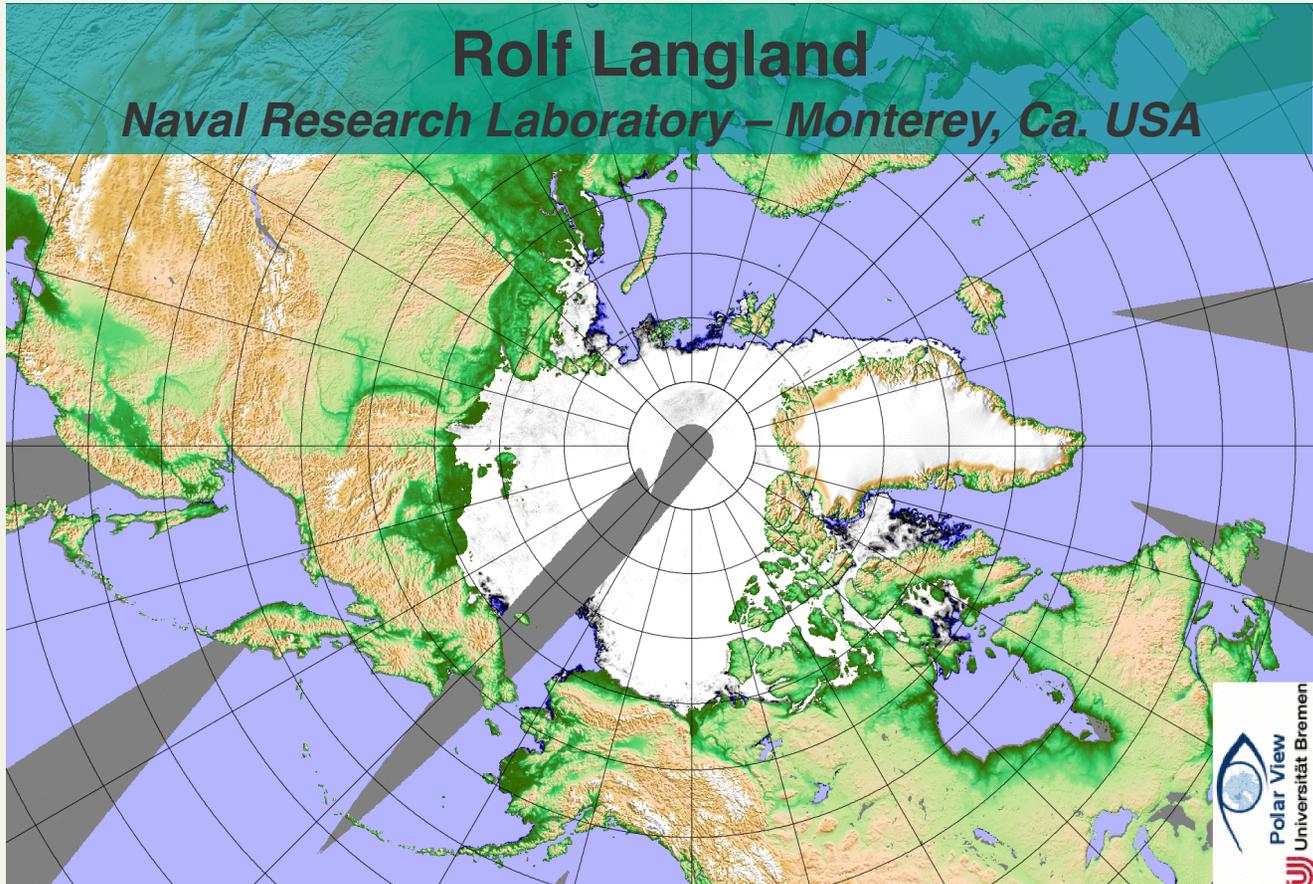


Towards an Optimal Mix of Observations for the Arctic

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ADI Workshop, Boulder, CO

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Observing System Objectives

- Support NWP (0 to 8 days)
- Short-range climate prediction
- Climate monitoring
- Provide observations to support forecasts by atmospheric, ice, and ocean models
- Want gridded analyses fields to cover the entire Arctic – not just observations at certain locations – this requires state-of-the-art (4d-variational) data assimilation techniques to properly incorporate and combine the many different types of satellite and in-situ observations provided by the global observing network.

Observing System Issues to Consider

- **Observation coverage (horizontal, vertical resolution)**
- **Surface and upper air observations**
- **Types of observations (T, wind, moisture, pressure, SST, ice)**
- **In-situ observations: more accurate compared to satellite observations, fewer in number, and less geographic coverage**
- **Satellite observations: more frequent in time, can provide complete global coverage – vertical resolution is less (represents layers, not exact heights or pressures). Greater problems with QC and bias correction.**
- **Analyses in regions where satellite observations provide the majority of data have greater uncertainty (poles, oceans, developing world nations) Ref: Langland et al (Tellus 2008, 598-603).**

Observing System Recommendations

- Increase the number of in-situ observations from commercial aircraft, radiosondes, surface stations
- Properly use the largest possible amounts of satellite observations – radiances, winds, moisture information
- Re-analyses should be performed using the best available data assimilation systems – forecast models and assimilation procedures that use QC, bias correction, and good estimates of observation and background error
- Understand that all atmospheric analyses are ESTIMATES of the true state, and contain varying amounts of error and uncertainty. There is no single “CORRECT” atmospheric or oceanic analysis – and we cannot exactly quantify the “error” in these analyses. **[If we did know the error in our analyses, we would be able to create “perfect” initial conditions for NWP!]**

Future Efforts

NRL-Monterey is interested in future collaborations on Arctic observing studies – including data assimilation and forecast experiments

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