

## Declaration of CryoClim product compliance with the GCOS climate monitoring principles

### for the GAO and GLO products provided by NVE

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The Global Climate Observing System (GCOS) provides recommendations for satellite-based observations of the climate in support of the United Nations Framework Convention on Climate Change (UNFCCC) (see GCOS report no. 107, Systematic observation requirements for satellite-based products for climate). The ten basic principles were adopted by the Conference of the Parties (COP) to UNFCCC through decision 5/CP.5 at COP-5 in November 1999. The complete set of 20 principles was adopted by COP through decision 11/CP.9 at COP-9 in December 2003.

The CryoClim service aims at adhering to the climate monitoring principles as far as practical feasible. To assist the provision of information to users about the current level of adherence to the principles for each product type, this compliance declaration is provided and updated following algorithm updates and other changes affecting the product content and quality.

GCOS' principles no. 11–20 are specific to satellite-based systems for climate monitoring. The principles are provided below together with statements on CryoClim product adherence:

*11. Constant sampling within the diurnal cycle (minimizing the effects of orbital decay and orbit drift) should be maintained.*

Not applicable (product sampling is several years).

*12. A suitable period of overlap for new and old satellite systems should be ensured for a period adequate to determine inter-satellite biases and maintain the homogeneity and consistency of time-series observations.*

Landsat 4 and 5 TM and Landsat 7 ETM+ used for the GAO and GLO products do overlap.

*13. Continuity of satellite measurements (i.e. elimination of gaps in the long-term record) through appropriate launch and orbital strategies should be ensured.*

Landsat-TM type data has been available since 1984. The mapping is not sensitive to small data gaps as long as new mapping can be carried out in about 5-10 years intervals.

*14. Rigorous pre-launch instrument characterization and calibration, including radiance confirmation against an international radiance scale provided by a national metrology institute, should be ensured.*

This is carried out for the sensors used (Landsat TM, ETM+) and in the future for Landsat-8 OLI and Sentinel-2 MSI.

*15. On-board calibration adequate for climate system observations should be ensured and associated instrument characteristics monitored.*

This has been done for Landsat TM and ETM+ and is/will be done for Landsat-8 OLI and Sentinel-2 MSI sensors.

*16. Operational production of priority climate products should be sustained and peer reviewed new products should be introduced as appropriate.*

The CryoClim Norway Mainland sub-service is operated operationally by NVE with sustained funding. This includes R&D leading to new and improved products as new algorithms and sensors become available.

*17. Data systems needed to facilitate user access to climate products, metadata and raw data, including key data for delayed-mode analysis, should be established and maintained.*

Access to metadata and climate products is ensured through the operational CryoClim web portal and web service supported by an operational backend system.

*18. Use of functioning baseline instruments that meet the calibration and stability requirements stated above should be maintained for as long as possible, even when these exist on de-commissioned satellites.*

Currently not applicable

*19. Complementary in situ baseline observations for satellite measurements should be maintained through appropriate activities and cooperation.*

NVE carries out regular in situ measurements of a set of glaciers. This has been carried out by NVE since 1962 and will continue.

*20. Random errors and time-dependent biases in satellite observations and derived products should be identified.*

The mapping approach includes manual interaction and control ensuring that random errors and biases are at a minimum.