GC31B-0475 Climate and vegetation productivity and their impacts on livestock mortality in Mongolia: “zhud” disaster mechanisms revisited

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Zhud is a term referring either to conditions when melting snow refreezes to form an icy layer covering the grass, or to unusually heavy snow falls in Eurasian arid and semi-arid regions. Under zhud condition, animals cannot obtain food under snow or ice layer, which sometimes results in zhud disaster, i.e. massive livestock kills. It has been recognized that the zhud disaster is directly induced by the harsh winter conditions but often influenced by drought in the previous summer. In this study, data-intensive reanalysis on regional determinants of zhud disaster was conducted for more than 300 soums (an administrative unit equivalent with county in US) in Mongolia. Various climatic, hydrological, and vegetation variables were developed from satellite remote sensing (RS) data, which includes daily mean air temperature, dew temperature, and evapotranspiration, monthly precipitation, and 16-day NDVI from 2003 to 2010. Annual livestock census data were collected for every soums in Mongolia. Each variable was standardized to z-score and utilized for stepwise multiple regression analysis to identify factors statistically significant for explaining soum-level livestock mortality. The regression models were successfully constructed for two-third of total soums. Considerable spatial variability in the determinants of livestock mortality was found across soums in Mongolia. As the primary determinants, summer NDVI and dryness equally explained 22% of the soum mortality, while 33% and 16% of the mortality were explained with winter temperature and precipitation, respectively. In spatial patterns, winter precipitation and temperature were primary determinants in mountain regions and northern cool and semi-arid regions, while summer NDVI and dryness were important in southern hot and arid regions. Our results indicate combined efforts of monitoring RS-based summer NDVI and dryness and forecasting winter temperature and precipitation can provide useful tools for zhud disaster early warning.

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