

Particle and flow dynamics in wall-bounded environments

Modeling & simulation of particle agglomeration

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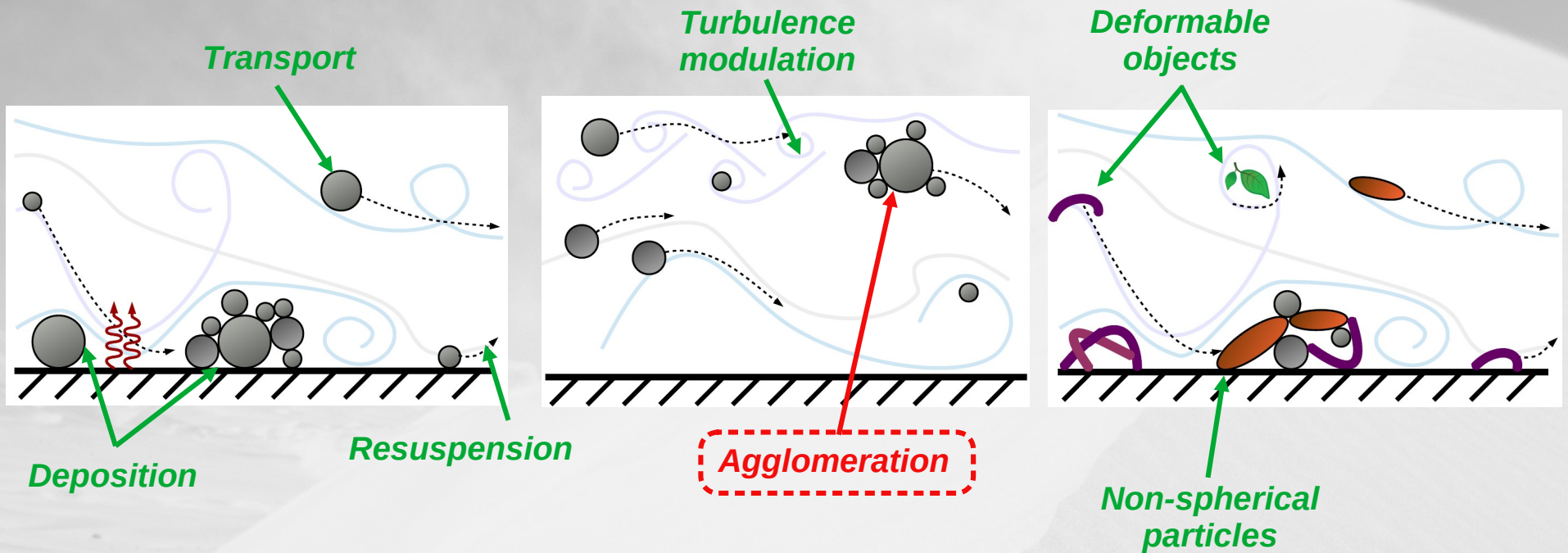
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General context: Physics at play

- What are the key mechanisms in dispersed two-phase flows?



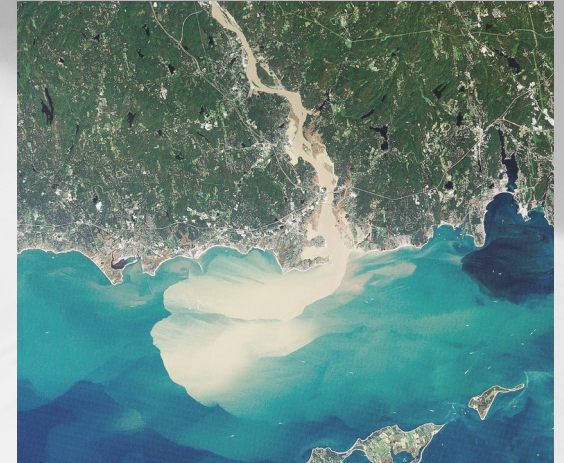
A range of physico-chemical mechanisms

General context: Applications

- **What are the applications for particle agglomeration?**

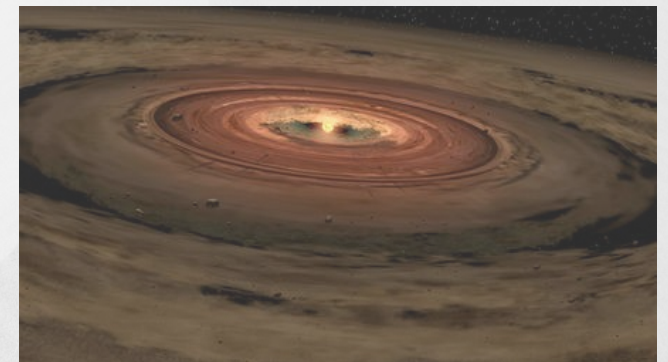
- Environmental applications:

