

# Numerical Weather Prediction

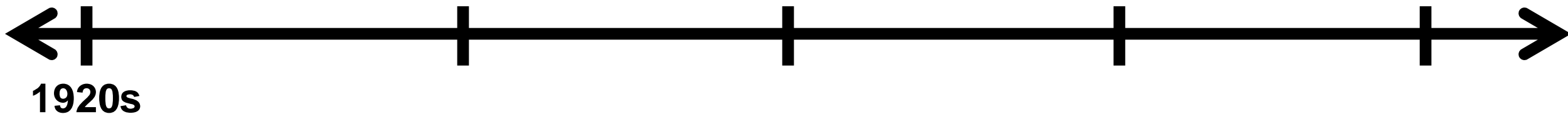
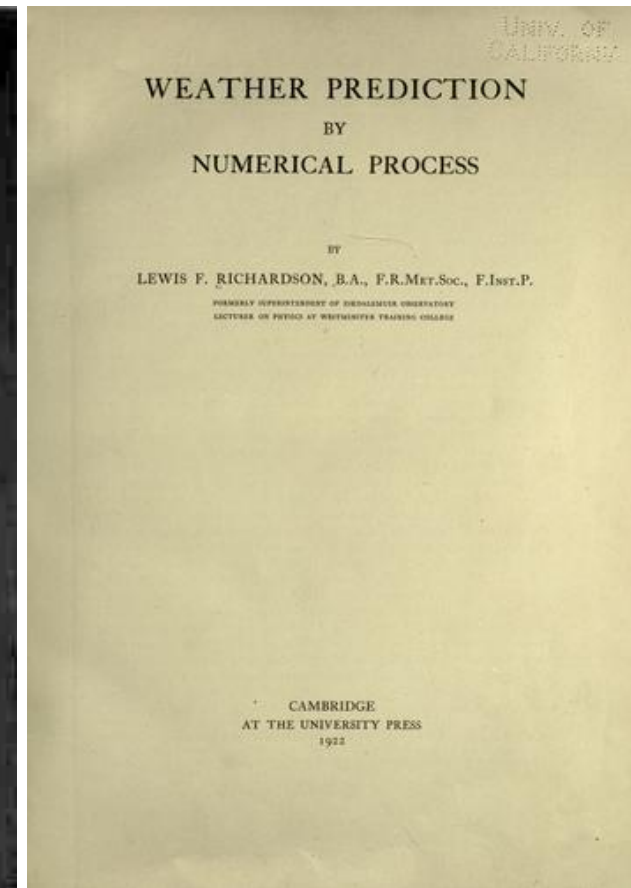
- “The integration of the governing equations of hydrodynamics by numerical methods subject to specified initial conditions” - AMS Glossary

“The one area in which our predictions are making extraordinary progress, however, is perhaps the most unlikely field... The holy grail of meteorology, scientists realized, was dynamic weather prediction — programs that simulate the physical systems that produce clouds and cold fronts.” Nate Silver - *The Signal and the Noise: Why So Many Predictions Fail — but Some Don't*

- NWP requires trade off between speed and accuracy. Forecast must be finished soon enough to be useful for prediction

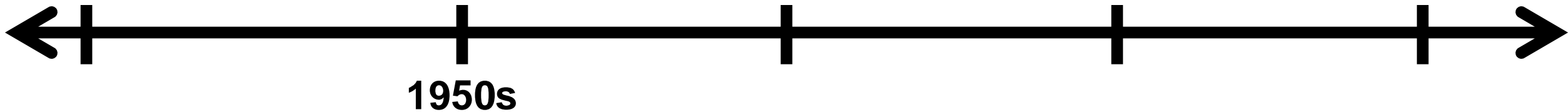
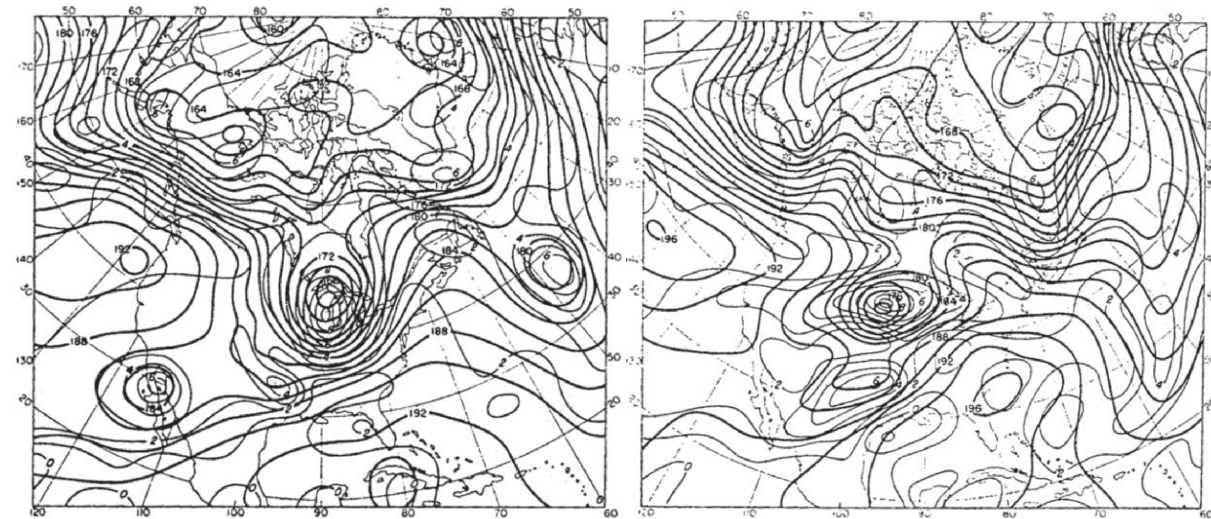
# History of NWP

