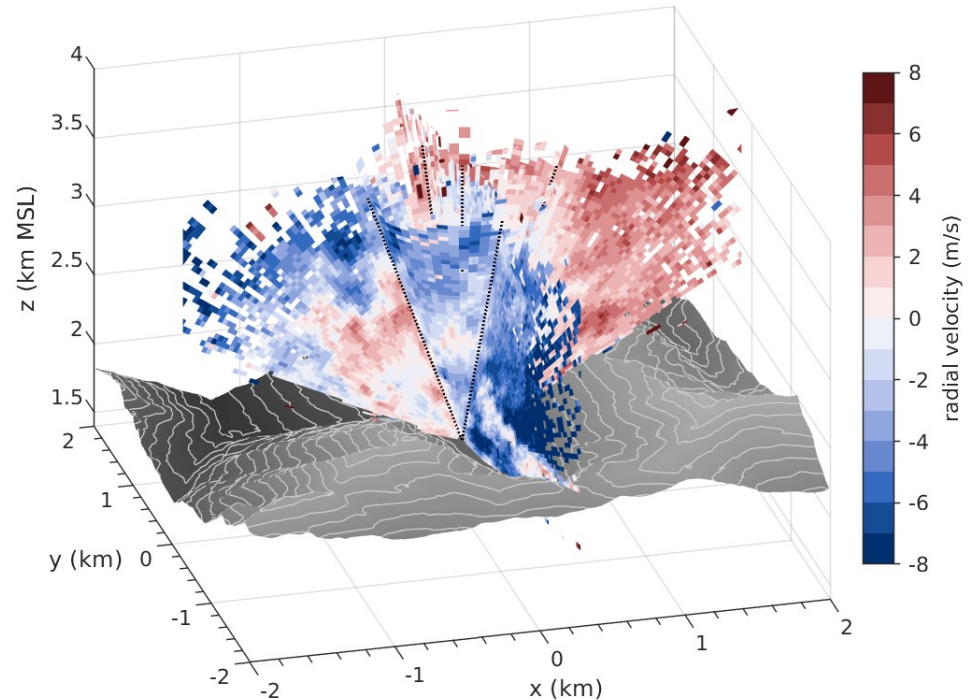


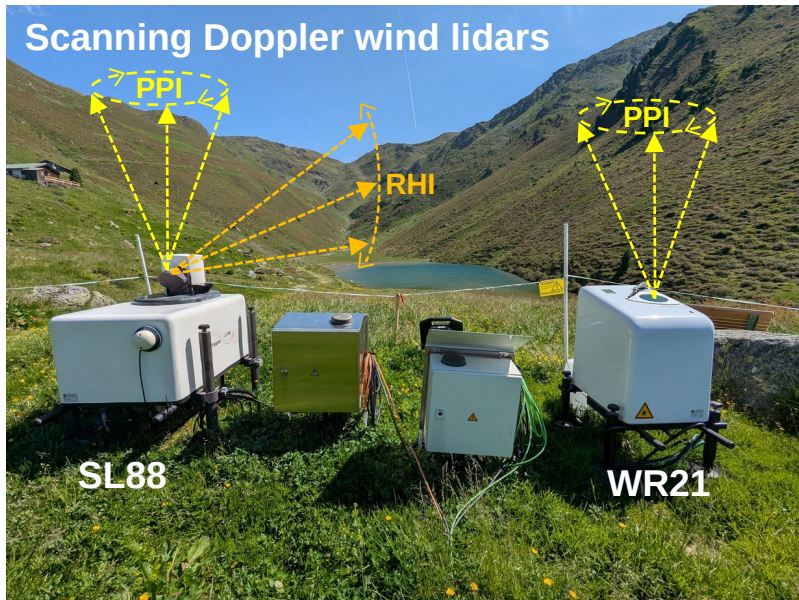
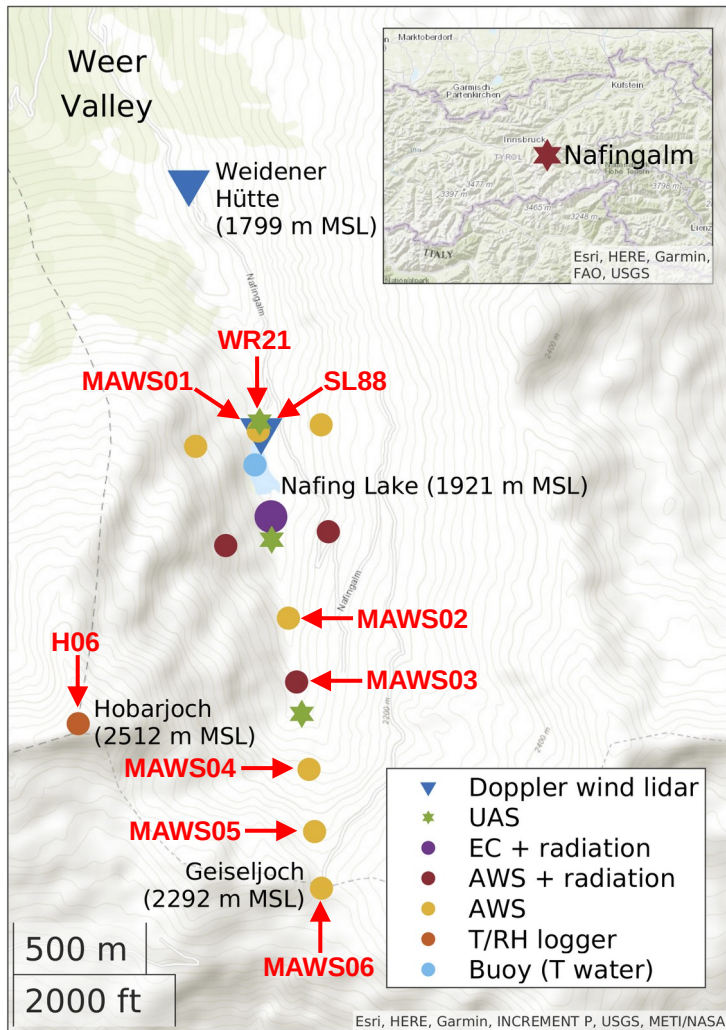
# Lidar-based observations of flow regimes and turbulence in a small Alpine valley during TEAMx



Alexander Gohm<sup>1</sup>, Norman Wildmann<sup>2</sup>, Almut Alexa<sup>1,2</sup>, Andrea Wiech<sup>1,2</sup>

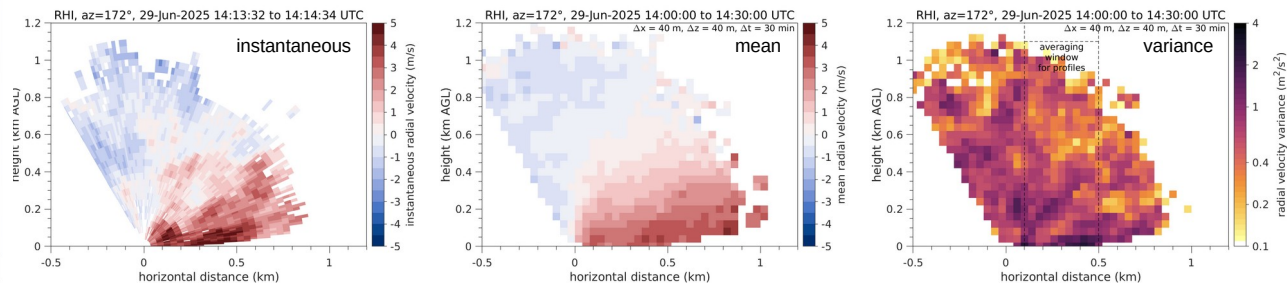


# Target area map and instrumentation layout
















## Turbulence calculation based on RHI scans

Radial velocity variance is computed as a space-time variance derived from all data points within a  $40\text{ m} \times 40\text{ m}$  subdomain over a 30-minute time window (Wildmann et al. 2019; 10.5194/amt-12-6401-2019). The range gate length is 36 m, and the elevation increment is  $1^\circ$ . To derive mean vertical profiles, the variance is averaged across a horizontal range from 100 m to 500 m south of the lidar.

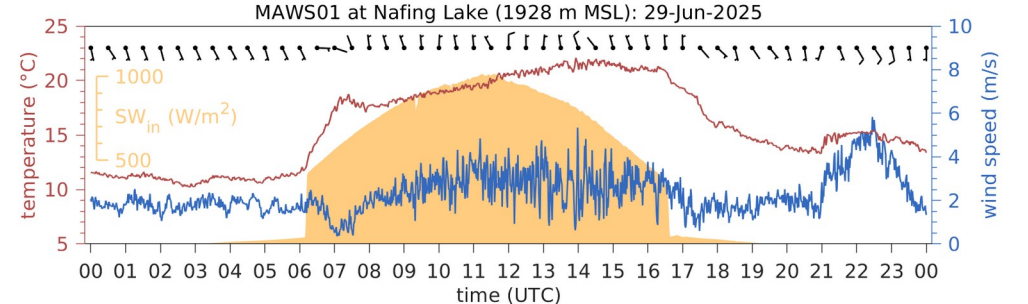
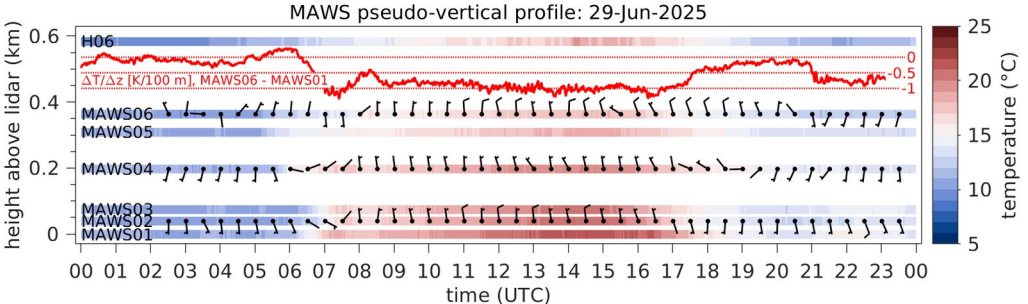
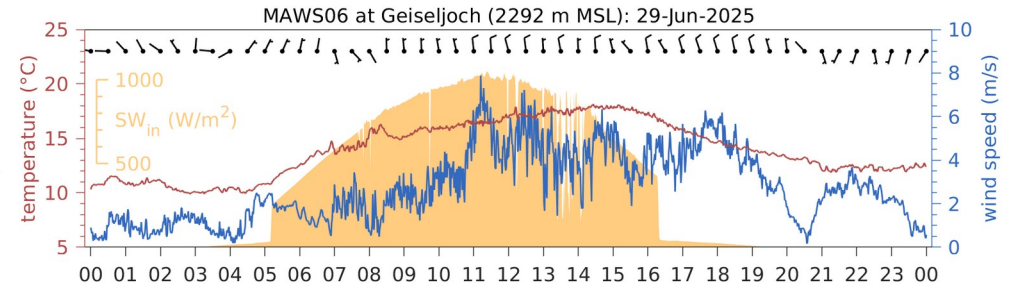
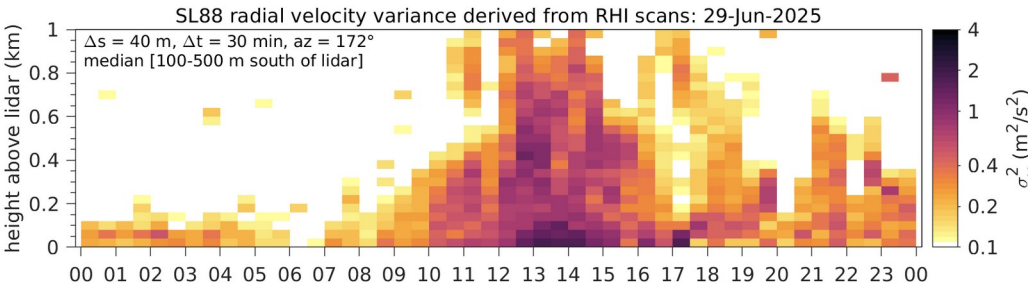
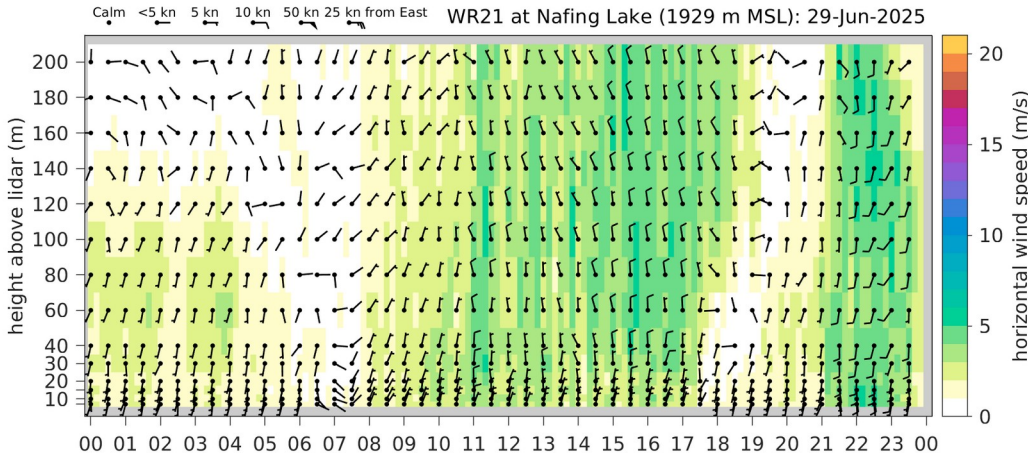
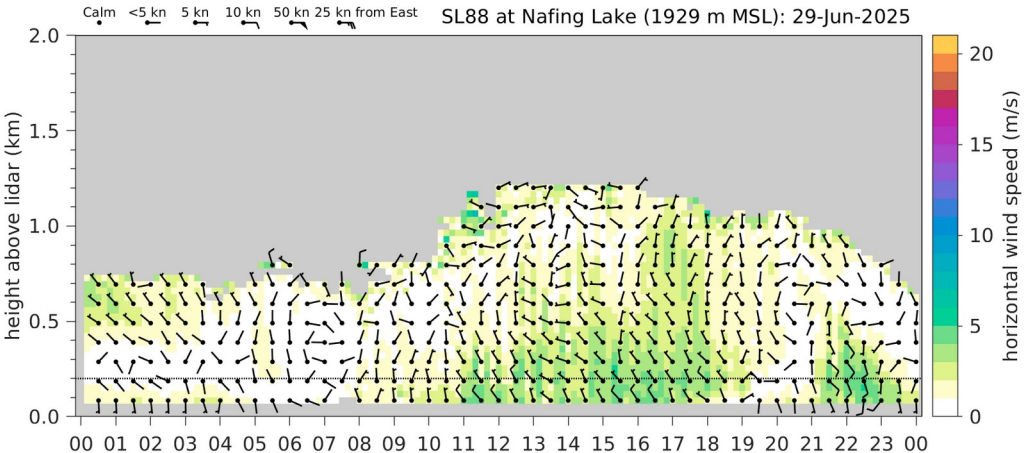


