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# Towards a multi-Modal, multi-Temporal and multi-Phenomena dataset for natural phenomena observation through deep learning

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La Région  
Auvergne-Rhône-Alpes



## 1. Key points

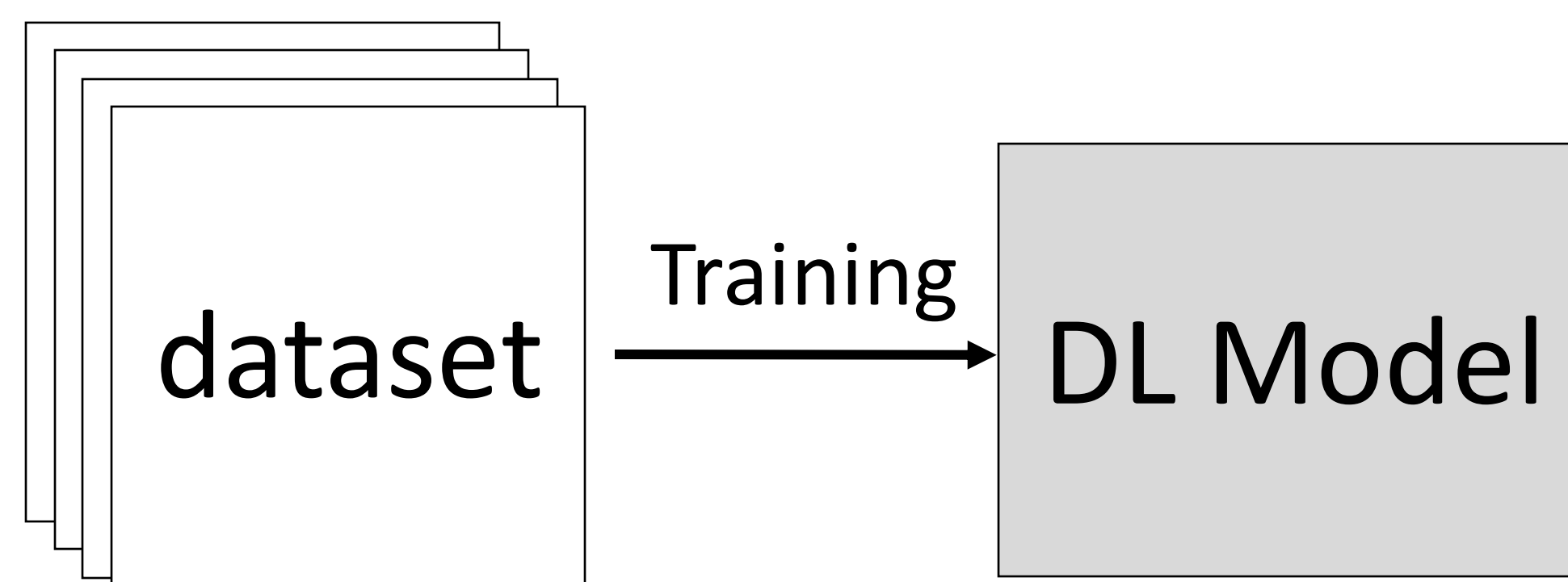
- **A common dataset** of standard products for fair comparisons
- **Multi-modal dataset** for early warning systems
- **Multi-temporal dataset** for ground motion monitoring
- **Multi-phenomena dataset** for cascaded event prevention

