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On the colour of snow, why does it matter?

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Snow is the most reflective surface on Earth. Snow often reflects the major part of the incoming solar radiation in the visible wavelengths. Hence snow cover has a crucial role to play in maintaining the Earth's climate. This whiteness and its subtle variations with the snow properties, namely snow microstructure and light absorbing impurities content, are responsible for several highly efficient snow-atmosphere feedbacks. In the context of rising temperatures, theses feedbacks accelerate snow metamorphism, darkening and melting, causing the unavoidable loss of white snow cover. This is why the optical properties of snow must be investigated, measured and modelled so that we can better understand and predict these complex feedbacks.

I will summarize my work on the measurements and modelling of the snow optical properties in the lab, in the field and from space. This talk will also demonstrate how this knowledge on the snow optical properties can be used to improve our understanding and modelling of the snow cover evolution for several applications such as avalanche forecasting and water resources.