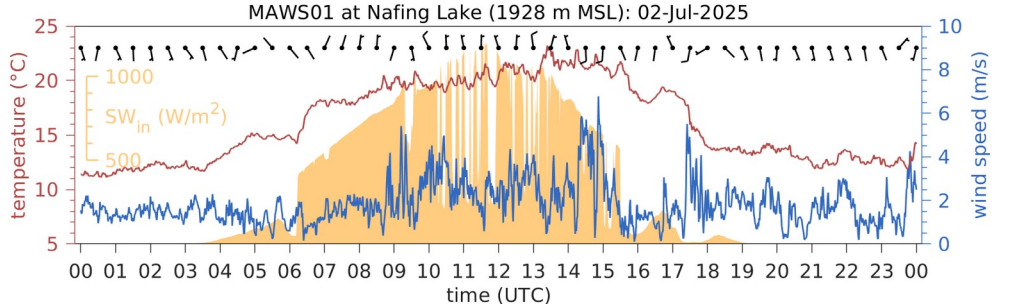
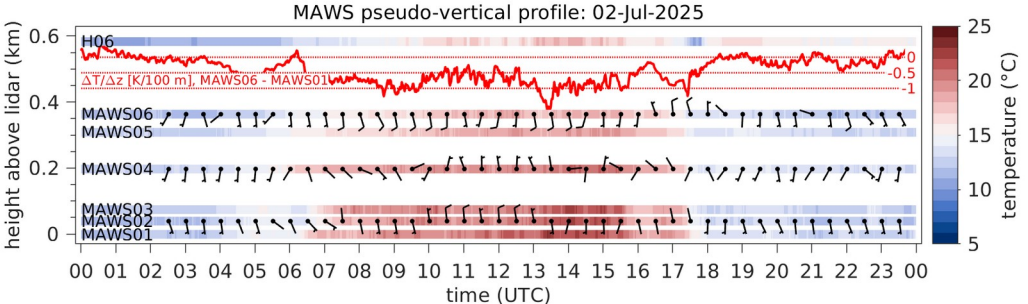
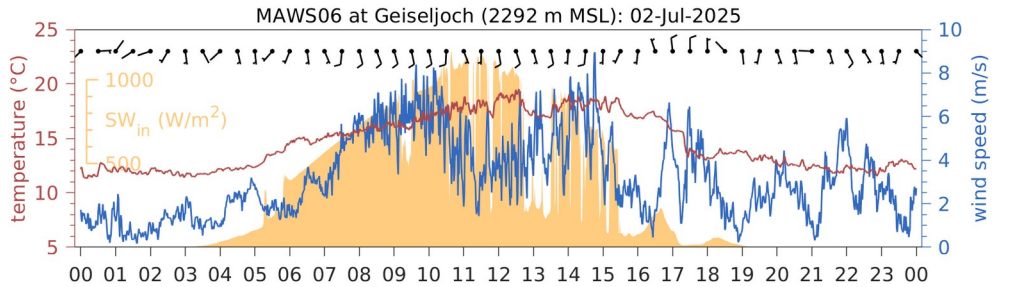
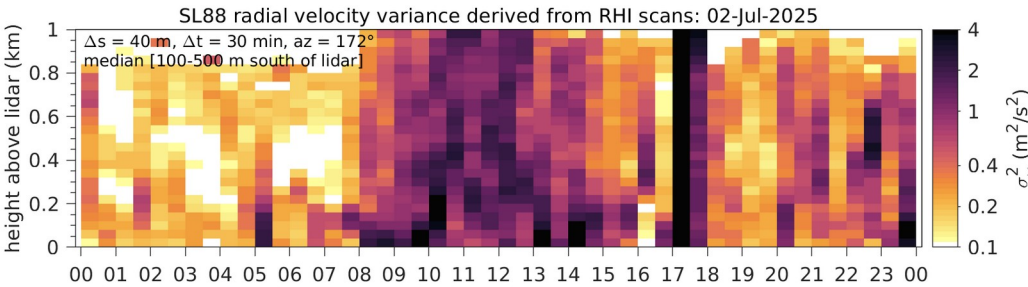
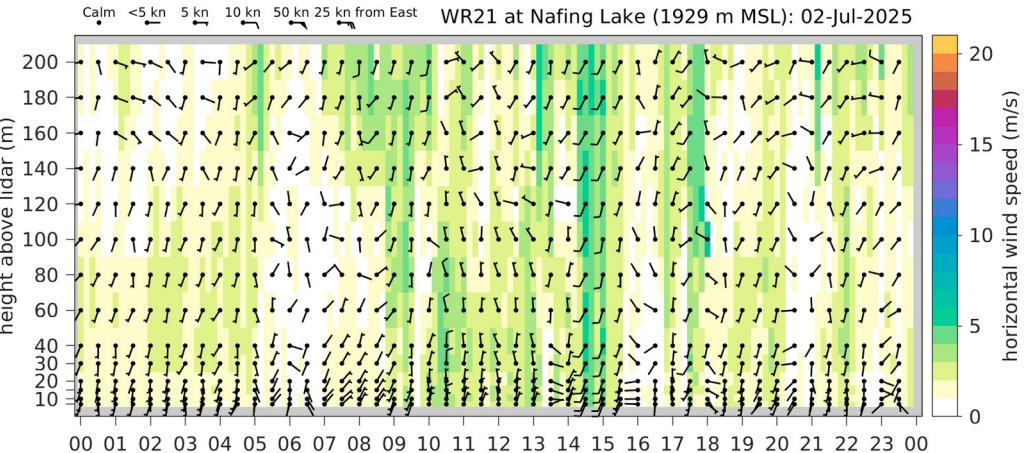
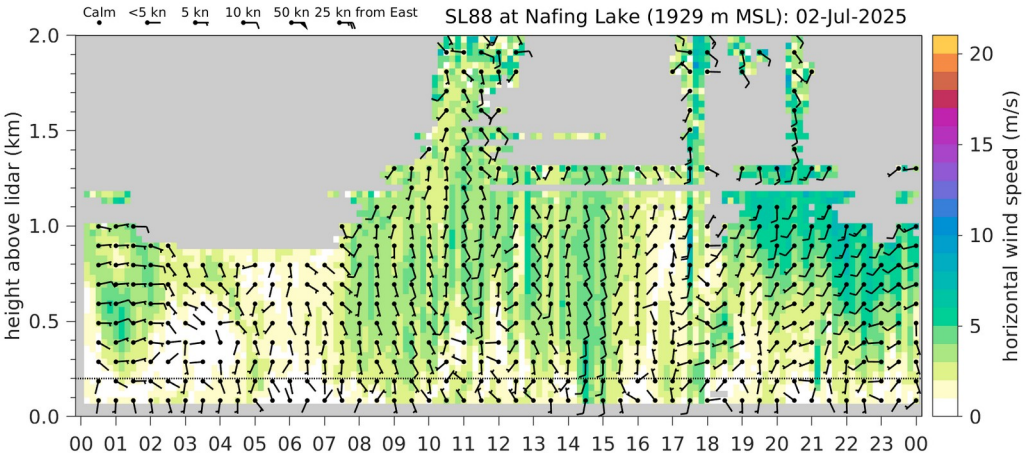
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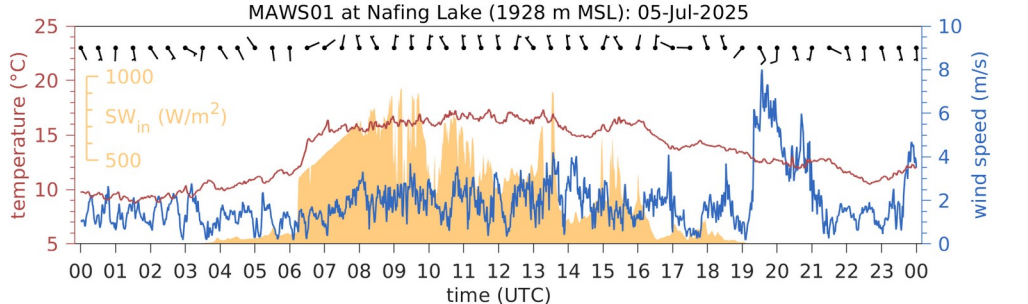
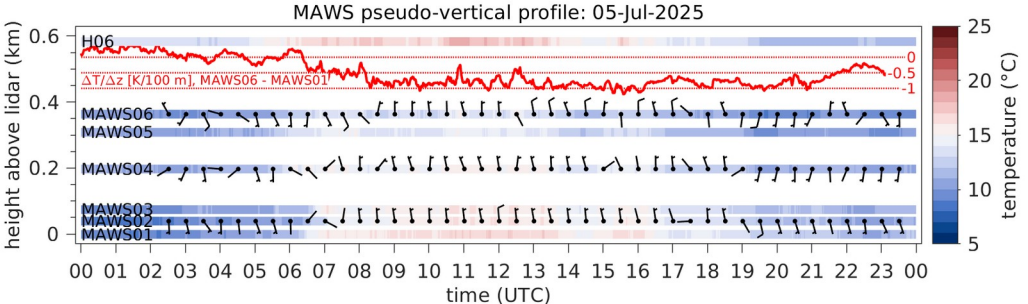
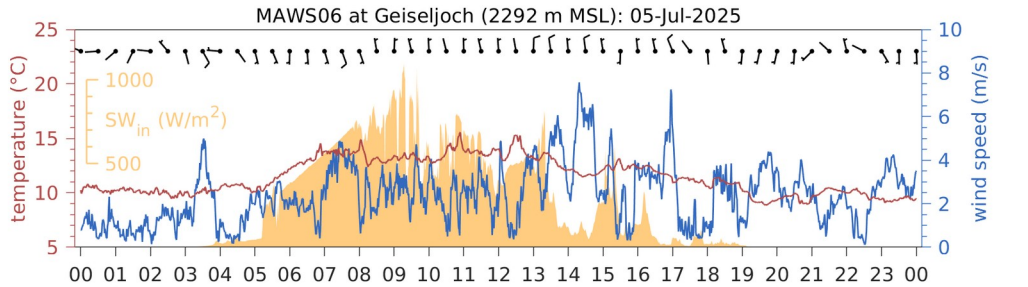
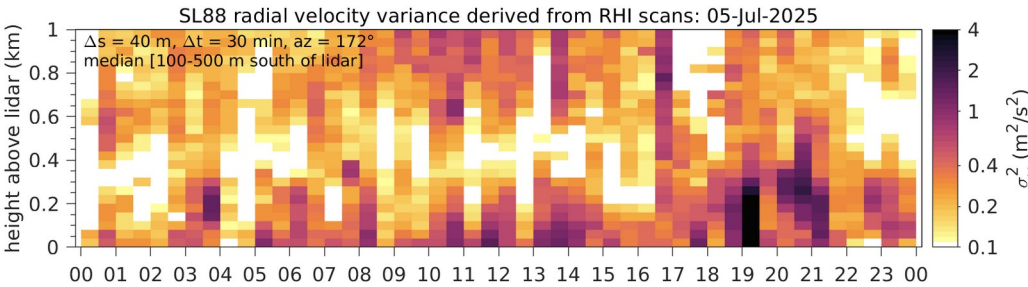
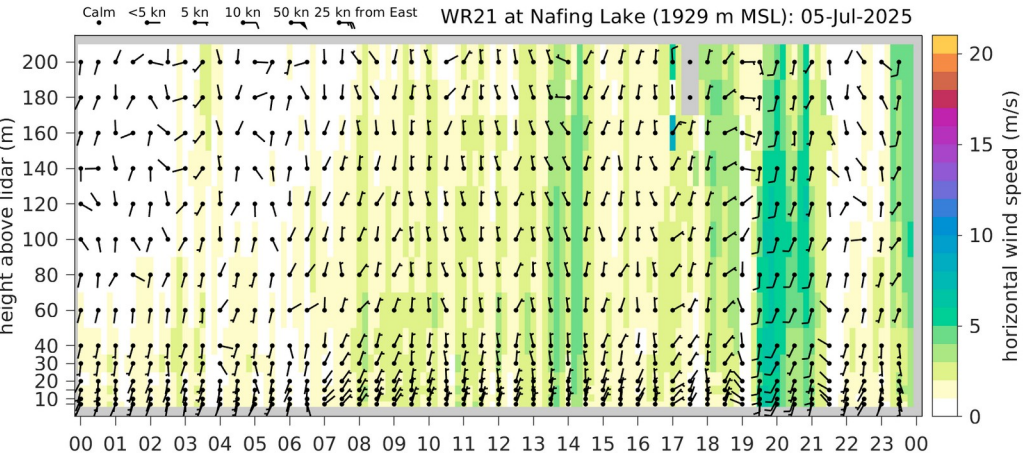
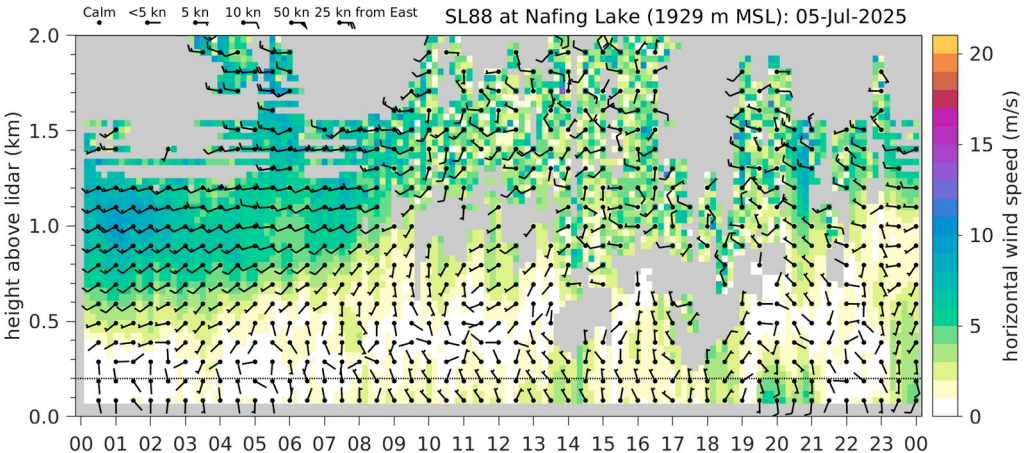
				Aircraft in target area		
	IOP	Date	Flow regime and characteristics	TUBS	DLR	UAS
	IOP07	29-06-2025	Unperturbed valley winds   weak ambient winds   no clouds	✓	✗	✗
	IOP10	02-07-2025	South foehn   transient upvalley winds   evening moist convection	✓	✗	✓
	IOP11	05-07-2025	Perturbed valley winds   westerlies aloft   afternoon moist convection	✗	✗	✓
	IOP12a	09-07-2025	Large-scale northerlies driving upvalley winds   low-level clouds	✗	✓	✓
	IOP12b	10-07-2025	Large-scale northerlies driving upvalley winds   mid-level clouds	✗	✓	✓
	IOP13	11-07-2025	Perturbed valley winds   northwesterlies aloft   afternoon moist convection	(✓)	✓	✓
	IOP15	13-07-2025	Transient up- and downvalley winds influenced by foehn and convection	✓	✓	✓
	IOP16	15-07-2025	Perturbed valley winds   strong northwesterlies aloft   clouds	✗	✓	✓
	IOP18	18-07-2025	Perturbed valley winds   moderate to strong westerlies aloft   clouds	✓	✓	✓
	IOP19	19-07-2025	Perturbed valley winds   strong westerlies aloft   afternoon moist convection	✗	✓	✓
	IOP20	20-07-2025	South foehn	✓	✓	✓
	IOP21	22-07-2025	Perturbed and weak valley winds   clouds	(✓)	✓	✓
	IOP22	23-07-2025	Perturbed valley winds   foehn in the morning   afternoon moist convection	(✓)	✓	✓

