective initiation** (indication for field campaign): diurnal and seasonal influence
- **Parameterization of convection** in climate models

Aims of the discussion

iii) Develop concrete **plans for future activities** (e.g., observations, numerical experimentation, theory, target regions, etc.) to address the above questions

- Large advancement in remote sensing (e.g., LIDAR, cloud radar, GPS). Some RAMAN systems might be available in the area of operations. Vertical profiles up to 5 km.
- Useful observational instruments: Raman Lidars, Doppler wind LIDAR, Disdrometers, MW radar, Cloud radar, GPS, Thetered balloons, Mesonets, Multiple Doppler radars
- Proposal for DOE/ARM (mobile facility)

Aims of the discussion

iii) Develop concrete **plans for future activities** (e.g., observations, numerical experimentation, theory, target regions, etc.) to address the above questions

- Target areas: Primary and secondary initiation hotspots identified in Austria, in Switzerland between Jura mountains and Alps, and in Garda Lake. NE Po Valley seems to be a strong candidate as target area.
- Target areas: seek regions with good polarimetric coverage for verification
- Numerical experimentation: should we focus more on idealized studies? Initiation over semi-idealized mountains with/without parameterized PBL
- Observational versus model climatology of initiation locations

Aims of the discussion

iv) Establish a **working group** on orographic convection to interface with TEAMx and broader meteorology community