## Acknowledgments

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## 2. Problem statement

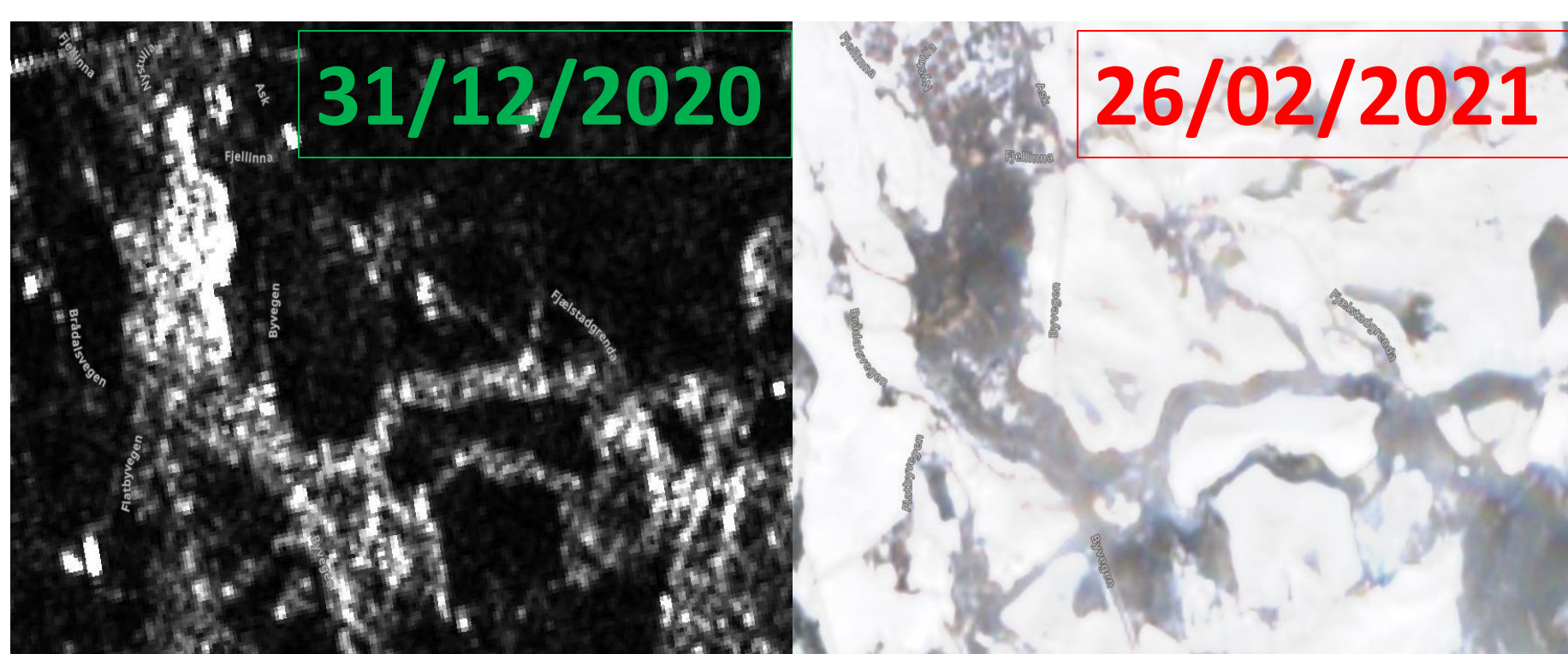
Problem specific  
Region specific  
Small  
No standard products  
No free access



~~Generalizability  
Reproducibility  
Fair comparison  
Improvements~~

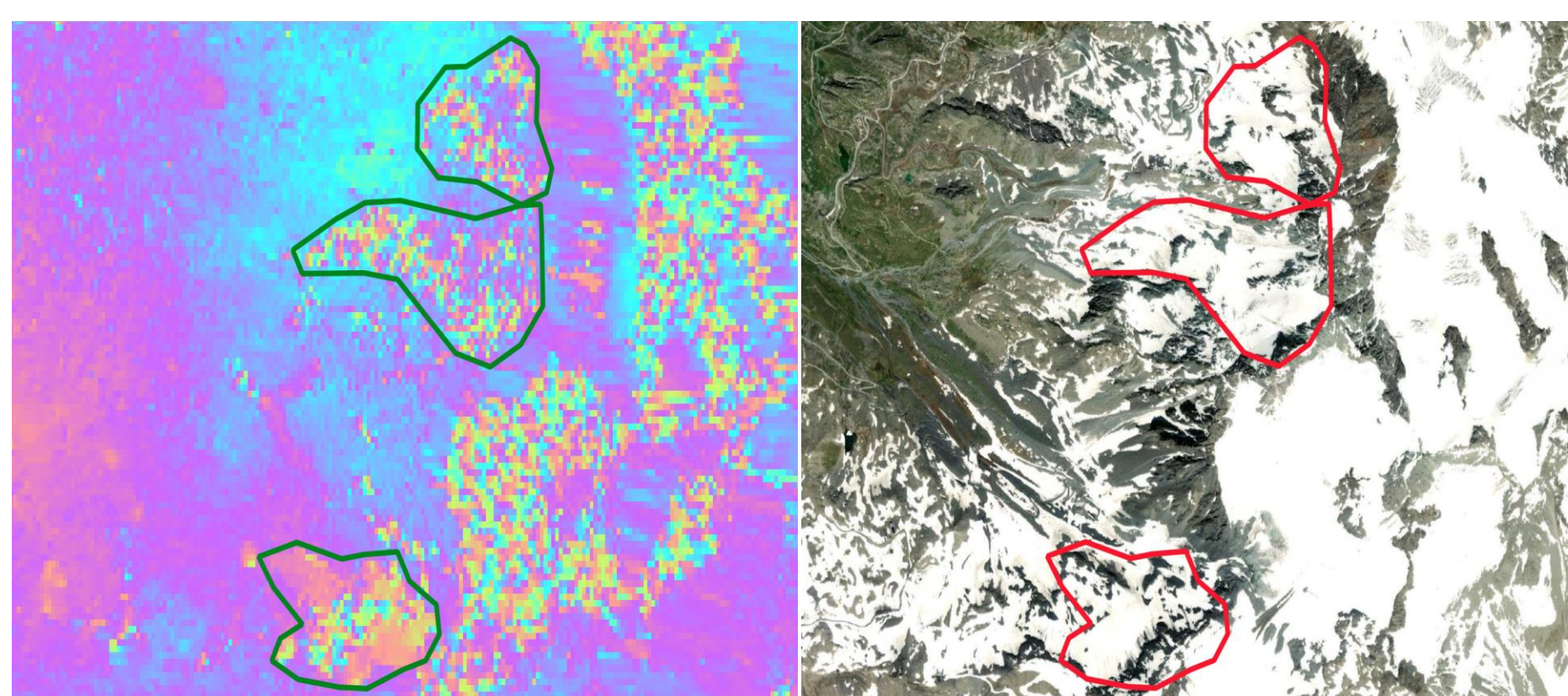
## 3. Multi-modal dataset

- **Complementarity**
  - Significant improvements due to modality specific features [1]
- **The earlier the better !**
  - First available modality used for emergency [2]