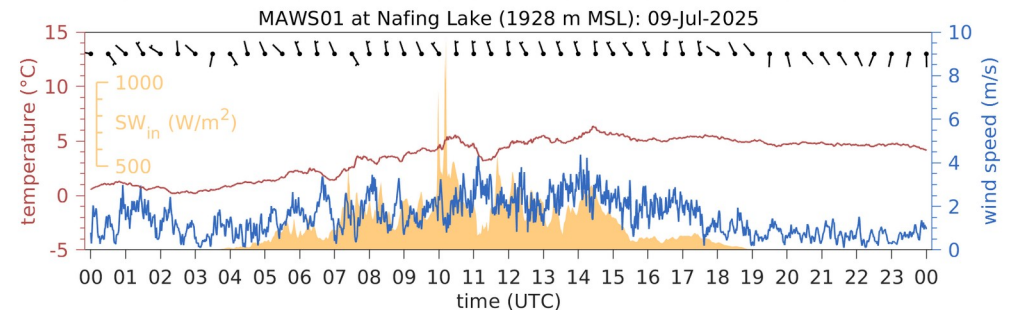
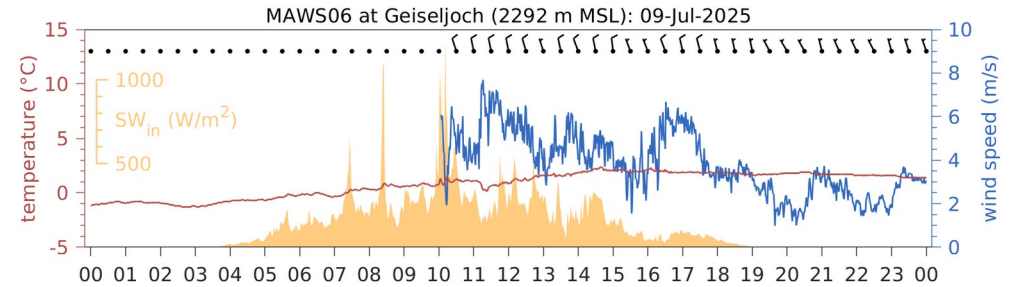
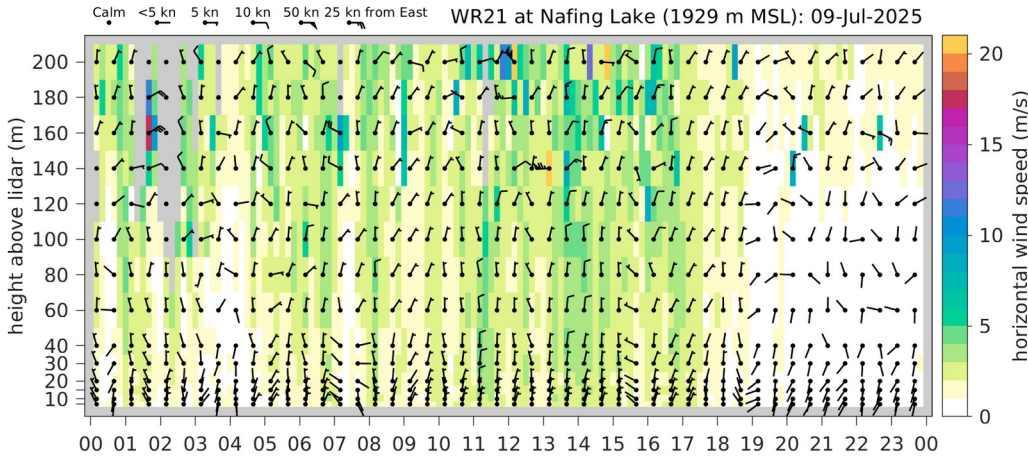
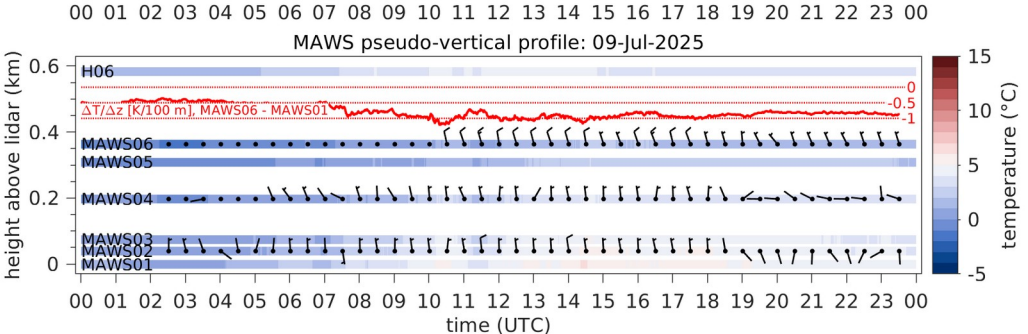
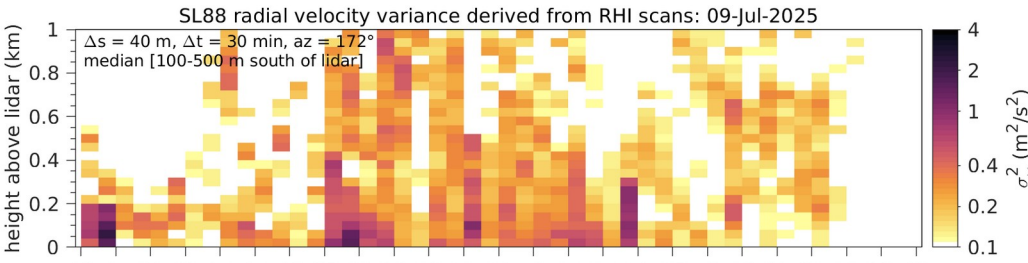
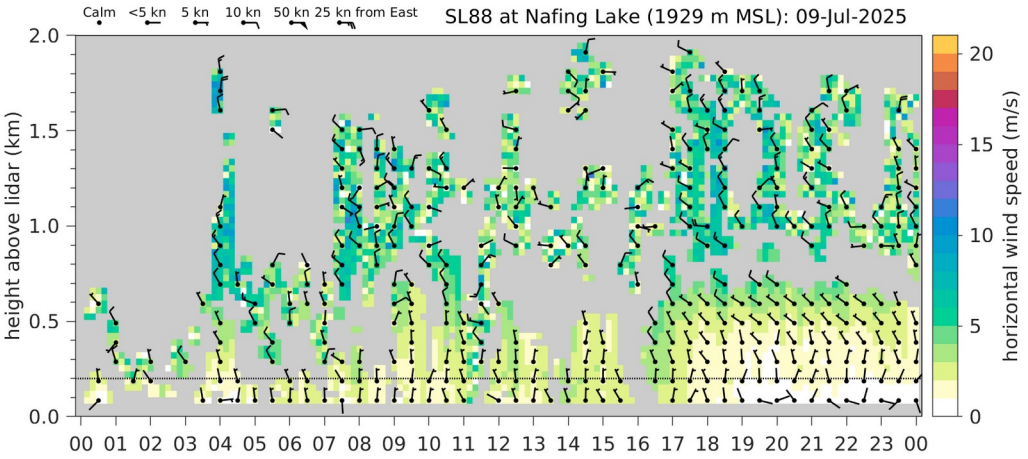
Selected Intensive Observation Periods (IOPs) during the TEAMx summer EOP, focusing on the target area Nafingalm

