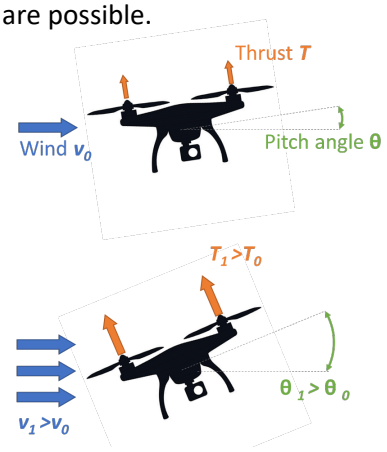
Master Thesis on Svalbard

Wind Estimation with Multirotor UAVs

Description	Unmanned aerial vehicles (UAVs) can be used to estimate wind speed and wind direction. This is relevant in the field of meteorology for studying the lower atmospheric boundary layer. Multirotor drones can be used to measure vertical profiles of wind speed and direction instead of conventional weather balloons. This allows for example to take wind measurements in areas that are difficult to access such as crevassed glacier fronts. This study investigates an indirect method to estimate wind. Attitude (roll, pitch, yaw) and heading data are correlated to experimental anemometer measurements. This information can be used to build a model for wind speed and direction estimation. The goal of this study is to mature an existing method for wind estimation on DJI Phantom and Mavic drones, previously developed at UNIS. In addition, the method will be expanded with an existing approach of estimating sensible heat fluxes from drone profiles data. The work will include fieldwork in Adventdalen. Additional fieldwork options are possible.  Fig. 1: Met mast measurements on Svalbard  Fig. 2: Effect of wind on aircraft.
Tasks	▪ Literature review on the topic of wind estimation with UAVs. ▪ Adapt & improve the existing method for wind estimation. ▪ Generate additional validation data for the existing method. ▪ Implement estimation of sensible heat fluxes. ▪ Conduct meteorological observations in Adventdalen. ▪ Critically discuss the results
Requirements	▪ Basic interest in meteorology and atmospheric research. ▪ Hands-on experience with drone flying is an advantage. ▪ Independent and reliable work style with a detail-oriented mindset.
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