

# 地形云 ( orographic cloud )



地形云 ( orographic cloud ) 是指潮湿空气经地形抬升至饱和而形成的山地云。气象出版社2012年出版的《英汉汉英大气科学词汇 ( 第二版 ) 》收录了该词条并翻译为地形云。

由上坡风形成的云通常为层状云, 由山地上升气流引起的多为荚状或波状云, 而由热力作用, 例如热源抬升或背风面辐和效应, 形成的则多为积云。上坡和波状云的形状和大小由地形对气流的干扰作用决定。因为此类云与地形地貌紧密相关, 所以它们一般都是驻云, 即便位于同一高度的风力可能非常强。地形上坡云包括层状云、盃云及焚风墙。对流地形云与地形地貌也密切相关。班塔 ( 1990年 ) 发现, 地形与大尺度风及日加热循环的相互作用引发山地气流, 而山地气流在决定对流单体的形成地点和降水的空间分布方面发挥着重要的作用……山地气流不仅控制着暴风雨发生的地点, 而且还控制着其发生时间。

以地形云为关键词在百度中的搜索结果超过了35万条, 其中最令大家耳熟能详的是珠穆朗玛峰的旗云。其实旗云不仅仅是珠峰独有的奇观, 根据世界气象组织国际云图集 ( <https://cloudatlas.wmo.int/zh-hans/orographic-influences-on-the-windward-side.html> ) , 有强风时, 可看到在峰顶附近形成的地形云在背风坡飘离山地。这是旗云, 不可与从山顶或峰顶吹落的雪相混淆。旗云可见于诸多世界著名山峰的山顶, 例如横跨中国和尼泊尔边界的珠穆朗玛峰、中国和巴基斯坦边界的乔戈里峰、瑞士的马特洪峰、德国的楚格峰等。而山顶的稳定气流和低水汽条件则更易形成贡嘎山上的帽状云。

以 orographic cloud 为主题词在 Web of Science 平台的 web of science core collection 数据库中检索可得到 108 条结果, 主要集中在大气科学 ( 87 篇 ) 和环境科学 ( 26 篇 ) 这两大领域。表 1 按照引用次数, 列出被引 75 次以上的 4 篇相关论文信息。

与“地形云”相关的衍生词汇和短语包括:

- orographic depression 地形低压
- orographic lifting 地形抬升
- orographic precipitation 地形降水
- orographic stationary front 地形静止锋
- orographic storm 地形风暴

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词汇

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表1 被引75次以上的orographic cloud主题相关论文

排名	题目	第一作者	来源	被引次数
1	Sensitivity of orographic precipitation to changing ambient conditions and terrain geometries: an idealized modeling perspective	Colle, BA	Journal of the Atmospheric Sciences, 2004, 61(5): 588-606	149
2	Global warming, regional trends and inshore environmental conditions influence coral bleaching in Hawaii	Jokiel, PL	Global Change Biology, 2004, 10(10): 1627-1641	134
3	Factors governing cellular convection in orographic precipitatio	Kirshbaum, DJ	Journal of the Atmospheric Sciences, 2004, 61(6): 682-698	86
4	Impact of land use on Costa Rican tropical montane cloud forests: sensitivity of orographic cloud formation to deforestation in the plains	Ray, DK	Journal of Geophysical Research-Atmospheres, 2006, 111(D2): D02108	78

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189 Ding Sheng, Zhu Yong, Li Gang, Zhang Maosong/ Quantitative Evaluation of Benefits of Special Implementation of Meteorological Services for Agriculture, Rural Areas and Farmers: Take Yuanjiang County in Yunnan Province as An Example

## History

191 Jia Pengqun, Wu Xinrui, Ma Jie/ A Century of People's Meteorological Service in China

199 Ye Mengshu, Sun Nan, Liu Huaiyu/ On the Independent Development of Meteorology in China in Recent 100 Years

## Reading

203 Wang Fu, Lu Qifeng, Ni Zhuoya/ The Important Plan of CGMS in Coordinating the Building of Meteorological Satellite Systems

207 Guan Min, Zhang Jiashen, Yao Yi Xin/ The Review of 2020 FENGYUN Satellite User Conference