31/12/2020 Gjerdrüm Landslide.  
First post-event SAR image (left) and cloud-free optical image (right)

## 4. Multi-temporal dataset

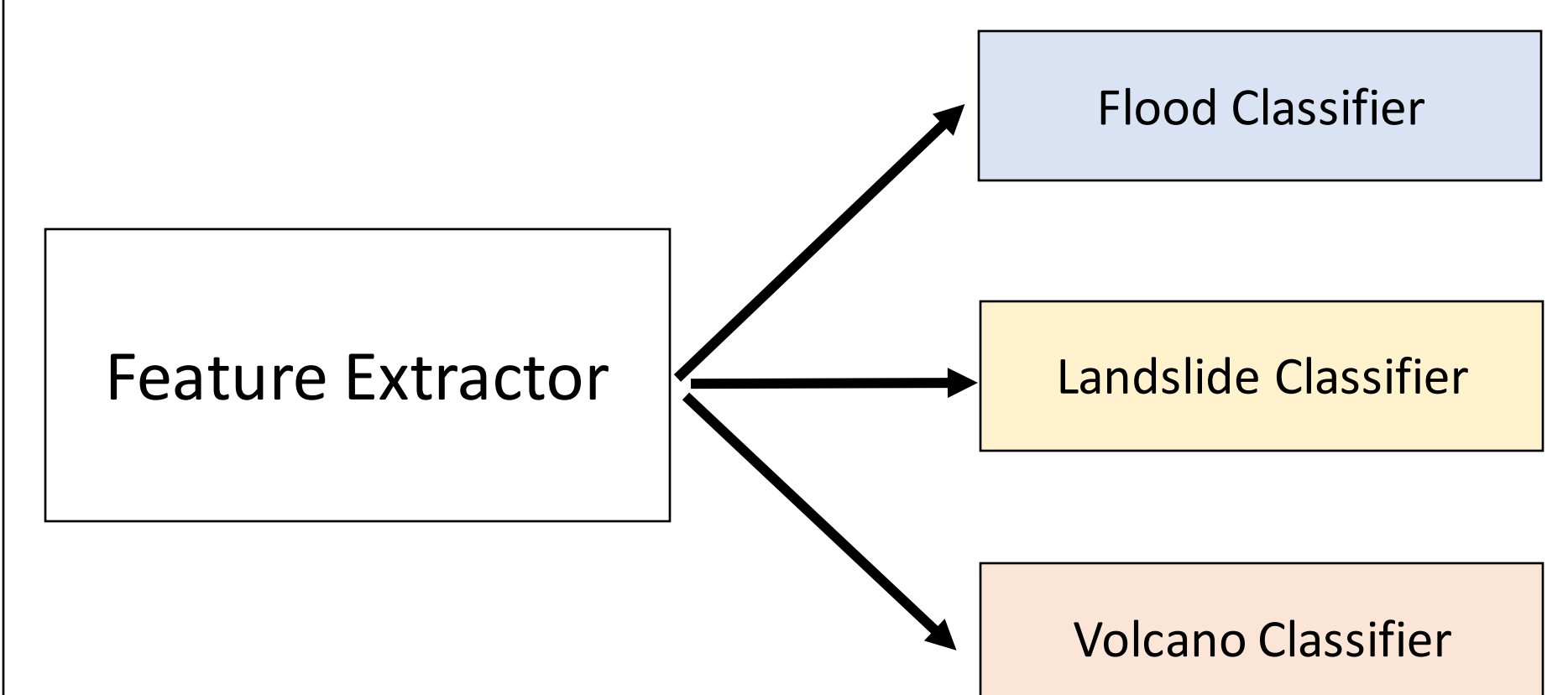


Interferogram generated (left) and its corresponding optical view (right). Green and red lines are suspicions of moving areas based on the interferogram.

- **Slow ground motions**
  - Monitoring of rock glaciers [3], slow moving landslides [4] and volcanoes [5]
- **Change detection**
  - Multitemporal images improve detections [6]

## 5. Multi-phenomena dataset

- **To leverage similarities**
  - Multi-task learning to strengthen tasks independently [7]



- **To detect triggered events**
  - Cascaded phenomena preventions

## 6. Common efforts

- Events **occurrence dates and locations** listing
- **Standard products** collection (Sentinel-1 / 2)
- Phenomena annotations with **expert knowledge**
- **Free release** of the dataset for community use

## 7. Conclusion

Need a common effort for a multi-MTP dataset for even more relevant deep learning researches and overcome specific dataset issues



## References

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