- Geo-morphology: Sedimentation in river delta formation
- Meteorology: Formation of clouds
Droplet growth
- Astrophysics: Growth of dust in planet formation



- Industrial applications

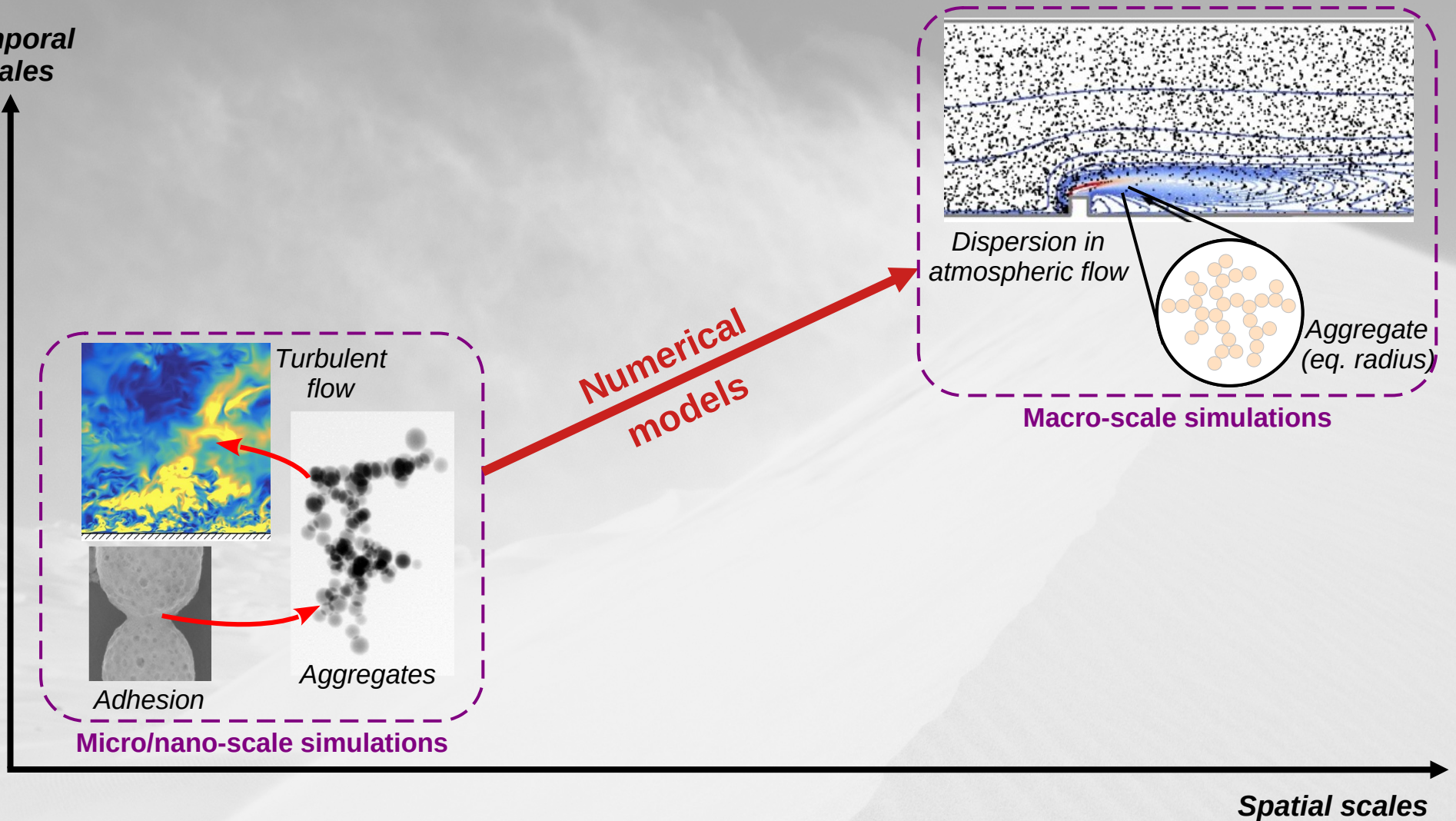
- Waste-water: Separation through settling
Flocculation
- Combustion: Growth of soot particles
- Food industry: Dry milk powders



