

Transport of pollutants from cow feedlots in eastern Colorado into Rocky Mountain alpine lakes

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Abstract. Concentrated Animal Feeding Operations (CAFOs), also called factory farms, are known for raising tens of millions head of livestock including cows (beef and dairy), swine, and poultry. With as many as 250 head of cattle per acre, a United States Department of Agriculture's (USDA) Agricultural Research Service (ARS) report showed beef cattle from CAFOs in the United States produce as much as 24.1 million tons of manure annually. Gases released from cow manure include methane (CH_4), nitrous oxide (N_2O), hydrogen sulfide (H_2S), and ammonia (NH_3). During boreal summers Colorado experiences fewer synoptic weather systems, allowing the diurnal cycle to exert greater control of meteorological events along the mountain-plains interface. Anabatic, or upslope winds induced by the diurnal cycle, contribute largely to the transport of gases and particulates from feedlots in eastern Colorado into the Rocky Mountains during the day, presenting a potential harm to natural alpine ecosystems. This study focuses on locating the source of transport of gases from feedlots along the eastern Front Range of Colorado into alpine lakes of the Rocky Mountains. Source regions are approximated using backward time simulation of a Lagrangian transport model.