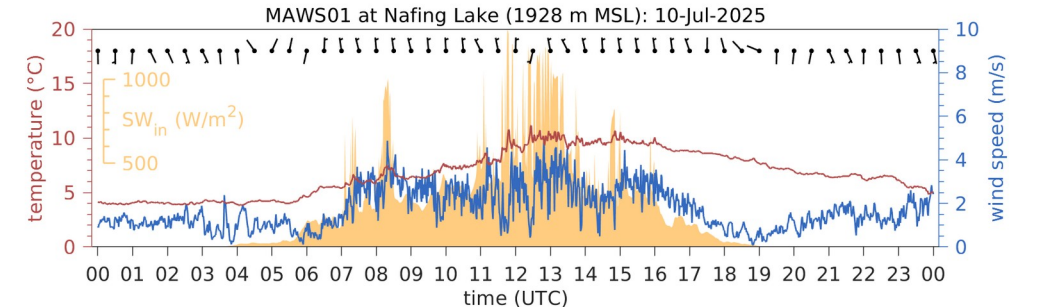
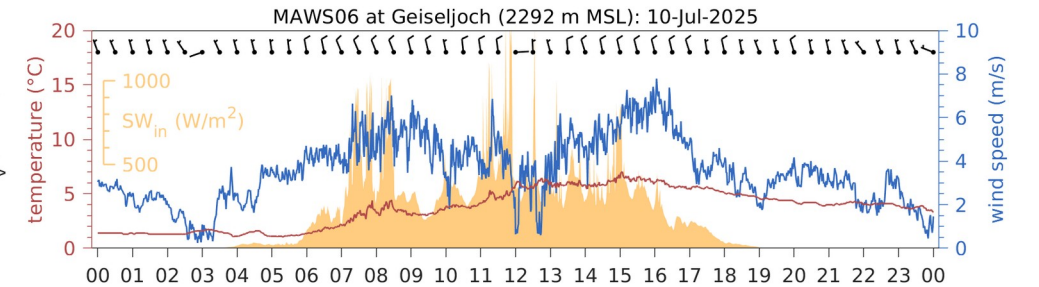
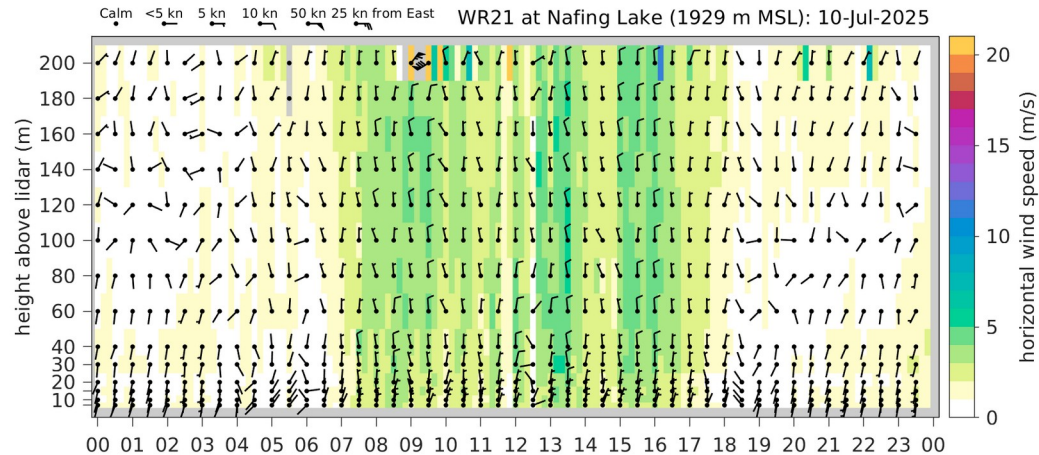
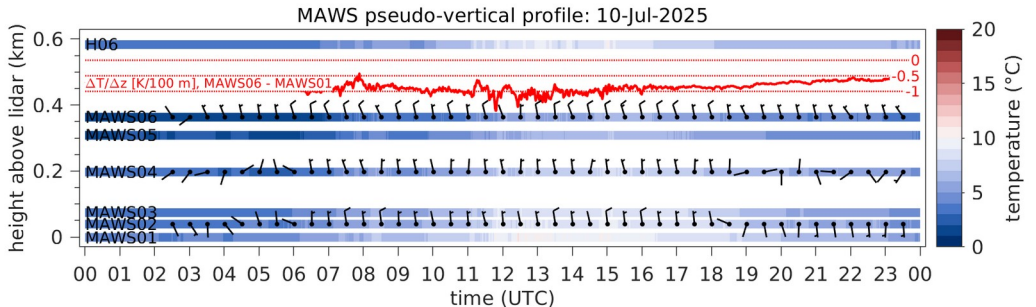
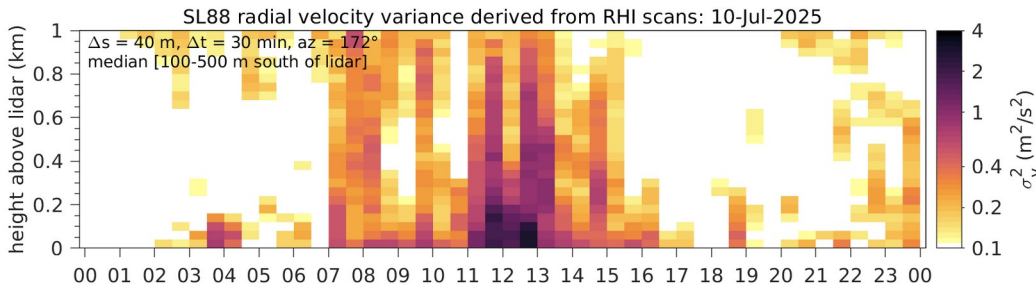
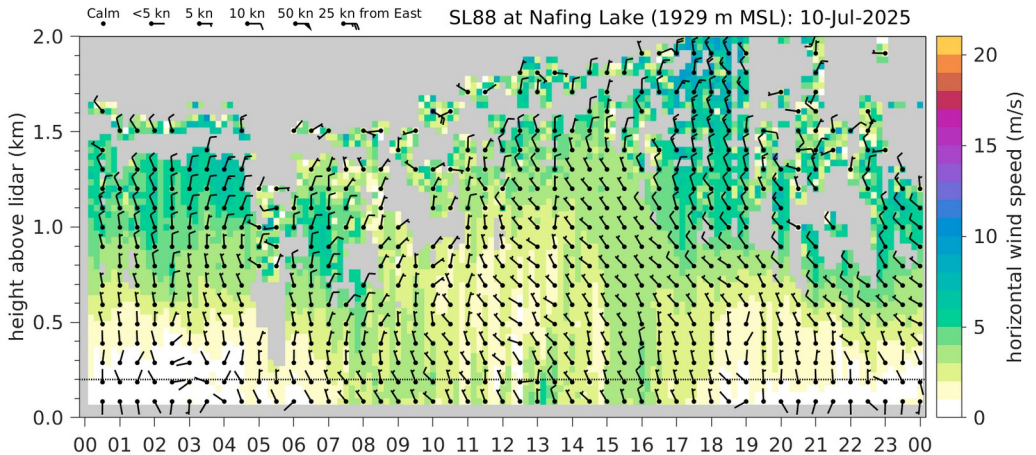
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[MAP](#)
[TABLE](#)
[IOP07](#)
[IOP10](#)
[IOP11](#)
[IOP12a](#)
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[IOP15](#)
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[VIDEO](#)

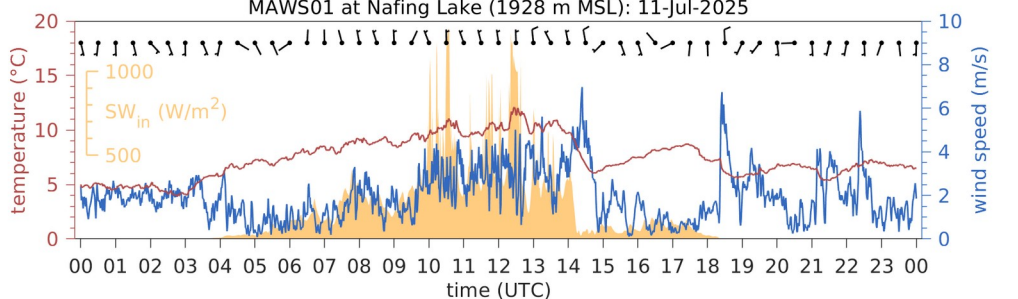
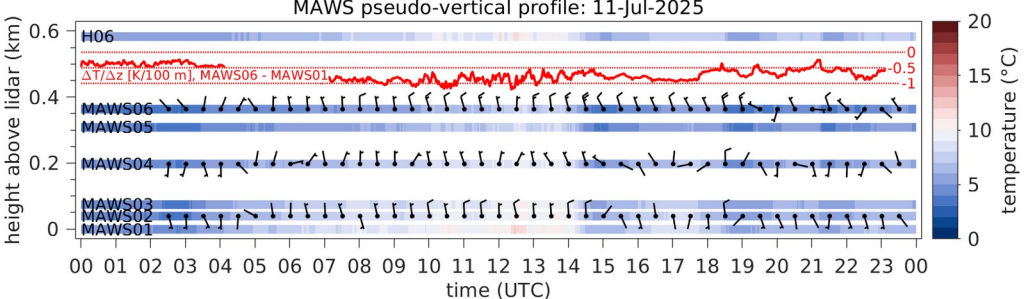
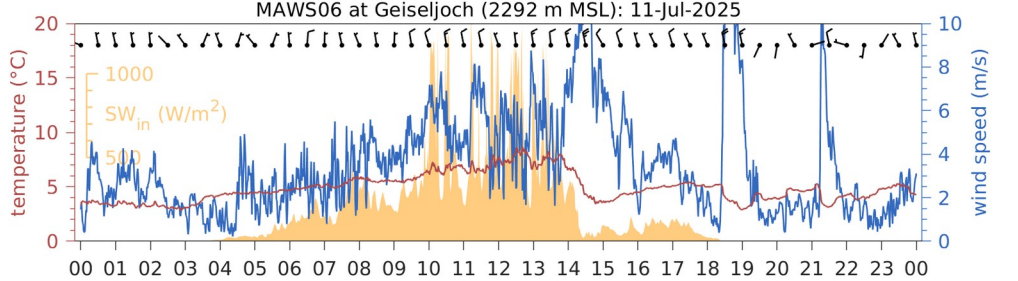
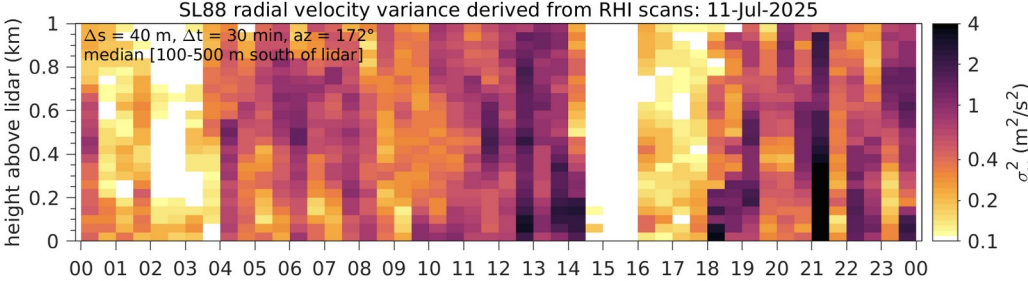
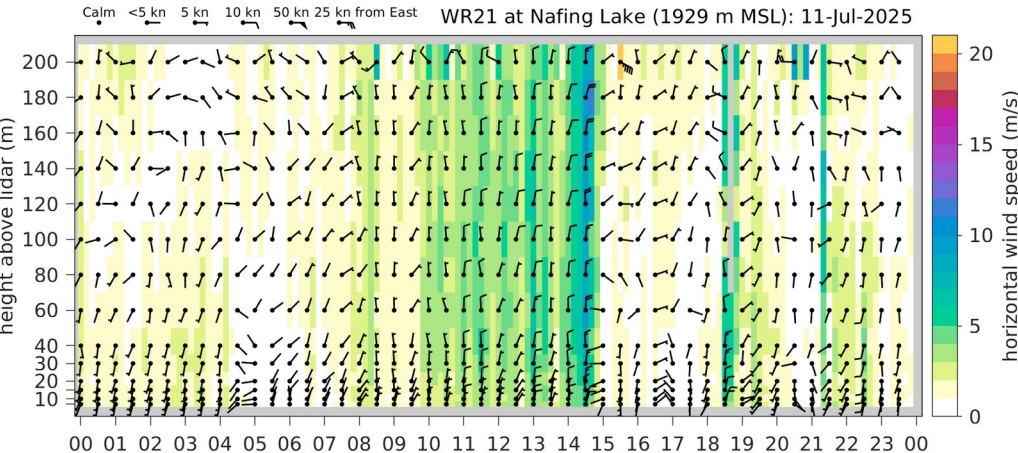
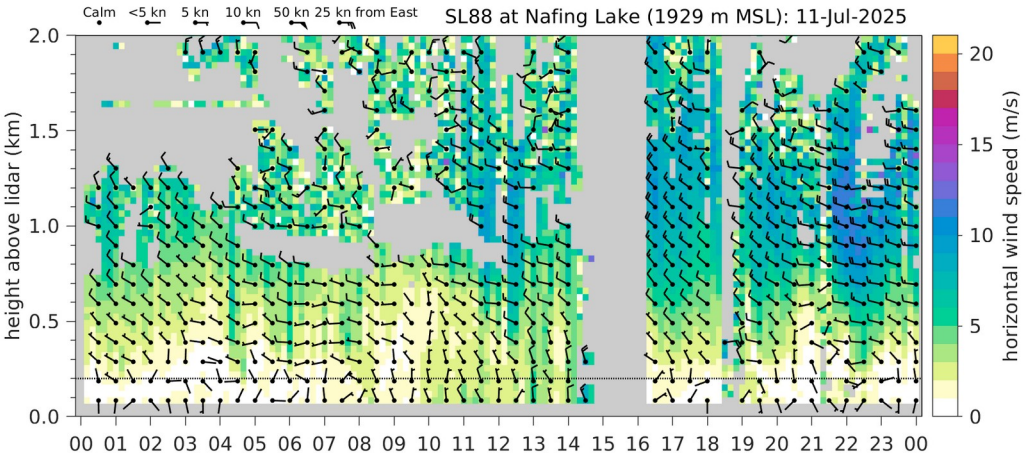


