# GRENE 北極圏プロジェクト陸域モデルグループの活動と目標

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# GOALS AND ACTIVITIES OF THE TERRESTRIAL MODELING GROUP OF "GRENE ARCTIC CLIMATE CHANGE RESEARCH PROJECT"

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The goals of the modeling group in the terrestrial research project of the GRENE Arctic Climate Change Research Project (GRENE-TEA) are to a) feed the possible improvement of the physical and ecological processes for the Arctic terrestrial modeling (excl. glaciers and ice sheets) in the extant terrestrial schemes in the coupled global climate models (CGCMs) to the CGCM research project, and b) lay the foundations of the future-generation Arctic terrestrial model development. To achieve these goals we have been attempting to 1) deepen the feasibility of mutual collaborations and comparisons between the participating models, and 2) enhance communications with the in-situ and remote-sensing observationists to transform the collections of observable data and information more effectual for calibration, validation, improvement and development of the conceptual and numerical models.
We will report our activities, especially the making and the resultant "brochures" of the participating models which provide the scope, targets, specifics and capability of each model to serve as mutual references among models, and as resources for communications with other researchers (e.g., observationists, data managers), staffs and the public.

Table 1. Summary of the participating models.

| | | |
|---|---|---|
| **Name and type of the participating models** | | VISIT: Material cycle model<br>MATSIRO: Land process model<br>[STEM: terrestrial ecosystem model + Stratified SOC-LSM: carbon-land surface model]<br>WRF: Regional Climate model<br>[MATSIRO + MATSIRO-Sim-CYCLE: dynamic vegetation model]<br>SNOWPACK: 1-D physical snow model<br>2LM: Land process model<br>CHANGE: Land process model<br>HAL: Land process model<br>SEIB-DGVM: dynamic ecosysytem model<br>SMAP: snow model |
| **Couple-able to GCM/RCM?** | | Yes (70%), No (30%) |
| Targeted spatial scale | | Site- to landscape (60%), Basin (40%), Regional to hemispheric (60%), Gglobal (70%), Other (10%) |
| **Targeted processes in:** | Snow | Seasonal snow (100%), Glacier/ice sheet/permanent snow (50%) |
| | Land-Atmosphere Exchange | Heat fluxes (100%), Water fluxes (100%), Fluxes of materials (60%), Other (20%) |
| | Subsurface physical processes | Hydrological-thermal processes (100%), Physical property (44%), Permafrost dynamics, Freeze/thaw (100%), Other (0%) |
| | Hydrology | Limnology or surface water body and flow (100%), subsurface hydrology, aquifer (25%), River channels, riverine heat and material transport (38%), Other (0%) |
| | Vegetation, ecosystem | Static vegetation (56%), Dynamic vegetation (56%), Ecology above the surface (44%), Ecology below the surface (44%), Carbon processes (56%), Nitrogen processes (22%), Other (33%) |

Table 1. (continued)

| | | |
|---|---|---|
| Preferred platform of the observations to utilize in the model-observation collaboration | | Field observation (100%), Air-borne remote sensing (30%), Satellite remote sensing (80%), Data assimilation (40%), Other (10%) |
| **Expects from the observation side*** | Forcing data/input data | 1 (40%), 2 (40%), 3 (10%), 4 (10%), 5 (0%) |
| | Validation data | 1 (60%), 2 (30%), 3 (0%), 4 (0%), 5 (10%) |
| | Boundary data | 1 (10%), 2 (30%), 3 (30%), 4 (10%), 5 (10%) |
| | Parameter values | 1 (40%), 2 (10%), 3 (50%), 4 (0%), 5 (0%) |
| | Knowledge/idea to improve the model | 1 (40%), 2 (30%), 3 (0%), 4 (30%), 5 (0%) |
| | Suggestions for new schemes/processes | 1 (40%), 2 (30%), 3 (0%), 4 (30%), 5 (0%) |
| **Willing to provide to the observation side*** | New/additional observational variables | 1 (20%), 2 (30%), 3 (40%), 4 (10%), 5 (0%) |
| | New/additional observational sites/regions | 1 (10%), 2 (30%), 3 (40%), 4 (10%), 5 (10%) |
| | Process analysis/clarification based on the observations | 1 (60%), 2 (30%), 3 (0%), 4 (10%), 5 (0%) |
| | Model improvement/development to explain the observed data | 1 (40%), 2 (30%), 3 (20%), 4 (10%), 5 (0%) |
| | Downscaling | 1 (20%), 2 (10%), 3 (30%), 4 (20%), 5 (10%) |
| | Upscaling | 1 (20%), 2 (20%), 3 (30%), 4 (0%), 5 (0%) |

*: ’1’ being “the strongest,” and ‘5’ “the weakest.”