



Istituto sull'Inquinamento Atmosferico
Consiglio Nazionale delle Ricerche

Allegato 1: set di domande fornite in busta chiusa

SET DOMANDE A

Domanda 1: il candidato presenti una applicazione presente nel proprio curriculum inerente allo studio della criosfera da remoto

Domanda 2 (tema del bando): Il candidato descriva le strategie per colmare i gap presenti nell'impiego dei dati remoti di tipo ottico, riferendosi alla criosfera.

Domanda 3- in che maniera, secondo il candidato, la ricerca scientifica può contribuire ad un rafforzamento dei percorsi di cooperazione allo sviluppo ed al successo dei progetti?

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Article

Detection of Winter Heat Wave Impact on Surface Runoff in a Periglacial Environment (Ny-Ålesund, Svalbard)

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Abstract: The occurrence of extreme warm events in the Arctic has been increasing in recent years in terms of their frequency and intensity. The assessment of the impact of these episodes on the snow season requires further observation capabilities, where spatial and temporal resolutions are key constraints. This study targeted the snow season of 2022 when a winter rain-on-snow event occurred at Ny-Ålesund in mid-March. The selected methodology was based on a multi-scale and multi-platform approach, combining ground-based observations with satellite remote sensing. The ground-based observation portfolio included meteorological measurements, nivological information, and the optical description of the surface in terms of spectral reflectance and snow-cover extent. The satellite data were obtained by the Sentinel-2 platforms, which provided ten multi-spectral acquisitions from March to July. The proposed strategy supported the impact assessment of heat waves in a periglacial environment, describing the relation and the timing between rain-on-snow events and the surface water drainage system. The integration between a wide range of spectral, time, and spatial resolutions enhanced the capacity to monitor the evolution of the surface water drainage system, detecting two water discharge pulsations, different in terms of duration and effects. This preliminary study aims to improve the description of the snow dynamics during those extreme events and to assess the impact of the produced break during the snow accumulation period.

Keywords: snow cover; rain on snow; snow melting; surface water runoff

1. Introduction

During the past decades, the Arctic region has been undergoing a significant transformation [1,2] associated with the onset of a climatic phenomenon defined as Arctic Amplification [3]. The overall increase in regional temperatures is a framework that includes extreme events, characterized by persistent warm and moist air masses occurring during the summer and, recently, also during the winter season. The broader term used for these anomalous periods is ‘warm spell’, even if the most extreme events are sometimes differentiated as heat waves (HWs) [4]. These terms share the definition based on prolonged periods of unusually elevated temperatures, where a large variety of metrics are focused on the assessment of their severity [5]. HWs are often associated with rainfall