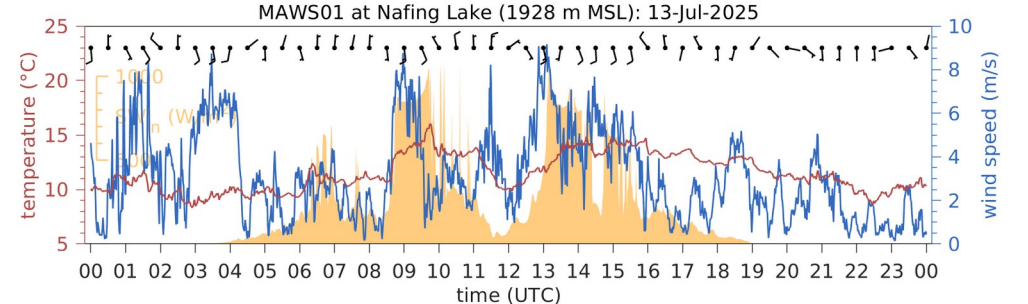
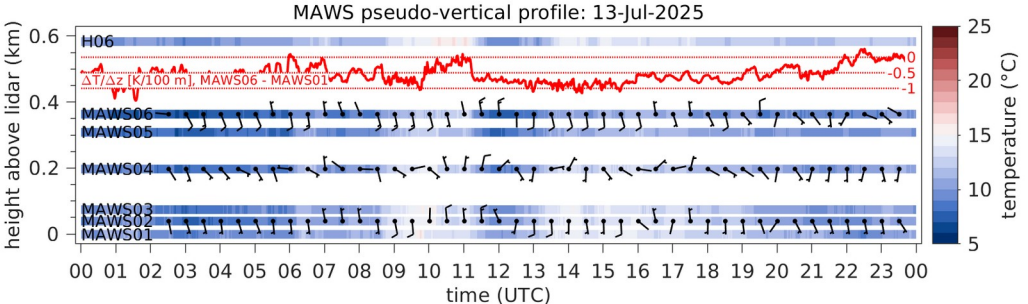
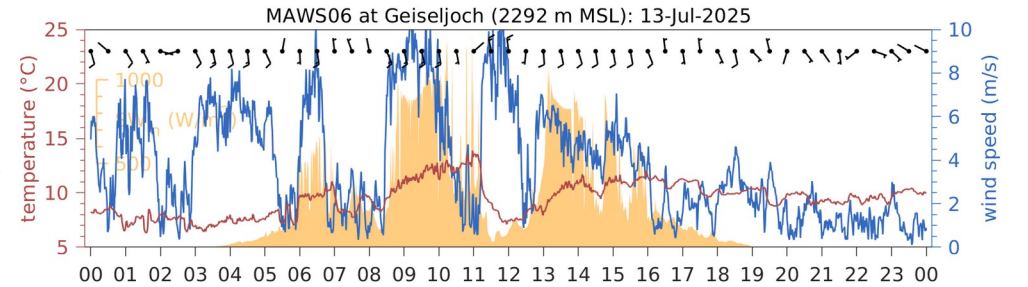
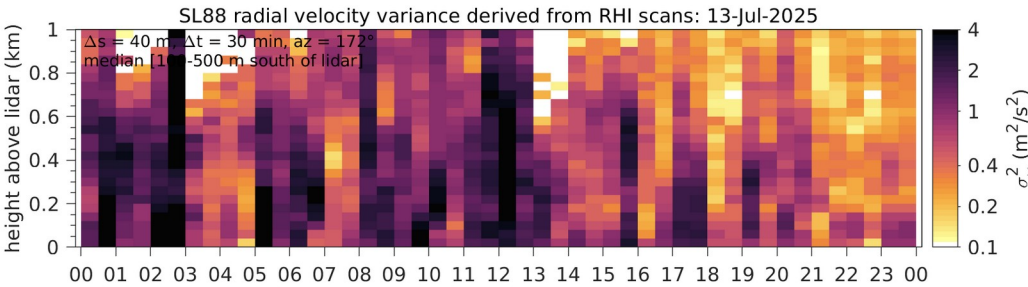
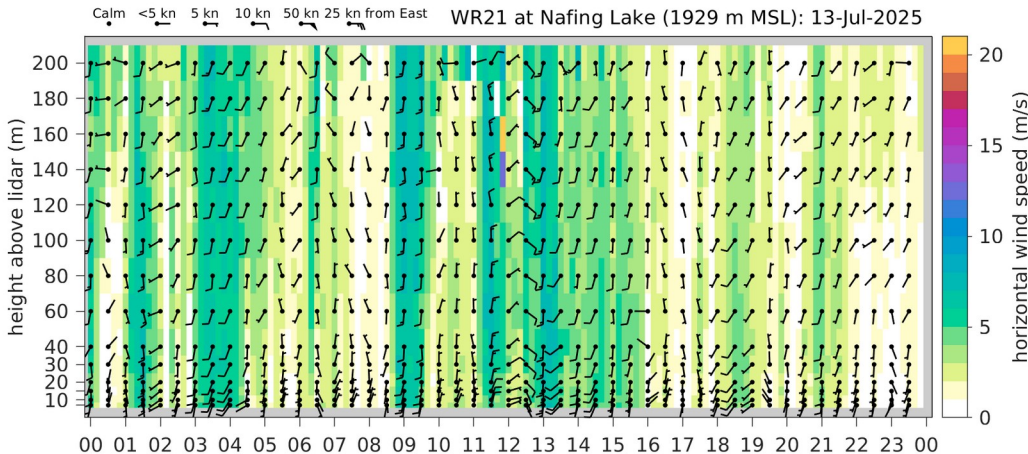
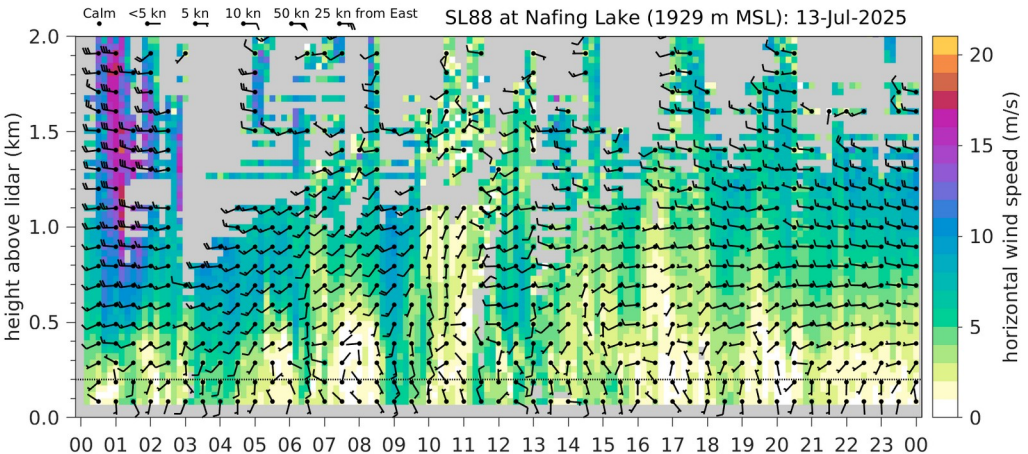


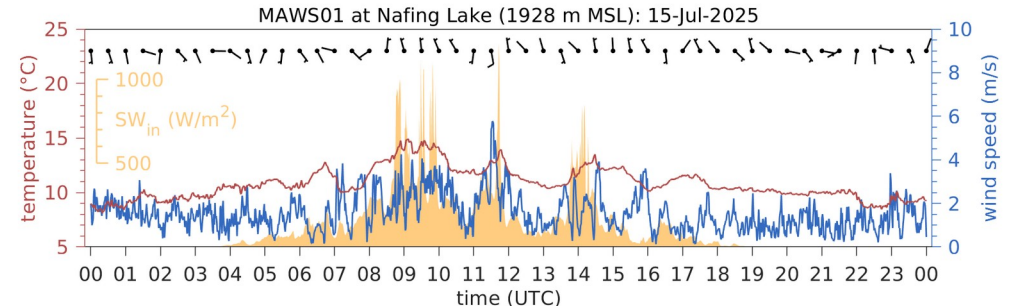
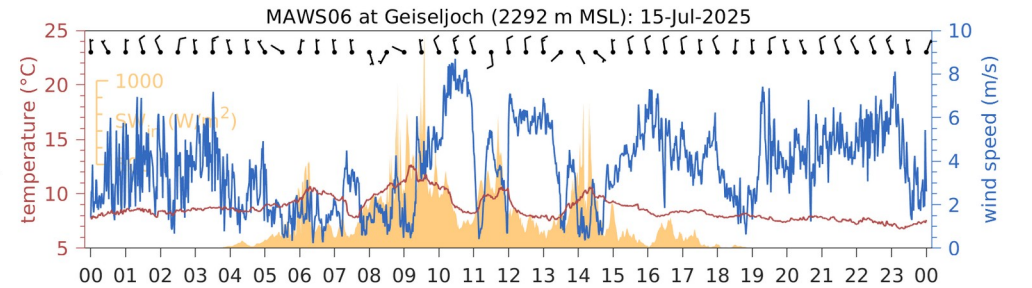
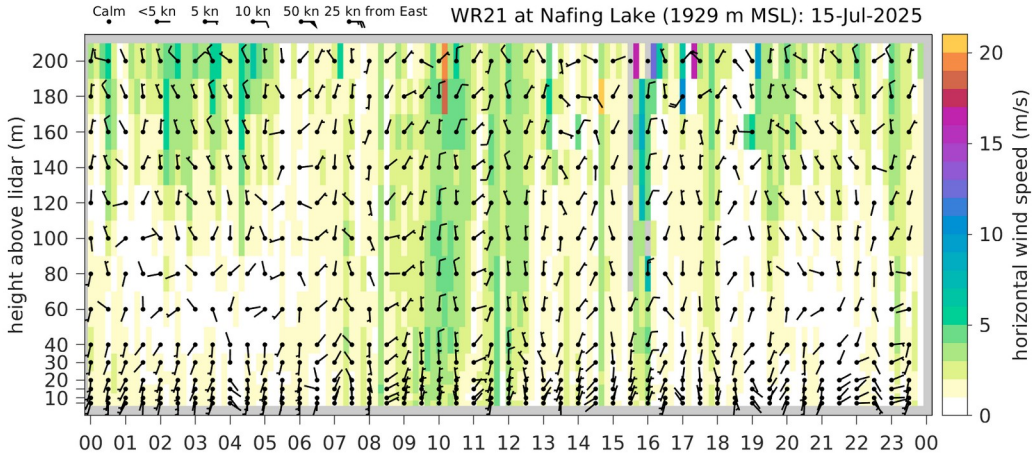
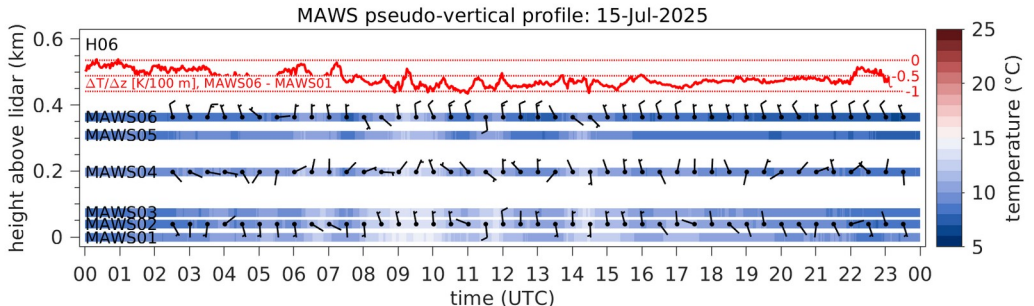
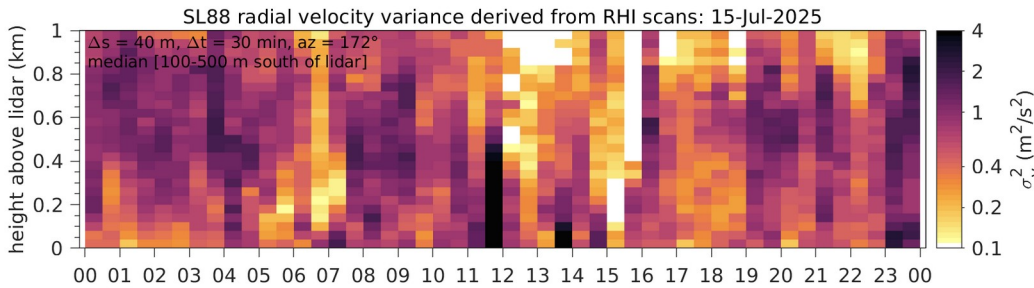
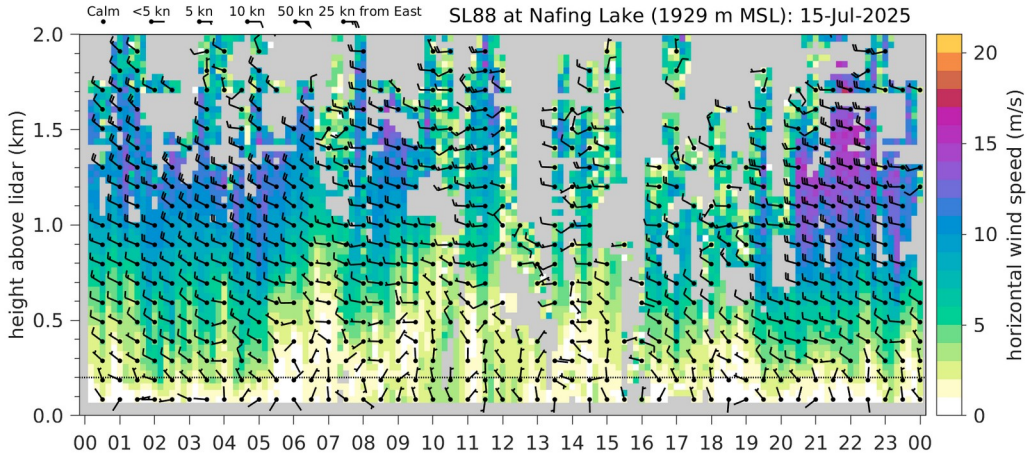


