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Sommario/riassunto	<p>Mountainous regions occupy a significant fraction of the Earth's continents and are characterized by specific meteorological phenomena operating on a wide range of scales. Being a home to large human populations, the impact of mountains on weather and hydrology has significant practical consequences. Mountains modulate the climate and create micro-climates, induce different types of thermally and dynamically driven circulations, generate atmospheric waves of various scales (known as mountain waves), and affect the boundary layer characteristics and the dispersion of pollutants. At the local scale, strong downslope winds linked with mountain waves (such as the Foehn and Bora) can cause severe damage. Mountain wave breaking in the high atmosphere is a source of Clear Air Turbulence, and lee wave rotors are a major near-surface aviation hazard. Mountains also act to block strongly-stratified air layers, leading to the formation of valley cold-air pools (with implications for road safety, pollution, crop damage, etc.) and gap flows. Presently, neither the fine-scale structure of orographic precipitation nor the initiation of deep convection by mountainous terrain can be resolved adequately by regional-to global-scale models, requiring appropriate downscaling or parameterization. Additionally, the shortest mountain waves need to be parameterized in global weather and climate prediction models, because they exert a drag on the atmosphere. This drag not only decelerates the global atmospheric circulation, but also affects temperatures in the polar</p>

stratosphere, which control ozone depletion. It is likely that both mountain wave drag and orographic precipitation lead to non-trivial feedbacks in climate change scenarios. Measurement campaigns such as MAP, T-REX, Matterhorn, COLPEX and i-Box provided a wealth of mountain meteorology field data, which is only starting to be explored. Recent advances in computing power allow numerical simulations of unprecedented resolution, e.g. LES modelling of rotors, mountain wave turbulence, and boundary layers in mountainous regions. This will lead to important advances in understanding these phenomena, as well as mixing and pollutant dispersion over complex terrain, or the onset and breakdown of cold-air pools. On the other hand, recent analyses of global circulation biases point towards missing drag, especially in the southern hemisphere, which may be due to processes currently neglected in parameterizations. A better understanding of flow over orography is also crucial for a better management of wind power and a more effective use of data assimilation over complex terrain. This Research Topic includes contributions that aim to shed light on a number of these issues, using theory, numerical modelling, field measurements, and laboratory experiments.