- Lewis Richardson the first to propose numerical weather prediction based on equations of motion (1922)
- Proposed having room of people who are carrying out calculations and passing around results via a “conductor”
- Estimated it would take 60,000 people to carry out



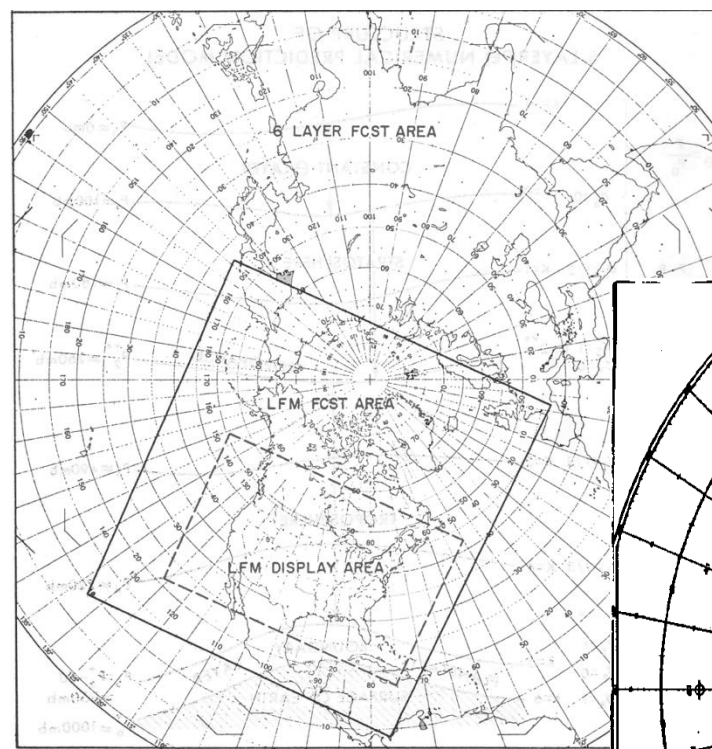
# History of NWP

- Fjortoft and vonNeuman: First forecast using one-layer model (1949)
- Charney: First full equation forecast on one level using ENIAC (1951)
- First operational NWP forecast in Sweden (BESK; 1954)
- Lorenz identifies chaotic properties of the atmosphere (1961)

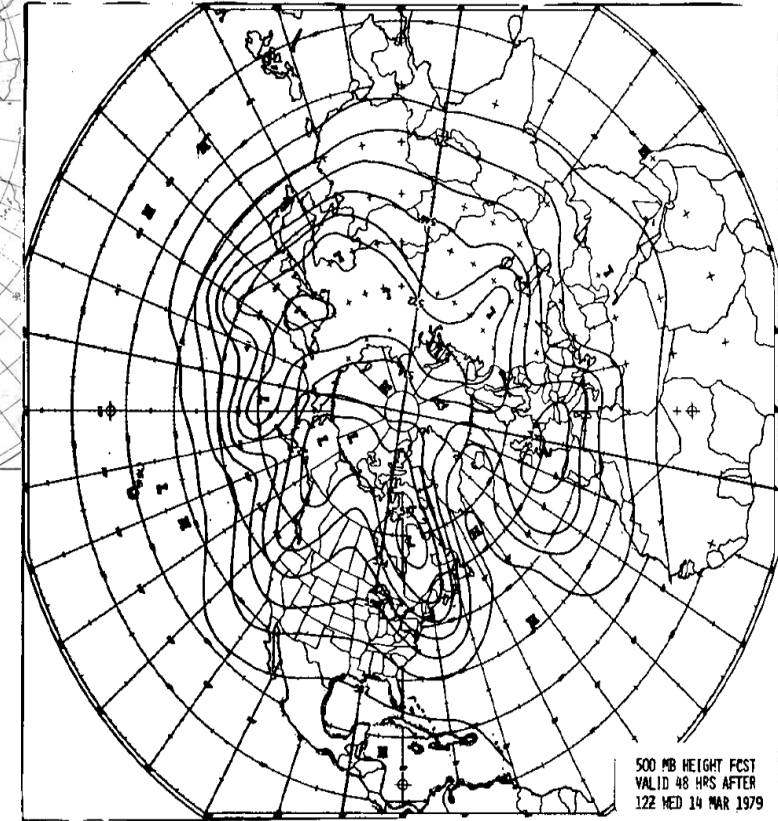


# History of NWP

- Limited-area model (LFM) 1971
  - 190 km resolution
  - 24 h forecast
  - 6-layer primitive equation model
- First global model in US (1980)
  - R30 (~250 km)
  - 48 h forecast
  - 12-layer full physics model



NOAA TPB-67



Sela 1980