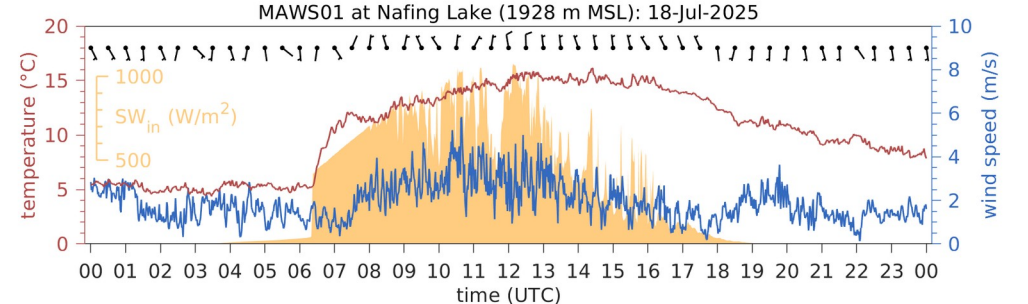
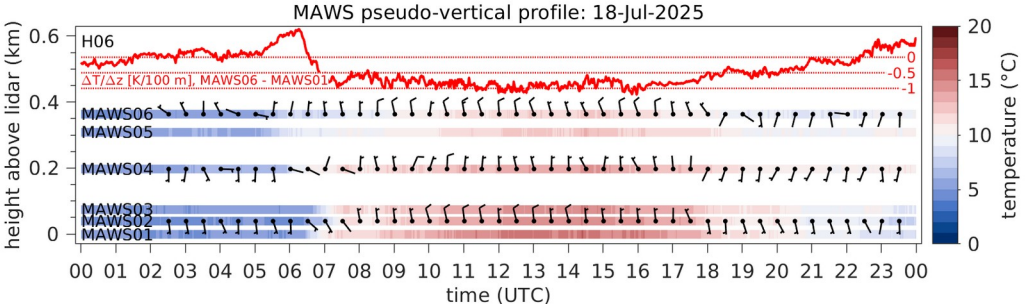
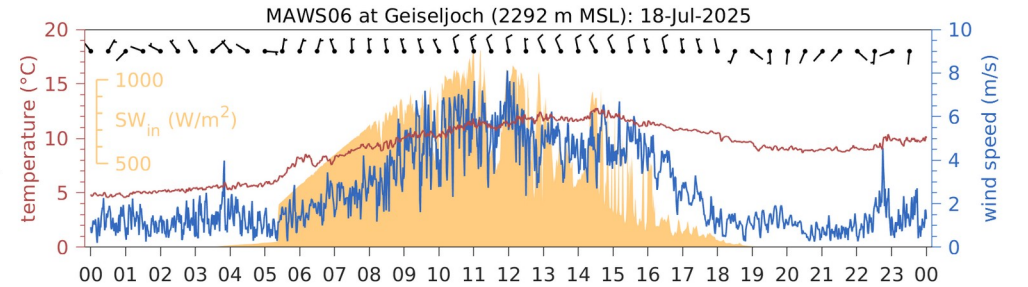
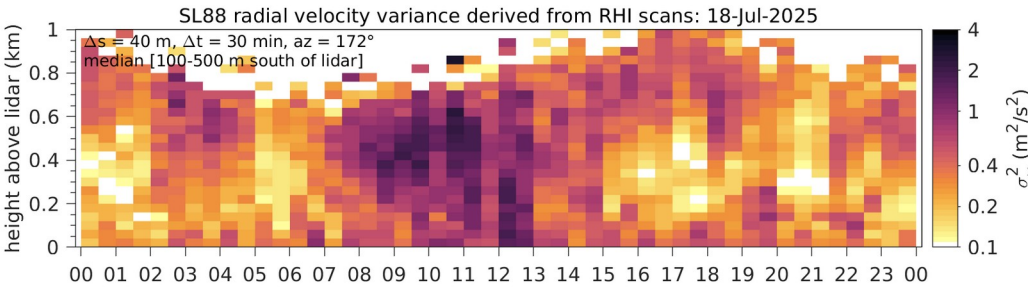
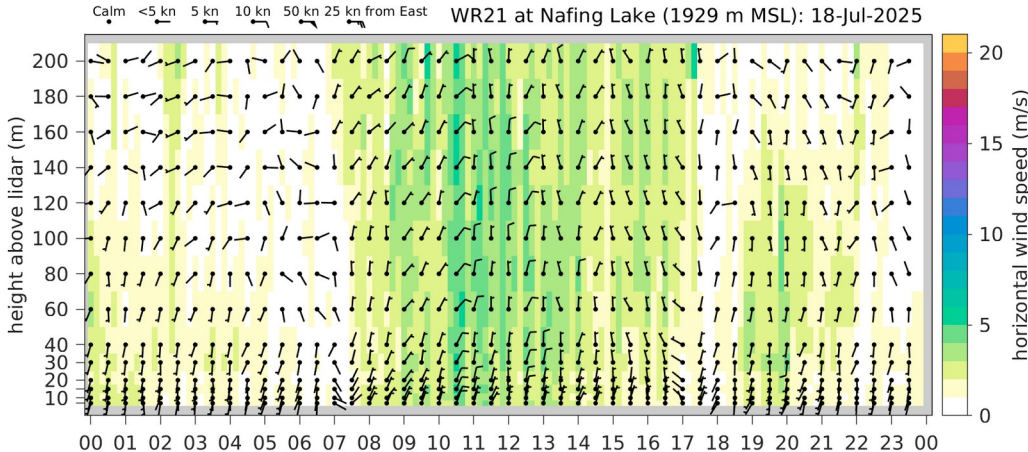
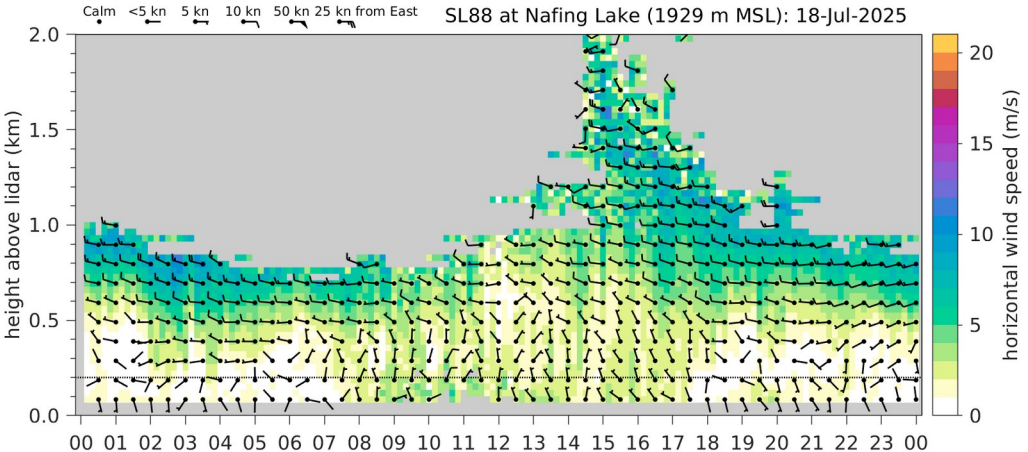