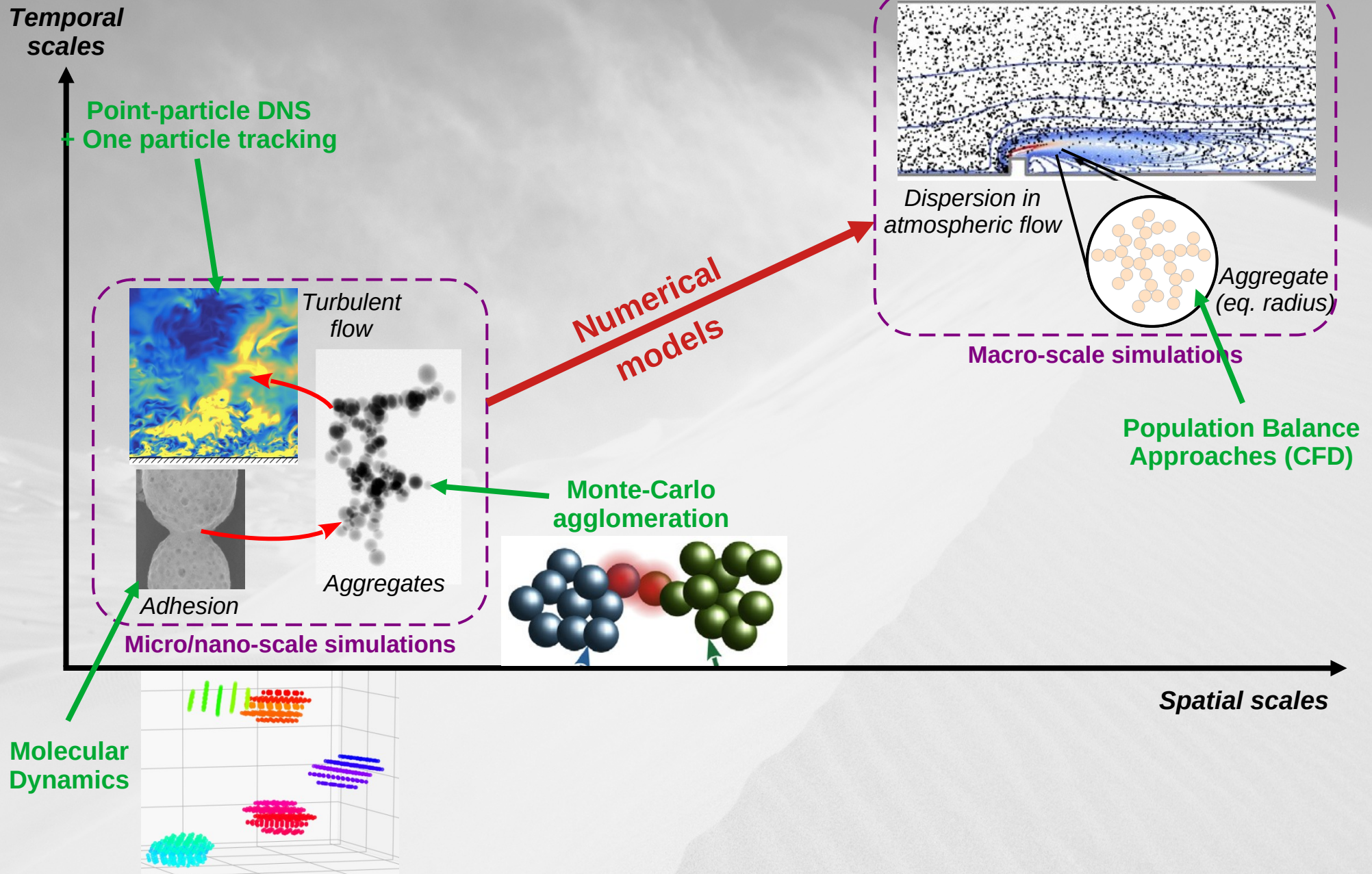
A range of scales and applications

Methodology: A multi-scale approach

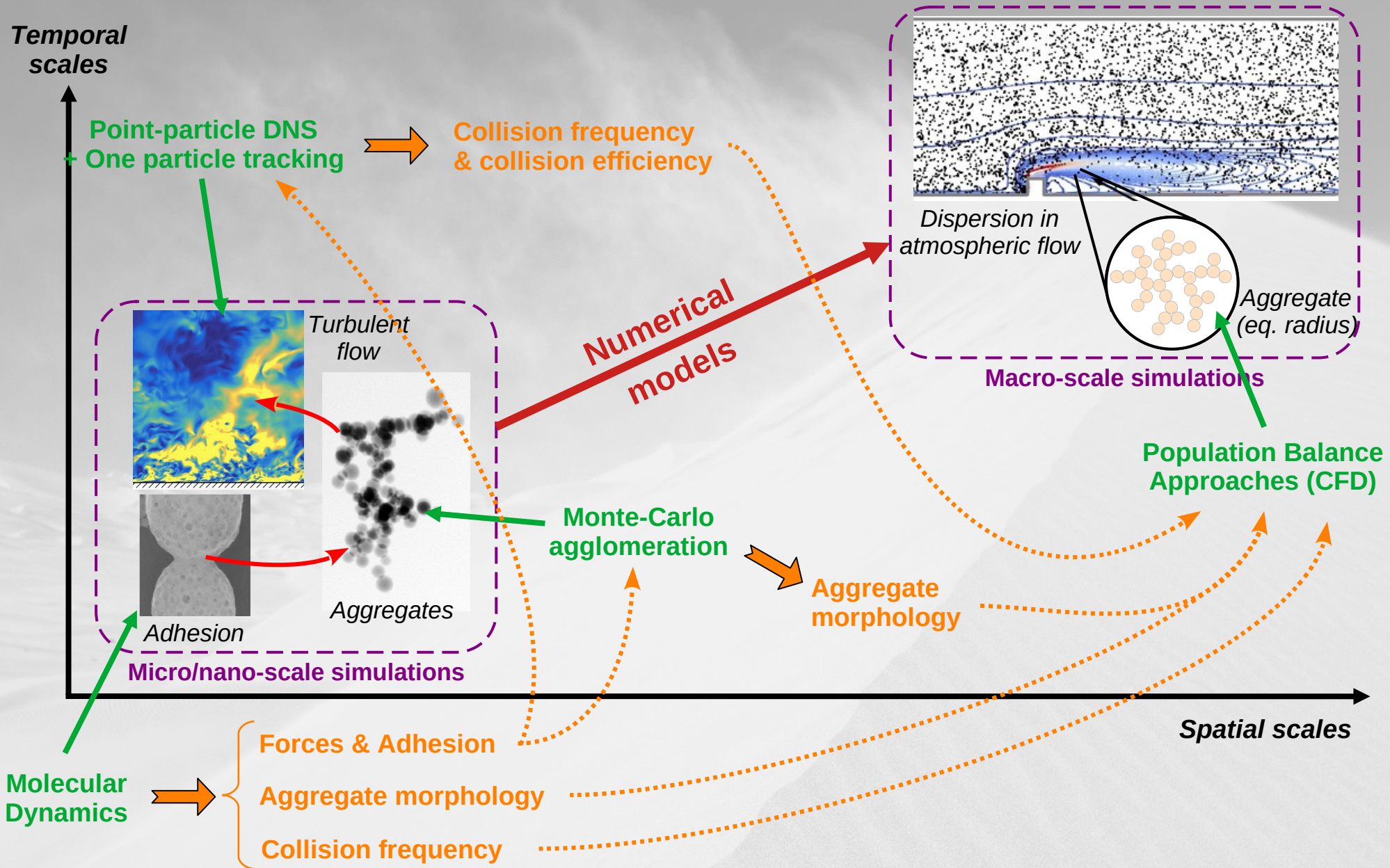
Temporal scales



Methodology: Tools used



Methodology: Information exchanged



Conclusion & perspectives

Take home message

- Multi-scale modeling approach for the simulation of particle agglomeration

Future works

- Study of the agglomeration of non-spherical, possibly flexible, particles
- Extension of population balance approaches for correlated agglomeration events

Further reading:

- Ramkrishna, 2000. Population balances: Theory and applications to particulate systems in engineering. Elsevier.
- Rodríguez et al, 2020. Applied Mathematical Modelling, 90, 582-614.
- Rodríguez et al, 2021. International Journal of Multiphase Flow, 149, 103962.

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