THORPEX Legacy: YOTC Perspective

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The YOTC project recognizes and addresses the fact that major improvements are needed in how the tropics are represented in global models, and how the tropics interacts two-way with the extratropics. A basic issue is the organization of convection into systems displaying an underlying chaotic order and dynamical coherence. The international YOTC project, joint between WCRP and WWRP/THORPEX, is focused on meteorological phenomena and events that feature such properties: the MJO and convectively-coupled equatorial waves, monsoons, two-way tropical-extratropical interaction, easterly waves and tropical cyclones, and the diurnal cycle. However, convective parameterizations in climate models do not represent convective organization, and the resolution of these models is presently too coarse to explicitly permit that process. For the first time and for the practical reasons of advancing computational capabilities, multi-scale convective organization is a key weather-climate intersection issue, as operational global weather models and experimental climate models are more commonly being used/tested with ~10 km computational grids. It is duly acknowledged that WWRP/THORPEX, WCRP and the US THORPEX Executive Committee (USTEC) have provided valuable support for YOTC’s weather-climate intersection research and prediction efforts.

Against this backdrop we make the following comments on the THORPEX Legacy/follow-on:

- Option C is the preferred way forward. However, a 10-year Environmental Prediction Program would have a much greater likelihood of success were WCRP and WWRP to move forward in partnership. Research on timescales up to subseasonal (weeks) is well suited to the WWRP.

- The YOTC project fits comfortably into subseasonal-to-seasonal research and prediction, and has a natural place in a joint WWRP-WCRP follow-on program in those areas: likewise, the proposed polar project and the subseasonal project of the WWRP.

- Together, these three projects would enable the WWRP to improve the coordination and rationalization of its scientific objectives, including attention to the engagement of the emerging nations.

- A THORPEX follow-on program would benefit greatly from increased interactions between operational prediction, research institutions, and academia particularly in terms of realizing sufficient funding for crucial areas of research.
• Physical and dynamical processes should have a prominent place in any follow-on THORPEX program; this would enliven and foster dynamical meteorology research which does not get sufficient attention (note a similar comment by Julia Slingo).

• A follow-on THORPEX effort, that bridges weather and climate, should explore the next steps and applications of the “virtual global field program” paradigm that YOTC has championed.

• Another salient follow-on is research that addresses the large-scale effects of convective organization, including the parameterization of convective organization in climate models, where it is presently a missing process.