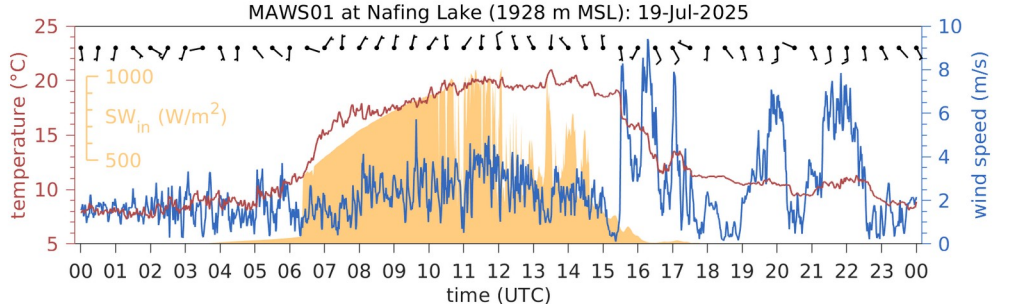
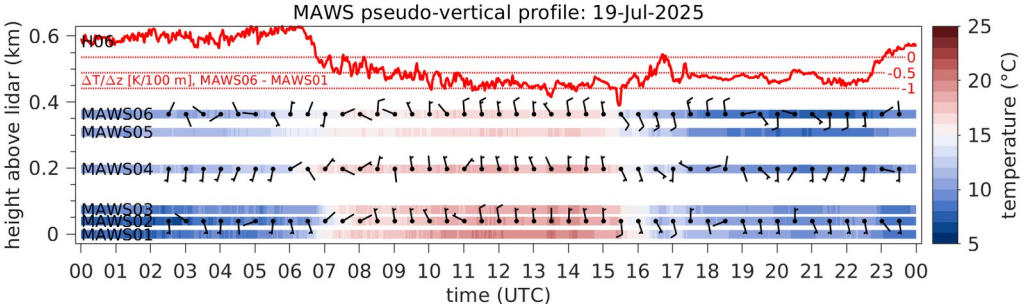
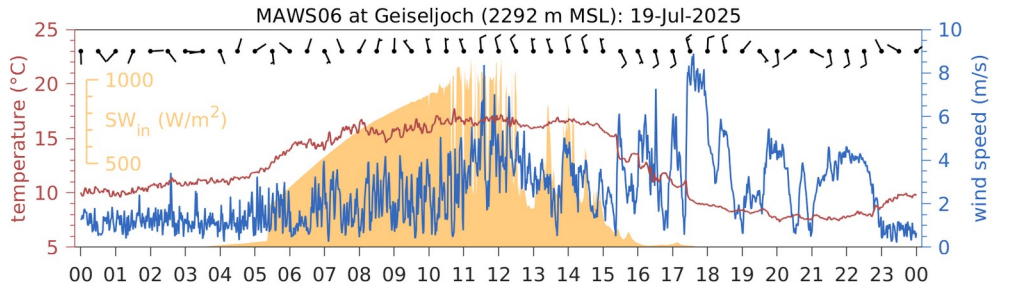
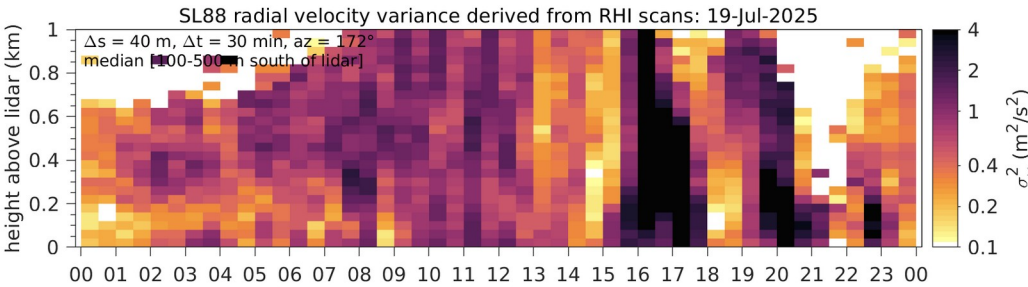
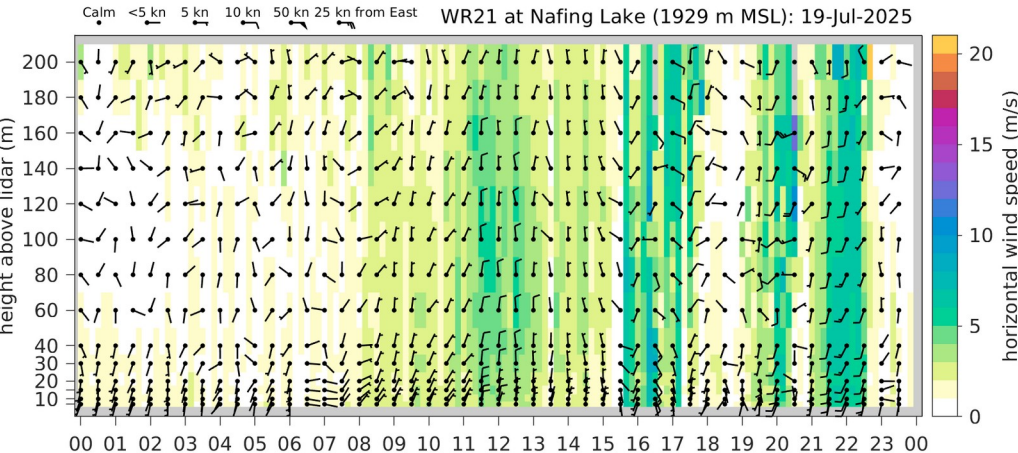
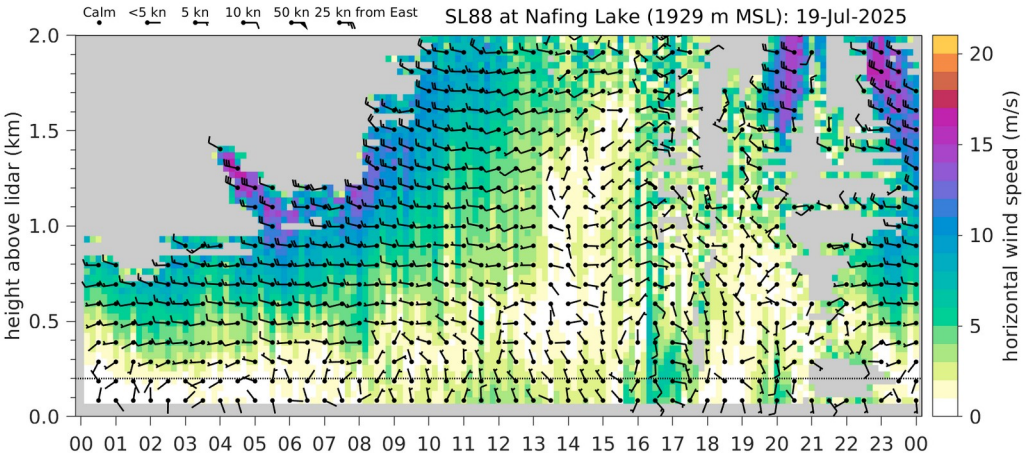


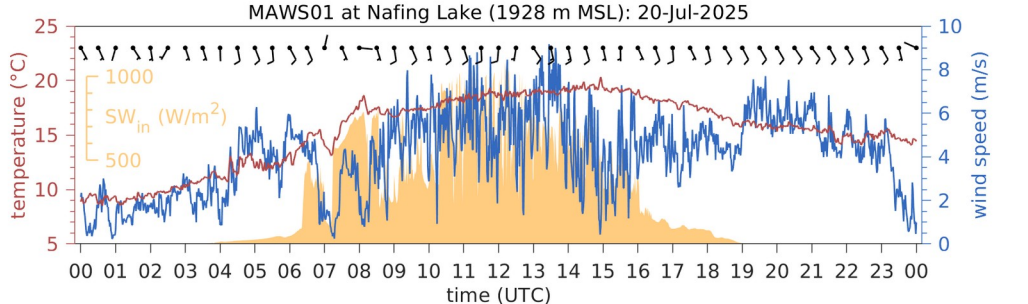
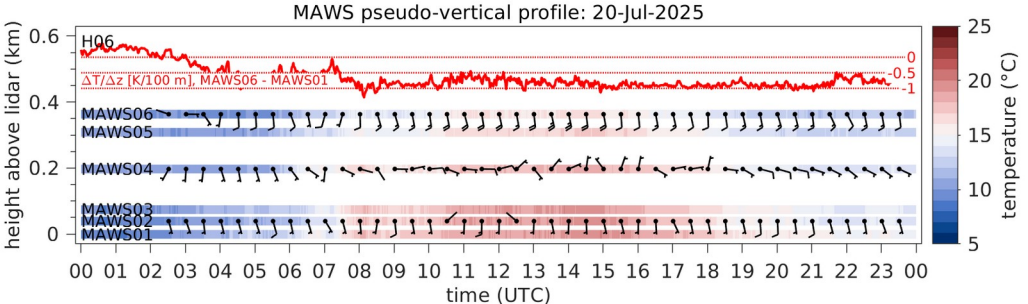
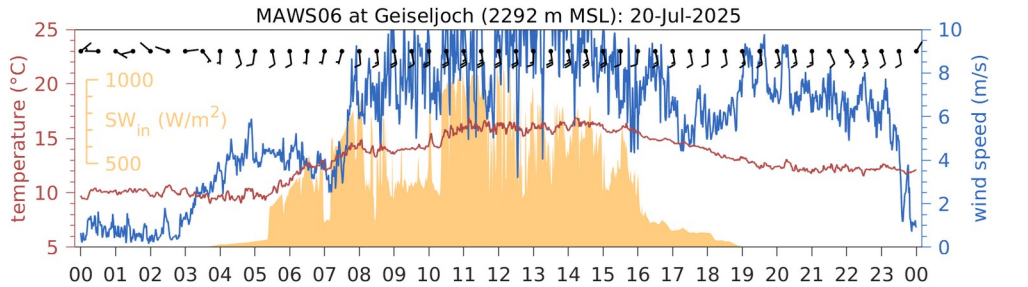
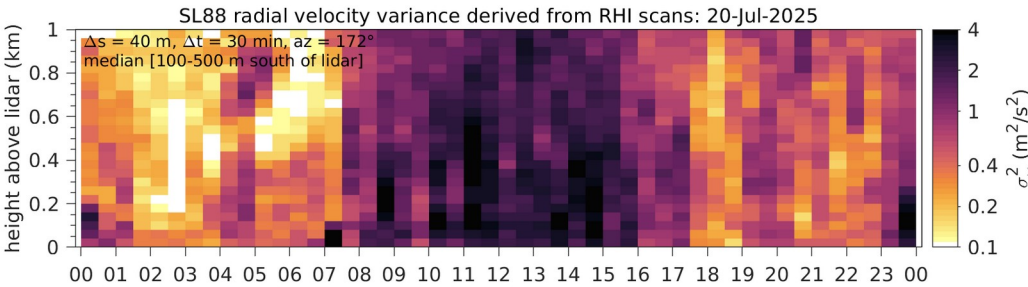
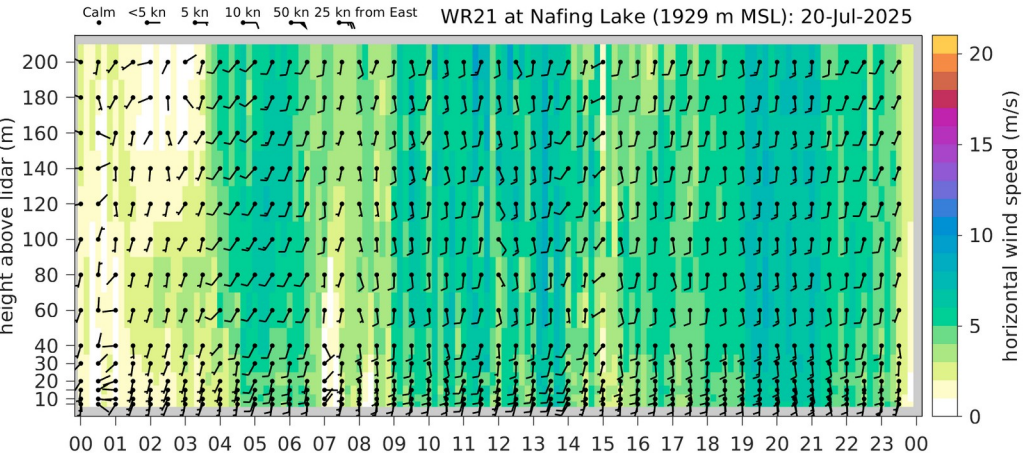
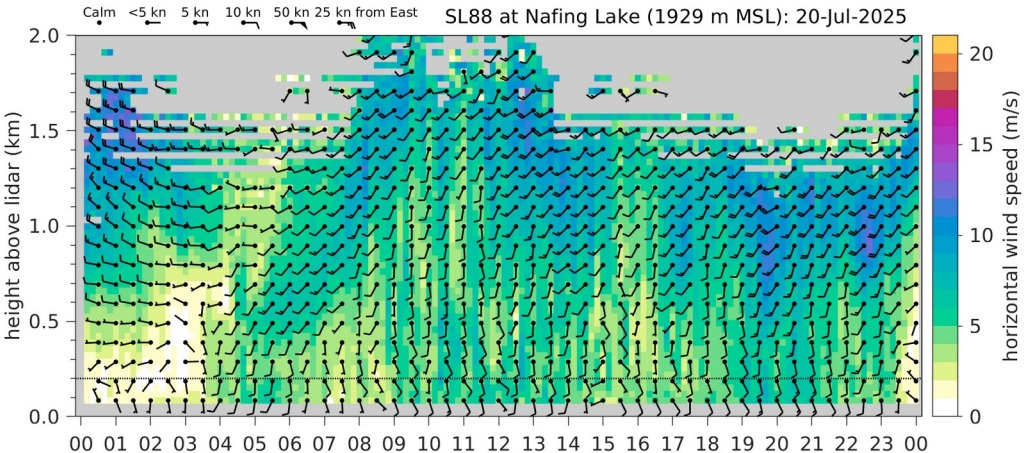


