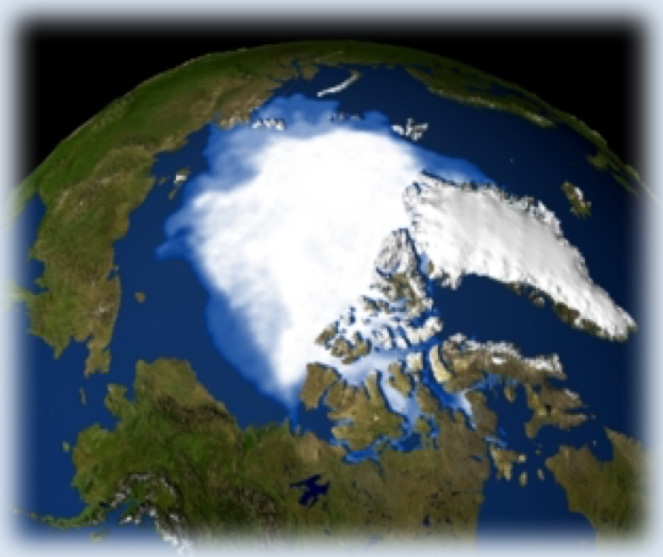
World Meteorological Organization
Global Cryosphere Watch

Observing the Cryosphere

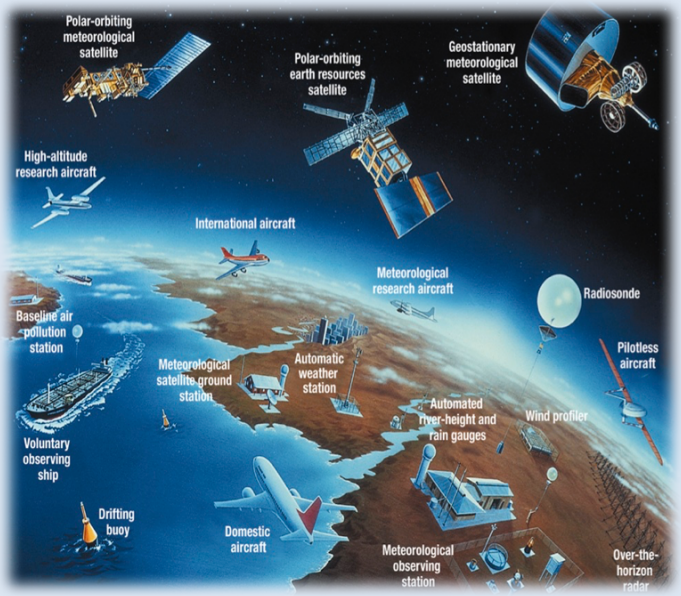
A comprehensive cryosphere observing system must be a combination of ground-based instrumentation, satellite remote sensing, aircraft measurements, modeling, and data management.

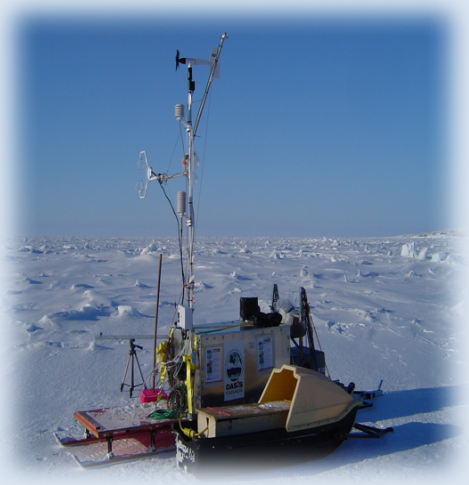
Conditions in areas where the cryosphere exists are harsh, and in situ observations there are difficult and expensive. Satellite monitoring overcomes some of the logistical obstacles, but satellites are costly and do not yet fully address the range of geophysical variables needed to understand the cryosphere.



Surface and airborne observations provide data that cannot be measured from space, more detailed information in critical areas, and observations with which to validate satellite retrievals.

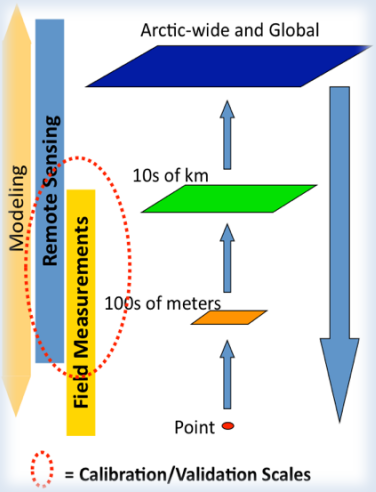
The complex system of satellites is essential for delivering sustained, consistent observations of the global cryosphere and are a key to extending local in situ measurements. No one all-encompassing sensor exists; rather, the combination and synthesis of data from different yet complementary sensors is essential, and underlines the critical importance of maintaining key synergetic elements of the system.





Similarly, surface-based measurements take many forms. Some are operational with semi-permanent infrastructure; others may be mobile and cover a short time span.

Together, in situ, satellite, and aircraft measurements cover all scales of observation, providing the data needed for small-scale process studies and global climate prediction.



As robust as the cryosphere observing system is, many surface observation networks have been reduced and some decommissioned. Monitoring efforts are in need of sustained funding. Space-based capabilities for some snow/ice properties are very limited. *There needs to be a concerted effort to improve and expand systematic, comprehensive, ground-based monitoring, and to support the development of remote sensing methods.*

For more information visit globalcryospherewatch.org.

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