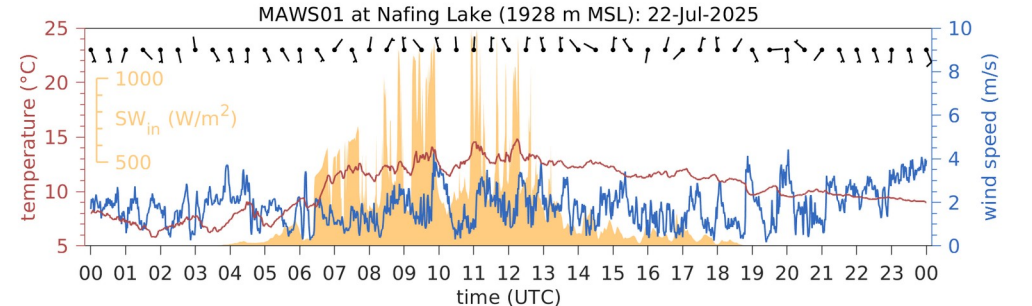
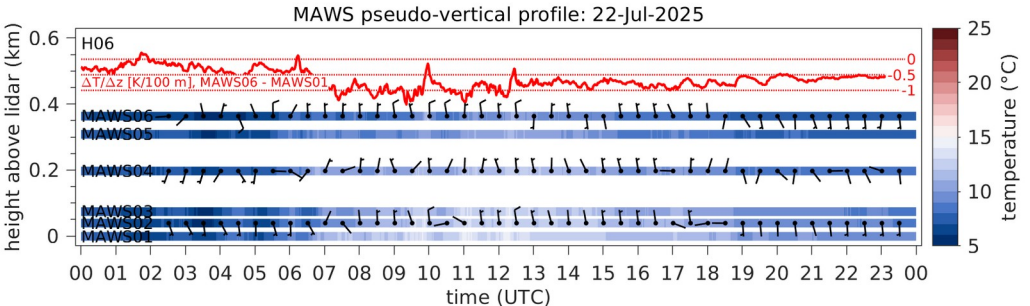
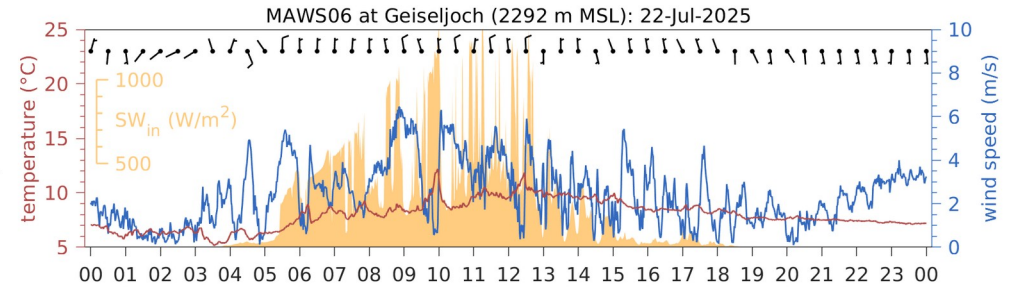
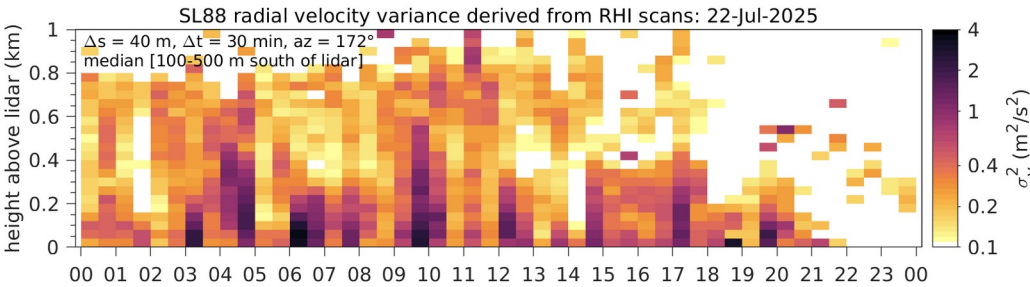
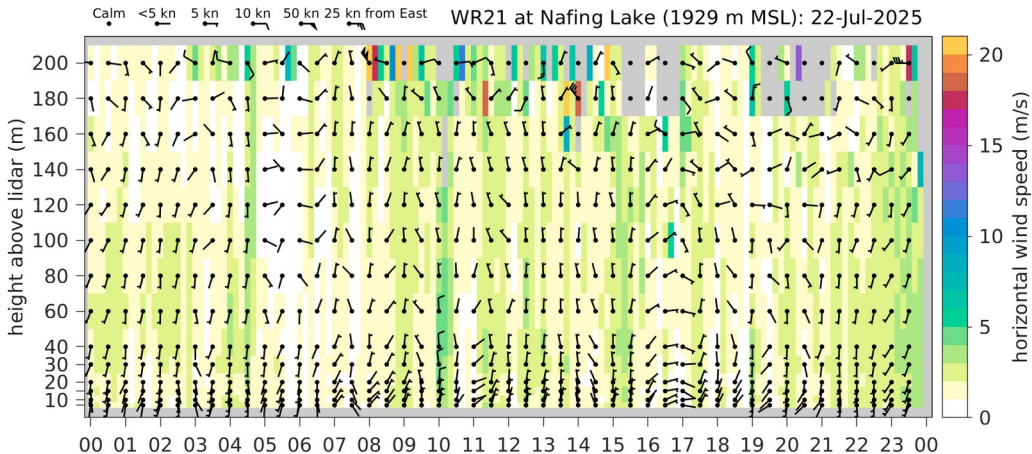
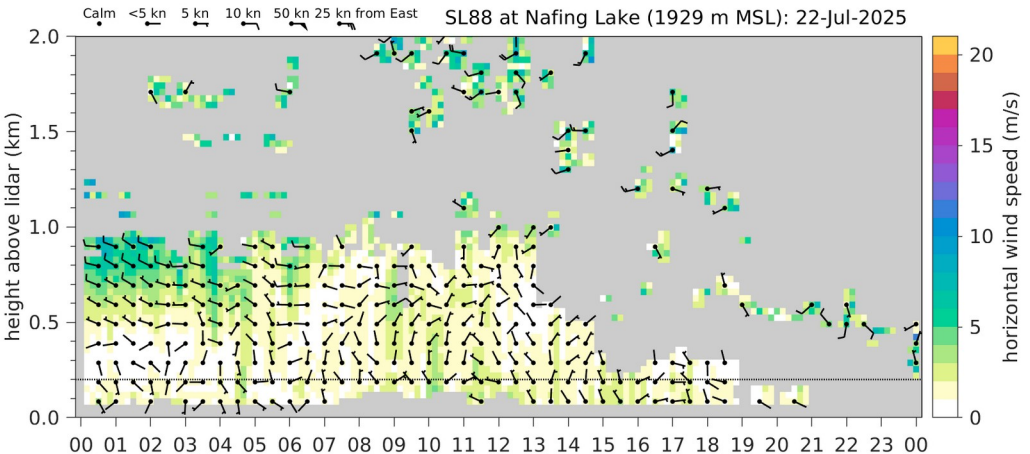


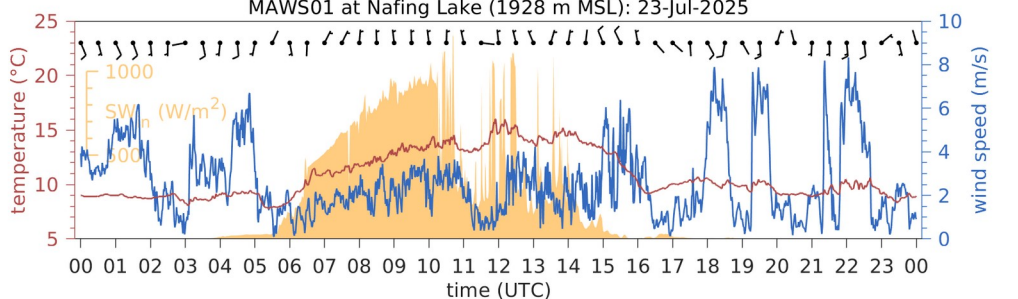
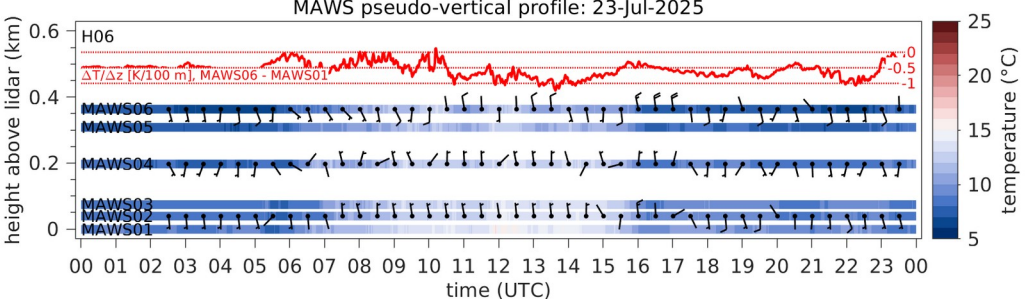
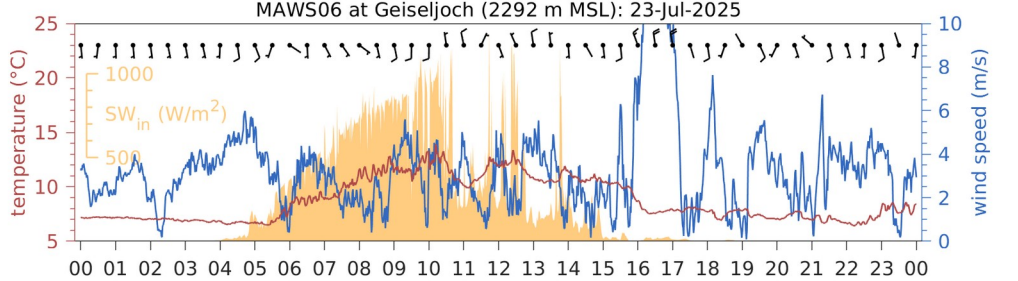
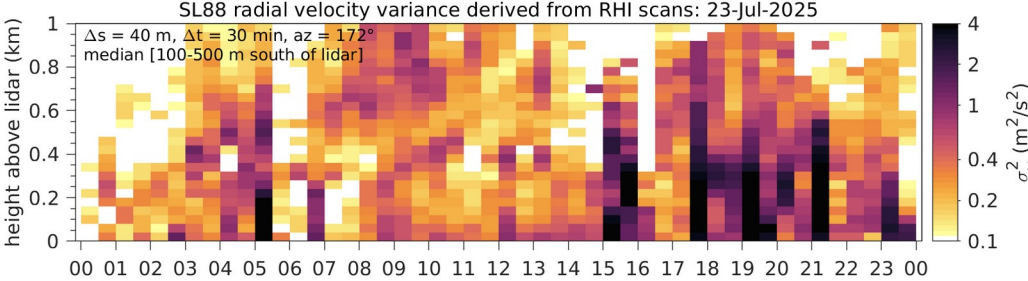
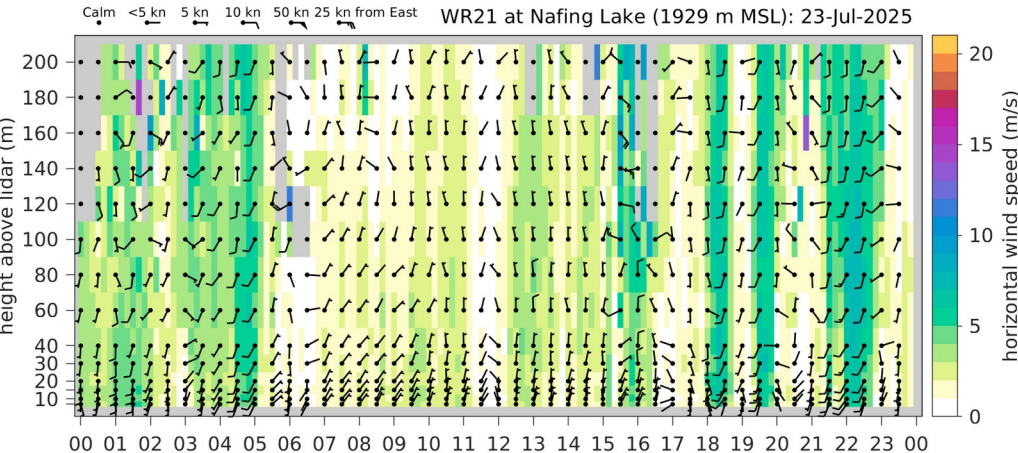
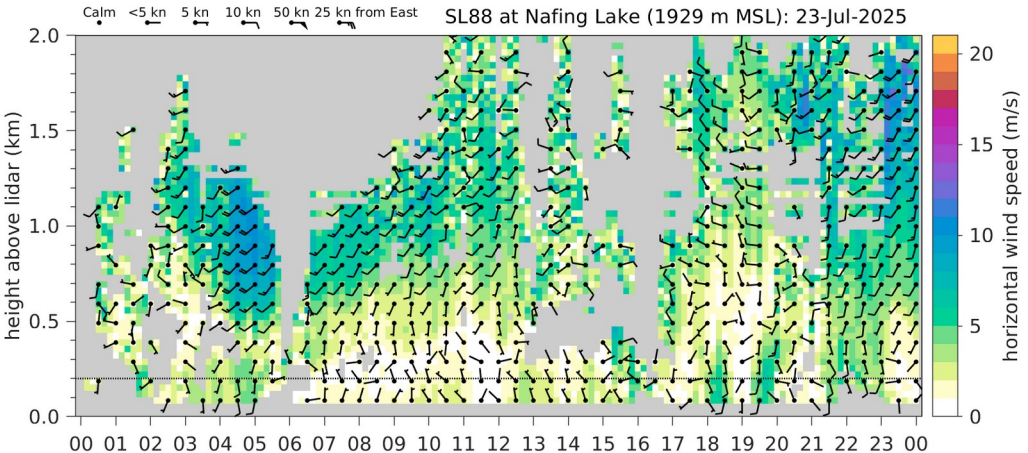












# Conclusions

- ▶ Processes and flow regimes identified at Nafingalm (13 TEAMx IOPs):
  - ▶ **Unperturbed valley winds**: 1 case (IOP 07)
  - ▶ Valley winds **perturbed by large-scale flow**: 5 cases (IOP 11, 13, 16, 18, 19)
  - ▶ Afternoon **moist convection**: 6 cases (IOP 10, 11, 13, 15, 19, 22)
  - ▶ Persistent or transient **south foehn**: 4 cases (IOP 10, 15, 20, 22)
  - ▶ Upvalley flow **driven by large-scale northerlies**: 2 cases (IOP 12a, 12b)
- ▶ Key findings:
  - ▶ **Unperturbed**, thermally driven valley winds are **rare** at Nafingalm
  - ▶ **Multiscale interactions** strongly impact the Mountain Boundary Layer (MoBL)
  - ▶ Detailed **future studies** are required to further investigate these processes

# Animation 1 for IOP18: 18 July 2025

